PC ADVISOR

BEST LAPTOP DEALS

33 Windows laptops reviewed inside

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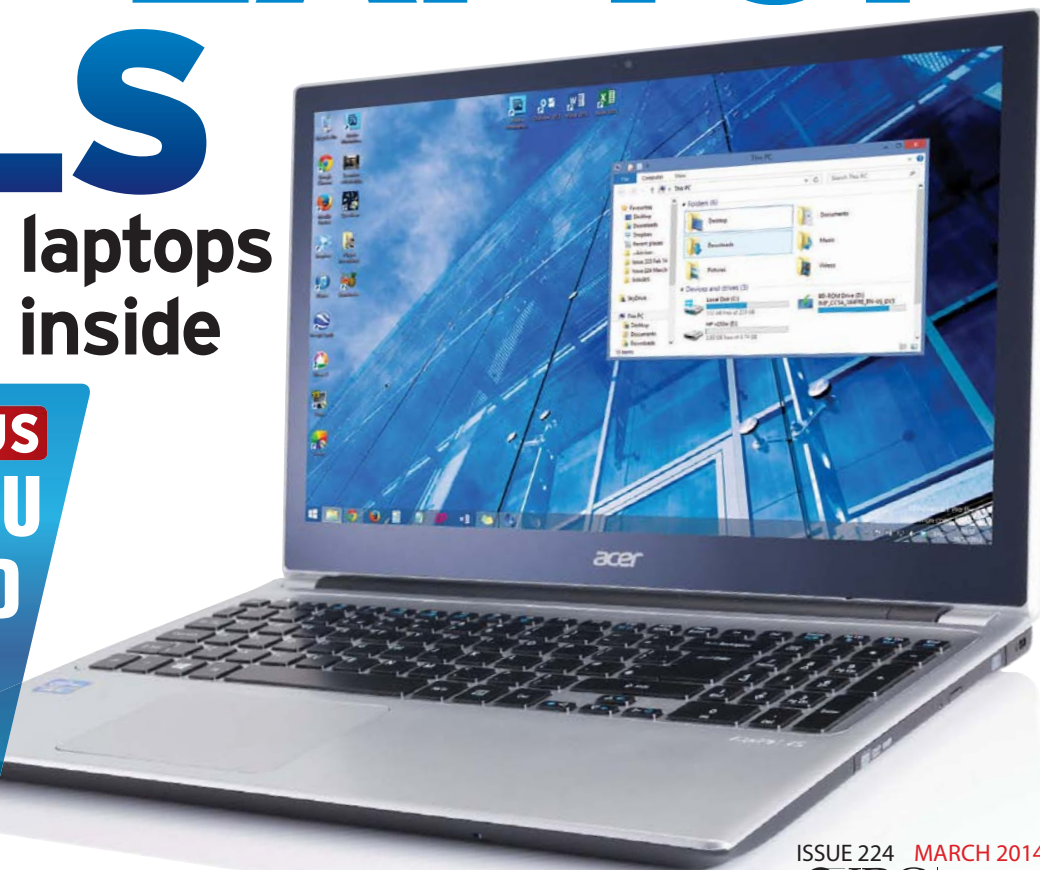
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JIM MARTIN

Free tech support

Our buying advice and reviews can provide all the tech support you and your family need

O ne of the disadvantages of being a PC expert is that your family, friends and even people you don't know expect free buying advice and tech support. By far the most frequently asked question I hear concerns what laptop they should buy, followed by a request to fix their PC/laptop/printer.

I don't mind offering buying advice, since I hate to see people wasting their hard-earned cash on tech kit that isn't up to scratch. Laptops, just like tablets, are personal devices. The right device for you isn't necessarily the best model for someone else, with size, weight, performance and battery life just four factors that you may or may not prioritise.

Armed with the 33 laptop reviews in this issue, including a group test of budget machines on page 66, you should be much better equipped to make a decision on what laptop you should buy.

'Budget', of course, is a relative term. Few laptops can compete with the ultra-low prices of Google Chromebooks, laptops that rather than Windows run Google's ChromeOS. For some people, they're the ideal budget choice at around £200.

We tried using only a Chromebook for a week to see what – if anything – we missed from Windows. You can see how we coped on page 85.

Many people are still running Windows XP and it's easy to understand why: it works well and does everything they need it to. But Microsoft is finally ceasing support for XP in April, with no security updates and patches released thereafter. So, if you don't want a vulnerable PC, it's time to upgrade your operating system.

But to what exactly? If you're keen to stick with the Windows platform, you have a choice of Windows 7 and 8 – and many people have been put off the latter by its unfamiliar tiled interface. We explain the pros and cons of each operating system on page 82.

And, in case you're not looking for a new laptop or wondering about upgrading from Windows XP, we've also got a host of other great features and reviews covering everything from sharing your files and printer across a home network to improving your computer's audio quality and fixing common PC problems. ⊠

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TEST CENTRE

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Reader comments

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Android vs iPhone

The LG G2 has the 'it' factor. It's difficult to explain, but this phone is sensational, innovative and downright smart in every way.

LG with its G2, Motorola its Moto X and Google with its Nexus 5. Hail to the new king: Google. Ding, dong, Apple is dead!

Apple had a good run, but the chances of a return to the glory days look very bleak when you have, in my opinion, a CEO with the creativity of a face cloth and a company with the drive of a car with no engine.

That's a good thing: not for Apple, of course, but for the consumer looking for 'wow'!

That said, I will always like my iPhone 4, which was designed back when Apple was innovative and hungry for success, not sitting on a pile of cash. **John**

letters@pcadvisor.co.uk

No subtitles

I have read several PC mags that tell you how to get free TV online, but they never mention the fact there are no subtitles on these sites. On Sky's service only about 10 percent of programmes have subtitles, and these are the most popular offerings. For some viewers subtitles are essential. *Robert Biglan*

Computers vs consoles

I'm an experienced PC- and console gamer, with an unbiased view toward both. However, consoles appear to be taking the lead.

While a PC requires a game to be installed, often via disc with a unique serial code that can be baffling for novice users, or downloaded from a specific account (such as Steam or Origin) via a flakey internet connection, with a console you just insert the disc. Consoles are also smaller, which makes them ideal for the living room and multiplayer situations.

Meanwhile, the PC's advantages over the console apply only to the hardcore gamer, offering such things as modification, and the best graphics and framerates.

With more casual than serious gamers, PC gaming's future looks bleak. *Steven Binks*

Windows 8 Reader

I read with interest the article in your February issue that explains how to PDF without Adobe Reader (read it online at tinyurl.com/nj9m5qc). I am always looking for ways to reduce the amount of storage space required by my data and applications.

I was pleased to learn I could ditch Reader, but even happier as another option became apparent. Windows 8 has its own Reader app. It is the first 'new' Windows app I have taken the time to try and have been pleasantly surprised by its functionality – perhaps I should try a few more! *Peter Walsh*

Flagged: Star letter

Digital copy of *PC Advisor*

Having just bought your magazine bundled with a bonus copy of *Macworld*, I thought it might be good if, rather than having to carry two magazines around to read, I could occasionally read them via my iPad mini. Why don't you include within the mag a code that allows the purchaser a free download of the edition they've just bought? As the magazine is sold in a plastic wrapper this code wouldn't be abused by those who haven't paid for a print copy. *Andrew Barnes*

Matt Egan, editor-in-chief, replies: It's a great idea, Andrew. We know because it's

an idea we have had ourselves! We suspect that plenty of our print readers would like to read on a tablet or PC. Unfortunately, as yet the practicalities have foxed us. It's very expensive to print a unique code in every issue, and it would have to be a unique code to stop less-than-honest types posting codes on the internet (the digital magazine is already pirated with disappointing regularity). And that's before we get in to the huge challenge of matching up our print subscriber database with the email addresses of digital subscribers. So far we haven't cracked it, but it's definitely something we'd like to do.

pcadvisor.co.uk/polls

Will Windows 8.1 persuade you to upgrade?

16%
Yes, I am going to upgrade from a previous version of Windows

8%
Yes, I am going to buy a new PC or laptop with Windows 8.1 preinstalled

66%
No, it hasn't changed my mind. I'll stick with what I've got

10%
Don't know
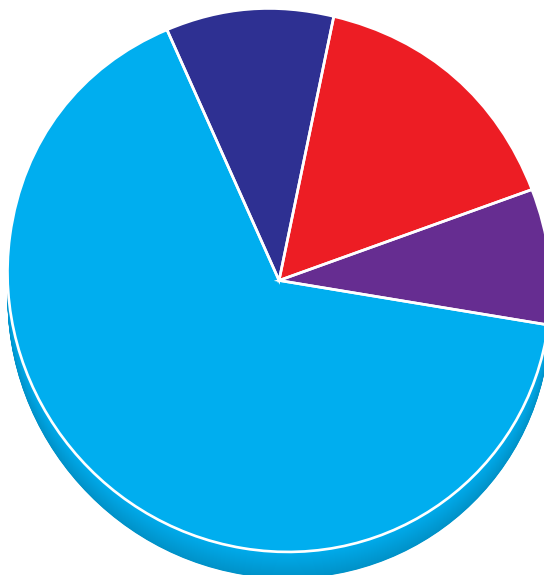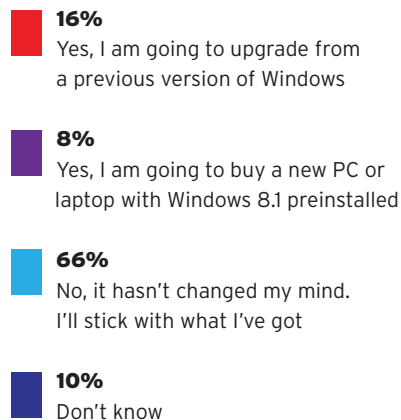
Based on 3,463 votes, tinyurl.com/o7wrj8v
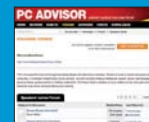
Embarrassing conversations

We've all said stupid things at times, and no doubt all know that feeling of wanting the ground to swallow you up. But, after the event, these little incidents are usually pretty funny, as our forum members found at tinyurl.com/o7ngdzf.

bumpkin A friend of mine told me his daughter was pregnant. I replied: "Does she know who the father is?" I meant to ask who is the father.

mbc A supervisor was late for a meeting. When he arrived he explained that his mother-in-law died in the night and he had been delayed by the undertakers. He then had a moan about the cost of the funeral. I, being sympathetic, said: "Yes, they make a killing out of these things."

Another time, my wife was working on a children's ward and filling in the admission forms for a child. She turned to the rough-looking parent and asked: "Are you the child's father?" She got a dirty look and the reply: "No, I'm his mother!"

flycatcher1 Some years ago my wife was trying to find items for a charity box. She telephoned the local toy shop and asked the young male assistant if he had small balls.

fourm member My wife trotted out the cliché "Still, it could be worse. You could get run over" in a group that included a young man who, five years before, had 'died' twice after being run over by a bus.

Blackhat Mrs B asked me to pick up a KFC meal. I approached the counter to be served by a young lady with a noticeable affliction on her lower lip. I placed my order thus: "Hi, could I please take out one two-piece chicken meal with bottled water and one large cold sore." I think I got away with it – I got a large coleslaw. ⊠

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Windows 8.1 upgrade warning

"I bought an HP PC five weeks ago. The machine developed a problem and on contacting tech support I was told that because I upgraded from Windows 8 to Windows 8.1 my one-year warranty was no longer valid. Can this be true?" asked *Maurice Warren.*

Camilla Morgan-Giles, a spokesperson for HP, replies: As Windows 8.1 is considered as an upgrade to the operating system rather than an update we advise all customers that it can cause issues with the hardware due to missing drivers. We will always explain that, in the event of this happening, we will try our best to get these issues resolved on Windows 8.1 (such as installing 8.1 drivers). However, if this is not possible, we would advise the customer to return the unit to its factory settings.

This will not void their warranty, but if the machine is unable to be recovered to the original operating system using the internal partition the only option we have is to transfer a customer through to sales for recovery discs.

Peppa Pig phone rocks

You might be surprised to learn that in a recent head-to-head comparison review a plastic Peppa Pig toy phone won out over the iPhone 5s. After all, it is bright and colourful, with a lovely picture of Peppa Pig smiling, and it costs only £1.99. You can also make as many free pretend calls as you like, and you can chew it. You can read our full review at tinyurl.com/Lrdyn3c.

"As an ex-Apple user, in June I made the switch to the Peppa Pig phone. It's sturdy construction and lovely, colourful image of Peppa Pig were the real sellers for me at the time. It's also worth mentioning the battery life: I had to charge my iPhone every night; the Peppa Pig phone's battery has been half-full since I bought it. I will never go back to Apple," wrote *Benji Sharpe.*

Argos: a digital leader

With news that Argos is replacing its paper catalogue browsing system with iPads (see *News*, page 13), *James Daykin* was concerned about his stationery supplies. "Now where will I get my free pens from?" he asked. "I'll have to stick with Ikea pencils."

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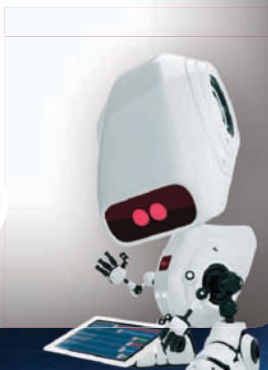
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CHRIS MARTIN

TABLETS DOMINATE PC MARKET

Apple and Samsung to lead the charge with Android accounting for 32 percent of PC market

Research firm Canalys predicts that tablets will account for 50 percent of the PC market in 2014.

It believes tablets will almost out ship all other PC form-factors combined, including desktops and laptops. The firm said tablet shipments will reach 285 million units in 2014, growing to 396 million in 2017.

In the third quarter of 2013 tablets made up 40 percent of PC shipments, only half a million units behind laptops. Despite the decline of PC- and laptop shipments, the worldwide PC market grew 18 percent during the quarter – thanks to tablets.

Canalys predicts that Android will be the main driver of growth in tablets, accounting for 65 percent of the market. Samsung will likely be leading the pack, while Apple will continue to be the main competitor outside the Android race.

"Apple's decline in PC market share is unavoidable considering its business model. Samsung narrowly took the lead in EMEA this quarter, and Apple will lose its position to competitors in more markets in the future," said senior analyst Tim Coulling.

"However, Apple is one of the few companies making money from the tablet boom. Premium products attract high-value consumers; for Apple, remaining highly profitable and driving revenue from its entire ecosystem is of greater importance than market share statistics," said Coulling.

But while Samsung and Apple will remain strong in the medium-term, there could be 'challenges' as competition hots up, said Canalys. The firm points to the rise of small-to-micro brand vendors in established and high-growth markets, plus international players such as Acer, Asus, Lenovo and HP.

Budget tablets are tempting many consumers and manufacturers with even supermarkets and retailers such as Tesco and Argos offering own-brand devices.

"With the cost and time-to-market advantages afforded by their Chinese supply chain, these vendors are eating up market share," noted analyst James Wang.

Microsoft is forecast to take 5 percent of the tablet market in 2014, up from 2 percent in 2012 with its Surface devices.

Canalys rounded out its report by stating it expects 2014 to "bring a flurry of acquisitions, mergers and failures as PC hardware vendors of all sizes struggle to maintain their desktop- and notebook business while attempting to capitalise on a tablet market that will see great volumes driving limited value".

CONSUMERS FLEECED OVER STORAGE

Gadget makers including Apple and Google could be ripping off customers with overpriced tablet storage upgrades, according to Which?.

The iPad Air costs £399 with 16GB of storage, and you'll have to pay an extra £80 for 32GB. Unlike many rival tablets, the iPad doesn't offer a memory card slot for expansion, so it's important to choose the correct version for your needs.

Which? claims the memory upgrade from 16- to 32GB costs Apple only £6, making the upgrade a markup of 1,267 percent. Google and Amazon also put high markups on additional storage, albeit somewhat lower than Apple.

SCRAPPED: WINDOWS RT TO MERGE WITH WINDOWS PHONE 8?

Microsoft has 'too many operating systems', and Windows RT is odds-on to take the inevitable fall

Microsoft has admitted it has too many operating systems and will no longer offer Windows Phone, Windows 8 and Windows RT.

Speaking at the UBS Global Technology Conference, Microsoft spoke about the effective failure of its cut-down Windows RT OS. Windows RT is available on desktop PCs, laptops and tablets.

Julie Larson-Green, EVP of Devices for Microsoft, said: "We have the Windows Phone OS. We have Windows RT and we have full Windows. We're not going to have three. We do think there's a world where there is a more mobile operating system that doesn't have the risks to battery life, or the risks to security. But, it also comes at the cost of flexibility. So we believe

in that vision and that direction and we're continuing down that path."

Larson-Green admitted that the concept of Windows RT wasn't explained to consumers very well. It was an attempt to give a simplistic but productive 'turnkey'

experience, similar to the way Apple presents iOS on the iPad.

"So the goal was to deliver two kinds of experiences into the market, the full power of your Windows PC, and the simplicity of a tablet experience that can also be productive."

"We didn't explain that super-well. We didn't differentiate the devices well enough. They looked similar. Using them is similar. It just didn't do everything you expected Windows to do."

She also claimed that Microsoft shouldn't have called RT Windows and, going forward, the firm will better differentiate the OSes. There's also been talk of rebranding.

It's unclear what the strategy will be. Microsoft will most likely ditch Windows RT or merge it with Windows Phone 8.

Argos swaps catalogues for iPads in digital stores

iPad-powered browsing system will help UK catalogue chain store become a leading digital retailer

Argos has announced that it will swap its catalogues for iPads in digital stores.

Moving with the times, the retailer has decided that catalogues, slips of paper and miniature pencils are out-of-date. Argos' new digital concept stores will see the lot replaced with iPads.

Customers will be able to browse items and place orders on the iPads before heading to the traditional collection point. Argos said it will be consistent with the online- and mobile shopping experience.

John Walden, managing director of Argos, said: "We are early in our ambitious plan to transform Argos into a digital retail leader. We are seeking to reposition our stores to support a digital future in which digital channels are the primary interface for customers, but stores continue to be critically important as a national

network for product collection, and a local presence for local colleagues to provide customer service."

The iPads will not only show items available to buy, but product videos and

customer reviews. The stores will have a 60-second Fast Track collection service for orders placed online or via mobile.

Argos said 40 percent of its sales come from digital channels, with revenue from smartphones and tablets accounting for 16 percent.

If you're a traditionalist who likes the original laminated catalogues, you'll be pleased to learn that the digital stores are popping up in only a select few locations.

The Old Street, Marble Arch, Old Kent Road and Chancery Lane stores in London will all be transformed, while new Argos stores will be built in Colchester, Essex and Dunfermline, Scotland.

Traditional catalogues will still be made available, however: Argos understands that customers may find this a more comfortable way of shopping.

Sky Hub doesn't require installation

Sky has launched a version of its Sky hub router that doesn't require an engineer to install fibre-optic broadband, making it the first of the four major ISPs to do so. BT's HomeHub 5 will follow suit. The Sky Hub costs £69, but will be included with all new Broadband Unlimited and Fibre Unlimited internet subscriptions.
MORE: tinyurl.com/qcc8ym3

YouView can record web channels

BT customers with a YouView Freeview box are now able to record programmes shown on internet channels, which was made possible by a software update for BT's Humax box. Furthermore, the update means users can pause and skip forward or backward.
MORE: tinyurl.com/nbewwt7
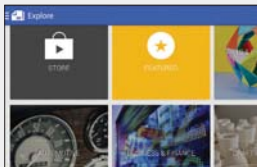
Google introduces Play Newsstand

Rivalling Apple's Newsstand, the Play Newsstand is now the place for Android smartphone and tablet users to head for news content, magazines and blogs. The new app is a replacement for both Play Magazines and Currents. Google said Play Newsstand offers more than 1,900 free and paid-for publications, including *PC Advisor*.
MORE: tinyurl.com/nk34vjg

VIRGIN 152Mb/s BROADBAND COMES WITH A CATCH

Broadband double the speed of BT Infinity is delivered with a price hike

Virgin Media has announced that it will accelerate its broadband speeds to 152Mb/s, but it will also introduce a price increase.

The firm said its package will be twice as fast as any other, including BT Infinity. The speed boost will arrive in early 2014.

Some services will remain unchanged but, from February, cable bills will increase on average by 6.7 percent. Virgin Media said the speed boost will mean customers get more for their money.

Virgin Media chief executive officer, Tom Mockridge, said: "As people simultaneously connect to the internet more things more often, they need powerful broadband with the bandwidth to deliver a great experience for everyone in the home. That connection is what we deliver with our unrivalled network.

"We are boosting speeds again and ensuring our customers get even more value from their Virgin Media subscription. Our top speed will be twice as fast as BT and all the others reliant on the old copper telephony infrastructure as we extend our lead as Britain's ultra-fast broadband provider."

After doubling the broadband speed for over four million homes, Virgin Media is promising to also increase customers' speeds by at least 20Mb/s depending on their current service. Users on HotUKDeals state that the 60Mb/s package will be upgraded to 100Mb/s for free.

Virgin Media said the 152Mb/s speed will allow customers to download an HD film in less than four minutes. Customers can enjoy BT Sport, Sky Sports and, more recently, Netflix.

Three rolls out free 4G to subscribers

Mobile operator hopes to encourage and enable use of the mobile internet

Three has started rolling out 4G LTE mobile broadband to customers with compatible devices.

The UK mobile operator is upgrading its network to 4G without charging its customers. Three said it started making 4G broadband available to customers on 2 December. However, only a few thousand customers in London are currently testing 4G ahead of a fuller launch.

"The rollout will accelerate in January, with all customers with a compatible device able to access 4G at no extra cost by the end of Q1 2014 when they are in an area with 4G coverage," said the firm.

Three said it aims to cover 50 cities by the end of 2014, and 98 percent of the population by the end of 2015.

Dave Dyson, CEO of Three, said: "We are building a brand and network that encourages and enables customers to enjoy the mobile internet. Customers are using more data than ever on Three, far more than on any other network. As we add 4G capacity to the network, this experience will only get better."

Three also announced that it is extending its 'Feel At Home' offer in the US, Indonesia, Sri Lanka and Macau. The scheme means customers won't be charged extra for calls, messages or data when roaming, which are included in their regular allowance.

64-BIT SNAPDRAGON 410 CPU CONFIRMED FOR BUDGET PHONES

Snapdragon 410 is Qualcomm's first 64-bit processor, yet it's aimed at entry-level smartphones

Qualcomm has announced that the Snapdragon 410 will be its first 64-bit processor for smartphones and tablets.

With the iPhone 5s holding the title of the first 64-bit smartphone, it was never going to be long before other manufacturers followed suit. Now major chip maker Qualcomm has confirmed its 64-bit Snapdragon 410 processor.

The product number may cause some confusion, being numerically lower than the Snapdragon 600 and 800 chips, but the 410 is aimed at budget smartphones in emerging markets.

The chip features integrated 3G and 4G LTE with multiband and multimode support, which the company is aiming squarely at China. Qualcomm aims to bring this functionality to its entire line-up.

Qualcomm said: "By offering 4G LTE variants to its entry-level smartphone line-up, Qualcomm Technologies ensures that emerging regions are equipped for this transition while also having every major 2G and 3G technology available to them."

"We are excited to bring 4G LTE to highly affordable smartphones at a sub-$150 price point with the introduction of the Qualcomm Snapdragon 410 processor," said Jeff Lorbeck, senior vice president and chief operating officer at Qualcomm. "The Snapdragon 410 chipset will also be the first of many 64-bit-capable processors as Qualcomm Technologies helps lead the transition of the mobile ecosystem to 64-bit processing."

The Snapdragon 410 is manufactured using a 28nm process and features an Adreno 306 GPU. Qualcomm said the chipset can handle up to 1080p video playback and a 13Mp camera, plus Wi-Fi, Bluetooth, NFC, FM, GPS, Glonass and China's new BeiDou.

Qualcomm said the Snapdragon 410 will be available for sampling in the first half of 2014 and will appear in commercial devices in the second half of the year.

Spotify Mobile goes free on Android and iOS devices

Spotify users can now stream ad-supported music on smartphones and tablets

Spotify has made freely available its Android and iOS mobile smartphone- and tablet apps.

Now any smartphone or tablet user can stream music on the go via Spotify for free. The service was previously restricted to Premium subscribers only, which costs £9.99 per month.

Spotify said: "You can now get Spotify on your mobile or tablet, absolutely free. Find the right music and shuffle play it on any iOS or Android device."

The Premium service remains available, and paid subscribers will get unlimited ad-free music streaming and higher-quality tracks than are offered by the free app.

Although any user can now access Spotify for free on their mobile, the service will be supported by adverts in the same way as are the desktop- and online versions of Spotify.

The firm believes that offering the mobile version for free will tempt more users to upgrade to the Premium service.

Spotify said users will be able to listen to their playlists and also hit 'shuffle play' to listen to a particular artist's entire back catalogue. The firm has started making available Led Zeppelin's back catalogue, releasing two albums per week.

The firm is also dropping the 10-hours-per-month limit that it had previously imposed on users of its free service.

While Spotify is available on iOS and Android smartphones and tablets, there are no apps for Windows Phone 8 and BlackBerry. ⌧

held to ransom
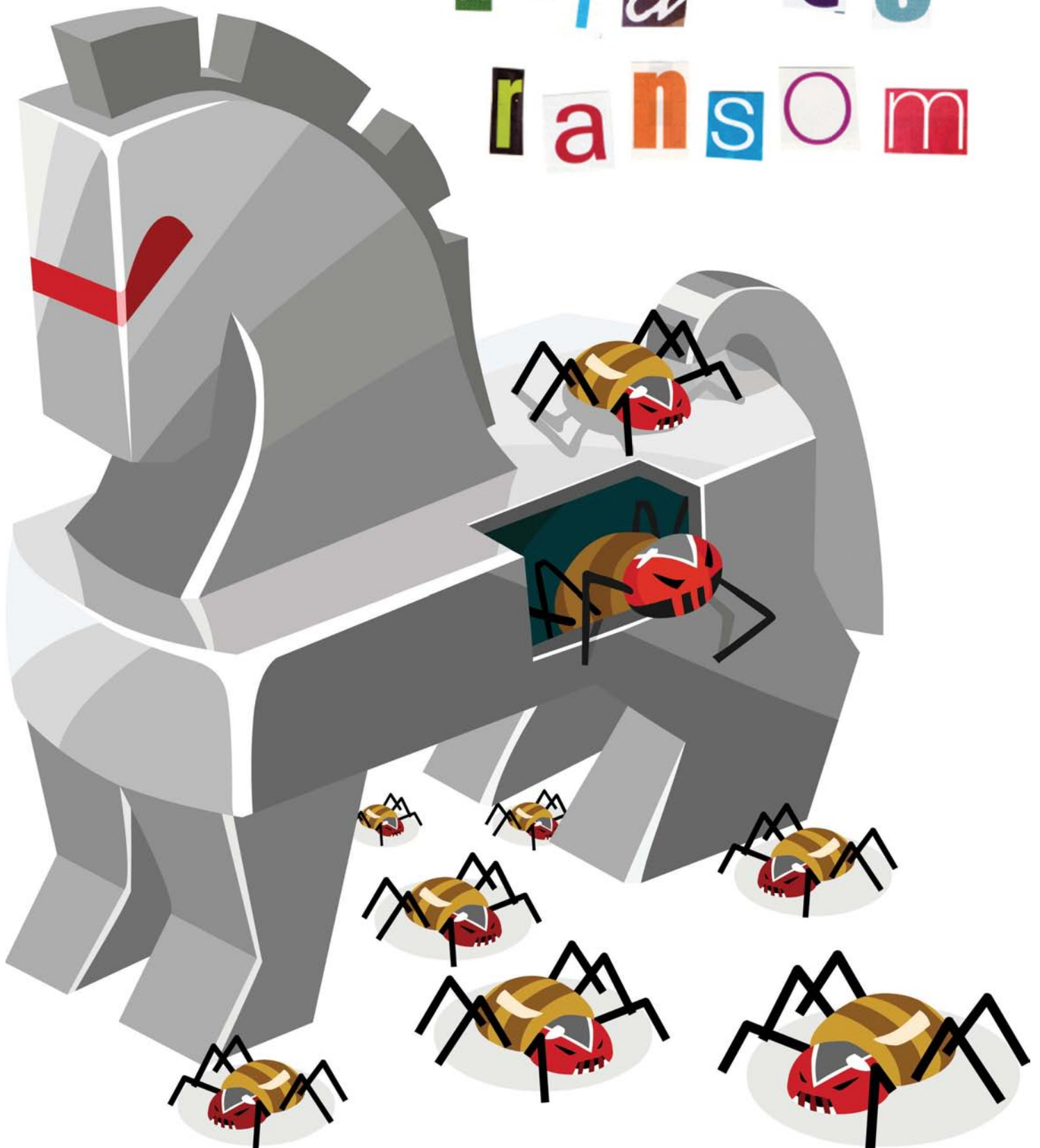
With the Cryptolocker virus recently making headlines, Martyn Casserly explains how this nasty Trojan horse works and what you can do to protect yourself – and your PC

Over the years the nature of computer viruses has seen a change in focus. When the earliest reported example, Creeper, appeared in 1971, its sole purpose was to gain access to a system and display the message: 'I'm the Creeper, catch me if you can!' Now, with so much valuable personal information stored on our PCs and online, something darker has emerged. Ransomware is a new class of Trojan horse that has begun to appear on personal systems in the past few years, and this should concern you.

The principle of Ransomware is simple. It tends to sneak into a system disguised as an email attachment and, when opened, proceeds to encrypt the files on your machine. The virus then self-destructs and tells the user their data has been taken hostage; it will be released only after they pay the required ransom.

Ransomware was first reported in Russia in 2004, with the Gpcode Trojan. Security analysts at Kapersky were able to crack the hold that program had over data by exploiting mistakes the author had made in the code. But now the Trojan is back, and this time the encryption is rock-solid.

Cryptolocker is the latest Ransomware to strike unsuspecting users, and it's so far proven impossible to crack. What's more, it doesn't just take the data on your hard drive.

"It also searches for files on all drives," reported Steve Gibson on the Security Now podcast, "and in all folders it can access from your computer, including workgroup files shared by colleagues, resources on company servers and more. Anything within its reach it encrypts."

Cryptolocker then displays its ransom note, demanding you pay for an unlock key via Bitcoins or MoneyPak. The exact fee can vary, but it can be as much as £300. A poorly worded message tells you your files have been encrypted and that any attempt to remove the software will destroy the only key that could decrypt it.

To increase the drama a countdown clock is displayed onscreen. In 72 hours your data will be gone forever. Photos, videos, documents, music and anything else stored on your PC will disappear beyond recovery.

The structure of the virus is such that it's not possible to create a key for the encryption; the data required to do so is held only by the originators of the virus.

"The RSA encryption algorithm uses two keys: a public key and a private key," explains Kapersky lab expert VitalyK on the Securelist website. "Messages can be encrypted using the public key, but can be decrypted using only the private key. And this is how Gpcode works: it encrypts files on victim's machines using the public key, which is coded into its body. Once encrypted, files can be decrypted only by someone who has the private key – in this case, the author or the owner of the malicious program."

The removal of the virus itself is of little use to the victim, and shutting down the server that holds the key will result in the

loss of the decryption tool – and it's difficult in any case, since the server locations are switched on a weekly basis.

All this means is victims must either pay the ransom or lose their data – and even if they do pay, there is no guarantee the criminals will honour their terms.

Cryptolocker attacks are becoming so prevalent in the UK that the National Crime Agency has released a statement from its Cyber Crime unit. It warned: "The emails may be sent out to tens of millions of UK customers, but appear to be targeting small- and medium businesses in particular. This spamming event is assessed as a significant risk."

The complexity and sophistication of a program such as Cryptolocker is in itself an unsettling precedent. It suggests there is more to this latest crimewave than a simple

bedroom hacker with impressive coding skills and little conscience – it shows elements of the fast-growing underworld of professional cybercriminals.

"Something of this size must be the efforts of a well-organised group," says Stephen Doherty, senior threat intelligence analyst at Symantec. "There'd be dedicated segments to this, because it's such a large and focused operation. The distribution of Cryptolocker is as high, or higher, than most Trojans you see in the wild."

The need for resources to run the scam is also a clue to size of the proponents.

"There's a lot of stages to this," Doherty continues, "to infect so many machines on an ongoing basis, and try to process all the money in the background. You'd want a well-organised team behind you."

The rise of the interconnected digital world has brought with it problems that previously existed only in the physical realm. From chancers who play on the innocence of victims, to serious organised criminals who have the money, skills, cruel intentions and a willingness to use them against the unsuspecting public. Take solace, though, in the fact we have ways to protect ourselves from these evil spectres of the web.

You should regularly run backups of your valuable data, then remove the drive from your computer. You should also create online backups via Dropbox, Google Drive, Skydrive and the like. And you should never open a file or link in an email or on a social network unless you're sure it was deliberately sent by the person themself. ☒

Google Glass:
safety, health & security

James Martin finds out whether connected eyewear can put you at risk

Google Glass is one of the most hotly anticipated new technologies for 2014. Early adopters, known as 'Glass Explorers', already praise the internet-connected eyewear's potential for surgery, firefighting, identifying criminals and much more.

However, there are some concerns that wearing Google Glass may compromise the safety and health of its users. A Californian woman's recent traffic citation for wearing Google Glass while driving reignited debate about the safety of using the device behind the wheel.

Aside from driving, we asked Google Glass explorers, app developers and others – all in the US due to the restrictions of Google's Explorer programme – to weigh in on the safety and potential health risks of using Google Glass. (Google didn't respond to requests for comments for this article.)

Is it safe while walking or cycling?
Glass Almanac blog editor and Glass Explorer Matt McGee has walked and cycled while using Google Glass. In general, he says he believes it's safe.

"Glass' navigation helped me get to some new places while I was walking through Philadelphia and San Francisco this summer. It was great to use the navigation and get where I wanted without having to look down and risk colliding into people or who knows what," McGee says.

Cycling is "a little trickier", McGee says; "you're moving 10- to 15mph and potentially near traffic. So I occasionally have to stop the bike if I need to do something with Glass. But it's really fun."

On the other hand, Rich Chang, CEO and partner of NewFoundry, a Google Glass app developer, says that walking or cycling while using Google Glass is potentially unsafe. "Many people are already not paying attention while crossing the street because of smartphones and MP3 players. Adding something that provides visual input is a recipe for increased accident risk."

As for cyclists, Chang notes that Google Glass "affects peripheral vision and reduces concentration overall". Cyclists could cause accidents, too, he adds, if Glass fell off while they were riding and they tried to prevent the device from breaking.

Meanwhile, David Berkowitz, CMO for digital- and technology agency MRY and a frequent speaker on wearable technology at events such as South by Southwest (SXSW), describes crossing a New York City street while wearing Google Glass as "one of the scariest, riskiest things I've ever done". He adds: "People have to learn to be careful, just like they need to learn to put their mobile phones away while crossing the street. That email or Spotify track can wait."

However, Berkowitz says cyclists can benefit from wearing Google Glass if they use the device cautiously. "A face-mounted display such as Glass can provide helpful, if not vital, information to cyclists, such as maps, traffic- and weather alerts, and your speed," he says. "Bike messengers, meanwhile, could use the hands-free, voice-activated mode to learn delivery information and to call customers."

Google Glass Explorer Charles Webster, who has an MSc degree in industrial engineering from the University of Illinois, Champaign-Urbana, says he doesn't feel that wearing the headset while walking is inherently unsafe.

Webster says he appreciates that Google Glass serves up information about restaurants, shops and historical buildings and sites as he approaches them on foot. Like McGee, Webster often uses Google Glass to capture photos and videos of things he sees along his route.

What are the health risks?

Wearing heads-up displays such as Google Glass can contribute to eye fatigue and may cause visual confusion, according to ophthalmologist and entrepreneur Sina Fateh, who has filed more than 30 patents related to heads-up displays.

"The problem is you have two eyes: the brain hates seeing one image in front of one eye and nothing in front of the other," Fateh told *Forbes* in March 2013. Heads-up displays can cause such problems as binocular rivalry, visual interference and a latent misalignment of the eyes that results when both eyes don't look at the same object.

The head of the Google Glass project, Babak Parviz, told *Forbes* that his team takes the potential side effects of wearing Google Glass seriously. A professor of ophthalmology at Harvard Medical School, Eli Peli, has been researching the impact of head-mounted displays for 20 years and has been consulting with the Glass team for about two years.

Peli told *Forbes* that Google Glass has "a more advanced design for safety and comfort than any of the previous head-mounted displays I've evaluated". Because Google Glass has a minimal impact on the wearer's field of vision, there's little chance of putting the user at risk of bumping into objects, Peli said.

The advanced design of Google Glass means those who wear it while walking won't be distracted, some experts say.

McGee has yet to experience any pain or discomfort from using Google Glass, but a few other Explorers have told him they can get a headache if they look at the screen for too long. "I think the longest straight time I've ever spent looking at the screen is probably about two minutes," McGee says. "It didn't cause me any trouble, but I can see how looking at it for longer might be a problem since it's so close."

Does it cause brain cancer?

Some have raised more serious concerns: frequent, long-term Google Glass use might cause an increased risk of brain cancer. The jury's definitely still out on this one, however.

The Federal Communications Commission sets the maximum Specific Absorption Rate (SAR) for mobile phones at 1.6W per kilogram. In documents filed with the FCC in February 2013, Google said its headset had a 1.34W per kilogram SAR, within the FCC maximum. On the other hand, it's worth noting that Google Glass is designed to be worn on the head, as opposed to smartphones, which are used only near the head during a phone call.

"It's controversial whether electromagnetic radiation exposure has

health risks, such as a higher risk of brain tumours," says Matt Katz, medical director of radiation oncology at Lowell General Hospital. "I would think if Glass was within FCC guidelines, it wouldn't be an issue."

Theft, security and privacy

Apple has made iPhones more difficult for thieves to hack via iOS 7 security enhancements and the iPhone 5s' biometric fingerprint scanner. Could thieves, always looking for lucrative, easy targets, soon be setting their sights on Google Glass users? (Currently, Google Glass Explorers pay $1,500 for the privilege, although the headset is expected to retail for less.)

Although it's too early to say whether Google Glass will be the next hot target for opportunists, there's reason not to be unduly concerned. Google was granted a patent in 2012 for an anti-theft system that disables the headset in the event of unnatural or sudden movements.

The movements could relate to Google Glass being snatched off a wearer's head, for instance. The system can also determine whether the wearer is the Google Glass owner; if not, the headset can be disabled. The anti-theft system can also sound an alarm and contact the police if it's stolen.

Once Google Glass is commercially available, it could stir serious security-related public-safety concerns, says Sedgrid Lewis, an Android app developer with more than 15 years of security- and crime experience related to technology.

"Security experts are wary that Google Glass users will be secretly snapping pictures in public places such as airport terminals or banks," Lewis explains. This could let users obtain images of physical layouts that could help them plan terrorist attacks or robberies.

Google Glass could also be "rooted", Lewis says, enabling the owner to bypass its security features. "People could then record video footage or audio without the lights flicking on the glasses. This could lead to all types of privacy concerns."

Like any portable device, Google Glass presents potential security risks to businesses, given how easy the device is to lose and the sensitive information that can be stored on it, says Nicko van Someren, chief technology officer at Good Technology.

It's also difficult to authenticate the legitimate users of Google Glass or other wearable devices due to the limited user interface, says van Someren. "This makes devices such as Glass more risky from a security standpoint, since thieves might access information on the devices."

Only as unsafe as its owners

McGee notes that the default mode for Google Glass is off/standby. Plus, if you wear it correctly, it sits above eye level. "It's never blocking your vision and it's never interrupting you with information when you don't want it," he says. "Even if a call or text message comes in, or maybe a tweet, the alert is audio-only and easy to ignore. Glass never turns on and demands attention on its own."

There are scenarios in which using Google Glass is unsafe, McGee says, but they're due to the scenario itself and how Google Glass is used. He adds: "The problem isn't Glass, it's the person. Microwave ovens aren't safe if you do dumb things with them."

Webster agrees: "Google Glass is unsafe to use for the same things for which tablets and smartphones are unsafe. I wouldn't watch a cat video on a tablet or smartphone while driving. The same is true for Glass." ⊠

What Android 4.4 'KitKat' will bring to your device

Chris Martin considers the impact of Android 4.4 KitKat

Google has launched Android 4.4 KitKat. Here's what it will bring to your current Android smartphone.

KitKat launched with the Nexus 5 smartphone and is rolling out to older Nexus devices such as the Nexus 4, 7 and 10. Beyond this, the rollout is a little more complicated. The Nexus range runs plain Android (aka stock or vanilla Android), which is the OS as Google designed it.

However, Google's manufacturing partners are free to tweak Android as they please, applying skins or overlays such as Samsung's TouchWiz and HTC's Sense. This makes rolling out new versions of Android more difficult, since they must tweak their own software to play nicely with the new OS.

Although these overlays can look very different to the plain Android experience found on the Nexus devices, all will benefit from any features built into the OS.

There is no guarantee that the latest Android OS will be rolled out to your handset, particularly if it is a relatively old device, but

the fact Google has enabled KitKat to run on smartphones and tablets with as little as 512MB of RAM should make the upgrade easier and therefore go in your favour.

Version 4.3 Jelly Bean brought only minor changes to Android, but 4.4 KitKat will be far more sought after.

Android 4.4 KitKat interface

Android looks better than ever, with visual interface enhancements such as transparent status and buttons bars. This means your wallpaper can cover the whole screen. The background to the app menu is also semi-transparent rather than solid black. And if you're listening to music, the lockscreen shows full-screen album artwork.

Google Now is just a swipe away from the home screen, making getting at this information much easier.

Immersive Mode

Our favourite new feature of KitKat is its Immersive Mode, which lets apps take

over the entire screen. This has been an issue since Android started using onscreen buttons (although not all handset use this approach). Now, content such as books and films can use all your device's screen estate. The status bar and navigation button clear off the screen and can be brought back in with a swipe.

Other smaller changes include the ability to initiate a Google Search with the phrase "Ok Google". The new phone app displays your most used contacts at the top and aims to tell you what company is calling you if the number isn't in your contacts list.

Wireless printing

Hangouts is now the default instant- and SMS messaging app for KitKat, but text messages can be handled by a different app if you prefer. Wireless printing is also now baked into the OS.

Low-power audio playback and touchscreen improvements are currently exclusive to the Nexus 5. ⊠

Why HP is sacking thousands of workers

HP is cutting back, and Matt Egan knows why
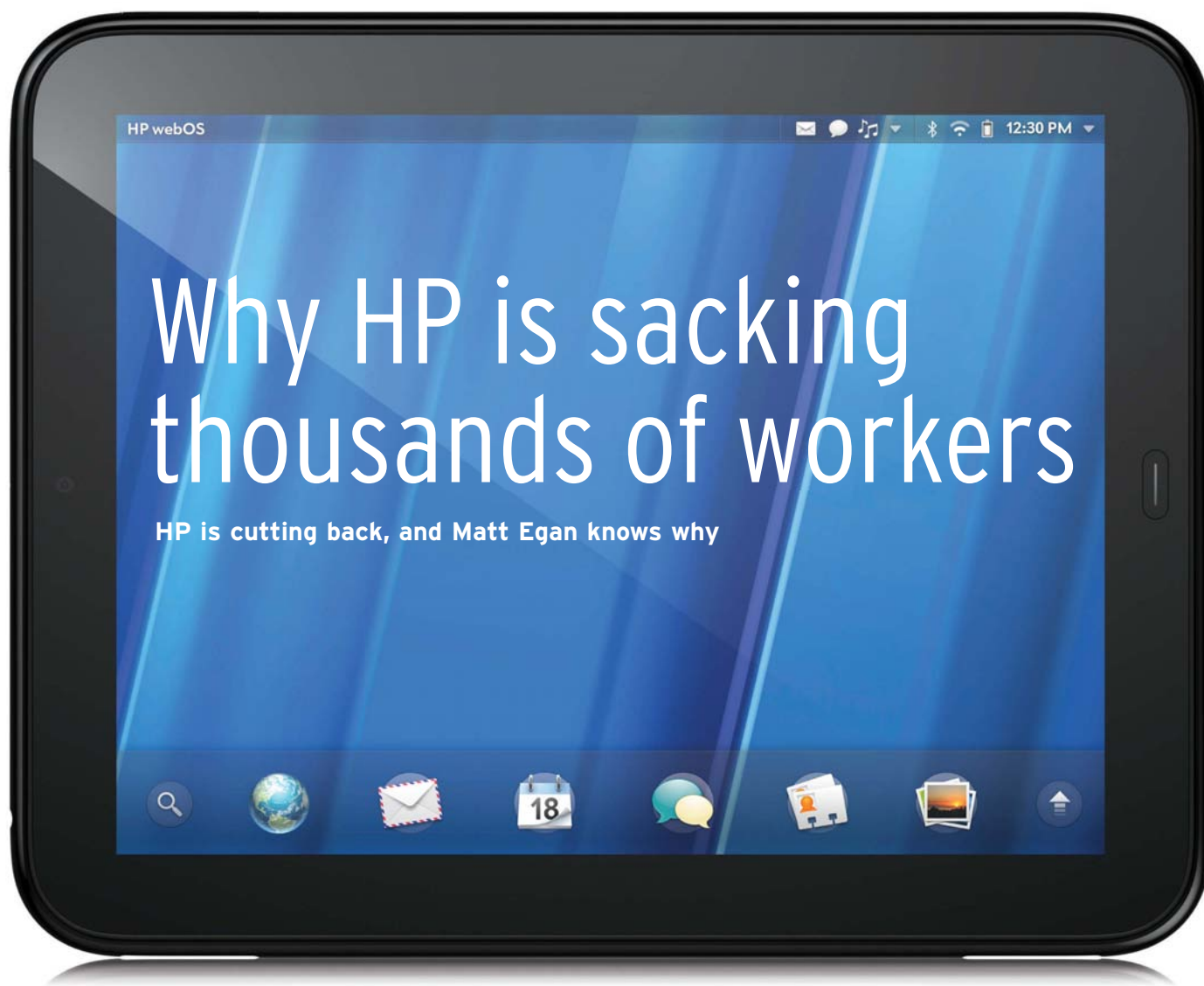
The news that HP is cutting more than 1,100 of its UK workforce was tragic for all involved. But how has one of the world's most recognisable companies found itself in this situation?

The history

HP is one of the originators of Silicon Valley. A scion of innovation in the tech world that inspired the likes of Steve Jobs and Bill Gates. It's a huge, historically successful firm. But the recent past hasn't been pretty.

Rewind to the beginning of 2010 and we find a charismatic tech-industry leader on stage hyping a tablet PC in front of an audience of industry types. Three months later Steve Jobs launched the iPad. The HP Slate PC was announced first, but never made it to the UK, and limped out in the US only after the iPad had destroyed any chance HP had of owning the nascent tablet market.

That same year HP bought Palm, threw aside its own failing iPaq and Compaq brands, and put its weight behind WebOS and a focus on smartphones and tablets. WebOS was very good, but HP's timing wasn't: Apple continued to dominate. That was the signal for the first upheaval in the HP boardroom,

with a new strategy announced for the business and Lèo Apotheker appointed CEO.

Apotheker said HP was going to sell off its personal computing division and concentrate on managed services. But then HP quickly changed its mind, announcing the appointment of new CEO Meg Whitman.

In 2012 Whitman announced that HP would merge the personal computer division with its printer business and once again refocus on the consumer business. Are you keeping up? HP wasn't, and the job losses that are now hitting the UK began that year.

Industry trends

The sad fact is HP was close to getting it right. When HP hyped the Slate PC the world was ripe for the tablet revolution. And the focus on smartphones that followed the Palm acquisition was a smart call, just executed too late and too poorly. By the time WebOS hit the market most smartphone users and – crucially – app makers had settled on iPhone, Android or both.

So HP wasted a lot of time and money chasing chimeras. And then when it made the potentially smart, but truly difficult decision to exit the personal computer

business – for whatever reason it wasn't able to follow through.

HP makes PCs, laptops, servers and printers. People are printing a lot less: that's one problem. Cloud storage is eating into the server business. Most critically, the PC and laptop market has slowed down. A lot. Smartphones and tablets don't replace PCs and laptops, but they do mean that you don't use your PC or laptop quite so much – and the latter are sufficiently fast that you will upgrade only when the old one breaks.

How then does HP drive sales of PCs and laptops? The only way to stand out in this market is to cut prices, and that means reducing profits and creating efficiencies. Either way, jobs have to go.

The verdict

Sadly, for a company with its legacy of innovation, HP hasn't done enough to stand out from the competition in the declining PC, laptop and printer markets. Meanwhile, its ham-fisted attempts to break into the smartphone and tablet markets have been expensive failures. Throw in a dose of boardroom instability, and a lack of clear vision, and HP's sad news is inevitable. ⊠

5 reasons your next phone should be a Windows Phone

In the crazy, mixed-up world of smartphones, a vote for Windows is a vote for innovation and quality. Matt Egan puts aside his prejudice to investigate

Here at *PC Advisor* we've rarely been entirely complimentary about Window Phone. It's not that there's anything wrong with Microsoft's platform; it's just that in a market that already included iPhone, Android and BlackBerry, Windows Phone 8 launched offering little new.

Add to that the fact that existing Windows Phone 7 users were given no means of upgrading, and it seemed that even Windows Phone fans would be dissuaded from sticking with Windows. And that meant those selling apps and media were less than keen to back the platform. That, in turn, meant fewer people buying handsets, and therefore fewer people making handsets and, well, from the start things didn't look great for Windows Phone 8.

But something is stirring in the Windows Phone world. In time to come the fact that everyone but Nokia stopped supporting Windows Phone 8 may be perceived as a blessing. Especially now that Microsoft has purchased Nokia's consumer phone business.

Nokia has a range of handsets that offer something for every screen size and price point. And for that reason, now may be the time to jump aboard the Windows Phone bandwagon. Here are five reasons why your next phone should be a Windows Phone.

1. A stable, secure platform

There is nothing wrong with Windows Phone. It was just late to the party, and the launch was miss-managed. There are still relatively few apps in the Windows Phone store, but at the last count it was 190,000. More importantly, it is increasingly difficult to find a specific app that should be there and isn't. And, anyway, the excellent Internet Explorer 10 and HTML 5 makes apps less important. The web works well on Windows Phone.

2. Quality handsets and experience

We've yet to test a Windows Phone that offers anything less than decent performance, regardless of the price point. They just work. If you are unsure of the handset you should buy, you can be sure that a Windows Phone is unlikely to be a lemon. Not least because it is almost certainly going to be made by Nokia.

Nokia offers a full range of solid handsets from 4- to 6in, and from £150 to £600. There's a phone for everyone and they are all decent, if not spectacular, buys. You can't say the same in either the Android world with its variable quality, or Apple's super-premium iPhone line-up in which the budget buy is a two-year-old handset that costs £349.

Nokia phones are well built and perform well. And if you are a Windows user the experience will be familiar and useful in a meaningful way. Windows Phone 8 becomes a much better deal when you are a regular Windows 8 user. If you use either or both of Xbox or Windows RT so much the better. Having a single login to access apps and media, as well as email and other communications, is pretty neat.

3. Variety in a samey world

And there's the other thing about the Nokia Lumia Windows Phone 8 handsets. They are distinctive. They look different.

The Lumia line-up offers a guarantee of at least a certain quality, but it also makes it the case that your friends with me-too iPhones and Androids will ask you what it is you are toting. Windows Phone 8 offers much the same functionality as do all premium smartphones. But it does so within a series of handsets, and within an interface, that look different to all the others.

It feels odd to say, but in the smartphone world at least Microsoft is the unconventional choice.

4. Business is business

That said, Microsoft hasn't lost its grasp of the mundane. If you run a business with a fleet of phones you have only two sensible options: Windows Phone and BlackBerry. Why? Because iPhone and Android don't allow for server side updates, remote data scrubbing and the like. Each iPhone or Android handset is its own little network, with all the security issues that entails.

If you want to be able to brick a phone when Darren in sales leaves it in the pub, or make sure all company handsets are keptup to date, you need to choose BlackBerry or Windows Phone.

BlackBerry fans, this is awkward. BlackBerry is very much yesterday's platform. If you want a set of phones that will gladden the heart of your network admin without causing the staff to revolt, Windows Phone it is.

5. Back a winner

The smartphone market is changing, and Windows Phone is doing okay. Nokia has around 10 percent of the market in countries such as the UK. That might not sound like much, but with the exception of Apple and Samsung every other phone maker in the world would love that share of the market. And with the Microsoft purchase likely to happen in the middle of next year, Nokia will get the backing of a company with extremely deep pockets and a desire to establish Windows Phone. There will also be clarity of purpose and strategy.

Plus the key market growth area is at the budget end, and no-one is better placed to win that battle than Nokia. ⊠

Slower growth will challenge smartphone vendors in 2014

More powerful processors will allow smartphone vendors to turn their high-end models into gaming consoles, but slower growth will also force them to focus more on improving their less expensive products in 2014, says Mikael Ricknäs

In 2013 smartphone shipments were expected to surpass one billion units for the first time, thanks to impressive 39 percent growth year-on-year, according to IDC. Shipments are expected to continue to grow by almost 20 percent in 2014, so vendors will have to work harder to get users to upgrade.

Here are some of the trends that will shape the market in 2014:

Higher screen resolutions

Larger screens with higher resolutions have been one of the biggest smartphone trends in the past couple years, and that shows few signs of abating. For example, LG's Display unit has developed a 5.5in screen for next-generation smartphones with a 2560x1440-pixel resolution.

That combination equals a density of 538ppi (pixels per inch), which compares to the HTC One's 468ppi on a 4.7in screen and the Samsung's Galaxy S4's 441ppi on a 5in screen.

The higher resolution allows users to see a full view of a desktop web page without any image distortion, said LG. Whether other vendors follow suit remains to be seen, but Samsung is reportedly working on a display with the same resolution on a smaller screen.

LTE picks up pace

While LTE is still in its infancy in many parts of the world, operators have started to test a technology called carrier aggregation to offer faster download speeds. It allows networks to devote more resources to some users by treating two channels in the same or different frequency bands as if they were one.

EE is testing two times 20MHz to reach 300Mbps, which is the theoretical maximum. Vodafone and Telefónica in Germany, as well as SK Telecom in South Korea, are testing one 10MHz channel plus one 20MHz channel for up to 225Mbps. The South Korean operator was the first to offer carrier aggregation in June 2013, but only at speeds that can be matched by the fastest regular LTE networks.

EE expects the first commercial 300Mbps routers will be introduced by the middle of 2014, with smartphones arriving in the second half of the year.

New LTE chipsets will also open the door for 4G phones that cost less.

A game console in disguise

Smartphones have had a profound effect on the gaming sector by making portable devices such as the Sony PlayStation Portable and the Nintendo 3DS less appealing. As smartphones become even more powerful in 2014, vendors such as Samsung and Apple will go after a larger share of the gaming market.

Qualcomm recently announced the Snapdragon 805 processor with the Adreno 420 GPU. With up to 40 percent graphics and compute performance improvement over its predecessor, the GPU enables ''advanced console quality gaming on Ultra HD or 4K displays, which is beyond what most consumers have in their living rooms'', according to Qualcomm.

The Snapdragon 805 processor, which runs four cores at up to 2.5GHz, is already available in small volumes and is expected to be available in commercial devices in the first half of 2014.

2014 will also see at least one major vendor emphasise that a new smartphone model can be transformed into a PC-like device, CCS Insight expects. The device will come with a second interface when deployed as a computer, which is something on which Ubuntu has been working. However, it will enjoy limited success, said CCS Insight.

More focus on low-end devices

Even though higher resolutions and faster network connections and processors will be enough to persuade some people to buy a new high-end smartphone, that segment of the market has plateaued. The key driver behind smartphone growth in the years ahead will be an expected price decrease, according to IDC.

In 2013, the average sales price for a smartphone was $337, down about 13 percent from $387 in 2012. This trend will continue and prices will gradually drop to $265 by 2017, according to the research company.

For vendors, this means finding a balance between performance, price and making a profit, according to IDC. But for users, this will result in more bang for their buck, and the difference between high-end and much cheaper phones will shrink.

The Motorola Moto G has already set a benchmark for phones that cost under £150 with its quad-core processor and 4.5in HD screen, and puts pressure on vendors such as Samsung and LG to come up with something better. We've reviewed the £135 Moto G at tinyurl.com/pckgd7n.

Motorola Mobility, which has been struggling, seems to have a hit with the Moto G. The smartphone has already had a major impact, despite being on sale for only a short time, according to Magnus Ahlqvist, Motorola corporate vice president for Europe, Middle East and Africa.

One thing that's missing from the Moto G's spec sheet is LTE, which is still too expensive for vendors to add to their low-end products. But that is likely to change as competition heats up in the chipset market. MediaTek is getting ready to launch its first SoCs (system-on-a-chips) with LTE, which is expected to help push the price for a smartphone with LTE below £200 without a contract during 2014. ⊠

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Jolla
Smartphone

The Jolla smartphone is a handset from a group of ex-Nokia employees. The device runs on Sailfish OS, which is based on MeeGo, previously owned by Nokia. The interface is entirely gesture based and interchangeable covers change content on the phone like wallpapers. Jolla offers a 4.5in IPS screen, 1.4GHz dual-core processor and an 8Mp rear camera.
€399 (£334)
jolla.com

YotaPhone
Smartphone

The Russian-made YotaPhone is a device that introduces an interesting concept to smartphones – it has not one, but two screens. On the front is a regular LCD display, while the back is a battery-saving E Ink screen. The rear offering can do much more than let you read books, though. It can show information such as notifications, emails, tweets or whatever you want really.
€499 (£418)
yotaphone.com

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Nokia Lumia 1520
Phablet
Nokia's latest smartphone is the Lumia 1520, and with a whopping 6in screen, it's placed firmly in the phablet category. Featuring the most up-to-date version of Windows Phone 8 the 1520 offers a Full HD screen resolution and a quad-core processor. The handset has a 20Mp PureView camera, too.
£550 inc VAT
nokia.com/gb-en

Yoyotech Warbird M-Cube I
PC
Powered by an AMD Black Edition processor and HD8670D graphics, the Warbird M-Cube I is an affordable gaming PC that comes in a range of colours. The price includes Windows 8.1 64-bit, and the M-Cube comes with an IPS monitor, gaming keyboard and mouse, and a free game.
From £599 inc VAT
yoyotech.co.uk

» Nike FuelBand SE vs Fitbit Force
Fitness trackers
Two of the latest fitness gadgets to help you lose some of those Christmas pounds are the Nike FuelBand SE and Fitbit Force. The FuelBand SE has a stronger but more flexible design than previously and is more accurate and efficient. Its rival, the Force, has features that were previously missing such as a proper screen, altimeter and the ability to tell the time.
FuelBand SE: £129 inc VAT; Force: $130 (£79)
nike.com/gb
fitbit.com/uk

VS

Amazon Kindle Fire HDX «
Tablet
Amazon has refreshed its table range with new 7- and 8.9in HDX models. They have higher screen resolutions (up to 2560x1600), faster quad-core processors and longer battery life. The HDX range comes pre-loaded with Fire OS 3.0 'mojito', which comes with a Mayday button for remote support. We review the 7in version in Hardware (from page 36).
£199 inc VAT (7in); £329 inc VAT (8.9in)
amazon.co.uk

Logitech PowerShell «

iPhone case

If you do a lot of gaming on your iPhone but get fed up of using the screen to play, then the PowerShell might be just what you've been waiting for. It adds console-style buttons and an analog d-pad to your smartphone for use with compatible iOS 7 games. It also has a built-in battery to keep you gaming for longer.

£89 inc VAT

logitech.com/en-gb

» Bayan Audio Soundbook X3

Bluetooth speaker

Bayan Audio's newest portable wireless speaker is the Soundbook X3. It uses Bluetooth 4.0 with the aptX codec and a built-in NFC chip for easy pairing with your devices. The X3 has 10 hours of battery life, an FM radio, four drivers and a bass radiator housed in an aluminium shell.

£249 inc VAT

bayanaudio.com

Nintendo 2DS «

Handheld gaming console

The 2DS is Nintendo's cheapest handheld games console and will, as the name suggests, play 3DS games in plain old two dimensions. Instead of the traditional clamshell design, it has a fixed structure but still has two screens, one of which is touch-sensitive.

£99 inc VAT

nintendo.co.uk ⊠

Amaon 7in Kindle Fire HDX **46**

36

38

43

ANDREW HARRISON

The hidden cost of choosing Google

Essential for a desktop PC, and just as invaluable for use with a laptop, is a monitor. It's your window into the world of the computer, and therefore your window into the world itself. Or maybe just the online version that we call the internet.

There are other uses of a computer beyond the internet of course, and many of these require the very best type of monitor you can find: photographers, graphic artists and CAD designers all demand an accurate monitor; one that can precisely convey the colour, contrast and fine details from an offline analogue world. We've assembled a group of six IPS monitors (page 74) that come at a slightly higher cost than normal. The additional expense means they'll reward you with better resolution, increased working- and viewing space, and more faithful colours than you see at the budget end of the market.

The monitor may be the device with which we monitor our computer, but what happens when the tables are turned and our computer begins to monitor us?

Ten years ago, anti-spyware was sold separately to traditional Windows antivirus software. It was designed to prevent unseen actors from quietly installing software on your PC, which might track your actions and the websites you visit, harvest your private details, and then phone home to sell on this information for profit.

Scroll on to today, and people seem to have forgotten this malware threat. Which beggars belief, since those small outbreaks of infection have turned into a worldwide pandemic.

There are now complete computing platforms that monitor every website you visit, report how long you stay on every page, and remember every search query you tap, no matter how personally embarrassing. They read your private email, track your physical location and learn where you live, find out where you work, and plot how you travel there.

Delusions of a privacy alarmist? More a warning to people who think of Android and Google Chromebooks as the cheap option. Cheap at purchase point, yes, but I'd suggest they are expensive in terms of the cost to your privacy.

When looking to buy your next phone, tablet or laptop, the cheapest is not the model with smallest number after the pound sign. It's the device that won't harvest your personal information and sell it on to advertisers as anonymous data.

And while Apple also collects lots of user data, unlike Google it doesn't sell it to advertisers. ⌧

PC ADVISOR TEST CENTRE

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£1,699 inc VAT
(256GB)

Contact
- apple.com/uk

Read more
- tinyurl.com/k3qsd9y

Specification
2GHz Intel Core i7-4750HQ; Intel Iris Pro graphics with 128MB DRAM; 15.4in (2880x1800) IPS display; OS X Mavericks; 256GB PCIe SSD; 8GB 1600MHz DDR3L RAM; ethernet and FireWire 800 via Thunderbolt adaptors (not included); HDMI 1.2, DisplayPort/Thunderbolt video out; dual-band 802.11a/b/n/ac 3x3 MIMO Wi-Fi; Bluetooth 4.0; 2x USB 3.0; 2x Thunderbolt 2; SDXC card slot; 958Wh non-removable lithium-polymer battery; 359x247x18mm; 2.02kg

PC ADVISOR
GOLD

Build:	★★★★★
Features:	★★★★½
Performance:	★★★★½
Value:	★★★★☆

★★★★½

LAPTOP
Apple MacBook Pro with Retina display 15in (late-2013)

When you need to get productive on your laptop, the 15in Apple MacBook Pro with Retina display could prove a real boon. It's not just because the screen gives you more working space; its larger frame can also accommodate more powerful processors and still run cool.

Just how productive is a moot point, since Apple is for the first time offering a 15in notebook without a discrete GPU. Leaving this out may make savings in cost and heat but, thanks to new hardware-acceleration techniques in creative software, the GPU now plays an important role off- as well as onscreen.

Every 15in Apple laptop since the PowerBook G4 has included either an AMD or nVidia graphics processor. And more recently, we've seen low-power Intel graphics included, too, with automatic switching that powers up the full-bore graphics only when relevant applications are running.

It's still not exactly cheap, but the £1,699 entry-level option relies entirely on the Iris Pro graphics solution that's embedded into a Core i7 quad-core processor. Once a recipe for slow-motion slideshows in place of fluid gaming video, Intel's integrated graphics may finally have come of age, if our recent tests of the 21.5in iMac are any indicator. In OS X Mavericks, Apple has also unlocked OpenCL to work with integrated graphics processors.

As with the 13in MacBook Pro update, there's in essence nothing externally new here. Even the battery inside remains the same, with multiple 95Wh lithium-polymer packs hard-glued to the inside of the chassis. But elsewhere inside is a different story.

We're focusing on the Intel-only model, but design professionals may be looking further upstream to the 'Best' Retina MacBook, which includes a 2.3GHz Core i7-4850HQ processor, 16GB of memory and 512GB of flash storage, plus an nVidia GeForce GT 750M graphics processor. And that model's graphics engine now includes 2GB of GDDR5 video RAM, for £2,199.

At £1,699, this 15in model has a 2GHz Core i7-4750HQ processor, 8GB of RAM, 256GB of storage, and the best Intel graphics available. Its internal updates include the Haswell processor for improved efficiency, PCI Express-based flash storage, and 802.11ac Wi-Fi.

Despite the slower clock of this entry-level version – 2GHz against the 2.3GHz of the first Retina Mac, and 2.4GHz of its February 2012 revision – this MacBook Pro runs faster than before.

In Geekbench 3, it averaged 3148 points in single-core- and 12,306 points in multi-core mode. Compare this with the 3124 and 12,044 points for 2012's MacBook with a 2.3GHz Core i7, and we see inconsequential 0.8- and 2.2 percent changes.

In Cinebench, we saw a similar fractional increase in CPU performance. Single-core mode rose from 1.28- to 1.34 points, and multi-core mode from 6.04- to 6.23 points in R11.5. And in R15's single-core mode we saw an increase from 108- to 115cb points, and from 520- to 564cb points in multi-core mode.

Cinebench R15 also told us the Iris Pro graphics could play at 28fps, a step up from the 22fps of our 13in sample with standard Iris graphics.

But using the older Cinebench R11.5 test, the new Iris Pro model played through with an average of 43fps.

Turning to games, and the Intel Iris Pro graphics proved more effective than an nVidia GeForce 650M solution. In Batman: Arkham City, we saw average framerates of 50fps from an nVidia 650M-equipped Retina MacBook Pro (1280x800, either Medium or High detail). The 2013 Iris Pro model played the same tests at 68- or 69fps. Stepping up to the screen's 1440x900 native resolution, it averaged 62- and 57fps at Medium and High detail.

The new storage upgrade worked well. We saw maximum sequential reads and writes of 791- and 751MB/s, while small-file random reads and writes were again balanced more in favour of writing, at 21- and 55MB/s respectively. Averaged from 4- to 1024kB, we saw random transfer rates of 196- and 328MB/s.

In the crusade waged by Apple against short battery life, the 15in MacBook Pro with Retina display benefits from the updates to the main processor and the operating system. The spec for all 15in MacBook Pro models now reads 'eight hours wireless web' – one hour longer than last year's figures, and one hour shorter than the 13in spec. And, as with the latter, we found our looped-video test measured runtime at eight hours, 14 minutes.

Verdict
We can see why Apple decided it was time to offer a 15in MacBook Pro without nVidia or AMD graphics. Intel's Iris Pro has wrought the kind of improvement that unlocks decent gameplay and rendering power.
⌧ Andrew Harrison

Specification

Specification: 2GHz Intel Core i7-3537U (3.1GHz Turbo); Windows 8 (64-bit); 4GB DDR3 SDRAM; 256GB SSD; 12.3in touch-sensitive IPS (1920x1080) display; Intel HD 4000; 802.11b/g/n; Bluetooth 4.0; 1x micro-HDMI, 1x mini-VGA; 2x USB 3.0; SD/SDHC/SDXC/MMC; 720p webcam with built-in mic; headphone/microphone socket; 50Wh lithium-polymer battery; 320x220x11mm; 1.3kg

Build: ★★★★★
Features: ★★★★☆
Performance: ★★★★☆
Value: ★★★★☆

★★★★☆

LAPTOP

Asus ZenBook Prime Touch

This gleaming, slimline laptop garnered rave reviews in its original incarnation as the ZenBook UX31E (tinyurl.com/6pg68z3), and quickly emerged as one of the leading lights of the first wave of Ultrabooks back in early 2012. But, having made such a big splash, Asus has been a little slow to update the ZenBook and keep it ahead of the pack.

In fact, one of the biggest changes with this latest model is its new name. That boring old model number has been relegated to a sticker on the base of the machine, while the packaging now proclaims this as the ZenBook Prime Touch (a small detail that still hasn't been updated on the Asus website).

That's the only visibly obvious change, though, and the basic design of the ZenBook remains unchanged. But, to be fair, that design remains striking even after almost two years. The ZenBook Prime Touch measures a maximum of 11mm thick along the back edge where the screen and keyboard panels hinge together, and tapers to a mere 3mm on the front edge. It only weighs 1.3kg, and the weight is so well balanced that you can easily pick it up and spin it around with one hand as you admire the sleek, metallic design.

The brushed-metal casing might owe an obvious debt to the Apple MacBook Air, but the dark, silvery-grey top panel looks classy, while the edge-to-edge glass on the screen panel makes the metal bezel of the MacBook Air look dated.

The keyboard and the large trackpad both feel comfortable to use, and although there's no ethernet interface, Asus includes a USB-to-ethernet adaptor for wired networks. Our only real complaint about the design is that the metallic edges of the unit are a little sharp, especially on the front edges of the keyboard section.

But that's all business as usual for the ZenBook. The main improvement with this model is that the 13.3in screen now provides touch-sensitive controls for Windows 8. The top-of-the-range model that we review here also includes an IPS display with 1920x1080 resolution, and a minor – 0.1GHz – speedbump to its Ivy Bridge processor.

The display is excellent, and definitely an improvement over its predecessor. The image is clear and detailed, with bright, vivid colours and wide viewing angles that will work well for streaming video, photo-editing or business presentations. The Bang and Olufsen speakers don't provide much bass, but they produce a clear, detailed sound and enough volume to let you listen to a few tunes without reaching for your headphones.

However, the rest of the machine's specification remains virtually unchanged from the previous model. That speedbump boosts the clock speed of the Ivy Bridge i7 processor from 1.9GHz to 2GHz, along with 4GB of memory and 256GB solid-state storage for a total price of £1,499. There's also an older model still on sale that includes an i5 processor and 1600x900 LED display without touch controls for around £1,000.

The lack of a Haswell upgrade is disappointing, though, mainly because of the battery life

improvement that it might have offered. The ZenBook's five hours (305 minutes) of streaming video was impressive 18 months ago, but now looks rather disappointing when compared to the 12 hours you can get from Haswell rivals such as the MacBook Air.

Performance, too, is respectable rather than breathtaking. The ZenBook's score of 5112 when running the PCMark 7 benchtest is more than adequate for running Microsoft Office, as well as more demanding applications such as photo- or video-editing. The Asus also starts up smoothly, too, taking just 12 seconds to cold boot and only pausing for two seconds before waking from sleep.

However, that score isn't great for a laptop costing the best part of £1,500. Even if the ZenBook can't stretch to a Haswell processor, then you would expect a dedicated graphics card. As it is, the integrated HD 4000 was only able to run Stalker: Call Of Pripyat at a meagre 15fps with medium graphics settings at 1920x1080 resolution, and the ZenBook had to drop down to 1280x720 to reach a playable 27fps.

Verdict

The ZenBook Prime Touch still looks great, and combines desktop-level performance with a slimline design that is extremely portable. However, the failure to provide a battery-efficient Haswell update is a missed opportunity, and means that the ZenBook isn't the leader that it used to be. ⊠ **Cliff Joseph**

Specification

2.4GHz Intel Core i7-4700MQ (3.4GHz Turbo); Windows 8 (64-bit); 16GB DDR3 SDRAM; 1TB HDD (5400rpm); 15.6in touch-sensitive (1920x1080) LED; Intel HD 4600/GeForce GT 740M (2GB); 802.11b/g/n; Bluetooth 4.0; 1x HDMI; Gigabit Ethernet; 4x USB 3.0; SD/SDHC/SDXC/MMC; 0.9Mp webcam with built-in mic; headphone socket; 62Wh lithium-ion battery; 379x250x30mm; 2.6kg

Build: ★★★★☆
Features: ★★★★☆
Performance: ★★★½☆
Value: ★★★½☆

★★★★½☆

LAPTOP

HP Envy TouchSmart 15-joo5ea

One of the key benefits of Intel's new Haswell processors is the improved power-efficiency that leads to greater battery life and portability. It seems a little odd, then, that the first Haswell laptop we've seen from HP should be a 15.6in desktop replacement system rather than a slimline Ultrabook.

To be fair, the Envy TouchSmart 15 is an attractive multimedia system with strong audio and video features, though, we were expecting something a bit more streamlined from a laptop that HP claims has been 'completely redesigned to be lighter and thinner'.

At the risk of annoying HP's design team, the TouchSmart looks rather like a 15in version of Apple's MacBook Air, with the same tapered profile, brushed-metal finish, and large, one-piece trackpad. It's better connected than the MacBook Air, though, with four USB 3.0 ports, HDMI, and Gigabit Ethernet available for networking and peripherals.

The keyboard also looks and feels very similar to that of the MacBook Air, with the same 19mm key pitch – although the size of the screen means that there's room for a separate numeric keypad as well. And, just below the keypad, you'll also find a fingerprint sensor for extra security.

However, the screen is in a different league from that of the MacBook Air – touch-sensitive and with full 1920x1080 resolution for high-definition video.

Viewing angles could be a little better – around 100 degrees horizontally and vertically – but the image is bright and colourful and works well for watching video, browsing the web or admiring your photo albums. It's good for

music, too, with Beats Audio quad speakers and a built-in subwoofer that produce a much warmer, fuller sound than you get from most laptop speakers. Music lovers also get a nice little bonus in the form of a year's free subscription to the Universal Music streaming service.

There's no DVD or Blu-ray drive, though, and yet the TouchSmart 15 still measures 30mm thick and weighs in at 2.6kg. We've seen many 15in laptops include a DVD drive and still weigh less, so portability isn't a strong point. Neither is battery life, unfortunately. Despite the inclusion of that Haswell processor the TouchSmart 15's compact little battery pack could barely manage 3.5 hours (200 minutes) when using the integrated graphics to stream video from the BBC iPlayer.

It's safe to say that you aren't going to be carrying the TouchSmart 15 around in a backpack with you on a regular basis. However, it can still earn its keep at home or in the office – particularly if you're looking for an entertainment machine with powerful multimedia features.

There are currently just two versions of the TouchSmart 15 available, priced at £799 with 8GB memory and 750GB hard drive, while our review unit included 16GB memory and 1TB drive for a total price of £999. Both models have the same quad-core i7 processor running at 2.4GHz, and GeForce 740M in addition to the standard HD 4600 integrated graphics.

The use of a 5400rpm drive means the TouchSmart 15 doesn't break any records when running the general-purpose PCMark 7 benchmark software, achieving an unremarkable score of 3550 points. However, the quad-core i7 processor has more than enough raw horsepower to handle demanding multimedia work such as video editing or audio recording. The healthy amount of RAM and storage space will come in handy here as well, allowing it to easily cope with large video files and high-res photos.

The GeForce graphics means that the TouchSmart 15 can handle some decent gaming action, too. We were able to run Stalker: Call Of Pripyat at 1920x1080 with medium graphics settings and still get a respectable 36fps, while dropping down to 1280x720 allowed it to cruise along at a comfortable 58.5fps. That's not hardcore fragging territory, but it's more than adequate for most casual gamers, and rounds out the TouchSmart 15's comprehensive set of multimedia features.

Verdict

The TouchSmart 15 isn't portable, even by the standards of other 15.6in laptops. However, its high-quality screen and speaker system make it an excellent entertainment machine for use at home, while the i7 processor provides desktop performance levels for even the most demanding graphics and video applications. ☒ **Cliff Joseph**

Specification

1.7GHz Intel Core i3-4010U; Windows 8 (64-bit); 8GB DDR3 RAM; 1TB HDD (5400rpm), 8GB solid-state cache; 20in (1600x900) IPS; Intel HD 4400; 802.11a/b/g/n; Bluetooth 4.0; Intel WiDi; 3x USB 3.0; SD/SDHC/SDXC/MMC; 720p webcam with built-in mic; headphone socket; 50Wh lithium-ion battery; 321x506x25mm; 5.4kg

Build: ★★★★☆
Features: ★★★★☆
Performance: ★★★☆☆
Value: ★★★½☆

★★★★½☆

LAPTOP
HP Rove 20

Convertible devices that can function as both a tablet and a laptop are all the rage at the moment – or at least that's what Intel and Microsoft would have us believe. Tablets and laptops are all about mobility, of course, so these convertible devices tend to be around 10 to 12 inches in size.

However, a few manufacturers have been experimenting with another type of convertible device – larger tablets that can also be used as a desktop PC, and HP's Rove is the latest addition to this fledgling category of 'mega tablets'.

When you take it out of the box for the first time, the Rove looks like a very large tablet. It has a 20in touch-sensitive screen, and includes Windows 8 running on a 1.7GHz Haswell i3 processor, 4GB of memory and a 1TB hard drive. That's the only configuration available at the moment, and costs £899.

The Rove weighs 5.4kg, so it's too big and heavy to hold like a conventional tablet. However, there's a stand that folds out of the back of the unit, allowing you to prop it up on a desk or table. The screen only has 1600x900 resolution, which is a little disappointing, but its IPS panel is bright and colourful and works very well for web browsing, watching video and playing games.

The size of the Rove also allows it to squeeze in a decent set of speakers, too, with respectable bass output and enough volume to listen to a few tunes or music videos on YouTube. And while we're still not convinced that touchscreens make any sense for laptops, a touchscreen this size is much more practical because it's far easier to tap and select items with your fingers. Even when you're using the traditional Windows desktop, you can still tap on icons and launch and control programs comfortably. We found it was easy to control Internet Explorer this way, and didn't have any problems clicking links and navigating.

Typing with the large onscreen keyboard is easy, too, although HP includes a wireless keyboard and mouse with the Rove as well. This means that you can use the Rove like a conventional desktop PC when you're working with Microsoft Word or other productivity apps, or if the kids need to work on a school report. The Rove also includes three USB 3.0 ports, for connecting a printer and other peripherals, and although there's no ethernet interface, HP provides a USB-to-ethernet adaptor for wired connections.

The i3 processor doesn't provide high-performance, but the 5400rpm hard drive includes an 8GB solid-state module that adds a little zip to overall performance and produces a score of 3255 when running PCMark 7. It'll handle Microsoft Office easily enough, and should also be able to handle a spot of photo or video editing as well. And, of course, that large hard disk provides plenty of room for media.

Gaming performance isn't up to much, though. The integrated HD 4400 graphics could only manage 18fps when running Stalker: Call of Pripyat at 1600x900 resolution, and 23.5fps at 1280x720, so gaming action will mostly be restricted to 2D family fare such as Angry Birds.

You're obviously not going to slip the Rove into your backpack, but it's still light enough to carry from room to room. You could use it with the keyboard and mouse on a desk when you need to do some work, and then pick it up and carry it into the bedroom to watch a movie.

The large screen needs a fair bit of battery power, and the Rove could only manage 3.5 hours (210 minutes) when streaming video off the BBC iPlayer. However, that's more than enough to watch a film in the evening, and the chances are that the Rove is never going to be that far from a mains socket at home.

Verdict

It's a shame that the Rove 20 is currently only available with an i3 processor, as it's probably not powerful enough to use as your main home PC. However, it will work really well as a second PC that acts as a kind of entertainment terminal that you can share with all the family. ⊠ **Cliff Joseph**

Specification

2.5GHz AMD A10-5750M; Windows 8 (64-bit); 8GB DDR3 RAM; 1TB HD (5400rpm); 15.6in (1366x768) LED; AMD Radeon HD8650G (integrated); DVD±R/RW; 802.11b/g/n; 1x HDMI, 1x VGA; 10/100 Ethernet; 2x USB 3.0, 1x USB 2.0; SD/SDHC/SDXC/MMC; 720p webcam with built-in mic; headphone/microphone socket; 41Wh lithium-ion battery; 375x260x28mm; 2.4kg

PC ADVISOR
RECOMMENDED

Build: ★★★★☆
Features: ★★★★☆
Performance: ★★★☆☆
Value: ★★★★☆

★★★★☆

LAPTOP
Lenovo G505s

Ever since the launch of Windows 8, PC manufacturers have been trying to sell us expensive Ultrabooks and tablets, and convertible tablets that think they're Ultrabooks. However, the top-selling laptops still tend to be unglamorous 15in models that sell for £500 or less, such as Lenovo's G-Series of 'everyday' notebooks.

Prices for the G-Series start at around £349 for a model with an AMD A4 processor, 4GB of memory and 1TB hard drive. We tested the new G505s, priced £499 with an A10 processor running at 2.5GHz, 8GB of memory and 1TB hard drive. The G-Series also includes one 17in model, which costs an extra £50, for people who need a larger screen.

You're not going to get anything fancy for that sort of price, but the G505s gets all the basics right. The laptop's case is made out of plastic, but it has a smart matt-black finish and feels sturdy enough to withstand the occasional bump in a backpack. The keyboard is firm and comfortable, and was large enough to let us type at full speed when we took the G505s down to our local Wi-Fi watering hole. Our only complaint here is that the trackpad isn't very sensitive, and you sometimes need to give it a good firm tap in order to click a button or launch an app.

It's also rather heavy, weighing 2.4kg and measuring 28mm thick when folded flat. However, that's about average for a 15in laptop with a built-in DVD drive such as

this, and the weight was just about manageable when we took it to a Wi-Fi bar for an afternoon. It's no Ultrabook, though, and will spend most of its time indoors.

Battery life is also a little disappointing. A laptop such as this ought to have room for a reasonably large battery, but the under-sized offering in the G505s provides a capacity of just 41Wh, and could only manage three hours (180 minutes) of streaming video on the BBC iPlayer. More casual web browsing or running Microsoft Office apps might allow you to stretch that out for another hour, but that's still poor even for a laptop in this price range. Our review of budget laptops (page 66) found that four to five hours of streaming video was common, so the G505s certainly leaves room for improvement there.

The screen is good for a laptop in this price range, though. It's not touch-sensitive, and the 1366x768 resolution isn't ideal on a 15.6in display such as this, but those are acceptable compromises at this price. More importantly, the image is bright and clear, with viewing angles wide enough that you can browse the web or sit back and watch some streaming video without having to constantly adjust the screen. And while we're not sure what a 'glare wedge' is, we were pleased to find that the screen of the G505s was less glossy and reflective than that of many laptops we've seen recently.

It's well connected, too, with an ethernet port for a wired network, two USB 3.0 ports, one USB 2.0, memory card slot and both HDMI and VGA ports for connecting a larger screen. There's no Bluetooth, though, so wireless connectivity is limited to 802.11 b/g/n.

Performance is modest, as shown by a PCMark 7 score of just 2700. But, to be fair, that score is largely a reflection on the 5400rpm hard drive, and the 2.5GHz AMD processor is more than adequate for web browsing and running Microsoft Office. The healthy 8GB of memory should also allow you to tackle more demanding tasks, such as the occasional spot of photo- or video-editing, while the 1TB drive provides plenty of room for storing music, photos and videos.

It can even handle a spot of casual gaming as the integrated Radeon HD8650G graphics managed a playable 35fps when running Stalker with medium graphics settings at 1280x720 resolution.

Verdict

The limited battery life is disappointing, but that's not a fatal flaw since a large laptop such as the G505s isn't going to spend a lot of time out and about anyway. Other features, such as performance, screen quality and the comfortable keyboard, are all good for a laptop in this price range, making the G505s a good option for people who need a reliable workhorse laptop for around £500. ⊠ **Cliff Joseph**

£1,350 inc VAT

Contact
■ samsung.com/uk
Read more
■ tinyurl.com/qx2k88k

2.4GHz Intel Core i7-3635QM quad-core (3.4GHz Turboboost); 15.6in (1920 x 1080) glossy touchscreen TN LCD; Windows 8 (64-bit); 8GB DDR3 SDRAM; 1TB HDD (5400rpm); AMD Radeon HD 8870M Graphics with 2GB GDDR5; dual-band 802.11a/b/g/n with 2x2 MIMO; Bluetooth 4.0; VGA; HDMI; gigabit ethernet; 2x USB 3.0, 2x USB 2.0; SDXC card reader; 720p webcam; Combined mic/headphone socket; Kensington lock slot; 91Wh lithium-ion battery; 376x250x24mm; 2.5kg

Build: ★★★½☆
Features: ★★★½☆
Performance: ★★★★☆
Value: ★★½☆☆

★★★½☆

LAPTOP

Samsung Ativ Book 8

Samsung rebranded its laptop range recently, turning 'Series' products into 'Ativ'. The Series 7 Chronos we reviewed before (tinyurl.com/7wl99pd) cost under £600, but at £1,350 the Ativ Book 8 is priced at more than double this.

So the Series 7 Chronos has morphed into the Ativ Book 8, but what's changed other than the name? The laptop looks extremely similar in terms of style and still runs Windows 8, though, there are some important changes that help explain the price hike.

For starters, the Chronos doesn't have a touchscreen whereas the Ativ Book 8 does. Whether this is an upgrade or not is a matter of opinion; we rarely use the touch facility on a laptop.

A potentially better improvement is that the screen resolution is now a full-HD 1920x1080 pixels – for many, a more suitable spec for a 15.6in screen size. Viewing angles are excellent, but the glossy surface counteracts this somewhat – a shame considering the older model has a nice non-reflective matt finish. But shiny is something nearly unavoidable for touchscreens.

You might assume that the Ativ Book 8 comes with the latest fourth-generation Intel Haswell processor. However, it has a third-generation Ivy Bridge chip – in this case a Core i7-3635QM that's clocked at 2.4GHz (3.4GHz with Turbo). There's 8GB of DDR3 1600MHz RAM and a large 1TB 5400rpm hard drive.

The Ativ Book 8 is a still a workhorse laptop and could make a good desktop replacement – it scores a mighty 4458 points in PCMark 7. However, while these scores are impressive, the Ivy Bridge chip is a negative point when it comes to battery life.

Battery life

The Chronos range exhibits good battery life and Samsung touts a total of 10.5 hours for this Ativ Book 8. But in our video playback over Wi-Fi test, the laptop lasted just five hours, 50 minutes. We were hoping for better, especially since it now packs a larger 91Wh battery.

An AMD Radeon HD 8870M graphics card with 2GB GDDR5 of memory means that it's more than capable of gaming. The Ativ Book 8 managed an impressive framerate of 62fps in Stalker: Call of Pripyat with a 720p resolution. At the laptop's native 1080p, the performance only dropped to 54fps.

The older model also has a slot-load DVD optical drive whereas the Ativ Book 8 does not. You might think this is because Samsung has trimmed the laptop down so it no longer fits, but we've measured it – it's the same 24mm thick chassis.

So what has it got instead? The answer is a full-size VGA port that doesn't require an adaptor and an additional USB 2.0 slot. That's on top of the HDMI port, two USB 3.0 sockets, an SDXC card slot, gigabit ethernet, and a combined mic and headphone socket.

Unchanged is the fact that this laptop is in some ways a joy to use, with a nicely designed keyboard with a separate number pad. The trackpad is very large and responds well to input. However, we found that clicking the integrated mouse buttons would usually send the mouse pointer flying, which we found an annoying hindrance.

Build quality is good, with a nice brushed aluminium lid and keyboard surround, while the underside remains plastic. It's hardly a very travel-friendly laptop, though, at just over 2.5kg.

Verdict

We'd rather have an optical drive instead of a touchscreen, but this is hardly uncommon. Nevertheless, the Samsung Ativ Book 8 is a powerhouse Windows 8 laptop. We like the smart design and usability, but you're paying a lot of money for a 2012-spec laptop, when 2013's processors changed the game. While processing performance is good, it's seriously missing out on the battery life we're seeing from newer Haswell chips. ⊠ **Chris Martin**

£1,699 inc VAT

Contact
- toshiba.co.uk

Read more
- tinyurl.com/p5bd3gb

Specification

2.4GHz Intel Core i7-4700MQ (3.4GHz Turbo); Windows 8 (64-bit); 16GB DDR3L RAM; 1TB hybrid HDD (5400rpm)/256GB SSD; 17.3in (1920x1080) LED; Intel HD 4600/ GeForce GTX 770M (3GB); 802.11b/g/n; Bluetooth 4.0; Intel WiDi; 1x HDMI, 1x VGA; Gigabit Ethernet; 2x USB 3.0, 2x USB 2.0; SD/SDHC/SDXC/MMC; 2Mp webcam with built-in mic; headphone socket, microphone socket; 47Wh lithium-Ion battery; 418x272.5x44mm; 3.4kg

Build: ★★★★☆
Features: ★★★★★
Performance: ★★★★★
Value: ★★★★☆

★★★★½

LAPTOP

Toshiba Qosmio X70-A

Toshiba's years of experience in the television market ensures it always equips its Qosmio multimedia laptops with high-quality displays that work well for watching video, browsing photos, and other forms of entertainment. However, the Qosmio X70-A is one of the company's few attempts to produce an out-and-out gaming rig.

It's a pretty good effort, too – although, like most high-end gaming machines, its heavyweight performance comes with an equally heavyweight price tag. Just one Haswell configuration is available at the moment, priced at £1,699, with a 17.3in screen, quad-core i7 running at 2.4GHz (3.4GHz Turboboost), 16GB of memory and both a 1TB hard drive and a 256GB solid-state drive. Graphics duties are handled by either the integrated Intel HD 4600 or an nVidia GeForce GTX 770M with 3GB of video memory. The only other option is an older Ivy Bridge model called the X870 that also includes a 3D display and glasses, which pushes the price up to £1,799.

Like most gaming laptops, the X70-A is a bit of a beast. Weighing in at 3.4kg and measuring 44m thick when folded flat, it's very much a stay-at-home laptop. It has a more subdued design than many of its gaming rivals, with a matt black aluminium case finished off with smart red trim around the edges. It does, however, include the obligatory smouldering red backlight on the keyboard just to let you know that it means business.

The 1920x1080 screen is sharp, colourful and very bright, with almost a full 180-degree horizontal viewing angle. The vertical viewing angle is a little more limited, but you have to physically lift the front edge of the keyboard up off your desk and tilt the screen right back before visibility starts to drop, so you'll always have a good view of the onscreen action during your gaming sessions. It's not touch-sensitive, but we doubt that many gamers will be worried about that.

The speakers came as a pleasant surprise, too. Designed by Harman Kardon, the four-speaker system is one of the loudest we've ever heard on a laptop. It produces a warmer sound than most laptops, and even manages decent bass output, too. It's certainly more than adequate for watching streaming video, listening to some music or gaming, without needing to plug in any headphones or speakers. The X70-A also includes a Blu-ray player for watching HD movies, and you can use either the HDMI interface, VGA or built-in WiDi if you want to connect it to a larger screen.

Even the keyboard and trackpad are well constructed. The keys have a very smooth action and will be comfortable for prolonged use, while the large trackpad responds quickly to even a gentle tap and lets you right-click by tapping with two fingers rather than having to press the right mouse button.

No corners have been cut on performance, either. The large hard drive only runs at 5400rpm, but it provides plenty of room for all your games, music and videos, while the secondary SSD adds some zip to overall performance. The X70-A managed a score of 6164 when running the general-purpose PCMark 7 benchtest, which puts it right up among the most powerful laptops we've seen in recent months.

The same is true of gaming performance. The X70-A managed 43fps even when running Batman: Arkham City at 1920x1080 with all the DX11 eye-candy and both graphics detail and anti-aliasing set to 'high', while turning those settings down to 'medium' allowed it to hit 50fps. We've seen other gaming laptops, such as the Chillblast Messiah (tinyurl.com/pcjp94q), that can exceed 50fps with Batman on 'high', but that costs £1,800, so the X70-A holds its own in terms of value for money.

The only minor disappointment is battery life. The 47Wh battery is modest for such a large laptop and barely stretches past three hours (185 minutes) when using the integrated graphics to stream video from the BBC iPlayer. Still, a laptop as big and heavy as this isn't going to leave home very often, so that's not the end of the world.

Verdict

The X70-A is expensive, but not over-priced when compared to many rival gaming laptops. In addition to its strong gaming performance the X70-A also provides an attractive screen and speakers that make it a great all-round entertainment machine. ⊠ **Cliff Joseph**

LAPTOP

Toshiba Satellite L50T-A-130

Specification
1.6GHz i5-4200U (2.6GHz Turboboost); Windows 8 (64-bit); 8GB DDR3 memory; 1TB hard drive (5400rpm); 15.6in (1366x768) LED touchscreen display; Intel HD 4400 graphics; 802.11b/g/n; Bluetooth 4.0; HDMI/VGA; 2x USB 3.0, 1x USB 2.0; 720p webcam with built-in mic; headphone and microphone sockets; SD card reader (SD/SDHC/SDXC/MMC); 43Wh, non-removable Lithium-Ion battery; 377.5x244x28.8mm; 2.5kg

Build: ★★★★☆
Features: ★★★★☆
Performance: ★★★☆☆
Value: ★★★☆☆

★★★★☆

Toshiba has been a bit slow off the mark to produce new laptops with Haswell processors, and even the Satellite L50T-A-130 is a modest effort that's unlikely to grab any headlines. It has the same unassuming design as many other models in the Satellite range, with a silver-grey plastic case that looks reasonably smart but not particularly exciting. It'll probably be equally deskbound, too, as the 15in screen and built-in DVD drive mean that it measures 29mm thick and weighs in at 2.5kg.

The build quality is perfectly good, though, with a sturdy panel to protect the screen, and a keyboard and trackpad that are both roomy and comfortable to use. The one standout feature is the large speaker grill that runs almost the entire width of the keyboard panel. Designed by Onkyo, the stereo speaker system produces a decent amount of raw volume, while the bundled DTS Sound software includes a 10-band equalizer, as well as options for quickly adjusting bass, treble and vocals on music. A few quick tweaks here allowed us to produce a better sound than most laptop speakers – and we even had to turn it down on occasion as they were too loud in our office.

That's the one real highlight, though, and other aspects of the L50T's design are much more mundane. The 15.6in screen is bright and clear, and perfectly adequate for browsing the web or watching some streaming video. However, the entry-level 1366x768-pixel resolution is disappointing in a mid-range laptop that costs around £650 – especially as Toshiba is specifically positioning it as a multimedia machine.

There's also some room for improvement in the viewing angles, which were only around 120 degrees both horizontally and vertically. Even so, that's still perfectly adequate for general use and didn't cause us any real problems during testing. It's also worth pointing out that the screen is touch-sensitive, which adds to the overall value for money – although we suspect that many people would gladly swap the touch controls for a higher quality screen.

Performance is a similarly mixed bag. There are less expensive models in the L50T range that use Ivy Bridge and even AMD processors, but the L50T-A-130 comes in at around £650 with a Haswell i5 running at 1.6GHz, along with a healthy 8GB of memory and 1TB hard drive.

We know that the Haswell chip is capable of strong performance even at relatively modest clock speeds, but Toshiba doesn't do itself any favours by pairing the state-of-the-art processor with an aging 5400rpm hard drive. The end result is a score of just 2850 when running the PCMark 7 benchtests. That's perfectly adequate for running Microsoft Office, web browsing or a spot of photo-editing but, again, is still the sort of performance we'd associate with laptops costing closer to £500.

Thankfully, the improved performance of the Haswell processor's HD 4400 integrated graphics means that the L50T can just about handle some casual gaming action, reaching 26.5fps when running Stalker: Call Of Pripyat at 1280x720 resolution with medium graphics settings. Haswell also comes to the rescue on battery life, providing a full five hours and 15 minutes of streaming video via its onboard Wi-Fi. That's not going to break any records, but it's above average for a model with a 15in screen and ensures that you will be able to get plenty of work done – as long as you have the strength to carry it around with you.

Verdict

Looking back over this review, we do seem to have used the word 'adequate' rather a lot. That pretty much sums up the L50T-A-130, as it's adequate in most respects but – apart from the beefy speakers – really doesn't stand out in any particular way. Cut the price by £100 and it'd be a good budget offering, but at £649 it may struggle to compete with its many mid-range rivals. ☒ **Cliff Joseph**

£430 inc VAT

Contact
- microsoft.com/uk

Read more
- tinyurl.com/m6j4khs

Specification

8 Core x86 AMD CPU; 8GB RAM; 500GB storage space; Blu-ray drive; 802.11n wireless; gigabit ethernet; HDMI in/out; 1080p; 4K support; optical out; USB 3.0

★★★★☆

GAMES CONSOLE

Microsoft Xbox One

Microsoft's Xbox One is an ambitious new system that intends to streamline your digital entertainment lifestyle, allowing live television to run simultaneously alongside gaming and apps.

This already positions Xbox One as far more than a traditional games console in the vein of Xbox 360, and arguably a more progressive piece of kit than Sony's PlayStation 4. On top of all that, it's bundled with an advanced version of the motion sensing Kinect camera, updated with the ability to read biometric data and see using infrared.

With new ways to combine entertainment, plus the novelty of gesture- and voice-control, Xbox One makes strides toward its own vision of the future. Though, it's not without a few trips and stumbles as we discovered during our road test.

Inside, the console uses an AMD x86 64-bit processor with 8 'Jaguar' cores and an estimated clock speed of 1.75GHz. There's also 8GB of DDR3 RAM, coupled with 32MB of eSRAM embedded memory to be used by developers as a cache. You get a 500GB hard drive, too.

The console comes with a Blu-ray/DVD drive as standard, and offers Wi-Fi, ethernet, optical out and USB 3.0. There's HDMI out and an HDMI in port on your console, which supports 4K.

You'll need to connect to the internet before powering up Xbox One for the first time, otherwise your console is nothing more than a chunk of plastic and metal. Booting up initiates a Day One patch that takes a few minutes to install.

With this done, it's decision time. First, the Kinect sensor. Would you like it to remain on or off? If you

decide to have it on, then you'll be able to use it to interact using gesture and voice control, which affects dashboard and in-game functionality.

Xbox One can respond, via Kinect, to basic voice commands that begin by saying "Xbox..." followed by specific instructions. Stating "Xbox On" impressively powers up the console before you even sit down on the sofa.

Kinect also swiftly signs-in users whose face the camera has recognised. Saying "Xbox Select" highlights in green the names of onscreen icons for you to clearly enunciate. The problem is, if you don't employ a commanding voice and articulate words in the manner of a strict teacher, Xbox One rarely cooperates on the first or even second attempts.

Gesture control accuracy is worse, and the practice of using hands and arms to sort through menus is torturous compared to the instant success of pressing a button.

With room for improvement regarding Kinect, this leaves the 'HDMI In' slot to add value, primarily integrating your TV set-top box into the Xbox One suite of dashboard options. After correcting some minor settings issues, watching TV via Xbox One was problem-free, though, we did notice slight image judder on some programmes.

In the US, Xbox One features an app called the OneGuide that overlays the TV signal, allowing for voice-activated navigation and channel search. Sadly for UK customers, the app isn't expected to become available until later in 2014. Until then, Xbox One TV integration adds nothing more than picture-in-picture style presentation via the dashboard's 'Snap' function.

Finally, on the subject of video, Xbox One will support 4K resolution video output at a later date. For now,

though, 1080p is the highest you'll see on your HDTV. Gamers shouldn't get their hopes up regarding 4K interactive experiences, though, since 1080p already seems a stretch for existing software.

Skype was the most pleasant surprise among all the applications available for Xbox One at launch. Once signed in, voice-activating a call with your existing contacts is quick and easy. While talking, Skype can run in the background while you play a game and/or watch TV, or explore other apps.

As a gaming console, Microsoft's offering is more stable, though, it lags behind Sony's PlayStation 4 in the raw performance stakes. Both devices use an AMD CPU and GPU, but the Xbox One chipset is geared towards complex media functionality whereas Sony allotted its silicon budget in favour of gaming. That said, any visual differences seem negligible across most games available for both, and only affect a handful of launch titles. Call of Duty Ghosts runs at twice the resolution on the PlayStation 4, but FIFA 14 is identical.

Our only quibble with the traditional gaming side of things is that the Xbox One controller requires AA batteries, or a rechargeable battery pack, to function wirelessly. PS4 controllers charge directly via USB as you would a smartphone. In the context of everything else being so forward looking on Xbox One, worrying about batteries seems a step backwards.

Verdict

Xbox One offers a glimpse of the future. While implementation leaves a lot to be desired at this early stage, many of the performance issues are likely to be software based and fixable via future updates. ⊠ **Paul Davies**
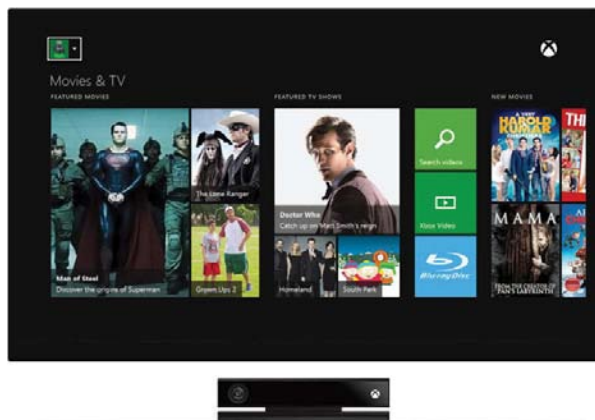
Specification
1.5GHz Intel Core i5-4210Y;
Windows 8 (64-bit); 4GB
DDR3L SDRAM; 126GB
solid-state drive; 11.6in
(1920x1080) IPS display;
Intel HD 4200; 802.11a/b/g/n;
Bluetooth 4.0; 1x USB 3.0;
SD/SDHC/SDXC; rear
camera, 8Mp; front
camera , 0.9Mp; webcam
with built-in mic; SIM slot;
headphone socket;
lithium-ion battery;
300x187x7.5mm; 800g

Build: ★★★★☆
Features: ★★★★☆
Performance: ★★★☆☆
Value: ★★★★☆

★★★★☆

TABLET
Sony Tap 11

Sony seems to have a bit of a fetish for developing 'the world's thinnest' gadgets. It has already done so with the recently launched Vaio Pro (tinyurl.com/ortteba), and the company is now turning its attention to the tablet market with the Tap 11.

Oddly, though, while Sony proclaims the Tap 11 to be "the world's thinnest Windows 8 tablet PC", the product pages on the company's website don't tell you how thin it really is, nor how much it weighs. So you'll have to take our word for it that the Tap 11 measures just 10mm thick and weighs 800g. The new iPad Air undercuts that by quite a bit – at just 7.5mm thick and a maximum weight of 478g – but, of course, the iPad isn't a Windows tablet. Sony's closest rival on the Windows side of the fence is the Microsoft Surface Pro 2 (tinyurl.com/qx9ezmb), which weighs closer to 1kg, so the Tapp 11 does seem to have the bragging rights on this one for now.

The Vaio Pro was marred by its less than sturdy build quality, and we have to admit that the plastic case of the Tap 11 looks a bit cheap and cheerful for a machine that costs over £1,000. There are also a few niggling flaws, such as the annoying and flimsy flaps that cover some of the ports on the edges of the tablet. But, to be fair, the plastic case does feel reasonably sturdy, and should be able to cope with life in a backpack or briefcase.

The 800g weight and the elongated 11.6in widescreen display, mean that you can't really hold it in one hand for very long, so you'll probably need to rest it on your lap or on a table for casual web browsing. However, the Tap 11 also incorporates Sony's high-tech 'Omnibalance' system – also known as 'a stand', which folds out of the back of the tablet, so you can sit back and watch some streaming video at your leisure.

This is where the Tap 11 comes into its own, as the 1920x1080 screen is bright and colourful, with excellent all-round viewing angles. It will work very well for watching video or giving an impromptu presentation when you're on the road. The speakers aren't bad either – they're too small to produce much bass, but the overall sound quality is more than adequate for listening to a few tunes or watching a movie online.

If you need to do some serious work, then Sony also includes both a wireless keyboard and a stylus for use with the Tap 11. The keyboard is clearly an attempt to mimic the keyboard cover of Microsoft's Surface tablet, but isn't as successful. The slimline keyboard panel can be placed over the screen in order to act as a cover, but it's held in place magnetically and isn't really secure enough to provide much protection. Sony describes it as a "full pitch" keyboard, which is accurate as the key pitch is a full 19mm, and there's also room for a small trackpad (90x40mm) and a pair of buttons. However, the keys don't travel very well and feel rather lifeless, so we're not sure we'd want to use it for long periods of time.

Connectivity is a bit limited, too, with just a single USB 3.0 port, microSD slot and micro HDMI. There's a SIM slot for mobile broadband, though, and you can also buy an ethernet adaptor for another £50. And while it's not the most powerful tablet we've ever seen, the Tap 11 is still perfectly capable of handling most routine computing tasks.

Prices start at around £850 for a model with a Pentium processor, but our review unit was equipped with a 1.5GHz Haswell i5 along with 4GB of (non-upgradeable) memory and 128GB solid-state storage for a total cost of £1,048. That combination produced a score of 3392 when running the general-purpose PCMark 7 benchmark, which isn't going to break any records but is more than adequate for running Microsoft Office and handling web browsing and some online entertainment.

You can forget about 3D gaming, though, as the integrated Intel HD 4200 could barely manage 8fps when running Stalker at 1280x720 resolution. The 8Mp rear camera proved rather disappointing, too, especially when the light started to fail on a rainy November afternoon.

The biggest disappointment, though, is the limited battery life. That slimline design doesn't leave much room for a battery and we got just four hours, 45 minutes of streaming video out of the Tap 11. You might be able to stretch that to around six hours if you're not using Wi-Fi all the time, but Sony's claim of 'up to 8.5 hours', seems optimistic.

Verdict
The lightweight, slimline design of the Tap 11 is undeniably attractive, and it's powerful enough to handle both entertainment and routine office work when it needs to. However, its modest battery life, and rather unappealing keyboard make it look a bit overpriced compared to rivals such as the Surface Pro 2 that come in well under £1,000. ⊠ **Andrew Harrison**

£199 inc VAT
(16GB Wi-Fi))

Contact
- amazon.co.uk

Read more
- tinyurl.com/o96x4nz

Specification
2.2GHz quad-core CPU; Customised Android 4.2.2 Jelly Bean; 7in IPS touchscreen (1920x1200) LCD; 2GB RAM; 16GB, 32GB or 64GB storage (4G also optional); 802.11b/g/n dual-band 2.4GHz and 5GHz; dual antenna; Micro-USB 2.0 port; accelerometer, gyroscope; 9W mains charger, USB cable; 1-year warranty; 186x128x9mm; 303g

Build: ★★★★☆
Features: ★★★★☆
Performance: ★★★★½
Value: ★★★★☆

★★★★☆

TABLET

Amazon 7in Kindle Fire HDX

Amazon's Kindle Fire range is constantly expanding, and the new HDX models are the latest additions. The 7in option has exactly the same design as the Fire HD (tinyurl.com/ch6clnz), with angular chamfers at the back. The flush-mounted buttons are much easier to find and use than on old Kindle Fires, too.

Build quality is excellent and we love the soft-feel back. The 'sharp' edges mean it's not comfortable to hold in one hand, though.

There are just two ports: a headphone socket on the right (when in landscape mode) and Micro-USB on the left. Unlike the camera-less Fire HD, the HDX has a webcam that can capture 720p video and be used for Skype calls.

At the top on the back is a glossy strip that houses stereo speakers. These are surprisingly good for watching videos or catch-up TV from iPlayer, and even listening to music. They're loud, too.

The HDX moniker refers to the new Kindle's screen. It has a higher 1920x1200 resolution than the HD (1280x800) and, importantly, is able to reproduce 100 percent of the sRGB gamut. Photos look almost hyper-real, with vibrant – but realistic – colour. It's very bright, too, and has great viewing angles.

However, there's a problem. In order to get that sRGB coverage and not compromise battery life, Amazon has used blue, rather than white, LEDs. For the most part, you won't notice, but any screen with a white or light-coloured background at the edges has prominent blue strips. This blue

light 'leaking' through from the LEDs, and it can't be avoided.

Storage-wise, there's a choice of 16-, 32- and 64GB models. You've also the option of those capacities in a Wi-Fi + 4G model, with the top 64GB version costing £329. Bluetooth is standard on all models, but only 4G versions have built-in GPS for accurate location services.

Equipped with a Snapdragon 800 quad-core processor running at 2.2GHz, the Fire HDX is an outstanding performer. We saw no hesitation or stuttering at any point during testing, and the dual-antenna Wi-Fi also appeared to be paying dividends, with snappy app downloads and quick web page loading times.

Amazon says you can expect 11 hours of mixed use from the non-removable battery, or 17 hours when reading books. Running our usual video-looping test, the HDX lasted for six hours, 38 minutes. That's at full brightness, half volume and with Wi-Fi enabled: a tough test. Still, other tablets, such as the Google Nexus 7 (tinyurl.com/m9hnr8q), have lasted longer.

The updated Fire OS software is a triumph. A lot of niggles that tainted the older versions have been addressed and it's easier to use.

Pretty much everything can be stored in the cloud, which is why there are buttons at the top of each section marked 'Cloud' and 'On device'. By default, you see the Cloud view, and tapping on an item downloads it immediately.

Good as these improvements are, the Fire HDX is exactly like all

other Fire tablets: it locks you into Amazon's world. It's no hardship being limited to buying ebooks and audio books from the well-stocked libraries, but the choice of apps in Amazon's Appstore lags behind plain Android devices.

BBC iPlayer is still the only UK-specific catch-up app, and you can't watch shows through other providers' websites because there's no Flash support in the Silk web browser. You won't find Google apps, either. There are third-party paid-for apps that let you access Google Maps, Gmail and YouTube, but it's a shame the free, official apps aren't there. With the choice of LoveFilm Instant or Netflix, we've no gripes about streaming TV shows and movies, though.

A feature that's exclusive to HDX tablets is the Mayday button. If you need help with your Kindle, swipe down from the top of the screen to see the menu, then tap Mayday. Tapping the Connect button will put you in a queue to speak to one of Amazon's Tech Advisors. We tried out the service and were impressed that our call was answered in under 10 seconds. You'll see a small video window of your helper, though, they can't see you. Given that this is a free service available any time of the day or night, it clearly adds value especially if this is your first tablet.

Verdict

The Fire HDX is a great choice for undemanding users who will benefit from the closed, safe, easy-to-use ecosystem and the tech support via the Mayday button. ⊠ **Jim Martin**

Specification

3.4GHz Intel Core i5-4670K overclocked to 4.4GHz; Windows 7 64-bit; 8GB DDR3 memory; 120GB SSD; 1TB hard drive (7200rpm); nVidia GeForce GTX 760 2GB VRAM graphics; Gigabyte GA-Z87-HD3 motherboard; DVD writer; gigabit ethernet; 2x DVI-I, 1x HDMI, 1x DisplayPort; 6x USB 3.0; 4x USB 2.0; 8x audio jacks; Corsair CX500M PSU; BitFenix Shinobi case; 205x460x490mm; 1-year collect-and-return warranty

PC ADVISOR
RECOMMENDED

Build: ★★★★☆
Features: ★★★★☆
Performance: ★★★★☆
Value: ★★★★☆

★★★★☆

GAMING PC

Aria Gladiator Sabre

Aria has long used the Gladiator name for its gaming systems, and its latest rig – the Sabre – aims to provide enough power to play the latest games at top settings for the reasonable price of £860.

The Haswell processor is a superb start. The Core i5-4670K has a tempting stock speed of 3.4GHz and a Turbo peak of 3.8GHz, but Aria beats both of these figures by overclocking the chip to a meatier 4.4GHz. It's a potent tweak. The Sabre whizzed through our PCMark 7 benchmark to score 7096 points, which easily bests the 5501 points from the AMD-powered Braebo Annihilator (tinyurl.com/m6nnsty) – and it's even quicker than the 7045 points scored by the Chillblast Fusion Uzi (tinyurl.com/p58mmmg), which costs almost £400 more.

The processor is chilled by a Corsair H80i water-cooling unit. It's a single-fan kit that attaches to the exhaust mount at the back of the chassis, and it does a good job: during our tests, the overclocked processor never rose above 57°C.

The nVidia GeForce GTX 760 2GB VRAM graphics card in this particular machine is an MSI-made Twin FrozR Dragon Edition, which means it's been given a helping hand with some factory overclocking: the original 915MHz speed has risen to 1,085MHz, and it'll hit a huge 1,150MHz when it uses nVidia's GPU Boost option.

The overclocked graphics card has enough power to handle modern games at top settings across one screen. We ran Stalker: Call of Pripyat with every option turned to maximum at 1920x1080 and the Sabre averaged 70.3fps – and at Bioshock Infinite's top settings this machine averaged 66fps.

The Samsung Evo Series is the firm's latest SSD, and the 120GB model used as here as a boot drive returned sequential read and write results of 517MB/s and 396MB/s in AS SSD. The former score is one of the best we've seen, although the latter is mid-range.

The rest of the specification comprises 8GB of DDR3 RAM, a 1TB hard disk and a DVD writer.

The Sabre's exterior impressed, too. The BitFenix Shinobi is a budget case, but you wouldn't know it: it's built from black matt plastic, the stylish logo gleams and the 460mm-tall facade is bordered by parallel meshed bands. The build quality is good, too – the sturdy front panel is paired with two solid side-panels that barely flex.

The matt black finish continues on the inside, and Aria has partnered the dark colouring with similar components. The Gigabyte GA-Z87-HD3 motherboard has a black PCB, and the power supply uses black cables that look far classier than the coloured cables on cheaper units. It's tidy throughout.

The Gigabyte motherboard has vacant PCI Express x16 and x1 slots, and legacy expansion cards are supported by two PCI sockets. Two spare memory sockets each support 8GB of RAM, and they're not blocked by the Corsair heatsink.

Storage expansion is handled by six tool-free 3.5in bays that sadly don't face the side of the chassis – rather, they point towards the motherboard – and there are two free 5.25in bays. The front has pairs of USB 3.0 and USB 2.0 ports and two audio jacks, and the rear provides four more USB 3.0 sockets, two USB 2.0 ports, a PS/2 jack, an ethernet plug and six audio jacks.

Our only issue is noise. The Sabre churned out a low hum when idling, but this increased during intense gameplay. A good set of speakers will drown it out, but it's worth remembering if you're searching for a quiet PC.

Verdict

Aria's latest PC is excellent in almost all areas: the overclocked processor is a top-end part that won't balk at any task, and its tweaked graphics card has enough power to handle every modern title on a single monitor. The rest of the specification is good, and it's built inside a good-looking, organised and sturdy chassis. Our only issue is with noise, but high-octane gameplay will drown that out. ☒ **Mike Jennings**

Specification
Corsair Obsidian 750D; Intel Core i7 4770K overclocked to 4.5GHz; Corsair H100i CPU cooler; Asus Maximus VI Hero motherboard; 16GB Corsair Vengeance CMZ16GX3M2A1866C10 1866MHz memory; 4GB AMD Radeon R9 290X graphics card; 250GB Samsung 840 EVO SSD; 2TB (7200rpm) hard drive; Corsair RM850 850W PSU; Windows 8.1 64bit OEM

Build: ★★★★½
Features: ★★★★½
Performance: ★★★★½
Value: ★★★½☆

★★★★½

GAMING PC
Chillblast Fusion Patriot

Over many years now, Chillblast has earned itself a reputation for delivering devastating powerhouses that charge to the top of our charts. Little surprise, then, to see that the Fusion Patriot, a showcase for all that is bleeding-edge, casts much of the competition into the shade.

It all starts from that simmering memory/processor base – 16GB of Corsair Vengeance memory is specified alongside an Intel Core i7 4770K CPU. The latter had been pushed up to 4.5GHz in our test system, giving it even more clout. The resulting PCMark 7 score of 7093 is tremendous.

Overall PC performance, then, is very strong, and the Patriot will make smooth work of the 64-bit Windows 8.1 operating system. The best is yet to come, though, and it's the 4GB XFX AMD Radeon R9 290X graphics card that lays down the most searing critique of the Fusion's competition. The scores of 183- and 113.7fps in Alien vs Predator, for instance, are a long

way adrift of the Mesh Elite Gamer's figures of 121- and 65fps.

The Patriot doesn't let the quality fade there. The Samsung 840 EVO packs in 250GB of sizzling solid-state storage, giving the Chillblast the perfect start as it fires itself up. Not that capacity has been sacrificed, as the 7200rpm Seagate Barracuda hard drive supplies a further 2TB of storage. The Pioneer BDC-207DBK offers 8x Blu-ray playback and fast DVD burning.

All of this is packed into the Corsair Obsidian 750d Full Tower case, a finely rendered slab of brushed aluminium that stares at you from across the computer desk. The interior is nicely laid out, with a decent amount of room, and easy access to components.

The H100i cooler does an excellent job of keeping that power processor under control, while the RM850 PSU completes the trio of first-class Corsair products, its 850W giving the PC more than enough slack. Given the firepower

onboard, it's inevitable that this PC is far from quiet, while the power output squeaks up towards 400W under load. This is by no means extortionate, given the graphics card, but this PC is light neither on sound nor electricity.

Verdict
If money is no object, the Patriot is clearly a number-one PC. Its performance is stellar, particularly if you're a fervid gamer. We can't find any weak links. ⊠ **Robin Morris**

Specification
Mono multifunction laser printer; 128MB standard memory; 4800x600dpi max printing resolution; 28ppm specified speed; auto duplex printing; 250-sheet standard input capacity; 251-sheet maximum input capacity; 10/100 ethernet; USB 2.0; wireless 802.11 b/g/n; 401x362x367mm; 11.3kg

Build: ★★★★☆
Features: ★★★★☆
Performance: ★★★★☆
Value: ★★★★☆

★★★★☆

PRINTER
Samsung Xpress M2875FW

Samsung's new mono multifunction laser printer, the Xpress M2875FW, was designed to be both eco-friendly and speedy, while still managing to produce good quality results.

Squarely pitched at the home and small office end of the spectrum, this MFP provides the full complement of scan, print, copy and fax functions in a compact framework. Neither the lightest nor heaviest in its class, the M2875FW nevertheless weighs a comfortable 11.3kg and feels sturdily constructed.

Everything about this printer feels tidily and efficiently put together; from the 40-sheet Auto Document Feeder on the top, through to the clearly laid out control panel that peaks out from the scanner cover, down to the smart pop-out cover at the front that hides the single sheet multipurpose tray.

The only niggling design flaw is the base paper tray that's designed to hold 250 sheets of A4, but only if you extend the tray out the back of the unit. Why, when this

is the most common paper type? Apart from this one blemish, the M2875FW redeems itself by having auto duplex for printing and copying as standard.

If you want to make Network use of the printer, then you have the full set of ethernet, USB 2.0 and wireless 802.11 b/g/n connectivity options. With Wi-Fi Direct also available, you can print effortlessly from a range of mobile devices – it took seconds for an iPhone to 'discover' the M2875FW.

Speeds are impressive thanks to the 600MHz processor and 128MB memory – documents with embedded graphics averaged 24ppm and duplex versions in 12ppm. Both text and images have a good degree of definition and detail, although the default brightness setting is too dark.

Toner cartridges for the Xpress M2875FW come in two varieties – Standard offers 1200 pages and High 3000. This works out as 2.5p

and 1.7p per page respectively. Further cost savings can be achieved using the dedicated Eco button, which offers handy features such as N-up, blank page skipping and toner save mode.

Verdict
In a crowded mono MFP market for SMEs where much is promised but not always delivered, the Samsung Xpress M2875FW does a good job of combining multiple features, fast speeds, decent quality and cost savings. ⊠ **Martyn Clayden**

Specification
2TB NAS drive (also available in 3- and 4TB capacities); gigabit ethernet; USB 3.0; external 12V mains adaptor; 139x49x171mm; 962g

Build: ★★★★☆
Features: ★★★★☆
Performance: ★★★★☆
Value: ★★★★☆

★★★★☆

NAS DRIVE
Western Digital My Cloud 2TB

Putting storage in 'the cloud' back under users' control is Western Digital's aim, and not just the few gigabytes that the usual suspects, such as Dropbox, offer – we're talking terabytes. The WD My Cloud is just another name for a NAS drive at home; only one that aims to provide remote access to your data, from any internet connection.

Inside is a low-power WD Green hard disk that's relatively cool and quiet, while the perforated case allows plenty of airflow, so there's no need for additional fans. On the rear are three connectors: ethernet to plug into your router, USB 3.0 as an option to plug in more storage, and DC inlet to power it from the supplied adaptor.

WD's My Cloud Setup software will walk you through initial admin registration. This is made as easy as is possible, with none of the usual routine of setting up account names, privileges and passwords; you can always dig into these later.

You can oversee the My Cloud's settings from a well-planned web browser interface. The unit is also set to automatically update with new firmware when it becomes available, taking a chore away from the user who wants a fit-and-forget solution.

WD assumes you are familiar with Microsoft-style networking jargon, though, with instructions such as "double-click the name of a particular share to view the folder". At least the accompanying FAQ below provides an answer to the question: "'What is a share?"

DLNA Media Server and iTunes Server software are installed, both running by default. And Time Machine compatibility is included, with a slider control that let's you select how much capacity you'd like to dedicate to automatic Mac backups. Notifications can be set up to email you news of any critical messages or other warnings.

To live up to its name and marketing, the WD My Cloud must be readily accessbility from outside your home network. The owner who sets up the unit will already be given cloudy access; other users can be easily added.

First, you'll need to create a new user from the Users tab in the web browser interface, providing a name

and password of your choice. This needs to be authorised by WD for some reason, so those credentials are sent for registration with WD's servers. The new user will receive an email, where they're then asked to make up another password.

Then in order to log in to your My Cloud, you must use the original password you gave to the device, not the new one you've just been asked to create. This is more complicated than it needs to be, and is guaranteed to cause confusion.

The free My Cloud apps for the iPhone and iPad are slick, letting you easily browse folders of JPEGs stored on the My Cloud, for instance. We uploaded some .rtf text files, and while they were openable, the text was not readable on an iPhone 5 as the right side of the paragraph was sliced off. On an iPad Air there was no such problem.

Network discovery

To enable network discovery beyond your local network, the My Cloud should open ports on your router through UPnP, although we noted in the admin interface that this may not have worked on our home network. To facilitate connections through firewalls and closed ports, the My Cloud tries to use WD's servers in the USA for a form of dynamic DNS; a relay connection in WD's description.

Our attempts to view the NAS drive contents on an iPhone were not entirely successful. We couldn't get through our office firewall with the My Cloud sited in the lab, so we tried the unit at home. On occasions our handset couldn't even find the My Cloud behind our router with its UPnP engaged. We tried resetting the device link, which involved requesting a code from the admin interface, a 12-digit number that you tap into the iPhone to authorise a new connection. When this failed we gave up in frustration.

The following day we reset the entire WD My Cloud back completely to factory settings, and were then able to link both iPad and iPhone to connect over cellular rather than a local network.

Data transfer performance over the local network was somewhat slow. Measured over a gigabit

ethernet network, it could achieve maximum read speeds of around 75MB/s but writes of just 25MB/s. You'd notice the slowness when you go to copy large files around the network – a Blu-ray film will take around 20 minutes to copy, rather than the three or four minutes on a truly gigabit-capable NAS drive.

Connecting from the outside world, though, the WD My Cloud's speed will be ample to serve up snapshots and music to your iPad. While UK ADSL users might see up to 20Mb/s download speed, the upload speed is unlikely to exceed 1Mb/s. If you have a fibre-based connection and are lucky enough to get 10Mb/s upload speed, that 1.25MB/s data throughput won't be much of an issue either.

Verdict

To make a home hardware-based personal cloud, the device and software must be easy to set up and use, and be completely reliable. With the My Cloud, Western Digital has made that setup straightforward, even if the need for separate device and WD server accounts is asking for trouble. ⊠ Andrew Harrison

POWERLINE ADAPTOR

TP-Link AV500+ Gigabit Powerline Adaptor

For home networking there have traditionally been two options – either lay ethernet cables around your house or use Wi-Fi. There is, however, a third way. Powerline adaptors let you use a building's existing electrical wiring to carry a network signal. You plug powerline boxes into different rooms in the house, that piggyback on to mains plug sockets, in different rooms in the house.

TP-Link's AV500+ Gigabit Powerline Adaptor with AC Pass Through Starter Kit includes two adaptor's from the company's 500+ range – TP-Link claims these are capable of speeds up to 500Mb/s. The ethernet ports on each unit are gigabit ethernet, which means any data bottleneck you'll experience will be from the powerline standard and your electrical wiring.

The units include an integrated power socket, into which other devices can be plugged as though it were a normal mains socket, so you don't lose any outlets. There's also a power saving mode, so when no data is being transmitted power consumption is reduced by up to 85 percent. In appearance the units are smart and unobtrusive. The white face helps them to blend into the room and three LEDs provide status information on power and network activity.

What distinguishes these Powerline adaptors from the competition is their ease of setup, or more accurately lack of setup. Simply plug the units into power sockets, connect the ethernet cables and you're done. The devices take care of managing the connection for you. We found that the units performed this task extremely quickly – two seconds after a link is established.

For the first test, we placed a unit next to the router and connected it by ethernet, the power side was connected to the wall via a 4m extension lead. The other unit was placed in a room down the hall connected to another 4m extension cable. In this setup, the transfer speed achieved was 63Mb/s. This is faster than the Devolo DLAN 500AV unit (tinyurl.com/kc2r6j2) we tested in the same conditions, which recorded a speed of a 40Mb/s.

We then plugged the second unit into the mains without using an extension. This setup saw a data rate of 75Mb/s, the same as the Devolo under the same conditions.

For the final test, we plugged in each of the units in adjacent rooms with no extension cords. This resulted in a transfer speed of 85Mb/s, the best performance equalling 17 percent of that advertised.

Verdict

This TP-Link kit can be found for a relatively low price of £60, and its setup is purely plug and play. When benchmarked its speeds were a little faster than its rival the Devolo DLAN 500AV under identical conditions, if still only a fraction of what TP-Link advertises from the product. ⊠ **John Taylor**

COMBINED SSD & HDD

Western Digital Black 2

The Black 2 is a novel solution to a laptop storage problem. You can have the fast performance of an SSD or the cheap price of a traditional hard disk. Performance on a budget is, however, difficult. To blend both decent storage capacity and high performance, you might install two drives – SSD and HDD. That's fine in a desktop computer with plenty of spare drive bays, but almost all laptops only have room for a single internal drive. That's where the Black 2 comes in handy.

It packages a 120GB mSATA SSD with a 1TB hard disk, all in a single laptop-sized 2.5in storage device. The two drives share the same bus, so only need one SATA connection

for power and data. The Black 2 comes in a cardboard box that slides open to reveal the drives. The unit also comes with a SATA-to-USB 3.0 adaptor and a USB 'key'.

Rather than containing any software, the key redirects your browser to WD's website, from which you can download the company's proprietary SmartWare software. This allows Windows to see both the SSD and hard disk – without it only the SSD portion can be used. Note that there's currently no support for Mac OS X or Linux.

We installed a fresh copy of Windows 7 on to the Black 2 without any issues. As expected, the Windows installer initially

recognised the device as a single 120GB drive, so we downloaded and installed SmartWare. Without even needing the usual Windows reboot, the second partition showed up ready to use, formatted and assigned a drive letter.

In its FAQ, Western Digital reminds users not to span a partition across the SSD and hard disk, including any RAID configuration. If for any reason the SSD fails, the data on the hard disk should be retrievable, as long as the host PC has the Black 2 software installed.

This is one advantage of having two separate volumes: in a combined-drive setup such as Apple's Fusion Drive or RAID 0, if

NETWORK ADAPTOR

Asus PCE-AC68 Wireless AC1900

The Asus PCE-AC68 is an internal 802.11ac wireless adaptor for desktop PCs. Since 802.11ac is a new standard, this one of the few desktop wireless cards we've yet seen that supports it.

The PCE-AC68 is made up of three main components. The card itself, measures just 103x69x21mm, so you shouldn't have any trouble fitting it into the smallest of cases. There's also a set of three giant antennas, which can either be connected directly to the back of the card or to a supplied extender, a black triangular module. This has a strong magnetic base, so attaches securely to the top of a metal PC case. If you opt to use the extender, three wires provide ample room to move it around if you're trying to get a better signal. A backing plate is included to cover the rear of your PC's case.

The drivers come with an Asus software utility that provides a more accessible way to connect to wireless networks and run simple tests than Windows' built-in software. It shows more detail about each wireless network in range, its channel number and security type. There are checkboxes to turn on and off features such as beamforming and turbo QAM, and for completely disabling the wireless radio. There's also a built-in ping tool, a handy

alternative to using the command prompt.

Although it's still early days for 802.11ac, most of the hardware we've seen so far has delivered significantly better speeds and range than 802.11n. The PCE-AC68 is another great example of the improvements the new standard brings. We measured 480Mb/s at short distance and 460Mb/s at 10m on 802.11ac – a great improvement over what's possible from any 802.11n device.

Given that we weren't expecting terrific speeds when testing the PCE-AC68 on an 802.11n network, its results were generally favourable – 148Mb/s at short range and 110Mb/s at distance aren't bad over 2.4GHz, and compare well with other wireless adaptors.

For many, old-fashioned wired ethernet is the preferred way to connect desktop PCs to a network. That's fine if your computer is within physical range of the router, but for other parts of the house, wireless or powerline ethernet are the only ways to avoid messy cabling. Start a huge data transfer, though, and the limitations of these networking technologies becomes apparent. With 802.11ac, you can expect speeds approximately half of what you get on gigabit ethernet, but without the need for network cables.

You may also wonder why anyone would consider an internal wireless network card when USB adaptors do the same job, without being fixed inside a desktop computer. The answer is that only the PCI Express bus is fast enough to ensure it can never be saturated with the mountain of data from 802.11ac. Not all manufacturers' implementations of USB are as good as they could be, so there's some potential for a USB 3.0 802.11ac adaptor to bottleneck performance.

Verdict

When paired with a compatible router, the Asus PCE-AC68 is a great upgrade for desktop PCs that need excellent wireless network performance. ⊠ **Orestis Bastounis**

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either disk fails, you lose all the data on both. If such a thing happens to the Black 2, you may be able to still read from the still-working side.

In our tests, neither the SSD nor the hard disk broke any performance records. We expected this, since 2.5in hard disks are slower than their full-sized counterparts.

For the hard disk component, the empty disk could read and write at the typical speed of a modern 5400rpm notebook HDD, around 114MB/s. That was the maximum transfer speed for large sequential files, with small files read and written at a much slower rate – around 1MB/s for 4kB data.

Turning to the SSD, we found that in line with WD's specification the write speed is slow – just 149MB/s in our tests. Maximum sequential speeds were faster and close to what we'd expect of a modern SSD, recording 456MB/s in CrystalDiskMark with 1000MB data.

From the same benchmark, we calculated the all-important IOPS

figures, which were close to 41,000 write IOPS and 60,000 read IOPS, for 4kB random data. Those are not especially high figures, and we'd expect closer to 80,000 or even 100,000 for a modern high-performance solid-state drive.

However, much faster access times and greater throughput still delivered superior boot and loading times over a conventional hard disk.

Verdict

Western Digital's Black 2 is less economical than buying a separate SSD and hard disk, and is only useful as a laptop upgrade where there's no space for two discrete drives. ⊠ **Orestis Bastounis**

Specification

AMD Radeon R9 270X; 2GB GDDR5; 1030MHz Core Clock (1120GHz Boost); 1.4GHz Memory Clock (5.6GHz DDR effective); 256-bit memory interface; 1280 Stream Processors; 80 Texture Units; 32 ROP Units; PCI-E Interface; DirectX 11; 2x DVI, 1x HDMI; 1x DP; 2x six-pin PSU connectors needed; 3-year warranty

Build: ★★★★☆
Features: ★★★★☆
Performance: ★★★★☆
Value: ★★★★★

★★★★☆

GRAPHICS CARD

MSI Radeon R9 270X Gaming Edition

Following hot on the heels of the R9 280X (tinyurl.com/owvap37) is another chip with the 'X' after its name – the R9 270X. It's also a member of the R9 family, and while this series is designed for enthusiasts, the range is wide – from the most powerful AMDs right down to this highly affordable £170 270X.

Like the 280X, this product is a twist on the older AMD technology, rather than supplying completely new architecture. It's primarily a 7870 with better clock speeds. Both the 270X and the 7870 chips offer the same core clock of 1GHz, but the 270X adds a Boost clock that pushes it up an extra 50MHz to a potential 1050MHz. In the case of this MSI overclocked version, that core clock (from a standard 1030MHz) has been given a further jolt, knocking it up to 1120MHz. It sticks to the factory settings when it comes to the memory clock, but even the default 270X gets a decent jump from the 7870 in any case – elevated from 1.2GHz (4.8GHz DDR effective) to 1.4GHz (5.6GHz DDR effective).

In many other respects, the 270X is pretty much identical to the 7870 – both have 80 texture units, for instance, and 1280 stream processors. All of this means that the 270X has some very decent bandwidth and texture fill rates. The latter figure, 89.6GT/s, is a good 9.6GT/s ahead of the 7870, and only around 13.3GT/s behind the impressive 280X.

Both the 270X and 7870 have 256-bit memory interfaces, but the 270X's superior clock rates help it to a memory bandwidth rate of 179.2GB/s – 25.6GB/s ahead of that 7870. It has to be said that the 280X, with its 384-bit memory interface, remains a long way ahead here, on 288GB/s. Nonetheless, the 270X has some impeccable rates for a £170 card.

The chip does only come with 2GB of memory, which may see it struggling two years from now. A £170 card is unlikely to be a long-term purchase, but it's worth bearing in mind if you're debating whether to lay down the extra for the 280X. 4GB versions of the 270X are likely to be launched, but the extra memory will add considerably to the price, while still not allowing the card to compete fully with its bigger brother.
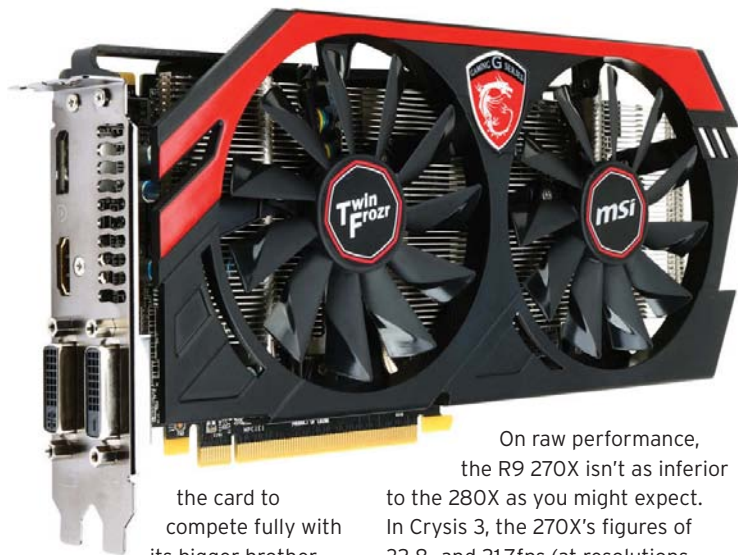
There's also some competition to the 270X in terms of the 270. This lower-clocked version is broadly similar, but offers a core clock of only 900MHz (with a Boost to 925MHz). The memory clock speeds are identical, though, as are most of the other specifications. At the time of writing, the difference between amounted to little more than £15-£20, which would seem to point to the 270X as having a distinct advantage. If the gap widens, we may cover the 270 separately.

Power hungry

The best way to make a chip work more efficiently is to improve the architecture. However, since the 270X is making use of older technology, this clearly isn't an option. As such, the raising of the clock rates means that the 270X needs more power to operate – it requires two six-pin power connectors from the PSU.

The chip's TDP is 150W, although we were seeing typical power consumption some 15W higher than this. The 7870, by contrast, gets closer to the 140W mark in real-world testing, despite having a TDP that's supposedly higher than the 270X's. The 270X is certainly a lot more power efficient than the 280X, but we will need to see a new design before AMD can resume the trend of falling power output rates.

The MSI is a quiet card, even if marginally louder than the 280X that we tested. Overall, though, we had no problems with sound levels.

On raw performance, the R9 270X isn't as inferior to the 280X as you might expect. In Crysis 3, the 270X's figures of 32.8- and 21.7fps (at resolutions of 1920x1080 and 2560x1440 respectively) compare reasonably favourably with the 280X's 39.8- and 22.1fps. Particularly at the higher resolution, the difference is very small. As the detail levels tumble, the 280X stretches away, but the 270X's performance is still very palatable. In Bioshock, it also holds on to the 280X well, notching up figures of 64.4- and 38.9fps, as against the 280X's equivalents of 70.8- and 44.5fps.

Only in Stalker: Call of Pripyat did the R280X start to work its way into the distance, and its figures of 94.7- and 70.3fps were very much superior to the 270X's of 80.1- and 62.3fps. This widening gap could, again, be because the 280X exerts more power over the 270X when detail levels are lower. The 7870 was inferior to the 270X all along. In Stalker, for instance, its figures of 71.3- and 49.5fps were a significant distance behind the 270X's.

Verdict

AMD's policy of retooling old hardware as new chips is paying dividends. The 280X is a hard card to beat at its price-point. The 270X, too, is a rather good value card, and not that far behind the 280X. Having said that, the latter does have a superior memory configuration, and pulls out a noticeable, if not enormous gap, all the way along. If you can afford it, the 280X is still the one to go for. The 270X, though, will do very well, and is an excellent card for the money. ⊠ **Robin Morris**

5 best apps for photography

Becca Martin compiles the best apps for improving your smartphone snaps

The cameras on smartphones and tablets are getting better and better. Gone are the days when all you could produce from your phone were grainy, poor quality images. It's got to the point now that the camera on your phone is arguably leaving compact cameras obsolete. After all, your smartphone is always with you and therefore so is your camera. It's compact and allows for almost instant upload to social networking sites such as Facebook and Twitter.

With that in mind, we've come up with five of the best photography apps we could find to enhance and aid your foray into the world of smartphone photography.

Instagram
Price: Free
Available on: iOS, Android and Windows Phone
Instagram allows you to take photos (which are then cropped into a square) and add one of 19 different filters, all of which have a different retro feel reminiscent of Lomography cameras. All the filters are bold and there's no control over the strength, which makes Instagram simple to use. The app also has a social networking element, as when you've created your image it is posted to your profile where other people can view, 'like' and comment on it.
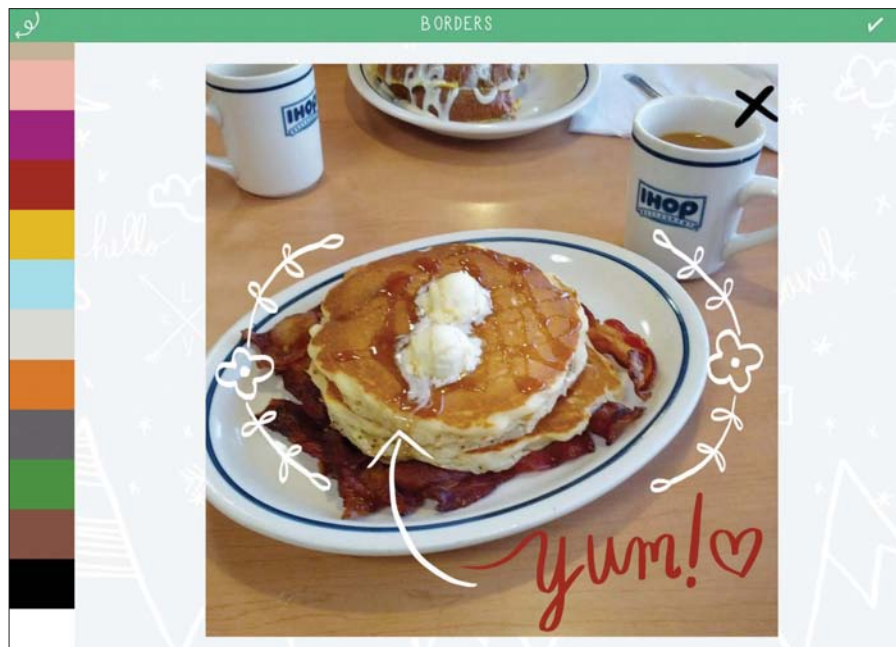
VSCO Cam
Price: Free
Available on: iOS and Android
Popular among many Instagram users, VSCO Cam can be used in conjunction with the aforementioned app, but allows for much greater freedom in editing. Although this app only provides 10 different filters, you are able to choose how strong or subtle you want it to be using a slider. You also have control over aspects such as saturation, sharpness and whether you want a coloured tint. However, VSCO Cam doesn't include a social networking aspect, so if you want to share the images you've created with your friends, you can either send it to Instagram or post it on sites such as Facebook.

Cartoon Camera
Price: Free
Available on: iOS and Android
Cartoon Camera (left) lets you make your photos appear as different styles of drawings, such as 'cartoon' and 'colour drawing'. It can't be used to edit existing photos, though. Instead, you get a live view when taking an image, which makes it easier to compose your shot and choose your effect before you take the photo. There's no way to share images from the app – it saves these directly to your device, so you can share the images from the picture gallery.

A Beautiful Mess
Price: 69p
Available on: iOS and Android
Loaded with attractive, hand-drawn frames, 'doodles' and other adornments, A Beautiful Mess (above) is still relatively unknown, but has been growing in popularity. It has different colour pallets including a 'neon' option for colouring different additions and a wide range of phrases or annotations you can add. Once again, if you want to share your creations with others, you can tap the 'share' button to send it to Instagram or a social networking site of your choice.

Amazon Cloud Drive Photos
Price: Free
Available on: iOS and Android
Not an app for editing photos, Amazon Cloud Drive Photos gives you 5GB of storage, which means that your photos and videos are all backed up by storing them in the cloud (online). So if your phone is lost, stolen or broken, you won't lose all your photos and videos. If you install Cloud Drive on your computer as well, you'll be able to access them easily all in one place. There's an 'Auto save' option that automatically saves your photos and videos to the cloud, so you have peace of mind knowing that they're all safe. It's a great app for those with limited internal storage.

ENTERTAINMENT APP
Bitstrips

Free

Contact
■ bitstrips.com

Read more
■ tinyurl.com/p96qljq

System requirements
iOS 4.3 or later, 75.7MB storage; Android 2.2 or later, 49MB storage

★★★★☆

What better way to spend a morning hanging around a deserted train station in the aftermath of St. Jude than to create hilarious comics starring yourself and your Facebook friends. This is the service offered by free Android and iOS app Bitstrips, and by now you'll almost certainly have witnessed its popularity through the cartoon adventures plastered all over your Facebook news feed.

Bitstrips is a huge download, but it includes a good number of high-quality cartoons, and you can go into some detail when designing your avatar.

You must log in via Facebook, although alternative logins are said to be coming soon. You then create your avatar in great detail, including gender, outfit, hairstyle, build, eye colour and much more.

If you like being the centre of attention, you can feature alone in your cartoons, but Bitstrips really is more fun when you involve your friends. If they already have Bitstrips avatars then you can include them in comic strips without their permission; if they don't, you can create an avatar for them.

The app's home page then delivers a scrolling list of the latest comics, and you can add new characters at the top of the page. Tap the Create icon at the bottom of the screen to create your own greeting card, status- or friend comic, within which you can choose from categories such as Birthdays and Anniversaries or Pranks and Insults. Once you've selected a particular cartoon, you can edit the character's facial expressions and add your own speech bubbles, then click to share it online.

Also worth a look is the Archives tab, which displays any comics your friends have created, plus your own cartoons on a separate tab. It's here that you'll realise just how popular Bitstrips is – and that's something of a problem. Bitstrips' servers are struggling to cope with the app's immense popularity, and the 'Comic servers are overloaded, please try again soon message' makes all too frequent an appearance.
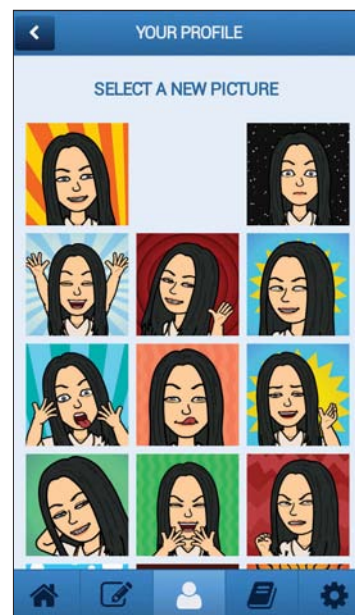
Verdict
Bitstrips is more than likely another Facebook fad, but this comic-creating app is loads of fun and it'll have your friends in stitches. It's worth a try. ⊠ Marie Brewis

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TOOLS APP
HPI Check

Free

Contact
■ hpicheck.com

Read more
■ tinyurl.com/k7zxdl5

System requirements
iOS 6.0 or later, 4.7MB storage; Android 2.3 or later, 2.5MB storage

★★★★☆

HPI is a company that's best known for its vehicle checks, and HPI Check is its official app. All you need to run a check is a full registration number.

The app is extremely simple to use because it doesn't need to be complicated. Once you download and open the app there's just one screen – this is where you enter the car registration and request a check. There's also a menu bar that has a number of options including your history and settings.

The beauty of this app is that if you're out looking at cars, you can do a quick on the spot check in a matter of seconds – as long as you have a data connection, of course.

So how much does it cost and what do you get? Although the app is free, an individual vehicle check costs £16.99, which you confirm after being presented with details such as make, model and year.

That might sound like a lot, but if you're going to be spending hundreds or thousands of pounds on a car, then it's a small price to pay to make sure that you're not being taken for a ride. It's a few pounds cheaper than doing it on the website, too, although you don't get a valuation for the vehicle and there's no option to buy multiple checks for a lower price.

Once you've purchased a check, the app quickly presents you with information on the car; for example, whether it's reported stolen or has had the number plates changed. There's plenty of other information, too, such as outstanding finance, number of former keepers, and whether the vehicle is marked as scrapped or imported.

A particularly handy section tells you the running costs, such as how much road tax will cost and miles per gallon. It's an extremely thorough check if you can afford the cost. You can get checks cheaper elsewhere, such as the Auto Trader app (tinyurl.com/pkcxklz), but the information is much more limited.

HPI uses various sources for its reports including the police, the DVLA, insurance companies, finance houses, industry bodies and garages.
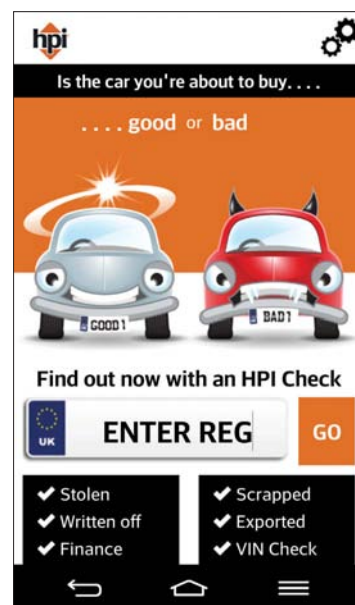
Verdict
The HPI Check is a simple and easy to use app for those looking at buying a used car. The information is comprehensive and presented well making sure you avoid getting conned. ⊠ Chris Martin

ENTERTAINMENT APP
Sky+

PC ADVISOR
RECOMMENDED

Free

Contact
■ sky.com
Read more
■ tinyurl.com/qamj5yy

System requirements
iOS 5.0 or later, 42.1MB storage; Android 2.2 or later, 16MB storage

★★★★½

Sky's updated app puts you in control of your Sky+ HD box from the comfort of your sofa or the other side of the world.

Most useful is the ability to set your Sky+ box to remote-record TV programmes when you're away from home – as long as the box is switched on. Forgotten to set the final episode of *Games of Thrones* to record? Still trying to get round Sky's bug of recording that second back-to-back episode via series link? The free app sorts all of that out for you from your smartphone or tablet.

The app provides customisable seven-day listings for all your Sky TV channels, just as you do with Sky's own electronic programme guide (EPG) on the telly. You can search by title, actor, channel, sport and other factors, learning actor and background info on shows, related news and live Twitter feeds.

Also useful is the app's ability to let you see what other times a show is airing to help you avoid clashes. When several programmes

you want to record are on at the same time, the app offers a solution.

Sky remote lost again? That's not a problem, as you can use your smartphone as a remote control to Play, Pause, Fast Forward, Rewind and change channels. You can also manage all of the recordings in your Planner, viewing them by genre; add a series link or delete a programme you no longer want – without interrupting viewing on the telly. As long as you're on the same network as the Sky+ box.

The app also works with Sky's On Demand service. Using it, you can download programmes to your Sky+HD box. This should save any pauses when downloading shows. Sadly, iPlayer listings are unavailable while Sky negotiates with the BBC, but all the other major players are here, including Sky TV, Sky Sports, 4oD and ITV Player – as well as box sets such as the *Sopranos*, *Alan Partridge* and *Dora the Explorer*.

You don't need an HD subscription to use the app, but you

do need a Sky+ HD box. You'll also need to log in to your Sky account.

Verdict
The Sky+ app has been updated to manage On Demand services, record TV shows and series link while away from home. It can also be used as your TV remote control – indeed it can replace it. ⊠ Simon Jary

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GAME
Angry Birds Go

Free

Contact
■ rovio.com
Read more
■ tinyurl.com/lon6e7I

System requirements
iOS 6.0 or later, 98MB storage; Android 2.3 or later, 168MB storage; Windows Phone 8, 98MB storage; BlackBerry 10, 49MB storage

★★★½

Angry Birds Go is a fun new free game from Rovio. It's much like Mario Kart and sees old and new characters racing against each other to earn coins and win gems.

There are two main tracks, Seedway and Rocky Road, and each offers five racing modes: standard race, against the clock, Fruit Splat (hit enough fruit before the finish line), head-to-head (vs) and Champion Chase, where you have to beat the bird three times to unlock that character.

And you'll need to unlock them, since each bird gets 'tired' after five races and has to recover. At which point, you can switch to another bird or pay 10 gems to 'revive' the one that's worn out. This is just one of many ways that Angry Birds Go will make money, since you can buy bags of gems from £1.99 to £70. Gems can then be used to buy coins within the game.

Coins are used to buy kart upgrades, and you'll need these not simply to remain competitive, but

also because races have ever-higher 'cc' requirements: you won't be able to enter certain races unless your kart exceeds the minimum rating.

You can purchase some karts, too, with prices again ranging from £1.99 to £35. However, you can also buy real toy versions of the karts, called Telepods, which are recognised (and unlocked) when placed over your device's camera.

Each character has a power-up that can be used once per race, with extra uses costing gems. Within each main course is a variety of different courses, some of which are in the air and others involving stunts.

To start a race, you catapult your kart when the countdown clock says 'Go', thereby adding a bit more fun and retaining a link back to the traditional Angry Birds games. You've a choice of tilt or tap to control your racer, and although tilt is more fun, tapping offers more control.

Verdict
Kids and adults alike will enjoy Angry Birds go, but you'll definitely want to disable in-app purchases and set a strong password to ensure your kids don't spend £100s buying gems and karts. ⊠ Jim Martin

SPEECH RECOGNITION SOFTWARE

Nuance Dragon Naturally Speaking Premium 12.5

System requirements
Windows XP SP3 (32-bit only)/Vista, SP2/7/8, 32- and 64-bit, 2.2GHz Intel or AMD dual core with 2MB L2 cache), 2GB (32-bit) 4GB (64-bit) RAM, 3.2GB disk space, internet connection

Usability: ★★★★☆
Features: ★★★★☆
Value: ★★★½☆

★★★★☆

There's been a lot of action recently in the speech-recognition world, but most of this has been on smartphones and tablets, with Apple's Siri and Google's Voice Search. The pioneer of speech recognition, though, is Dragon Naturally Speaking (DNS) on the PC.

DNS does two things for a computer: it enables dictation and control of Windows. All versions of DNS 12.5 integrate directly with Word, WordPerfect and OpenOffice/Libre Office, and the Premium product also works directly with Excel and PowerPoint. No speech training is required, though, you'll see some improvement if you spend 10 minutes or so running through some training text, and more if you let it examine your documents and emails to tailor its vocabulary.

This is more of an evolutionary upgrade than a revolutionary one. Using Dragon Remote Microphone, now in both iOS and Android versions, involves downloading a free app and setting up a new user profile to work with a phone. After a brief training session and linking your phone to the PC running DNS 12.5, you can use your handset as an alternative to the cabled headset supplied in the box.

The quality of microphones in iPhones and most Android smartphones is as good as from
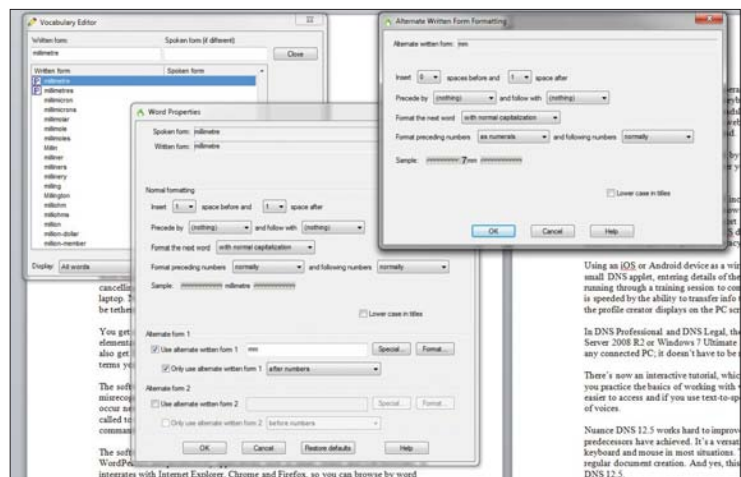
SPEECH RECOGNITION improves if your let DNS examine your documents

Bluetooth headsets, so recognition accuracy from our tests was well up to standard. You need to hold the phone to dictate, of course, but this is no more awkward than using an audio recorder to record dictation.

Other improvements include full support for Gmail and Hotmail, so you can use online email resources as well as offline ones, such as Outlook. You can turn off Windows command recognition when dictating to improve recognition speed, too. New microphone options include wideband Bluetooth models, which have superior accuracy to 8kHz devices.

The core engine has been improved and Dragon claims 20 percent better recognition. Since it's already in the high 90s, you're looking a differences between one misrecognised word in 100 and one in 120. During our tests, we saw very few misrecognitions and most of those were of homonyms, such as 'to', 'too' and 'two'.

Verdict

If you want speech recognition on a PC, there's little alternative to Dragon Naturally Speaking, and Nuance continues to improve its speed and accuracy. ⊠ **Simon Williams**

ANTIVIRUS SUITE

Avira Free Antivirus 2014

System requirements
Windows XP, SP2 (64-bit), SP3 (32-bit)/7/8 (both 32- and 64-bit), 1GB RAM, 150MB drive space

Usability: ★★★★☆
Features: ★★★☆☆
Value: ★★★★★

★★★★☆

If you're looking for an antivirus suite, then Avira's Free Antivirus 2014 is worth a look. It offers a number of modules, including AV scans and real-time protection, a two-way firewall, a social network shield and a scan scheduler. All the admin functions, including displaying quarantine files, are also present.

The software's interface is smart and traditional, without the Windows 8-style panels adopted by many other AV suites. The main functions appear as a menu down the left-hand side of the screen, with corresponding status and control panels appearing to their right, as you click on them.

Options such as automatic and manual AV scans are provided, and Avira helpfully offers a series of predefined scan sets, including local drives, My Documents and active processes. The Configuration settings also offer to protect you from adware and phishing scams.

Missing from the free product are options such as email scanning and a website checker, but on the plus side, there appear to be fewer nags when running the free product to upgrade to one of its paid-for stablemates.

There are two extra functions you can add for free: Secure Backup and Avira Free Mobile. The first of these provides 5GB of online

storage, with a simple dashboard interface giving full access. By default, it backs up the contents of My Documents, including photos and videos, but there's no facility to use the software for local or internal network backups.

Avira Free Mobile is available for iPhone, iPad, iPod and Android phones and tablets, and offers AV protection and anti-theft, with location tracking and the ability to wipe the phone and set off an alarm – pretty good for a free offering.

We last looked at Avira Free Antivirus in its 2012 incarnation (tinyurl.com/d9oml48) and running the same set of tests on the new version gave improved results.

PC MAINTENANCE SUITE

Iolo System Mechanic 12.0

$40

Contact
■ iolo.com
Read more
■ tinyurl.com/mos8uzz

System requirements
PC: Windows XP/Vista/7/8,
32- and 64-bit, 256MB
RAM, 120MB drive space,
internet connection

PC ADVISOR
RECOMMENDED

Usability: ★★★★☆
Features: ★★★★½
Value: ★★★★½

★★★★½

IOLO SYSTEM MECHANIC keeps an eye on the health of your computer

One of the best-known names in PC housekeeping, System Mechanic, has reached version 12 and iolo technologies has introduced a couple of new utilities to the suite, as well as improving existing ones.

It's structured like a pyramid, with a one-click fix, called PC TotalCare, at the apex. Use this to run most of the main sub modules and clean up your computer, without getting into the minutiae of individual tuning and repair.

On our test machine, the quick scan of problems took one minute, 16 seconds and fixing them took just two minutes, 50 seconds, most of which was spent updating its problem definitions, in a similar way to an antivirus application updating virus signatures. At the next level down there are all-in-one tools, such as PC Repair, which looks at any problems with the hard drive; while PC Cleanup removes system clutter and frees up drive space.

System Mechanic also introduces two new tools. The first of these, Core Data Recalibrator, corrects corruption in Windows information within the Windows Management Instrumentation. It's one of the automatic tools that runs as a preventative, so it's hard to measure the effect it has.

The second tool, Stability Guard, is designed to track new programs introduced to your PC, and monitor any impact they might have on its stability. This is handy and you can monitor its effect, using the reliability report. This shows any events that could hit stability over a selectable timescale.

Each event has a point on the graph and clicking on it gives details of what occurred; for example, an update not completing successfully. Over time, you should be able to tell if Stability Guard has increased the reliability of your machine.

Having run PC TotalCare, removed all the dubious apps installed at startup and performed a system optimisation, our test machine's startup time reduced from one minute, 18 seconds to one minute, 14 seconds, hardly earth shattering. A 2GB file copy from drive to drive dropped from one minute, 30 seconds to one minute, 31 seconds, again a small improvement.

Our test machine is regularly restored to a comparatively clean install, though, so on a more heavily used system, with a greater build up of redundant code and Registry clutter, you could expect a bigger performance boost.

Verdict

With many of the tools included in System Mechanic 12, its difficult to directly measure individual benefits. Our own measurements in startup and copy times show marginal improvements, but the true value of this suite will be in the long-term stability of a PC and the prevention of system slowdown over time. ⊠ **Simon Williams**
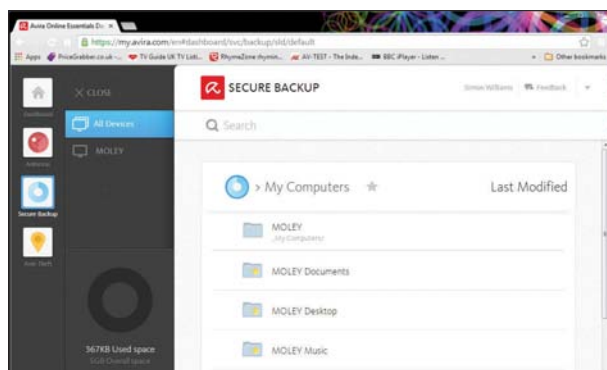
Avira's **SECURE BACKUP** offers users 5GB of online storage

Scanning 50GB of mixed files took 42 minutes, 12 seconds, a scan rate of 141 files/s, around 10 percent higher than before. There's still no noticeable fingerprinting, though, with a second run examining the same number of files in a very similar time.

The software has a noticeable impact on system resources, and our 1GB copy took 32 percent longer to run with a background scan in progress than without. The test site AV Test (av-test.org) reflected this problem and scored it at 3.5/6.0 under its Usability criteria, which measures the overall system hit.

It didn't do too well under the Protection category, either, again scoring 3.5/6.0. Although it was consistently better at spotting new and widespread malware than the group average, it dropped significantly to just 81 percent when looking at zero-day attacks.

The suite did better in the Usability section, which measures false alerts. Here it scored a respectable 5.0/6.0.

You should note that these figures are all from the 2013 version of Avira Internet Security, which uses the same engine as the free product, though, there may have been improvements in the 2014 iteration. AV-Test results are not yet available for this product.

Verdict

Avira Free Antivirus 2014 is simple to set up and use, and it's good to see free mobile support and backup, as well as the core AV functions. It's not the best free protection available, though. ⊠ **Simon Williams**

VIRTUALISATION SOFTWARE

Parallels Desktop 9 for Mac

£64 inc VAT

Contact
■ parallels.com/uk
Read more
■ tinyurl.com/n2u3vtu

Specification
OS X 10.6.8 or later

Usability: ★★★★☆
Features: ★★★☆☆

★★★★☆

Installing from a **DISK IMAGE** is easier, with the app automatically finding guest .iso and .dmg files for you

Parallels Desktop 9 for Mac is this year's update to perhaps the most popular virtualisation program for OS X. Parallels is trying hard to cram in every possible features it thinks you'd want, along with several we wish it wouldn't.

New options include Apple's PowerNap, which now extends to Windows. This is a spin-off from Intel's low-power mode that allows PCs with recent Core processors to entertain certain tasks when the computer is asleep; in the case of applicable recent Mac models this could include Time Machine backups, downloading software updates and checking for email.

USB 2.0 has been supported from the beginning, and more recently USB 3.0 has been included for manual activation with some success, depending on the device. Now Parallels has added support for FireWire and Thunderbolt.

With every revision to virtualisation software there's a promised increase in performance. The biggest delta advertised by Parallels is in disk performance, said to be 40 percent better than Parallels 8. A useful synthetic benchmark to check processor and memory speed is the cross-platform Geekbench 3, although our Windows 7 guest machine was unable to run it in Parallels 9.0.23062. (More recently, the 9.0.23350 update has now fixed this issue, albeit with results slower than Parallels 8.)

Futuremark's PCMark 7 is a Windows system performance test, which recorded 4412 points in Parallels 9, against 4363 for Parallels 8. That may look better, although it's little more than a one

PARALLELS DESKTOP 9 FOR MAC offers useful support for Windows 8

percent increase in point score. Compare the results with arch-rival VMware Fusion and we see a wider gap, in Parallels favour. Fusion 5 and 6 scored 3963 and 4116 points respectively, so that's a seven percent lead when comparing latest versions of these VMware apps.

Graphics capabilities and performance have long been Parallels' forté and version 9 proved no exception. Parallels 8 introduced experimental support for Microsoft DirectX 10.0, although we noted very patchy performance in parts of the PCMark 7 benchmark that employ this API. Parallels 9 fixes the flakey rendering and plays DX10 graphics cleanly, if slowly.

The Stalker benchmark averaged 38fps in DX10 mode (against 37fps in Parallels 8). VMware's Fusion package can't use DX10 at all, and by defaulting back to DirectX 9, Fusion 6 played much faster, at 61fps, if with poorer visual quality.

Besides offering official support of Windows 8 and 8.1, Parallels makes Microsoft's operating system more usable. Even before the sticking plaster of v8.1, Parallels had come with an option to let Windows boot directly into the regular desktop, rather than the original default of huge Metro tiles. And with the help of Stardock's Start8 utility included with Parallels 9, the much-missed Windows Start menu returns, too. If you do find Metro apps useful, you can also use them windowed within the classic desktop, to save you having to move to and fro inside the operating system.

Installing virtual machines from disk images has become

easier in Parallels 9, with the app automatically finding potential guest .iso and .dmg files on your local drives. You can also now install from a connected USB thumbdrive.

Parallels Desktop 9 for Mac officially supports various flavours of Linux, as well as some UNIX systems such as Solaris and FreeBSD, plus the last three standard versions of OS X, from 10.7 Lion. Running 10.5 Leopard and 10.6 Snow Leopard is also possible, but only in Server guise to comply with Apple's licence terms.

Parallels provides a relatively painless way to run Linux, with a graphical script to install the essential tools for better performance and integration with the host Mac. It's not terribly up to date, though – for the key distro of Ubuntu, for example, guest support is officially extended only as recent as 12.04 Precise Pangolin from 18 months ago, despite two major releases since then that aren't acknowledged by Parallels. In our experience, though, even the latest 13.10 Saucy Salamander seemed to work perfectly well.

The same can't, however, be said of OS X guest support, which is becoming patchier with every new version of Apple's operating system. Drag and drop is still missing, although cut and paste of basic text works, if not files and folders.

Verdict

Parallels has added some useful new features to its Desktop 9 for Mac application, keeping it the highest performance virtualisation package for OS X. ☒ **Andrew Harrison**
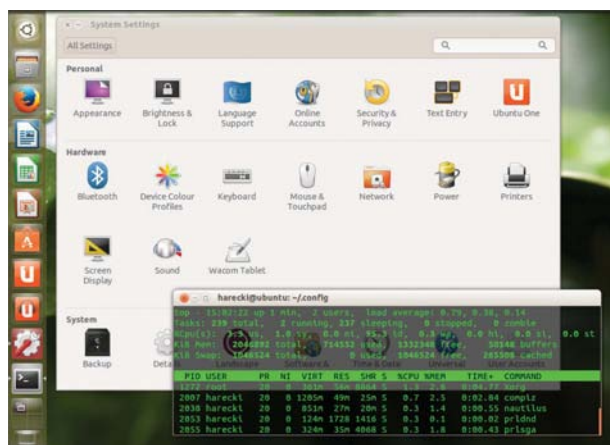
GAME

Assassin's Creed 4: Black Flag

£30 inc VAT

Contact
■ ubi.com/uk
Read more
■ tinyurl.com/L7x3amL

System requirements
Windows Vista, SP2/7, SP1 /8 (32- and 64-bit); 2.5GHz Intel Core i5 2400S (or higher), 3GHz AMD Phenom II x4 (or higher); 2GB RAM; 30GB disk space; DirectX compatible sound card

★★★★☆

NAVAL BATTLES make a refreshing change from Assassin's Creed's traditional rooftop pursuits

After last year's ponderous and risk-averse Assassin's Creed III failed to be the intended shot in the arm for the increasingly samey historical series, AC4 doesn't get to be the interim instalment its creators perhaps hoped it could be. AC2 was followed by two non-numbered playing for time chapters, but AC3's colonial US setting and its mind-numbingly dull protagonist Connor have been dumped.

Perhaps trying to salvage the dour Connor and his free-running, musket-wielding adventures in early New York and Boston would have been worthwhile, but AC4's unexpected shift to a pirate-riddled Caribbean and a boisterous, initially amoral lad from Swansea quickly feels like the right decision. 'Assassin' in the title or no, this has long been a series about the player's pursuit of wealth and glory rather than stealth and subtlety, so playing as a greedy, sadistic pirate makes perfect sense.

It's a weight off Assassin's Creed's infamously self-regarding shoulders – sure, the laughable overarching tale about ancestor races, apocalyptic prophecies, memory simulators and warring illuminati remains to some degree, but it's downplayed in favour of unfettered derring-do and dastardly deeds on the high seas.

Things don't begin well, as AC4 spends its first couple of hours mired in the beyond-dreary endless tutorial paradigm that laid the last couple of Creeds so low. Each AC seems obsessed with being as

ASSASSIN'S CREED 4 shifts the action to the pirate-riddled Caribbean

accessible as possible to someone who's never played another game in the series, but at the same time it breezily bombards everyone with the continuity-overloaded gibberish it's crammed into the preposterous plot of the past five games.

Fortunately, both sins give way to relative freedom at around the three-hour mark – still too long to spend being told for the umpteenth time how to jump on to a wall or stick a sword into a nasty man, but a vast improvement on AC3's agonising eight hours of tutorial. Better still, the freedom you're given is not the same old running and stabbing, but the helm of a well armed pirate ship and an ocean full of enemies, islands, secrets and loot.

AC's traditional roof-hopping escapades are in evidence if you visit larger settlements such as Nassau and Havana, but for the most part you'll be bombarding

the Spanish navy with a round of cannons, harpooning sharks or diving for lost treasure. The game's as complicated to control as it is broad in theme, but soon enough all of this becomes second nature, and the hunger for cash and upgrades to your increasingly impressive ship becomes overwhelming.

You'll be greedily scouring the map for the telltale icons that reveal the locations of Royal fleets, blue whales, colonial forts and plantations, and while the whole thing rides on the back of itch-scratching, it's also a constant party. Naval combat plays like a trailer for *Master and Commander*: all the drama, almost none of the complexity of ship-to-ship battles, but cannon fire and boarding is a refreshing change from AC's traditional roof pursuits and clumsy eavesdropping.

Verdict

It's compulsive and agreeably ridiculous, with some brilliant scenery and a great sense of scale in its oceanic destruction, but at the same time the nuts and bolts of Assassin's Creed – parkour, melee combat, architectural puzzle-solving – are treated so perfunctorily, and feel like just one more insulting repeat of what these games have been asking us to do for almost a decade. Assassin's Creed 4 winds up being a great pirate game, which is hardly an over-subscribed marketplace, but whether it's a great Assassin's Creed game is another matter entirely. ⊠ **Alec Meer**

GAME

Train Simulator 2014

Windows XP/Vista/7/ 8; 2.8GHz Core 2 Duo processor; AMD Athlon MP (multiprocessor variant or comparable processors); 2GB RAM; 512MB with Pixel Shader 3.0 (AGP PCIe only); 6GB drive space; Direct X 9.0c compatible sound card

★★★★☆

You can select how easy or difficult you want a **TRAIN'S CONTROLS** to be

Simulators aren't everyone's cup of tea, but if you're even remotely interested in trains, you should certainly take a look at the Train Simulator series. This latest annual update does little to wow long-term fans, but it's as good a time as any to jump on board if you're looking to buy your first train sim.

Chief among the changes is the new menu system. The bright, fresh look is easier to use and lets you decide which train you want to drive on which route, and in the season and time of day of your choice.

There's also a slightly more coherent career system, which looks as if it wants to mimic those in racing sims such as Grid 2 (tinyurl.com/q72hzlp). However, rather than start you off with some short, easy scenarios, you're presented with the full list for all the routes you own, just as in previous versions.

Now, though, you do accrue (or, more commonly, lose) points for your driving ability, and get an overall score – XP points – at the end of each scenario (mission). But, since you're free to do as you please and with nothing apart from Steam achievements to unlock, there's no real sense of progress that you get with 'proper' career modes.

Having played Train Simulator for a couple of years and seen which routes and locomotives were included with the 2012 and 2013 versions, it's slightly disappointing that only three routes are bundled with 2014: Donner Pass, London to Faversham and Hamburg to Hanover. Really, though, any version

The **ATTENTION TO DETAIL** given to the trains is highly impressive

of Train Simulator is best thought of as a starter kit.

Using the menus or the main Steam interface, you can browse and buy scores of extra routes and individual locos to bolster your collection. Routes tend to be around £25, but Steam's summer and winter sales often mean you can pick them up for around half that price.

Existing users of TS will get the core game updates for free, but not the new routes or trains. So, if you want them all, the standard edition's £25 price looks a lot more attractive. For an extra £10, the 'Steam Edition' also gets you the Sheerness Branch Extension Route and Southern Pacific SD70M Loco.

Learning to drive the trains is easy, and the short tutorials will get you up to speed in no time. You can choose how easy or difficult you

want the controls to be, even driving without the main overlay if you demand the maximum authenticity.

The game itself looks and plays exactly the same as before, which is to say that it's good but not perfect. Even at the highest resolution and detail levels (for which you'll need a powerful PC and graphics card) Train Simulator looks a tad dated.

It's by no means bad, though. Attention to detail is highly impressive, especially where the trains and their cabs are concerned. Not only are they visually accurate, but the sounds are, too, thanks to samples taken from the real-life versions. In fact, TS2014 sounds so amazing it makes up for the graphics. Routes are accurate, too: the modelling of stations such as the St. Pancras is a sight to behold.

However, general scenery is pretty basic and even your virtual passengers look like they're from a game made a decade ago. They materialise as the train doors open and vanish like ghosts after walking aimlessly to the end of the platform (instead of the station exit). Such details may be unimportant to some, but they do detract from an otherwise realistic experience.

Verdict

It's great to see a fresh menu system and the ability to create and modify routes, but there's little else new for long-time players. However, given that the update is free and automatic, there's not much to complain about. ⊠ Jim Martin

GAME

The Novelist

★★★☆☆

You decide exactly
how much time **THE
NOVELIST** is allowed
in which to write

Oh, The Novelist is a tricky one. It would be extremely hard to deem it a particularly well-realised game, but at the same it offers a powerful experience.

A point-and-click adventure game of sorts (with stealth elements, more on which later), The Novelist concerns titular author Daniel Kaplan as he strives to complete his difficult second novel at the same time as helping his lonely wife and educationally troubled young son.

You play as an unseen, possibly supernatural, presence who's able to affect Daniel's decisions. You do this by reading letters and diaries left conveniently around the house, listening in on the family's thoughts and exploring their memories of recent difficulties.

It's up to you to then choose whose preferred course of action is the most important, which will most likely cause the other two's short-term goals to be dashed.

Time for creativity

Sometimes, these dilemmas are too neat, and it's implausible that there'd have been no way to, say, allow wife Linda to attend a local art class in addition to taking son Tommy to visit friends and/or giving Daniel more time to write. Indeed, your degree of sympathy may vary hugely depending on how familiar you are with creative pursuits, and the perils of interrupting them.

However, frequently The Novelist is extremely moving, as what seemed like a relatively minor

GAMEPLAY can be rather tedious; your character never leaves the house

compromise leads to an unhappy son, or Daniel forsaking his writing for a time despite the demands of his irate publisher results in a closer family. If you're a parent yourself, you'll find painful echoes of the self-sacrifices required when a child, rather than yourself, becomes your primary concern.

The Novelist admirably avoids melodrama, even if some conclusions could be said to be a little extreme, with a subdued, minimalist art style and soundtrack creating a sombre rather than hysterical mood.

Tedious gameplay

However, it's too lightweight in terms of play – all you do is move from room to room in search of a handful of glowing objects to click upon, and at no point do you ever get to leave the stark three-bedroom house in which the game is set.

It's tedious to control, and with each new stage the sense of gameplay being a chore rises. Everything depends on how much you get out of the agony of decision and the chill of consequence.

There's an attempt to make The Novelist more conventionally 'gamey' by adding an optional stealth mechanic, whereby your unseen protagonist must stay out of sight of the family as you/it rifle through their possessions. It's flaky and adds nothing to proceedings, though, to the point that you're better off playing 'story' mode so you're spared occasional irritations in between diary-reading.

The Novelist is a little difficult to truly recommend then, at least not to a mass audience, but at the same time it's impossible not to applaud it for treading where most games fear to, and for often being emotionally affecting with it.

It has power for parents, and for partners, too, but a little less Hollywood sensibility and a few changes of scenery would have done the game wonders.

Verdict

The Novelist can be extremely moving, but it can also be extremely tedious. It's worth experiencing even though it's a tricky game to praise. ⊠ Alec Meer

MONO MULTIFUNCTION LASER PRINTER

Samsung Xpress M2070W
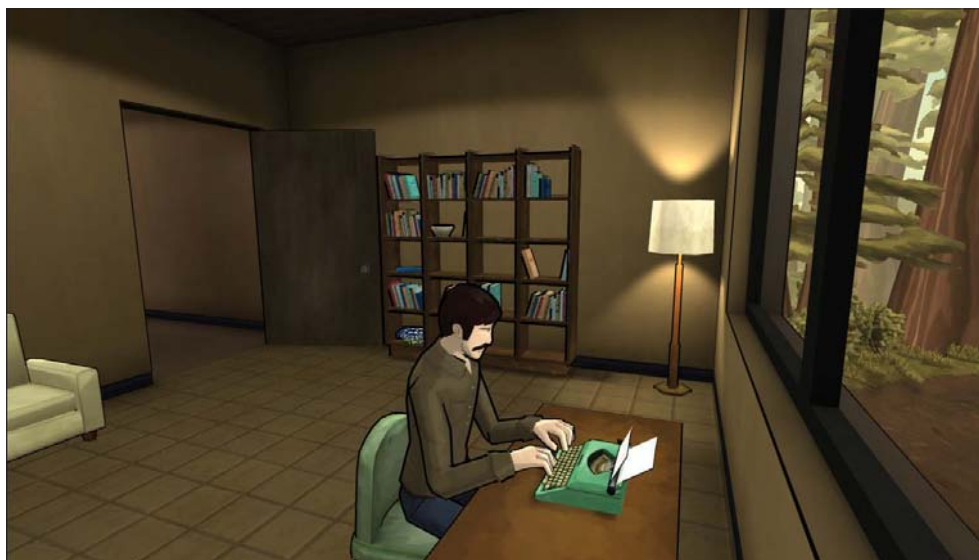
£108 ex VAT
£130 inc VAT

Contact
■ samsung.com/uk
Read more
■ tinyurl.com/oyzkjke

Specification
Mono laser multifunction; 128MB memory; max print resolution 1200x1200dpi; 1200x1200dpi optical scanner; copier; no fax; USB 2.0, wi-fi 802.11b/g/n, NFC mobile phone; 150-sheet input; manual duplex; 406x360x253mm; 7.4kg

Build: ★★★½☆
Features: ★★★★☆
Performance: ★★★★☆
Value: ★★★★☆

★★★★☆

Samsung seems to have an almost never-ending supply of strong-performing laser printers rolling off the presses. Its Xpress M2070W may be a highly capable low-priced laser first and foremost, but it also finds room for one or two highly intriguing features.

Perhaps the most meaningful of these is the mobile phone link. This uses NFC (Near Field Communication) to provide a low-power link between peripherals. Here it allows the M2070W to hook up flawlessly to a handset. In our tests, we found the app was easy to get up and running, and it produced near-instant results.

The Samsung isn't so innovative in terms of design, though. The dark grey scanning component of this multifunction device sits rather inelegantly on top of the cream body. The control panel is colourful, if brief; though, because the M2070W is so easy to set up, you'll probably have little need to go through the text menu system.

There's the usual supply of extra Samsung functions, and the paper saving mode has been tweaked. You now get the option of looking at a simulation of the document, and can opt to strip out unwanted elements, such as images and text, before initiating print. As a way of saving paper, this is fast and painless.

The M2070W's paper handling is average for a printer at this price point – 150 sheets isn't an amazing capacity, but it'll suffice. In other areas, the Samsung fares better. Its 128MB of memory is a healthy complement, and the printer will have no problems manipulating image-soaked documents. The 1200x1200dpi resolution is finely focused, and the 600MHz Cortex A5 is a notch above the typical processor found in similarly-priced models. Connectivity is good, too. Not only do you have the NFC tool for working with a phone, but there's also a wireless 802.11b/g/n interface. There's no ethernet, though.

Scanning is well handled, with the Samsung able to produce A4 image in 10 and 32 seconds at resolutions of 300- and 600dpi respectively. The resulting pictures are accurate and realistically shaded.

Printing is also impressive. We got speeds of up to 17.1ppm at high resolution from the fast processor. Text output is dark and crisp, and better than the pale characters you get on some cheap lasers. It's not be the best at graphics and our grayscale tests revealed a rather limited range of shades, but it'll make an adequate job of PowerPoint presentations. For anything more advanced, you'll probably want a colour model.

One glaring omission is auto duplexing. With such a good basic pace, you would have thought that a duplexing speed of around 10ppm would have been possible. Sadly no such feature is forthcoming.

One other slight concern is the cost of running this model. At £38 for a 1000-page toner cartridge, this has a high cost per page of 3.8p. We'd really like to see this below the 3p mark.

Verdict

The Xpress M2070W doesn't look as polished as we'd like, the absence of auto duplexing is surprising and the running costs are also a little high. In almost every other respect, though, the Samsung is excellent.
⊠ **Robin Morris**

MONITOR

NEC MultiSync EA273WMi

£237 ex VAT
£285 inc VAT

Contact
■ nec-display-solutions.co.uk
Read more
■ tinyurl.com/n6yahxr

Specification
27in monitor; 1920x1080 pixels; AH-IPS technology; 82ppi; matt anti-glare finish; white LED backlight; 639x548x23mm (with stand); 8.7kg

Build: ★★★½☆
Features: ★★★★☆
Performance: ★★★½☆
Value: ★★★☆☆

★★★½☆

As part of NEC's Enterprise range, the 27in EA273WMi is solid enough to withstand being hauled from desk to desk, and has the energy-saving tricks that cost-conscious CFOs will appreciate. It's also a 16:9 ratio display that uses LG's Advanced High-performance In-Plane Switching (AH-IPS) technology.

Build quality is certainly one for the standard office in that it's square and boxy, weighing in at 8.7kg. The back panel is set back from the thick edges and is supported by a telescopic stand that swivels. The monitor can tilt backwards and forwards, there's a good deal of play vertically and it rotates from horizontal to portrait orientation. However, only in the dreams of the NEC marketing department can this be reckoned to have 'sleek aesthetics'. That said, there is a white model, which is a bit more attractive.

The EA273WMi has a pair of small speakers built in. These are fine if it's only speech you listen to, though, as the sound quality is akin to a transistor radio from circa 1973.

Most of the interfaces are located under the back ledge and include DisplayPort, DVI-D, HDMI, analogue D-Sub, a jack plug, NEC's ControlSync for linking up to six NEC MultiSync monitors and two sets of passive USB 2.0 ports (four up one down).

The onscreen menu controls can be found on the bottom-right corner and are touch-sensitive. These are easy to navigate and contain access to interesting functions, including the human sensor (which turns the panel off when you move away), ambient light sensor and a low-energy Eco mode. To make energy-saving enthusiasts feel even happier, a display reveals how much carbon emissions have been saved.

Of course, the first thing that's apparent after switching the monitor on is its coarse 1920x1080 resolution, which on a 27in computer monitor makes everything look chunky. But to be fair, the display is still reasonably crisp. Ultimately,
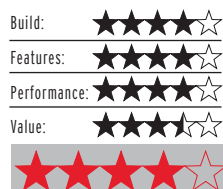
Build: ★★★★☆
Features: ★★★★☆
Performance: ★★★★☆
Value: ★★★½☆

★★★★☆

A3 FLATBED SCANNER
Xerox DocuMate 4700

A3 may have started to catch on in medium-range printers, but scanners at this size are still hard to come by.

Like the majority of affordable flatbeds, the 4700 doesn't come with an ADF (Auto Document Feeder), so you won't be able to print large volumes of A3 scans out of the box. However, Xerox has a potentially useful solution to this. Hook it up to a compatible ADF-equipped model from Xerox's DocuMate range and you can use the ADF on that device to fuel the 4700. If you have to buy an ADF model separately, this won't work out as an amazingly cheap deal – the 3460, for instance, will set you back around £940 on its own. However, should you already own a compatible model, this facility could save you the cost of buying a full ADF-equipped A3 model – Xerox's own range start from around £1,600.

That's not to say the 4700 isn't a very good scanner in its own right. A3 flatbeds are still thin enough on the ground for the 4700 to feel like quite an event. The scanner looks rather sleek, with its interesting blue/cream colour scheme. However, the A3 support necessitates a rather large 580x495mm footprint, so this isn't a device you can squeeze into a space on the desk. It has a nine-strong panel of buttons, providing quick access to a range of options,

covering various different types of BMP, PDF, JPEG and RTF files. You can change the defaults to suit your own needs, and the sheer number of buttons should make it possible to get one-touch execution on most of your tasks. The Xerox fully embraces cloud scanning, too, offering access to services such as Google Docs, and letting you create profiles to use with them.

On the face of it, the specifications aren't sparkling. Only 24-bit is supported and the resolution is just 600x600dpi, while the likes of the A3 Plustek OpticPro A320, for instance, can reach an optical resolution of 1600x1600dpi. However, the 4700's real-world performance was vastly superior.

The promise of 3.5 seconds for an A3 scan proved wildly optimistic, but we were able to achieve times of almost eight seconds for a sheet at 300dpi, and 19 seconds for 600dpi. For A3 output, this is remarkably good – indeed, it's rather faster than many A4 models. An A4 page took a brisk six seconds for 300dpi, and 12 for 600dpi images. The scanner turned out highly detailed scans in both A3 and A4, packing images with clarity and depth, and producing crystal

clear reproduction of characters. Our colour chart threw up no imperfections, and every scan looked authentic and natural, even when rendering intricate skin tones.

The software is good, too. PaperPort is now a very polished document manager, while OmniPage Pro allows for first-class OCR. Combined with the finely focused Xerox, we were able to achieve 97 percent accuracy on even our most demanding source material.

Verdict
The 4700 is the best A3 scanner we've looked at, and one of the very best flatbeds overall, in terms of performance and quality of output. It's not cheap, but then no A3 flatbed is. A slightly increased price with an ADF would have made it truly indispensable. However, if you have a compatible Xerox DocuMate nearby, this will become an outstanding buy. ⊠ **Robin Morris**

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you'd be forgiven for thinking that 2560 pixels wide is a better resolution for this size of panel.

The test for colour coverage showed a useful 98 percent of sRGB gamut and 74 percent of AdobeRGB, which is lacklustre for a professional graphics monitor but adequate for an office display.

Onscreen uniformity at 100 percent. Brightness showed some variations, but not serious in the context of the display's application. The top third was darker, but only by around 10 percent, which is almost inconsequential here.

NEC claims brightness levels of 250cd/m², and in our tests we recorded a nearly identical

254cd/m². That's perfectly fine, if unremarkable, for most circumstances. The contrast ratio of 770:1 was less than the advertised 1000:1, but still in line with expectations. For colour consistency across the display, the results were generally good with Delta-E average of 2.35 at 50 percent brightness.

Verdict
The relatively low resolution for the size and the mid-range price tag mark it out as an unexceptional, but solid performer. For standard office duties where the power-saving features can come into play, it's a decent quality display that will serve well. ⊠ **Duncan Evans**

NAS DRIVE

QNAP TS-421

Specification
2GHz Marvell single-core ARM processor; 1GB DDR3 RAM; 2x USB 3.0, 2x USB 2.0 ports; 2x eSATA; 2x gigabit ethernet; hot-swap four-bay enclosure; 2.5in or 3.5in SATA disks; two-line LCD; disk indicator LEDs; 90mm cooling fan; external power supply; 177x180x235mm; 3kg

Build: ★★★★☆
Features: ★★★½☆
Performance: ★★★½☆
Value: ★★★★☆

★★★★☆

If it's an affordable four-bay NAS storage unit you're after, then you should consider the TS-421. The metal chassis is sturdy, and despite the low price, QNAP has kept changes to its internal specifications to a minimum – it has a 2GHz Marvell chip and 1GB of memory.

The rest of the layout remains unchanged since the TS-419P II we reviewed in 2012 (tinyurl. com/72n4gbn). Both models have the same chassis and a variety of expansion sockets – two eSATA, two USB 2.0 and two USB 3.0. One v2.0 port faces the front for quick data dumps, configurable for one-touch copy in either direction. Again there are two gigabit ethernet ports at the back where the second could prove handy in more elaborate networks.

Revamped OS

What has changed remarkably since our previous QNAP review is the new QTS 4.0 operating system that now drives the company's network-attached storage. After many years with the same administrator's layout featuring sidebar and graphical if flat look, QNAP has revamped the interface. It now closely follows that of Synology – a rich and layered environment with movable windows that is, to all intents, the GUI over a multi-tasking workstation computer.

The Control Panel is the central focus for most of the drive's settings and adjustments, with additional shortcuts to specific applications provided as icons on the NAS PC's desktop. Here you'll find handy collections of utilities such as Backup Station, which combines access to rsync incremental backups UNIX-style with real-time remote replication (RTRR) with Apple Time Machine for local Mac automated backups.

On the cloudier front there are shortcuts to Amazon S3, ElephantDrive and Synform. Or you can create backup jobs to direct-connected external disks. There's even a slide-out graphical tray, just like Synology's, with a quick overview of the system's current status.

The overall look is a little too bouncy and effervescent for our taste, as if QNAP was trying to outdo Synology by adding more eye candy that ultimately detracts from what is still a serious and powerful operating system beneath the bubble gum skin.

Take Qsync, for example, an application that has matured into a sophisticated yet simple to use utility to provide you personal cloud storage with synchronisation even when roaming on remote networks. It supports selective sync of folders on your Windows PC or Mac, so you don't have to locally store the same full directory as other users, and with privileges control to resolve conflicts on shared files.

Performance

Read performance for a single sequential transfer was at the gigabit limit. We loaded the TS-421 with four WD Red 3TB disks, and could easily copy files from the NAS at 112MB/s over AFP.

Write speed was considerably behind, though, as we usually find with low-power ARM-powered NAS units. Here we measured just 36MB/s in large-file sequential writes, around the same speed as USB 2.0. Over SMB, the write speed was seen to rise to 39MB/s; but then reads using the Microsoft network protocol fell to just 72MB/s.

Power consumption is low, specified at 13W with system alive but disks sleeping, rising to a typical in-use figure of 31W. Compared to Intel-powered NAS drives, there's little concern here about excessive power consumption.

Verdict

The QNAP TS-421 has a broad reach across a number of services beside local network file serving, with powerful small-business services as well as plenty of potential for home multimedia hosting. Available for less than £400, this well-made four-bay NAS unit is a recommended product. ☒ **Andrew Harrison**

PC ADVISOR
RECOMMENDED

BUDGET laptops

The laptop world has never been this good or varied, and that means plenty of high-quality portables are available for less than you might think. Mike Jennings puts six of the latest offerings through their paces

The tech world might be cooing over Ultrabooks, but there's no need to pay big money if you want a high-quality laptop – as this test demonstrates.

The six machines we look at here cover a broad swathe of the laptop market, from lighter portable machines with 14in screens to larger 17in notebooks with dedicated graphics processors – ideal for gaming. The price range is wide, too, with notebooks on offer from £330 right up to £630.

We've got systems that are suited to work, play and watching films, but many of the attributes that make up a good laptop don't change, no matter what type you're buying.

One of the biggest shifts in Windows laptop design over the past 18 months has been the advent of touchscreens, and two machines in this budget group test now include finger-friendly panels. The touchscreens on offer in notebooks from Asus and Acer work well with Windows 8, though it's only worth considering if you really do need touch technology.

After all, big-screen laptops – such as the Toshiba Satellite and Asus X75VC – are large enough that touch functionality would require the user to stretch their arms to reach the corners, and machines such as Dell's Latitude 3440 are designed for work, where touch control is largely wasted. Also check whether a potential new portable has a glossy or matt screen: while the former might look more impressive, the latter will be easier to use.

There's another type of component that's making its way into low-end laptops – Haswell processors. Examples from Intel's latest range are included in two of the six machines here, and its talents lie in several key areas. The difference

it makes to battery life is dramatic, and it's no surprise that one Haswell-equipped machine is the longest-lasting on test. This change alone is enough to make us recommend Haswell-based laptops over those that use older Ivy Bridge chips, even if there's no dramatic leap forward in application performance.

Haswell also has better graphics capability, and our tests illustrate that these cores aren't far behind modest discrete GPUs. In short, laptops with Intel's latest processor are capable of running modern games. If you want to play games but aren't concerned with a more expensive machine with discrete hardware, it's worth looking out for Haswell.

It's also worth considering your personal power needs. Many laptops these days, especially Ultrabooks, come with batteries that can't be accessed or changed – a nightmare if the powerpack breaks, or if you work in the field and need to carry replacements. While more expensive laptops may have all-day battery life – at least eight hours real use – these midrange models cut corners here, but you should expect at least five or six hours.

A host of smaller factors are also worth considering. Laptops with more than one USB 3.0 port, for example, will be more versatile, while systems where interior access is available will mean that the memory, hard disks and wireless cards can potentially be replaced or upgraded.

The laptops in this test aren't as flashy as Ultrabooks, but there's plenty to like about them in their own right: some are slim and light, others are and more powerful with large screens, and there are touchscreens, discrete graphics cards and Blu-ray drives on offer – and they're all less than £650.

Photography by Dominik Tomaszewski

Build	★★★½☆
Features	★★★☆☆
Performance	★★★☆☆
Value	★★★½☆
Overall	★★★☆☆

ACER ASPIRE V5 TOUCH

£579 inc VAT • acer.co.uk • tinyurl.com/nnh57bu

Several of the machines in this test include Intel's latest Haswell processor, however, Acer has instead opted to use an older Ivy Bridge chip. This is forgivable, though, as the Aspire V5 does have a touchscreen, which adds to the cost.

The Core i5-3337U is one of Intel's low-power processors, and its clock speed of 1.8GHz can be dynamically lifted to 2.7GHz by automatic Turbo Boost. Its two cores are Hyper-Threaded, so the chip can address four simultaneous threads, and it's got 3MB of L3 cache – the same as Haswell.

The processor is paired with a generous 6GB of DDR3 RAM, but could only score 2413 points in the PCMark 7 benchmark. It's the second-slowest result here, but this is a mid-table score that saw Windows 8 run without any sluggishness – we had no issues when running office software, light photo-editing tools and media either.

The Aspire's touchscreen is mediocre. Its 211cd/m² brightness level lags behind the Packard Bell and Toshiba laptops, and its measured black level of 0.57cd/m² is mid-table. It makes for a contrast ratio of 370:1 and a screen that's not as punchy as we'd like.

The uninspiring specification is, at least, crammed inside a good-looking exterior. The build quality is good, too. There's very little give in the wrist-rest and the screen is one of the sturdiest here. Design-wise, it's unfussy but reasonable: chrome-effect metal coats the plastic chassis and looks smart, and there's a glossy black screen surround. The Acer's maximum thickness of 24mm isn't much more than an Ultrabook, although its 2.6kg weight is on the heavy side for a modern 15.6in machine. Around the edges there's one USB 3.0 socket, two USB 2.0 connections and an HDMI output. The right-hand edge also houses a DVD writer.

The keyboard is also reasonable: the base is extremely firm, which goes some way to making up for the light, shallow Scrabble-style keys. The trackpad is good, with two responsive buttons and a wide, smooth and accurate surface.

VERDICT: The Acer Aspire V5 is a sturdy and smart-looking laptop, but its decent exterior masks several key deficiencies. The Ivy Bridge processor can't match Haswell chips for application performance, games ability or battery life, and the screen's colour accuracy is hampered by poor contrast and mediocre brightness.

Build	★★★★☆
Features	★★★★☆
Performance	★★½☆☆
Value	★★★½☆
Overall	★★★½☆

ASUS V550C

£582 inc VAT • asus.com/uk • tinyurl.com/nqalwlf

The Asus V550C has a 15.6in screen, which puts it in the middle of this test's field, but it's the slimmest laptop on test – its maximum thickness of 22mm tapers to a 14mm front edge. Those vital statistics are almost svelte enough to join ultraportable territory if you excuse the weight, and the V550C continues to impress elsewhere.

The aluminium-coated lid is finished with a subtle, dark brushed pattern, and the wrist-rest and keyboard surround are both coated with the same brushed aluminium in a lighter colour. The black keyboard rises up from the base, and the screen is surrounded by a glossy black bezel. Build quality, though, is mixed, and not as good as the Dell Latitude 3440. There's very little flex in the wrist-rest, but the screen becomes slightly distorted when the back of the panel is pressed. The base isn't as solid as we'd like, either.

The keyboard is one of the best in this group. The Scrabble-tile keys have almost as much travel as those on the Dell machine, and the base is solid. The layout is fine, too, with large keys and room for a number pad. The trackpad is a little larger, although it's too skittish – we had to reduce its speed to make it more usable.

The V550C is initially impressive, but it's unable to compete when it comes to its components. It's powered by an Intel Core i5-3337U, which is a low-power part. That's clocked to 1.8GHz and has a Turbo peak of 2.7GHz, but it uses the older Ivy Bridge architecture.

The V550C's PCMark 7 result of 2463 points slips into the bottom half of our performance table, and it's marginally slower than the 2699 scored by the Haswell-powered Dell. While the Asus V550C beat its rival in PCMark's Lightweight and Productivity tests, it fell behind in the rest of the software's individual tests.

The Asus has 6GB of RAM and a 1TB hard disk, with the latter proving a quick performer: its sequential read and write test results of 102MB/s and 94MB/s are among the best in this group.

The V550C has a touchscreen display, but quality is mixed. Its measured brightness of 184cd/m² is the lowest here, and the Gamma measurement of 2.64 far from the preferred 2.2. The screen makes a dim first impression, and colours don't look particularly inviting.

VERDICT: The Asus impressed with its smart, svelte design and its good keyboard and trackpad, but it falls behind the Dell in several key areas. The Asus isn't far behind, but the Dell still takes the crown.

Build	★★★★☆
Features	★★★☆☆
Performance	★★★☆☆
Value	★★★☆☆
Overall	★★★☆☆

ASUS X75VC

£599 inc VAT • asus.com/uk • tinyurl.com/lsn5dqx

The Asus X75VC is the largest laptop in this group – its maximum thickness and weight of 39mm and 3kg outstrip even the Toshiba Satellite's 34mm, 2.7kg bulky frame. And yet it's also one of the most unassuming. There are no lights on show, and the only sop to style is a lined pattern etched into the plastic across the wrist-rest and lid.

The X75VC makes up for its lack of style with good build quality. It's sturdier than the Toshiba thanks to barely any 'give' in its wrist-rest and base, and the screen didn't flex much from side to side, with no screen distortion when we depressed the centre of the rear panel.

The keyboard has a firm base, a good layout and a number pad, and its keys have more travel and a more consistent action than the flimsy Toshiba's unit. It's not the best keyboard here, though.

Behind the dull exterior lies one of the most potent specifications in this test. Star of the show is the group's only discrete graphics core. The nVidia GeForce GT 720M is one of the company's most modest mobile parts, but it's from its current range and still has a specification that can outpace the best Intel can offer: 96 stream processors clocked to 719MHz, with 2GB of dedicated video memory.

Unsurprisingly, the Asus delivered the group's best gaming results. At Stalker's Medium quality settings and a resolution of 1280x720, its 45fps average easily beat the next-best Toshiba, which scored 33fps, and the Asus was the only machine to return a playable score when we upped the resolution to the display's native 1600x900 resolution. In this more demanding test, the X75VC averaged 33fps.

This is also the only laptop here with a Blu-ray drive but, elsewhere, the specification is mixed. The 1TB hard disk returned sequential read and write scores of 93MB/s and 86MB/s, which aren't the best, and its 50.9-second boot time is also fifth out of the six laptops on offer.

The screen's 1,600x900 resolution is fine, and the measured brightness level of 249cd/m^2 is among the highest in this group. The screen covers only 83 percent of the sRGB colour gamut, which is a little better than the Toshiba but the joint-highest here.

VERDICT: The X75VC has the best gaming results of any laptop in this group, and it's also got good application performance, decent build quality and a reasonable keyboard. However, it's only worth buying if discrete graphics or a Blu-ray drive are important.

Build	★★★★☆
Features	★★★★☆
Performance	★★★☆☆
Value	★★★★☆
Overall	★★★★☆

PC ADVISOR RECOMMENDED

DELL LATITUDE 3440

£516 inc VAT • dell.co.uk • tinyurl.com/kqgo23p

Only two of the laptops in this group include one of Intel's new Haswell processors and, despite its factory-fresh technology, the Latitude 3440 is one of the more affordable systems on test.

The chip of choice here is the Core i5-4200U. It's a low-power, dual-core part with Hyper-Threading, clocked at 1.6GHz. Its Turbo Boost top speed of 2.6GHz is a larger leap forward than Ivy Bridge chips can manage. Haswell doesn't make a huge leap in application performance, though, and the Dell's PCMark 7 benchmark result of 2699 points is the third-best in this group. That said, the Latitude wasn't sluggish when handling work tasks and web browsing.

Intel's new chips make up ground in games. The HD Graphics 4400 core made for decent gaming performance: an average framerate of 24fps in Stalker took the bronze medal in this group.

Elsewhere, the Dell provides what we'd expect from this level of machine: 4GB of RAM, a 500GB hard disk, and a DVD writer. The hard disk returned a good sequential read pace of 101MB/s, and the Latitude's 40.6 seconds boot time is the best in this group. It's also the only system here to use Windows 7, although the choice of operating system can be changed at the checkout.

The Latitude is the only machine here with a 14in panel, and the 1366x768 screen used here isn't a touchscreen – but it does have a matt finish, so it's easier to see under bright lights. Quality is middling: the brightness and contrast figures of 201cd/m^2 and 291:1 do little to stand out, and the Delta E of 7.9 means the Dell has the poorest colour accuracy of any system here.

The Dell's exterior is impressive. We like the brushed metal wrist-rest and lid, and we've no issues with build quality: the Latitude might be one of the smallest laptops here, but it's the strongest.

The Scrabble-style keyboard is the best in this group: the large keys have good travel, and there's a solid base. It makes for the most consistent and satisfying typing action in this group, and it's partnered with a solid trackpad: the surface is smooth and responsive, and the buttons are both good.

VERDICT: The Latitude 3440 is designed for work rather than play, and that means its talents lie in certain keys areas: the Haswell processor delivers reasonable application and games performance, and the keyboard and touchpad are excellent.

Build	★★★☆☆
Features	★★⯪☆☆
Performance	★⯪☆☆☆
Value	★★★⯪☆
Overall	★★⯪☆☆

PACKARD BELL EASYNOTE TE11HC

£329 inc VAT • packardbell.co.uk • tinyurl.com/al6dlaa

Packard Bell, a subsidiary of Acer, is known for its budget laptops, so it's no surprise that the EasyNote TE11HC is the most affordable machine here. At £329, it's almost half the price of others here.

Build quality isn't bad at all: there's very little give in the wrist-rest, the screen is sturdy, and the base feels strong. It looks reasonable, too, with a glossy black lid and metal-effect wrist-rest.

Get a little closer, though, and the Packard Bell's cost-cutting becomes clear. The keyboard's flat buttons are light and don't have much travel, and we found them inconsistent, with some key presses even failing to register onscreen. The touchpad is the smallest in this group, and its two buttons feel weak.

The Packard Bell also has this test's slowest specification. Our review sample came with an Intel Celeron B820 processor, and retail models have a slightly more powerful Pentium B960 chip – either way, there's not much power. Unsurprisingly, the TE11HC was far down in our benchmark tables. The chip's overall PCMark 7 score of 1989 points is a long way behind the fifth-placed Acer, which scored 2413, and the EasyNote's Computation score of 6175 is especially poor.

The Celeron in our sample shares its basic HD Graphics core with the Pentium part in retail models, and it's the weakest graphics chip in this test. Its 17fps result in the standard Stalker benchmark is 4fps adrift at the bottom of our benchmark tables.

The rest of the specification failed to impress, too. The 500GB hard disk's sequential read and write scores of 72MB/s and 59MB/s are the slowest here, and the processor's peak temperature of 73°C is the second-highest in the group – only the Asus X75VC, with its significantly more powerful processor, got hotter.

Battery life wasn't great, either. The 48Wh battery looks sizable on paper, but it lasted for just three hours, 26 minutes in our tests – the Dell, which has Haswell inside, lasted for almost twice as long.

The final major component, the screen, proved inconsistent during tests. The 1366x768 resolution screen looks bright, but its lack of real depth means the panel lacks the definition we'd expect.

VERDICT: The Packard Bell is this test's cheapest machine by some distance and, while that's great for the bank balance, making a laptop this affordable involves numerous compromises. It's only worth buying if you need a budget machine for basic tasks.

Build	★★★☆☆
Features	★★★⯪☆
Performance	★★★★⯪
Value	★★★⯪☆
Overall	★★★⯪☆

TOSHIBA SATELLITE C75-A-13P

£629 inc VAT • toshiba.co.uk • tinyurl.com/p86hu4q

The Satellite C75-A-13P is one of two desktop replacement machines in this group, and Toshiba has made sure that this system stands out when compared to its bland-looking rival – the Asus X75VC.

The glossy plastic lid looks like it's made from metal, and the metallic styling is carried over to the wrist-rest, where the silver colour contrasts well with the glossy black keyboard surround and screen bezel. The good looks don't last, though, as the Toshiba's build quality is inconsistent. The base is solid, but the wrist-rest has a little more bounce than we'd like, and the back of the screen feels weak.

The C75 is a mixed bag ergonomically, too. Its width means there's room for a number pad, and the layout is fine, with large Space and Return keys – but it lacks quality. The Scrabble-style keys have a solid base, but there's barely any travel and they feel wobbly. The trackpad is one of the smallest here, but its buttons are light and responsive.

The Core i5-4200M is one of Intel's latest Haswell processors, and it has a stock speed of 2.5GHz, a Turbo limit of 3.1GHz and 3MB of L3 cache alongside Hyper-Threading. It's no surprise that this machine delivered the group's best benchmark result. Its PCMark 7 score of 3228 points easily beat the 2914 scored by the Asus, and the Toshiba topped the table in every one of PCMark's individual categories, too.

The Haswell processor also includes Intel's new HD Graphics 4600 graphics core. It's the best integrated core here, and its 33fps average in Stalker's Medium-detail test is the only playable result from laptops that include Intel's integrated chipsets.

The Toshiba includes 8GB of RAM, and the 1TB hard disk's read and write speeds of 101MB/s and 94MB/s were among the best here. And, surprisingly for a large laptop, its battery lasted for four hours, 21 minutes in our tests, which was the second-best result here and longer than the Asus X75VC, which lasted a little over three hours.

The non-touch LED panel makes a good first impression thanks to its 267cd/m² brightness, which is the highest in this group test. Its sRGB gamut coverage of 82 percent isn't great but among the best in the group, too, and its average Delta E of 5.8 isn't bad either.

VERDICT: The Satellite C75's Haswell processor helps it deliver the best application benchmarks of any machine here, and battery life is better than the Asus, too. If you need a desktop replacement without breaking the bank, then the Toshiba has edged ahead of its rival.
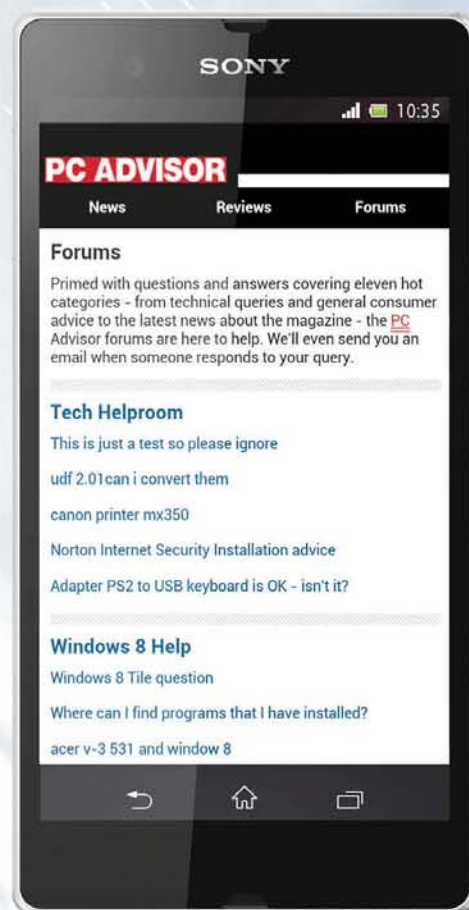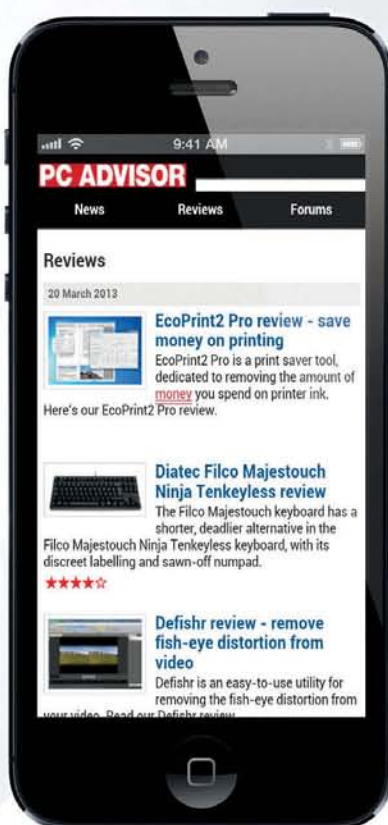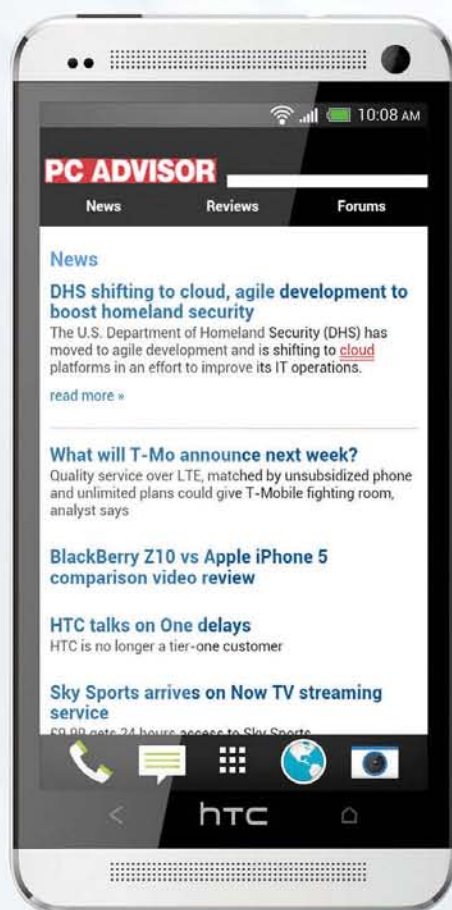
Conclusion

The laptops in this group range from portable 14in models to bulky 17in desktop replacements, but our testing revealed a clutch of notebooks that stood out from the crowd.

Top of the heap is the Dell Latitude 3440, which was hauled above its rivals in part thanks to the inclusion of a Haswell processor. Intel's low-power chip has enough power for general computing and productivity software, but also has a more powerful graphics core than previous Intel-based laptops, so gaming is possible. There's the crucial issue of battery life, too: the Latitude lasted for much longer than any other machine here, although it was still short of six hours. The Dell didn't just impress from under its bonnet. It's one of the best-looking systems here and, at 2kg, it's the lightest. Despite that, it's got decent build quality throughout, and its keyboard is excellent – we were up to speed in no time.

The rest of the group traded blows, with nothing able to mount a serious challenge to the Dell, but second prize goes to the Toshiba Satellite C75. It's a desktop replacement with a large 17.3in screen, and it's the only other system here with a Haswell processor: that means the best PCMark 7 result of any laptop in this group, and better battery life than the other desktop replacement-class Asus X75VC. And, while the Asus was a little faster in gaming, the Toshiba wasn't far behind thanks to its Haswell integrated graphics.

Elsewhere, Packard Bell's system proved to be the cheapest by a long way, but its weak specification and battery life mean that it's only suitable for those on the tightest of budgets. Two systems arrived with touchscreens – the Acer Aspire V5 and Asus V550C – but these spec-ticking features were joined by poor performance, short battery life and mediocre build quality. ⊠

	ACER £579 inc VAT ★★★☆☆	ASUS £582 inc VAT ★★★½☆	ASUS £599 inc VAT ★★★½☆	
Model	Aspire V5 Touch	V550C	X75VC	
Product code	v5-571P-53316g50	V550CA-CJ105H	x75vc-ty103h	
Processor	1.8GHz Intel Core i5-3337U	1.8GHz Intel Core i5-3337U	2.6GHz Intel Core i5-3230M	
Graphics	Intel HD Graphics 4000	Intel HD Graphics 4000	nVidia GeForce GT 720M, 2GB DDR3	
Display	15.6in (1366x768) glossy touchscreen	15.6in (1366x768) glossy touchscreen	17.3in (1600x900) glossy	
Operating system	Windows 8 64-bit	Windows 8 64-bit	Windows 8 64-bit	
Storage	500GB hard disk	1TB hard disk	1TB hard disk	
Memory	6GB DDR3	6GB DDR3	8GB DDR3	
Ethernet	Gigabit	Gigabit	Gigabit	
Optical drive	DVD writer	DVD writer	Blu-ray reader/DVD writer combo	
Video out	HDMI	VGA, HDMI	VGA, HDMI	
Wi-Fi	802.11b/g/n, dual-band	802.11b/g/n, single-band	802.11b/g/n, singe-band	
Bluetooth	Bluetooth 4.0	Bluetooth 4.0	N/A	
Webcam	720p	720p	1080p	
Speakers	Stereo speakers	Stereo speakers	Stereo speakers	
Audio in	Built-in mic, 3.5mm line-in/out	Built-in mic, 3.5mm line-in/out	Built-in mic, 3.5mm line-in/out	
Audio out	N/A	N/A	N/A	
USB	1x USB 3.0, 2x USB 2.0	1x USB 3.0, 2x USB 2.0	1x USB 3.0, 2x USB 2.0	
Kensington lock slot	Yes	Yes	Yes	
Card slot	SD, MMC	SD	SD	
Trackpad	106x77mm, two-button	105x73mm, two-button,	104x72mm, two-button	
Other software	N/A	N/A	N/A	
Power adaptor	90W	65W	65W	
Battery	37Wh lithium-ion, removable	44Wh lithium-ion, removable	47Wh lithium-ion, removable	
Dimensions	382x253x24mm	380x266x22mm	420x282x39mm	
Weight	2.6kg	2.6kg	3kg	
PCMark 7 score	2413	2463	2914	
Battery	3 hrs, 18 mins	3 hrs, 25 mins	3 hrs, 18 mins	
Stalker	21.1fps	22.4fps	45.2fps	

Battery life (hours)

| | Acer | Asus V550C | Asus X75VC | Dell | Packard Bell | Toshiba |

PCMark 7 score (points)

| | Acer | Asus V550C | Asus X75VC | Dell | Packard Bell | Toshiba |

Stalker, 720p (fps)

| | Acer | Asus V550C | Asus X75VC | Dell | Packard Bell | Toshiba |
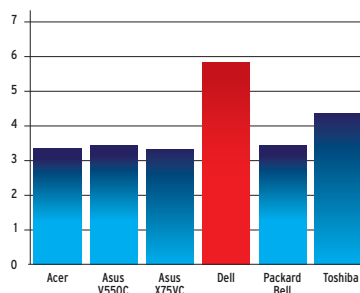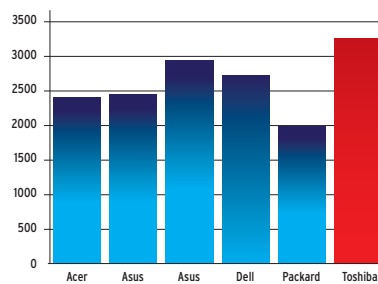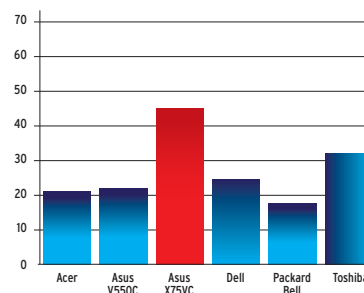
DELL £516 inc VAT ★★★★☆ PC ADVISOR RECOMMENDED	**PACKARD BELL** £329 inc VAT ★★☆☆☆	**TOSHIBA** £599 inc VAT ★★★☆☆
Latitude 3440	**EasyNote TE11HC**	**Satellite C75-A-13P**
SM003L34408UK	TE11HC-B826G50MnksMFG	p8ceae-008008en
1.6GHz Intel Core i5-4200U	1.7GHz Intel Celeron B820	2.5GHz Intel Core i5-4200M
Intel HD Graphics 4400	Intel HD Graphics	Intel HD Graphics 4600
14in (1366x768) matt	15.6in (1366x768) glossy	17.3in (1600x900) glossy
Windows 7 Professional 64-bit	Windows 8 64-bit	Windows 8.1, 64-bit
500GB hard disk	500GB hard disk	1TB hard disk
4GB DDR3	6GB DDR3	8GB DDR3
Gigabit	Gigabit	Gigabit
DVD writer	DVD writer	DVD writer
VGA	VGA, HDMI	VGA, HDMI
802.11b/g/n, single-band	802.11b/g/n, single-band	802.11b/g/n, single-band
Bluetooth 4.0	N/A	Bluetooth 4.0
720p	720p	720p
Stereo speakers	Stereo speakers	Stereo speakers
Built-in mic, 3.5mm line-in/out	Built-in mic, 3.5 mm line-in	Built-in mic, 3.5 mm line-in
N/A	3.5 mm line-out	3.5 mm line-out
2x USB 3.0, 1x USB 2.0	3x USB 2.0	1x USB 3.0, 2x USB 2.0
Yes	Yes	Yes
SD, MS, MS Pro	SD, xD, MS, MMC	SD, MMC
102x56mm, two-button	85x45mm, two-button	86x59mm, two-button
N/A	N/A	N/A
65W	65W	65W
40Wh lithium-ion, removable	48Wh lithium-ion, removable	48Wh lithium-ion, removable
346x245x25mm	383x252x32mm	413x268x33.7mm
2kg	2.5kg	2.7kg
2699	1989	3288
5 hrs 50 mins	3 hrs, 26 mins	4 hrs 21 mins
24.3fps	17.1fps	32.5fps

Monitors

Whether you need a monitor for work or the home there's a huge range of options to choose from. We look at six of the latest models

A decent monitor can make a huge difference to your computing experience. A poor screen not only looks bad, but can cause eyestrain and make it impossible to edit photos or video with accuracy. Conversely, a good display can increase enjoyment and boost productivity through reduced fatigue and sharper text and graphics, thanks to increased resolutions.

Even if your screen looked great when you bought it, the chances are it doesn't look quite as good now. Monitors age, and as they do so their picture quality gradually decreases over time, growing dimmer as colours shift ever further away from their original hues. It's likely a monitor that's several years old won't be able to display the full range of colours expected from a new model.

Photography by Dominik Tomaszewski

PC ADVISOR TEST CENTRE

based gaming, but they suffer from narrow viewing angles and the worst colour reproduction. A narrow viewing angle means that the edges of the screen may show an apparent shift in brightness or colour, even before you move your head around.

Much wider viewing angles and improved colour reproduction can be had from In Plane Switching (IPS) displays, though, these have traditionally cost a lot more. They are much better suited to any work involving photography, graphic art or video, and are generally more relaxing to use than a TN display. The good news is that the price of IPS has fallen dramatically in the past two years.

If your current monitor is perched on top of a pile of books, you should consider a replacement featuring a height-adjustable stand rather than the basic tilt. Swivel and pivot adjustments offer more options such as using your monitor vertically rather than horizontally.

A glossy screen coating can look impressive, but is also susceptible to unwanted reflections. Your choice will be a matter of personal preference. Look for a monitor with the highest contrast ratio you can find, to get a sharp, clear picture, with deep blacks and punchy graphics. High brightness isn't important unless you want to sit back and use your monitor like a TV in a brightly lit room.

If your PC doesn't have any speakers, you may want to opt for a model with built-in speakers and perhaps a headphone socket. And fans of Windows 8.1 or Android may want to consider a touch-enabled display.

Whichever monitor you choose, you'll need to check that the inputs match the connectors on your PC or laptop, and also make sure your computer can output images at a resolution high enough for your display. This is particularly important for screens supporting better-than-HD resolutions such as 2560x1440 pixels.

Most users should look for a monitor featuring as close as possible to 100 percent sRGB coverage. Lower than this will result in unimpressive 'washed out' colour reproduction. Going above 100 percent is great for those working with print and professional equipment, but careful calibration and setup will also be required to avoid incorrect colours.

Other than price, your main consideration is likely to be size. This will be down to how much space you have available and personal preference. Linked to size is resolution: a monitor with more pixels will display a sharper image, though text and icons will reduce in size unless you configure your operating system to enlarge them. If your eyesight is poor, you may prefer to opt for a large model with a medium resolution, such as a 27in display with 1920x1080 pixels, though smaller 24in and 23in screens often offer the same number of pixels for less money.

Several different types of panels are used in modern monitors. The least expensive is the twisted-nematic type, often called TN. These respond very quickly to fast-moving graphics, making them great for action-

Build	★★★★☆
Features	★★★★☆
Performance	★★★½☆
Value	★★★★☆
Overall	★★★★☆

AOC Q2963PM

£354 inc VAT • aoc-europe.com/en • tinyurl.com/nxdagmk

It's time to go wide with AOC's 21:9 ratio ultra-wide Q2963PM. That's appreciably wider and narrower than even the regular 16:9 aspect ratio displays designed for video use. The new 21:9 ratio equates to 2.37:1, which sits neatly between the classic 2.35:1 ratio of the original CinemaScope and Panavision cinema formats, and today's 2.39:1 used in more recent 35mm anamorphic film.

This 29in LCD screen has LED backlighting and a resolution of 2560x1080. That many pixels means you'll need to use DisplayPort, HDMI 1.4 or above, or dual-link DVI to connect. This display is rather stylish, with a squat appearance and gun-metal grey plastic finish. Its ends are rounded, giving a smooth and sculpted effect.

Like all the displays in this round-up, the AOC uses a variation of IPS technology, here specified as Advanced High-performance IPS (AH-IPS), a technology from display maker LG.

The Q2963PM's main panel slides onto a short stand, which has all the interfaces, power socket and speakers built into it. It means that the monitor is much lower on the desk than most. It tilts up, but doesn't rotate on the base, nor has any height adjustment.

There are interfaces for DisplayPort, dual-link DVI-D, MHL, HDMI and D-Sub VGA. The speakers take a 3W amplifier and overall power consumption is specified at a 65W maximum. It does require an external power transformer, which will sit on the floor separately. On the right edge of the screen are a set of stubby push buttons that are used to navigate the onscreen menu. We did find that the OSD interface isn't the most natural to use, though.

Brightness consistency was very good, with the bottom-right corner being the only area of much difference, the worst part was 6.2 percent dimmer at 100 percent Brightness. The gamut coverage was good with 98 percent of sRGB and 80 percent of Adobe RGB. Maximum brightness was recorded at 240cd/m^2, while the rated contrast ratio measured using the checkerboard test was at 530:1.

VERDICT: The AOC Q2963PM's ultra-wide display would be well suited to cinematic film playback, side-by-side documents and immersive widescreen gaming. However, its unconventional 2560x1080 resolution may cause issues with titles that aren't expecting the 21:9 aspect ratio. The display also sits quite low on the desk and is without any height adjustment. **Duncan Evans**

Build	★★★☆☆
Features	★★★☆☆
Performance	★★★☆☆
Value	★★★★½
Overall	★★★★☆

PC ADVISOR RECOMMENDED

HAZRO HZ27WIE

£250 inc VAT • hazro.co.uk • tinyurl.com/qa37oom

Hazro's no-frills HZ27WIE is a 2560x1440-pixel 27in display for just £250. Not only that, but it has a high-quality IPS panel, beloved of those who demand the best colour reproduction and the widest viewing angles. The specification also includes a total of four inputs, including VGA, DVI, HDMI and DisplayPort for maximum connectivity.

Look more closely, though, and the cost savings start to become apparent. First, while the chassis is sturdy, it has a certain home-made feel to it. Its parts have been put together well, but you can see the joins, and the control buttons down the right-hand side are so stiff that you'll need to use both hands when pressing them or you'll end up pushing the monitor across your desk. The short, plastic stand is also fixed in place, allowing no ergonomic adjustments to be made.

Performance results were a mixed bag. At this price, we weren't expecting professional-level accuracy, but the HZ27WIE performed well, with little deviation from perfect colour reproduction. The display achieves 100 percent of the sRGB colour gamut and can therefore accurately display the full range of colours you're ever likely to need outside of professional colour-critical work. In fact, it slightly exceeds sRGB, which will prolong the monitor's useful life as its colours start to fade.

However, displaying a black screen image reveals a lot of visible light bleed at the extreme edges, and our uniformity tests at various brightness levels reveal the top-right corner to be around 20 per cent dimmer than the bottom right. However, in general use, this is nowhere near as noticeable as you might imagine.

The HZ27WIE is also very power hungry: this is partly due to its extremely powerful backlight, which kicks out up to 390cd/m^2 in our tests. Unfortunately, it's a difficult beast to tame, and even at a brightness setting of zero, we couldn't get it dim enough to reach our standard test brightness of 120cd/m^2. This monitor at its dimmest setting is brighter than the AOC Q2963PM turned up full, achieving 254cd/m^2, which some people will find uncomfortably bright. At full brightness, the display consumed 63W, falling to 44W at the minimum brightness.

VERDICT: The Hazro HZ27WIE is noticeably imperfect, but offers enormous value for money. If you can accept the power consumption and high brightness, it's a real bargain. **Paul Monckton**

PC ADVISOR TEST CENTRE

Build	★★★★☆
Features	★★½☆☆
Performance	★★★½☆
Value	★★★½☆
Overall	★★★☆☆

HP ENVY 27

£370 inc VAT • hp.co.uk • tinyurl.com/n84twog

If you want something stylish to sit on your desk at home, then cast your eyes upon the HP Envy 27, a 27in IPS panel with built-in speakers. With the slimmest of bezels, a smooth, sculpted back, audio front panel and a knack of seeming to hover above the solid metal stand, this could be the monitor of your dreams. One consequence of such a slender rear, though, is a less-than-pretty external power brick. And the interface ports are around one-third from the bottom, so it won't present the prettiest of rears – an important consideration for installations in office receptions, for example.

The interfaces here comprise DisplayPort, HDMI and D-Sub VGA. Audio can come in through either HDMI or DisplayPort connections, although you may need to manually set your computer to send the audio to that monitor. Alternatively, there are audio jacks for input and output.

The sound is pretty good despite the Beats Audio tag, with treble tones being particularly crisp, but there's little bass and it certainly won't be replacing your hi-fi any time soon.

Also worth noting is that the screen is glossy and reflective, so picks up distracting reflections. As befits something that looks so good, the monitor controls are touch-sensitive on the bottom strip, but they are invisible until touched, at which point they illuminate.

Unlike some of the other 27in monitors here, the maximum resolution for the Envy 27 is only a full-HD 1920x1080, and that poor 82ppi pixel density makes the display image look soft in comparison.

Checking the colour gamut coverage, sRGB reached 97 percent, Adobe RGB at 76 percent (and NTSC at a lowly 71 percent). Brightness consistency was mostly satisfactory except for the right side, which was brighter – up to 16.3 percent difference at 100 percent brightness setting. Checking the screen on pure black there was clear light leak on that side, too. The rated brightness for the Envy is 300cd/m^2 but with our user settings we saw 287cd/m^2 – still ample for work in even brightly lit rooms. The measured contrast was good at 750:1 at 100 percent Brightness.

VERDICT: The HP Envy 27 has stylish looks, a big glossy screen and speakers built in. It's design makes it seem to float in mid-air, and it delivers punchy images. However, it doesn't offer the pixel resolution of Hazro's HZ27WIE and costs considerably more. **Duncan Evans**

Build	★★★★☆
Features	★★★★☆
Performance	★★★½☆
Value	★★★☆☆
Overall	★★★½☆

LG 23ET83

£230 inc VAT • lg.com/uk • tinyurl.com/k8wbr7r

LG's 23ET83 touchscreen display is an easy way to add touch input to your existing Windows PC or laptop. Without the need for any special drivers, it works as a simple plug-and-play upgrade.

Touchscreen monitors can look a little unconventional, often adding extra thickness and, out of necessity, bucking the current trend for super-thin bezels and sleek slimline panels. The 23ET83 is no exception in this respect, yet its striking white exterior and edge-to-edge glass give it a stylish, if chunky, look all of its own. The wider frame around the display facilitates Windows 8 gestures that require you to sweep inwards from beyond the edge of the desktop.

Its 23in gloss panel is attached to a hinged stand, offering only a basic tilt function. Sadly, it doesn't tilt backward close to the horizontal, which some people have found a more comfortable position for using a big touchscreen for any length of time.

At the rear of the display, there's a VGA port, as well as a pair of HDMI inputs alongside a connector for an external power supply. A USB port allows the touch functions to be relayed to your PC. There's also a headphone socket provided, but no built-in speakers.

The 23ET83 features an IPS panel, which ought to be able to deliver very good image quality. While its wide viewing angles are as good as we would expect from the technology, the touch-sensitive surface implementation has adversely affected picture quality.

In our tests, we measured 97 percent coverage of sRGB, but a low contrast ratio of only 420:1, which left the image looking washed out compared to other similarly- priced IPS displays. Although rated at a maximum brightness of 250cd/m^2, the LG measured 195cd/m^2 in our tests. This is a comfortable brightness level for general desktop use, but falls far short of the brightest monitors, which are more clearly visible across a well-lit room. Colour and brightness uniformity were both excellent, as was overall colour accuracy, but the touch-sensitive top layer also imparts a feeling of separation from the picture as though viewing the screen through a window.

VERDICT: If you're itching to add some touch capability to a Windows 8 PC, then the LG 23ET83 is a simple and effective way of doing so. Picture quality is a step up from cheaper TN-based displays, though you'll be compromising on both style and picture quality when compared to regular non-touchscreen IPS monitors. **Paul Monckton**

Build	★★★☆☆
Features	★★★★☆
Performance	★★★★☆
Value	★★★☆☆
Overall	★★★★☆

PHILIPS 272P4

£449 inc VAT • philips.co.uk • tinyurl.com/qxx22qc

The Philips 272P4 is a premium-quality monitor with great performance. Aimed at professional users, this 27in 'Quad HD' display incorporates many features that will appeal to home users interested in the graphic design or photography.

Featuring a high-quality PLS display panel with a 2560x1440-pixel resolution, the 272P4 offers consistent colour with wide viewing angles and nearly 78 percent more pixels than a standard HD monitor. This places it in the same league as Apple's 27in Thunderbolt Display (tinyurl.com/nkhkzm8), although its dull grey plastic body won't be challenging the latter in any style or build-quality contests.

However, the 272P4 has a few tricks up its sleeve, such as a height-adjustable stand that also pivots 90 degrees to allow you to work in portrait mode. It incorporates a three-port USB 3.0 hub, a raft of inputs, including a pair of HDMI connectors, DVI Dual-link and DisplayPort, with the ability to daisychain to a second display without the need for a second cable trailing to your PC. You can also connect more than one port at a time for picture-in-picture and side-by-side multi-input display. The screen has a matt anti-glare coating, which we found much easier to work with than the glossy alternatives that cause distracting reflections.

The PLS (Plane-to-Line Switching) technology used in the 272P4 is Samsung's take on IPS technology that features in many of the high-quality displays currently available. It advertises wide 178-degree viewing angles and consistent colour, the latter borne out by our test results. We recorded 99 percent coverage of sRGB and a maximum checkerboard contrast ratio of 530:1. Screen uniformity is also very good in terms of both colour and brightness.

This is a bright display, which we measured up to 264cd/m² – a little shy of its rated 300cd/m² brightness. Nevertheless, power consumption remained relatively low at 37W, reducing to 25W with the brightness lowered to standard 120cd/m². This is without enabling any of the power-saving features of the monitor, which may reduce this figure further still.

VERDICT: We are impressed with the 272P4. While it's not the most stylish display for home use, it's aimed more at professional programs and its feature set reflects this. We have no complaints about picture quality and its ergonomics are first-class. **Paul Monckton**

Build	★★★★☆
Features	★★★★☆
Performance	★★★★☆
Value	★★★★☆
Overall	★★★★☆

PC ADVISOR BEST BUY

SAMSUNG S24C650PL

£178 inc VAT • samsung.com/uk • tinyurl.com/k969ymh

The Samsung S24C650PL is a basic but high performance PC monitor that's suited to the office or the home. It's a matter of taste, but we often find that desktop monitors bearing the business label are the more classically attractive of any display. Samsung's 24in offering is no exception, a simple widescreen frame with thin matt-black bezel and unfussy supporting column.

It has a fully adjustable stand that also allows for 90 degrees of rotation to put the screen into portrait mode – popular with gamers who may set up a three-way triptych to extend the PC desktop space. That's certainly helped here by the 9mm-thin bezel. At fullest extent, you can raise the landscaped monitor to up to 490mm, from desk to top of screen.

This monitor takes advantage of IPS-like technology to ensure good colour accuracy and wide viewing angles. In this case, it's plane-to-line switching, or PLS, that gives a similar effect to in-plane switching, at a lower price. In our tests, it was capable of 99 percent of the sRGB gamut, and a high 82 percent figure for the more demanding Adobe RGB range, too. Despite the rich colours found on IPS panels, real-world contrast ratio figures aren't always the most impressive, but the Samsung here managed a good 760:1 in our checkerboard test. Colour uniformity across the panel was consistent, while overall Delta E averaged to just 1.70, suggesting precise colours.

Connection options run to one DisplayPort, one HDMI, one VGA, and a two-port USB 2.0 hub, albeit passive only which should be enough to feed a wired keyboard and mouse on your desk.

Sound quality through the built-in speakers is of the alert-sound-only variety, but enough for most basic of audio monitoring.

We found the onscreen menus relatively easy to use, with the help of real click buttons on the monitor itself. Options here include response-time adjustment from Standard to Fast and Faster. RGB adjustments are present, as well as five Color Tone settings: Cool 1 and 2, Normal, Warm 1 and 2, plus a Custom setting. These were found to dial in blue to yellow casts, while the Custom option strangely didn't actually lead us to any more adjustments.

VERDICT: The Samsung S24C650PL is a basic but high-performance PC monitor that's suited to the office or the home. It has great image quality and a simple unadorned aesthetic. **Andrew Harrison**

PC ADVISOR TEST CENTRE

How we test

We evaluate monitor performance using a combination of objective measurements and subjective assessments.

We use a Datacolor Spyder 4 calibrator to set up and test each monitor. This device measures the brightness of the display, as well as the accuracy of the colours reproduced. By viewing a variety of test material, we can determine such factors as the sharpness of text and the natural appearance of skin tones. We also look for features such as 'banding' in areas that should appear smoothly shaded and missing pixels. We also check for any smearing or ghosting of moving images. Next, we take a look at the build quality and ergonomics of each display. Checking the adjustability of the stand, accessibility of controls and connectors, and the ease of use of the onscreen menu system. If there are speakers included, we'll also give them a listen and touchscreen displays will be given a workout in Windows 8.1.

	AOC £354 inc VAT ★★★★☆	HAZRO £250 inc VAT ★★★★☆ PC ADVISOR RECOMMENDED	HP £370 inc VAT ★★★☆☆	
Product name	Q2963PM	HZ27WIE	Envy 27	
Screen size	29in	27in	27in	
Panel technology	AH-IPS, matt finish	AH-IPS, glossy finish	IPS, glossy finish	
Aspect ratio	21:9	16:9	16:9	
Colour depth	8-bit	8-bit	8-bit	
Native resolution	2560x1080	2560x1440	1920x1080	
Pixel density (ppi)	96	110	82	
Contrast ratio[1]	530:1	540:1	750:1	
Brightness (cd/m²)[1]	239.9	389.8	287.3	
sRGB gamut[1]	98%	100%	97%	
Adobe RGB gamut[1]	80%	80%	76%	
Colour accuracy average (delta-E)[1]	N/A	0.65	N/A	
Stand	Fixed	Fixed	Tilt	
Video Inputs	VGA, DVI (Dual Link), HDMI (MHL), DisplayPort	VGA, DVI (Dual Link), HDMI (MHL), DisplayPort	VGA, HDMI, DisplayPort	
USB	No	No	No	
Speakers, amp	Stereo, 2x 3W	No	Beats Audio speakers	
Other features	External PSU	External PSU	Beats Audio badge	
Dimensions	714x388x214mm	653x479x206mm	622x454x140mm	

[1]Measured performance

Conclusion

AOC's Q2963PM stands on its own as the only 21:9 ratio ultra-widescreen display in the group. It's great for watching films, but not all games will support its unconventional screen dimensions.

The LG 23ET83 is the smallest display here, measuring just 23in, but it offers the same 1920x1080 resolution as many 27in monitors. More importantly, it's the only display here to support touch input, so it's a choice for fans of Windows 8 apps. It's small size also helps keep the price down to an affordable £230

If you have rather more to spend, then HP's Envy 27 features a modern, stylish design that should appeal to those who care about appearances in their home. It's a good multimedia choice, featuring beat-in speakers and a bright, glossy display with plenty of contrast. It's less convenient for work, though – you can't adjust the stand and the glossy screen will splash reflections all over your spreadsheets.

Most expensive of the bunch, the £449 Philips P272P4 combines the higher 2560x1440 resolution, with a fully-adjustable stand and excellent image quality. Built for performance rather than style, it could be a great boost to productivity.

Hazro's HZ27WIE isn't without its faults, but at £250 offers great value for money, offering a 27in, 2560x1440 IPS display for at least £100 less than any other 27in screen in this round-up. It's therefore highly recommended for all but the most exacting of users.

If either space or your budget is tight, then the Samsung S24C650PL is a great choice. At £178, it's by far the least expensive monitor here and comes with a high-quality PLS panel, an ergonomic stand and flexibly connectivity options. With built-in stereo speakers and a three-year warranty, it qualifies as Best Buy for anyone who doesn't need a bigger or higher-resolution display. ⊠

LG £230 inc VAT ★★★⯪☆	PHILIPS £449 inc VAT ★★★★☆	SAMSUNG £178 inc VAT ★★★★☆ PC ADVISOR BEST BUY
23ET83	272P4	S24C650PL
23in	27in	24in
IPS, glossy finish	PLS, matt finish	PLS, anti-glare finish
16:9	16:9	16:9
8-bit	8-bit	8-bit
1920x1080	2560x1440	1920x1080
96	109	94
420:1	560:1	760:1
143.5	317.7	263.2
97%	100%	99%
75%	79%	82%
0.8	2.86	1.7
Tilt	Height, tilt, swivel, pivot	Height, tilt, swivel, pivot
VGA, 2x HDMI	2x HDMI, DVI (Dual Link), DisplayPort	VGA,HDMI, DisplayPort
1x up	No	1x up, 2x down
No	Stereo, 2x 2W	Stereo, 2x 1W
10-point touch input	2Mp camera	N/A
544x208x399mm	639x495x197mm	555x487x224mm

Upgrading from XP:
Windows 7 vs Windows 8

Support for Windows XP ends in April 2014, so it's time for hold-outs to upgrade. David Bayon runs you through the options for buying new or upgrading your old PC
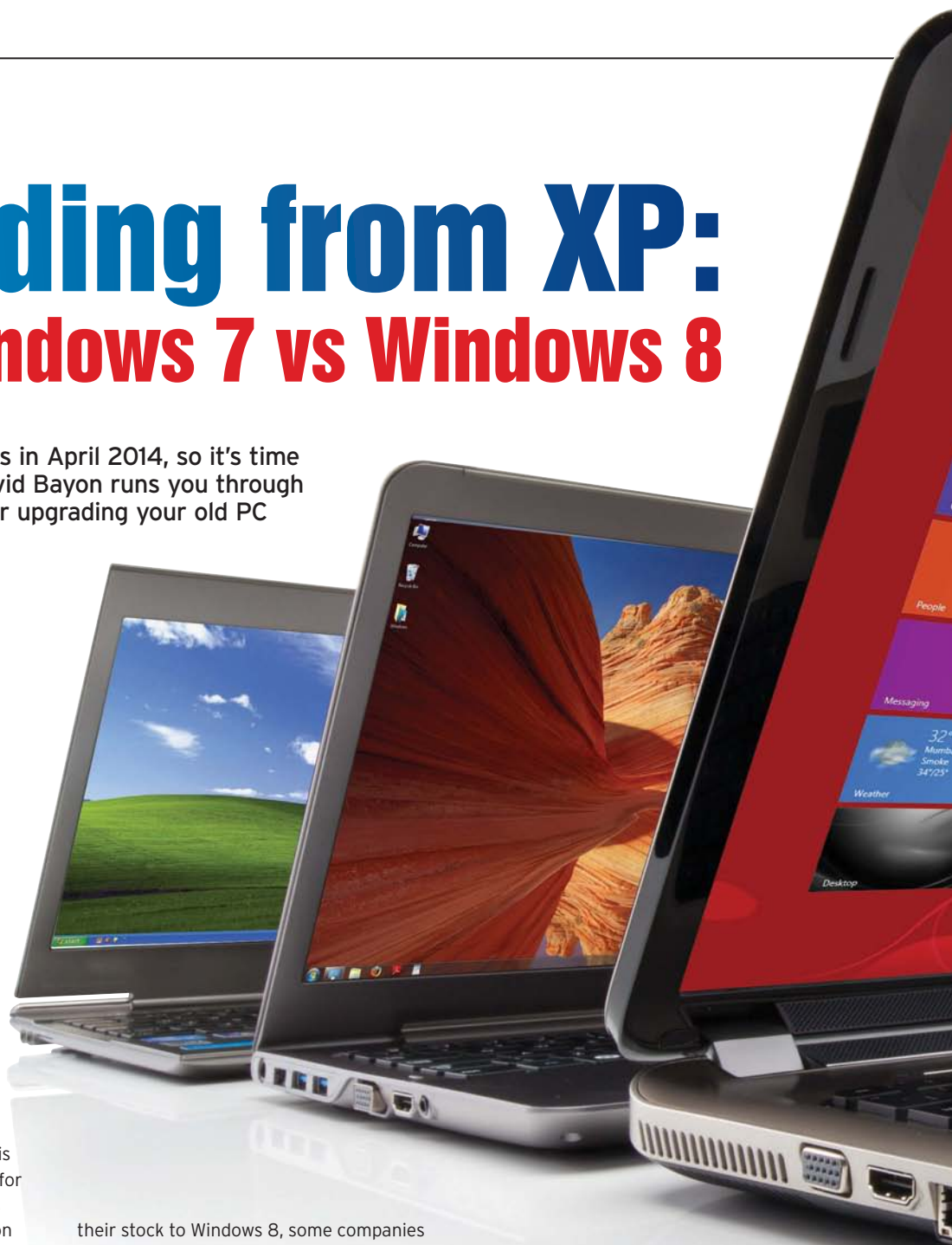
After nearly 13 years, Microsoft is bringing to an end its support for Windows XP in April 2014. This means a lot of people have a big decision to make. Even if you're still happy using XP, support won't be there if things go wrong. And without support there are no more security updates, meaning your PC will be vulnerable to malware and viruses that take advantage of unpatched exploits.

You could pull out the network cable or switch off Wi-Fi, but the sensible option is to finally move on from Windows XP. And that can be a daunting prospect.

Should you buy a copy of Windows 8 and install it on your existing hardware? Would Windows 7 be less of a shock to the system, and can you even still buy it? Or maybe you should dive in headfirst and just buy a new PC. We're here to help you decide.

Buying a new PC

Buying a new PC today means moving to Windows 8, right? Not necessarily. Although the big manufacturers such as Dell and HP have been pressed by Microsoft into shifting their stock to Windows 8, some companies are still making use of the 'downgrade rights' that allow them to offer Windows 7 preinstalled. Many systems on Lenovo's website can be customised to run Windows 7 Professional, while Samsung and HP still offer business laptops running the OS. You won't find the option everywhere, but Windows 7 laptops can be had if you're prepared to look around and be more flexible in your choice of brand and model.

The situation is much simpler when it comes to desktop PCs. You can still go to independent retailers such as Scan and Chillblast to buy custom-built PCs running Windows 7 – at least while stocks last. Amazon also lists plenty of Windows 7 systems, but primarily through marketplace sellers – keep your wits about you.

Microsoft no longer sells Windows 7 through its UK website, however. Unless you have a disc and activation key you're not using on another PC, you'll have to buy an OEM disc – in essence Windows 7 without the tech support – from one of many retailers offering them online. This is easy to do, but you'll end up paying almost as much as you would for Windows 8: we found genuine Windows 7 Home Premium SP1 discs for £70 at eBuyer and CCL Computers, both of which had several hundred in stock. Just make sure you buy the correct version (32- or 64-bit) for your computer.

Of course, there's always eBay, and you'll find no shortage of PCs, laptops and installation discs knocking around. We wouldn't trust secondhand Windows 7 keys (at least not while you can still buy an official one that's guaranteed to work), but there's no harm in perusing the hardware to see what bargains can be had. Whether it's worth paying for an older PC when you already have one is something only you can decide.

> ❝ **Microsoft is bringing to an
> end its support for Windows XP
> in April 2014** ❞

The upgrade process

The upgrade from XP to Windows 7 will wipe all your applications and personal files, so make sure you follow the instructions for using the Windows Easy Transfer tool (tinyurl.com/y2o5wkr) to move your files on to an external hard drive if necessary. Once you're up and running in Windows 7, simply double-click 'Windows Easy Transfer – Items from old computer' to restore your data.

It might be time to buy new applications, but if you insist on using older programs that aren't supported in Windows 7 you can take advantage of the Windows XP Mode available

to the Professional and Ultimate editions. This is a fully functional version of XP that runs within Windows 7, making it possible to run otherwise incompatible software. Download it from tinyurl.com/yapvreg. You'll still need your original XP installation media and activation code, however.

If you'd prefer to upgrade to Windows 8, this is certainly the easier option. It can be installed over the top of XP SP3 and, although you'll lose your applications, your personal files will be retained. You don't even need to get your hands on an installation disc. Run the Windows 8 Upgrade Assistant

(tinyurl.com/purpjy5) to see whether your current system can be upgraded; if it can you'll be given the option to pay for and download Windows 8 there and then. This costs £100 for the consumer version.

The support issue

The imminent end to support for Windows XP should act as a reminder that all operating systems have a shelf life. It's worth bearing in mind that official consumer support for Windows 7, which includes warranty claims and free tech support, will end in January 2015. However, Microsoft's extended support,

which includes the all-important stream of free security updates and other business perks, will continue until at least 2020. It's probably not enough to sway your decision if you want to stick with Windows 7, but it's worth knowing.
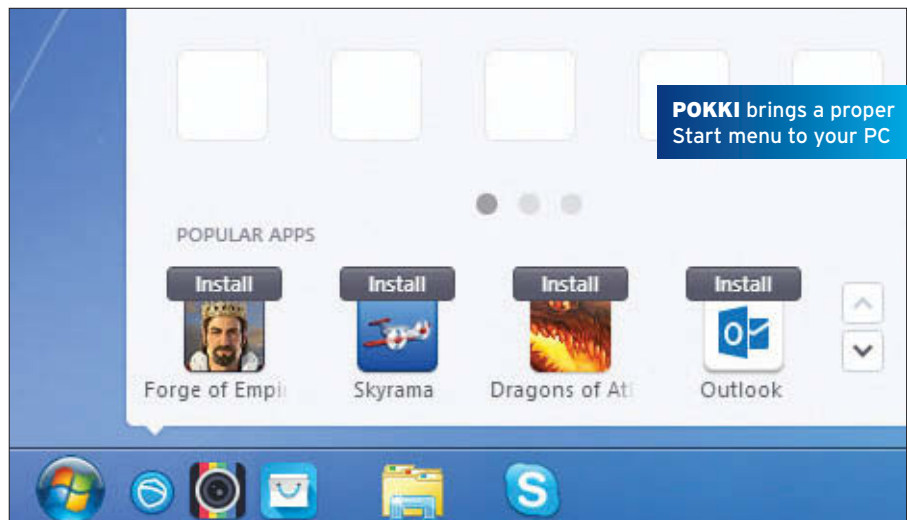
Windows 7 or Windows 8

So far we've focused on the practicalities of the upgrade, but what about the differences in terms of how the two operating systems work? So much has been written and said about Windows 8 that it's easy to fall straight into the mindset that the OS is something of a misstep by Microsoft.

Seeing and using its tiled interface for the first time can be a bewildering experience, but that doesn't mean you should automatically reject its charms (no pun intended). The recent Windows 8.1 update has ironed out a few of the more troublesome kinks, and there's now a fair amount to like about this very modern OS.

The way apps work has been refined, so you can now snap together up to four of them, with each taking up a quarter of the screen; this makes it easier to take full advantage of larger monitors. The Store has been redesigned to make apps easier to find, too, and the system-wide search is now very powerful – it will now look online and in your email, as well as on your hard disk(s). Windows 8.1 feels like a solid refinement to what was an initially rough launch product.

We're not going to suggest Windows 8 has the sort of app selection that would make Apple nervous, but it is growing slowly but surely, and it currently tops 25,000. The bundled apps are mostly very good, especially the newly updated Mail app, while Facebook, Netflix, Skype and more are available in gorgeous full-screen apps. There's also a small but decent choice of Xbox Live games, such as the well-known Asphalt 7 and Rayman Jungle Run. On the right device – by which we mean one that's

POKKI brings a proper Start menu to your PC

relatively portable and has a touchscreen – these apps can be great fun to play with, and you'll get them only on Windows 8.

Crucially, you don't have to use the new tiled interface: the old XP-style desktop is still there. If you're not buying a new PC, there's no denying that an interface built for touchscreens seems a bit out of place on an ageing desktop PC.

Thankfully, it's easy to get Windows 8.1 to stick to its less extravagant desktop persona and make less painful the transition from older versions. Just right-click on the taskbar and choose Properties, then select the Navigation tab, and you'll see an option to have your PC boot straight to the desktop.

One major difference is that the Start menu has been replaced by the Start screen but, once you get used to it, it's not that bad.

If you're unimpressed, there are plenty of free utilities, such as the excellent Pokki (pokki.com), that will bring back a 'proper' Start menu in Windows 8. This popular Start-menu replacement will bring back all the features you're used to, as well as adding more: you can search your computer, set favourite applications and go directly to

sections of the Control Panel, although you'll probably want to disable the annoying suggested games and apps. It also lets you shut down your PC as normal, although Windows 8.1 now includes shut-down options when you right-click the Start button.

Alternative Start-menu replacements include Start8 (tinyurl.com/6tkkmgy) and Classic Shell (classicshell.net). Each has the same core goal: to reinstate some of the fine control that Microsoft has decided in its wisdom to remove.

Unless you change the default programs for playing videos, opening PDFs and viewing web pages, you'll still find yourself in the Modern UI from time to time, but with a few tweaks you can live in the 'old' Windows world and treat Windows 8 just like Windows 7.

But, if this is the case, does it even matter which version you choose? Yes and no. If you're buying a new PC and it has a touchscreen, you'd be unwise to stick with the non-finger-friendly Windows 7, but for pretty much any other situation it's a simple matter of personal preference.

In truth, there's unlikely to be a major desktop application released in the coming years that doesn't run in Windows 7 – and, indeed, many gamers would argue that their favourite titles run more smoothly in the older OS. There's also been something of a backlash among experienced games developers against Windows 8's more restrictive approach to software sales.

Windows 8 is faster, less likely to crash and more secure than Windows 7: three of many more good reasons to plump for the newer operating system.

If you do opt for Windows 7 over 8 you're certainly not being backward; it's still an excellent OS. You won't have to mess around with Start-menu replacements, and there's no danger of being hurled into a different interface when you press the 'wrong' key.

Ultimately, it's up to you: there is no right or wrong choice. ⊠

Boot straight to the **DESKTOP** in Windows 8
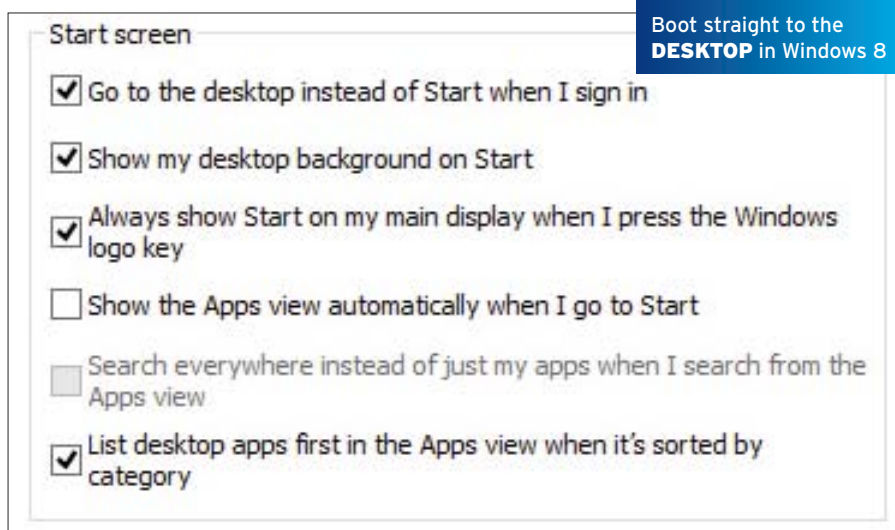
Living with a Chromebook

We used only a Chromebook for one week while completing the kind of everyday tasks that you would assume a laptop could achieve. Find out how Martyn Casserly got on

In the past year, one style of laptop in particular has dominated the market when it comes to low-cost machines. This is all the more surprising when you consider that it doesn't run on Windows or anything Apple related. Google's Chromebooks are internet-focused devices that offer access to the company's complete online ecosystem – including an office suite for creating documents, spreadsheets and presentations, 100GB of free cloud storage on Google Drive, plus an expanding app store – and all of this for free. No licenses, no 30-day trials, just useful and usable software running on lightweight and reliable devices. There are, of course, some compromises to be made, as the majority of functions require an internet connection to run, but Chromebooks do make a compelling case if you're looking to spend less than £250 on a device.

With Google announcing a new range of Chromebooks, and more set to be released in the coming months from a range of manufacturers, we thought it would be a good time to put one through its paces and see if it's a viable alternative to a fully-fledged Windows laptop. The idea was simple: live solely on a Chromebook for a week while completing the kind of everyday tasks that you would assume a laptop could achieve. The results were very interesting.
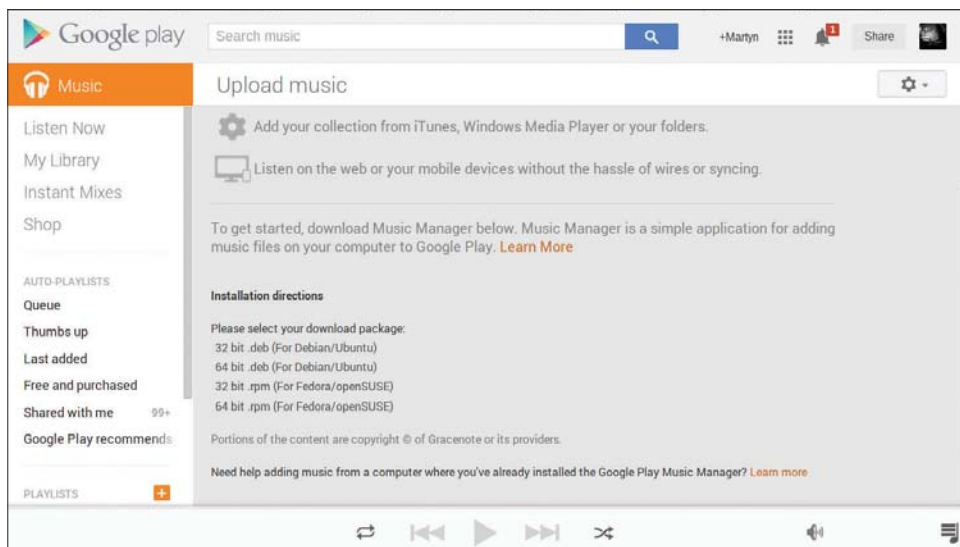
drive, or, seemingly, the capability to run Google's own Music Manager software. When following the links to download it, we ended up with a list of Linux-based packages. Not exactly the carefree, simple lifestyle that the Chromebook ads project.

In many ways this highlights something you need to know about these devices up front: they're not really meant to be your primary machine. If you have a desktop PC on which you keep your large library of data, then the Chromebook will be an excellent companion device. But if you want a powerhouse computer that you'll do everything on, then the full features of a Windows laptop would be a wiser choice, especially if you spend a bit more money.

Printing

One instance where the reliance on another machine becomes apparent is if you want to print anything directly from a Chromebook, because basically you can't. Printing, like many other aspects of the Chrome OS, is handled in the cloud. If you have a 'Cloud Print' ready printer, then you can send your document over the internet, from your Chromebook, and it will appear on paper in no time. If, of course, you have an older printer, then you'll need to connect it to an internet-based desktop or laptop, download the Chrome browser and enable Cloud Printing. Which of course beggars the question: "So why don't I just use that machine to print it?" There are advantages to cloud printing, as once you've set it up it is in fact easy and convenient to use, especially if you travel quite a lot, but it does require machines connected to the printer to remain on at all times.

Photos and video

A common use for laptops is a place to manage and edit photographs of your family and friends. This can be done locally on the Chromebook, but really you'll want to create a folder on Google Drive and put them all in there. Importing images is quite easy. If you use a mobile phone for your photography, then install the Google + app (Android and iOS) and select the option to sync your photos. Now

General daily duties

If you've used the Chrome browser on your PC, Mac, tablet or phone, then you'll already understand about 90 percent of how things work on a Chromebook. Each app you launch, be it Gmail, Google Drive or Evernote, opens as a tab in the browser window and behaves just as it would on any other machine. This makes using the device a very simple experience. Sign in with your Google account (you'll need one to use a Chromebook) and all the data you have on any other Google service is there, or rather it's online and you have access to it. You can save data locally on the hard drive, but as they generally only come with a 16GB capacity this would soon fill up, and that's not the way Chromebooks are designed to work. Google gives every new user 100GB of online storage for two years (which is plenty for most people to keep their photos, home videos, and documents safe) and has geared the entire Chrome OS around the principle of working primarily on the internet.

With this focus, it's no surprise that social media, online shopping, banking and web browsing are a perfect fit. The hardware can prove a little slow on image-heavy sites, but for most things the experience is smooth and unencumbered by pop-up dialog boxes prompting you to upgrade various plug-ins. This is down to the fact that Google constantly upgrades Chrome OS, taking care of Flash and Java at its end. You also have access to the Chrome App store, from which you can download useful things such as Tweetdeck and Outlook, but as so many of these services are available online there's no real need.

There are a few notable absences that a PC user might miss, such as Skype and iTunes, which will most likely never appear on the platform. But Google does offer alternatives, with Google Hangouts being an excellent online video chat option, and Google Music enabling you to store 20,000 songs online for free, all of which can be accessed and downloaded by your phone or tablet. Of course you'll need a music library already stored on another machine to achieve this, as the Chromebook doesn't have storage space, a CD

whenever you launch the app it will upload any images on your phone directly to Google. This also means that if you have photos on USB sticks or memory cards that you want on your phone, then uploading them to Google + will achieve this, too. Alternatively, if you use a DSLR or compact camera, you can remove the SD card and plug it into the slot on the Chromebook and drag the files either to Drive or the local storage. The file manager is basic, but it will get the job done.

Editing on the included software is also quite rudimentary– pretty much just rotate and crop – but if you head to the app store, you can download a wide variety of photo-editing programs. As a test, we took a picture on our Nikon D50, imported the image using the SD card, then edited its size, saturation and sharpness all online through the free app Pixl Editor. The software handled everything easily, and also offered an impressive range of Photoshop-style features, which included layers, masks, and a variety of filters. Finally, we downloaded the finished image and posted it on Facebook, all without issue.

Video editing posed a greater challenge, and not one in which the Chromebook fared well. There are several good editing apps available, all of which store the videos online, so the processing is done there rather than on the slow, local hardware. This does, of course, mean that everything has to be uploaded when you want to work on it, something that takes a lot of time. Sure, it can be argued that video editing is possible on a Chromebook, but really it's not at all enjoyable.

Consuming media is a more straightforward task. Video services are well catered for on the Chromebook, with Google's own YouTube site working happily when streaming 720p video. Netflix was a similar experience when accessed directly through its website, but iPlayer performance was a little disappointing, with stutters in the video a regular occurrence alongside pauses to buffer content. The Chromebook we were using had an HDMI port, so we hooked it up to a TV and found that it performed pretty much the same, with the only real issue being that the mouse pointer didn't automatically disappear when a video was playing. So as well as being a cheap laptop, it's also a way to turn your TV into a smart device.

Where the Chromebook can lose a little ground is when you open lots of tabs at once, due to the fact that its components are not exactly high powered. HD video playback can slow to a stutter if you're also running Facebook, several web pages and Gmail at the same time, as the device struggles to cope with the load. In fairness, though, lower-end Windows PCs often feature similar specs and can begin to lag in the same way. So a good rule of thumb is to close tabs you're not using if you want your machine to run smoothly.

Getting work done

Many people have switched from Microsoft Office over to Google's alternative offerings in recent years, mainly due to the fact that they're reliable, available on any machine and free. Chromebooks plug directly into these services and using them is an excellent experience. Creating documents, spreadsheets and even some presentations is simple, and as long as you don't use lots of intricate formatting you can export them in .doc, and .xls formats that can be emailed to clients or friends with no compatibility issues. You can also do all of this offline (one of the big issues initial Chromebook users faced) and then when you find yourself in a Wi-Fi spot again, the apps automatically sync up the changes to the online versions. After trying this several times to see if it would cause confusion we gave up, as the syncing was fast and incredibly reliable. There's also the feature of online collaboration, where more than one user can work on a document at once. This, again, is implemented flawlessly, showing that Google really does know its stuff when the web is involved.

Gaming

There's a surprising number of games in the Chrome Store. From driving titles and puzzle games to first-person shooters, you can certainly while away some time with these browser based efforts.

Sadly, many of the big name titles are just links to websites that want to sell you a game, and anything graphics intensive

A wide range of **GAMES** are available from the Chrome Store

struggles unless you're on a fast internet connection. With iOS and Android games improving all the time, aided by their touch interfaces, there's no doubt that the offerings here feel pretty old school. There's fun to be had, but if gaming is important to you, then you best look elsewhere. Of course, it should be mentioned that you won't be playing Battlefield 4 on a £250 Windows laptop either.

Devices

While Chromebooks will happily accept USB sticks, external drives, and Bluetooth speakers on the newer machines, you'll definitely run into problems if you want to use more specialised equipment. Fitness widgets such as the Nike FuelBand or Fitbit list no support for Chromebooks at all, instead focusing on Mac or PC. You can't plug your latest mobile phone into them either, as they don't support the transfer protocols that many of these devices use. That isn't necessarily the end of the story, though. Using our resident Samsung S4, we were able to download an app called Airdroid that allows Chromebooks to access its files via Wi-Fi and move things on and off the internal storage. We were even able to use the phone's camera remotely. In typical fashion iOS proved not so pliable.

Verdict

Reading through this article might leave you with the impression that Chromebooks aren't very good. For some readers this will definitely be the case. The inability to print directly, or run mainstream software such as Photoshop or iTunes, are deal breakers for many. Others may point out that any Windows-based computer with the Chrome browser installed can achieve everything a Chromebook can, plus loads more, and again you can't argue with that. But this would be oversimplifying what the machines have to offer. In truth most of the things we do on our computers these days happen online. Sure there are those who make movies, or do heavy editing on photos, but if we're honest, the majority of us just update our Facebook profiles, browse the virtual shelves on Amazon, compose a few emails, and work on the odd document or two. For these tasks, the Chromebook is an excellent choice. Google has carefully marketed the devices as second or even third machines, and we think that's exactly where they belong. Chromebooks offer enough functionality to make them genuinely useful, while eschewing any bells and whistles that would add to the cost. Most of them run silent, barely get warm, and are light enough (and cheap enough) to throw in a bag when you're leaving the house. A few years ago the idea of machine like this seemed, well, a bit daft. Today, they make a lot more sense for a lot more people. ☒

SHARING ECONOMY

Apps and websites match people looking to rent with unused space, cars and more. Roland Waddilove investigates

Put simply, sharing economy is a means through which people are able to rent items such as a spare bedroom, an under-used car sitting on the drive or the power tools gathering dust in the shed.

What if you could find someone who needed somewhere to stay for a few days, a car to go somewhere, or a chainsaw, workbench or drill to complete a DIY project? You could help them, prevent wastage of otherwise little-used items, earn some extra

money, and feel good about providing a much-needed service.

Of course, people can use traditional services such as a hotel if they need somewhere to stay, or a car-hire company if they need transport. But it's much cheaper to privately rent.

The sharing economy has taken off in recent years. A typical example is Airbnb (airbnb.co.uk), which caters to two types of people: there are those with an unused house, bedroom, mobile home or even

a boat; and there are those looking for somewhere to stay, whether to live or on holiday or a business trip. The Airbnb website and mobile apps match people in need with those who can meet their requirements.

Plenty more sites and services cater to the sharing economy, and new companies pop up all the time. This means the range of items you can rent is also increasing.

CouchSurfing.org, for example, lets you rent your sofa to people who need a cheap place to crash overnight. It lets you earn

> ❝ **If you are renting your car to a stranger you need to be sure that they won't stuff their McDonald's take-away rubbish under your seat** ❞

way. Sites that offer this service include BlaBlaCar.com and Carpooling.co.uk. You won't have much luck if you live out in the sticks, but both can be useful services within large cities.

Is it a coincidence that the sharing economy grew in popularity with the rise of smartphones and tablets? Probably not: apps for tablets and phones make it easy to find what you are looking for. You can search for places to stay, cars to share, and tools and services for hire. GPS and satellite navigation on phones then make it easy to locate the car, house or person with whom you are dealing.

Sharing economy services tend to have their roots in a single city, such as London, Manchester, New York or Chicago, and many will then expand their operations based on their success. This means services tend to be patchy: not everything will be available where you live, especially if you are in the country or a small town. The sharing economy works best where there are large numbers of people with things to rent and just as many people wanting to rent them.

The sharing economy sounds fantastic, but there are pitfalls to sharing your home, car or belongings, and the whole sharing economy could very quickly collapse.
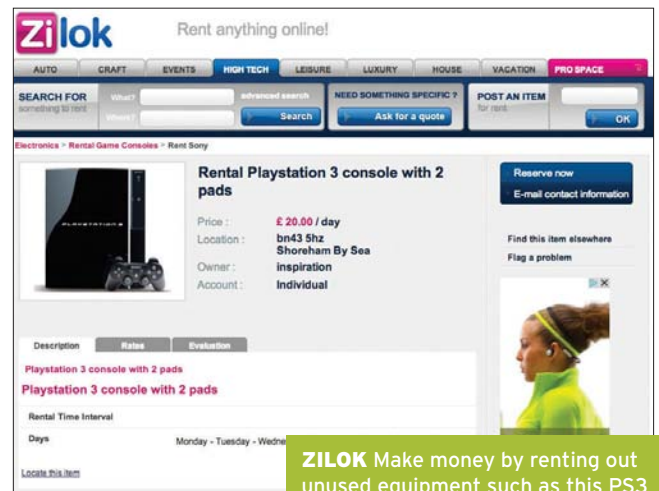
Building trust

If you are booking a place to stay, how do you know whether it is as advertised? Can you trust the person enough to pay them in advance? Will you get what you paid for? If you're renting out your house or a bedroom, how do you know the person renting it won't trash the place and steal your belongings?

If you are renting your car to a stranger you need to be sure that they are a safe driver, and that they won't stuff their

ZILOK Make money by renting out unused equipment such as this PS3

McDonald's take-away rubbish under your seat or smoke in your car.

Will the person borrowing your power tools look after them? Will the power tools you borrow be in good working order?

Both parties in the sharing economy need to trust each other. This is usually achieved by reviews, reputation ratings and testimonials. As someone renting out a room, car and so on, you need to be able to show good customer ratings and comments. As

AIRBNB This app lets you browse places to stay in any city

money and meet new people, or perhaps you are the one travelling and in need of a cheap place to stay.

Car schemes let you lend or borrow a car rather than using a car-hire firm, and offer or receive lifts rather than using a taxi service. Buzzcar.com is one such service, currently available only within France; Zipcar.com and EasyCar.com are UK alternatives.

Rather than hiring a car, you might prefer to spread the cost by getting a lift with someone who happens to be going your

a customer you also need to build a good reputation. For example, you want to rent out your car to a careful driver and not to someone who mistreats the cars they hire. Customers with a good reputation find it easier to book space, cars and other services. Bad reviews and ratings affect your ability to rent out things and to rent things yourself.

Some websites perform checks on the people using their services and car-hire companies may, for example, check to see whether you have any driving convictions. Typically a deposit has to be paid, which encourages the renter to take extra care. Problems are rare, but not unknown. One awful example saw a traveller raped by the host she found via CouchSurfing.org.

Work out the costs
Sharing websites need to cover their costs, so they tend to charge both listing and service fees. Airbnb, for instance, charges a 3 percent booking fee. So, if you charge £50 a night to stay in your home and someone books it for four nights, you will be charged £6. Guests are charged booking fees, too. Between 6- and 12 percent is added to the bill when you stay somewhere, and there are cleaning fees.

If you rent out your home, bedroom or power tool, or offer people lifts in your car, you will earn money. This means that you must declare it to HM Revenue & Customs as taxable income.

It's worth working out your net profit. Rent your car for £100 via Buzzcar, for instance, and you'll receive £70 from the site and pay 20 percent in tax, leaving you £54.

Are you insured?
What if you rent your car to someone and they have an accident? What if you rent out a room and the guest damages something

Going somewhere? Use BLABLACAR to get a lift

or steals your laptop? Insurance issues complicate matters, but they shouldn't be ignored. If you rent your car to someone, your insurance is unlikely to cover them. Buzzcar provides this cover, but this is reflected in the site's high fees.

Websites that specialise in matching car drivers making journeys and people wanting lifts often do not charge. This doesn't mean the lift is free, but it is a way of getting around insurance issues. If you share the petrol money with someone that's fine, but you shouldn't make a profit. Transactions are between the driver and the person getting the lift, not through the site. This could lead to disputes over payment, but a ratings system should weed out the freeloaders from the honest hitchhikers.

Legal problems
Rules, regulations and legal problems could derail the sharing economy, and it's not hard to see why. If you regularly rent out one or more spare rooms in your house, for example, are you a hotel? There are fire and hygiene regulations governing hotels, and you may need guest house insurance, public liability insurance and a licence or permit. It may even be expressly forbidden in your city.

Last year someone rented his bedroom in New York via Airbnb, and his landlord is now looking at a fine of £40,000 for breaching hotel rules. The tenant may be evicted and lose his home. Some city authorities say Airbnb should pay the standard 15 percent hotel tax and, in Amsterdam, authorities are chasing people offering rooms because they say they are little more than illegal hotels that don't have a permit or licence.

It isn't just Airbnb that has come under fire. Car-sharing services could be regarded as taxi firms. If you arrange for a car to pick you up and take you somewhere for which you pay a fee, isn't that the definition of a taxi? California issued fines against Lyft, SideCar and Uber for "Operating as passenger carriers without evidence of public liability and property damage insurance coverage."

It is not known how many people declare their income from renting out rooms, couches, cars and equipment, but authorities won't forever turn a blind eye to the activity. Indeed, they could end up forcing websites to reveal member lists and then chase people for unpaid taxes going back years.

Sharing-economy companies argue that traditional rules and regulations are outdated, but they face difficulties getting them changed. So, if you rent something, make sure you aren't breaking the law. ⊠
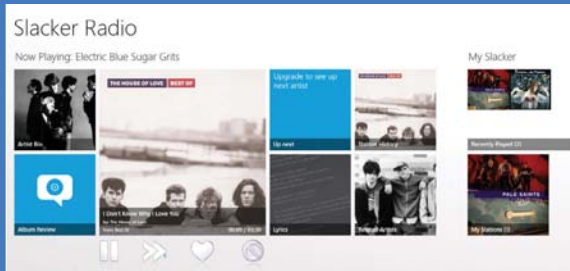

Share or rent a car at CAR CLUB
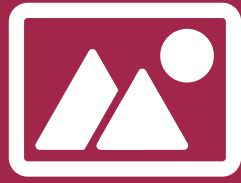
10 best Windows 8 apps
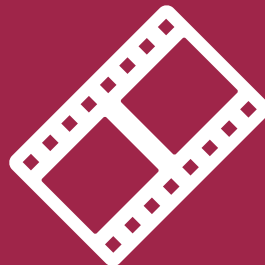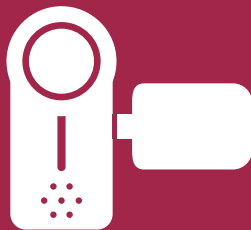
It's time to leave your old desktop programs behind, and to get in touch with some useful no-cost apps made for Microsoft's Modern interface. Brad Chacos compiles 10 of the best

SLACKER RADIO

The Windows Store is strong on music-streaming options. From iHeartRadio to TuneIn Radio to Xbox Music, the store has all sorts of free possibilities. But Slacker Radio may be the best streaming music app for Windows 8. The free version has dozens of DJ-curated radio stations in multiple genres, and lets you have Slacker create stations around artists of your choice. Premium subscriptions ditch the ads and unlock on-demand playback.

FRESH PAINT

When Microsoft chose to show off Windows 8's finger-friendliness its own Fresh Paint, it did so for a very good reason: unlike the so-so desktop Paint program, Fresh Paint is a blast to use. The simple act of swiping your finger across your screen to paint digital pictures has never been so fun and seamless. Some of the app's most robust features are available only in premium download packs, but the basic app should suffice for most people.

FHOTOROOM

Windows 8 suffers from a dearth of lightweight image editors. Instagram is a no-show, and even Adobe's Photoshop Express isn't especially appealing. But Fhotoroom, a Windows Phone transplant, packs editing tools, picture frames, filters and more to help you add finishing touches to camera shots no larger than 4Mp. (A paid version removes that file-size restriction and adds a few more tricks.) Even if you don't choose to participate in Fhotoroom's social network, you can share your pictures on Twitter, Facebook or Flickr.
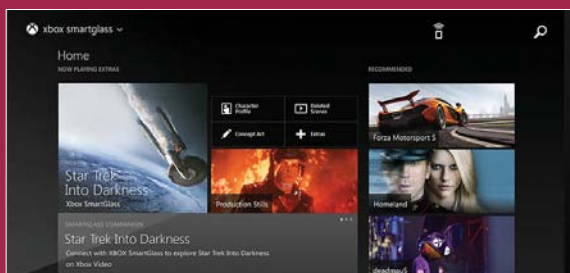
XBOX SMARTGLASS

If you have an Xbox 360 or Xbox One, Microsoft's Xbox SmartGlass is a must-have app. The app displays secondary maps, weapon-selection screens, secrets and more information tied to the game you're playing on your Xbox. Although support for current-generation games has been rather light, second-screen apps are starting to catch on as convenient companions to big-name games – and SmartGlass is the most polished one around.
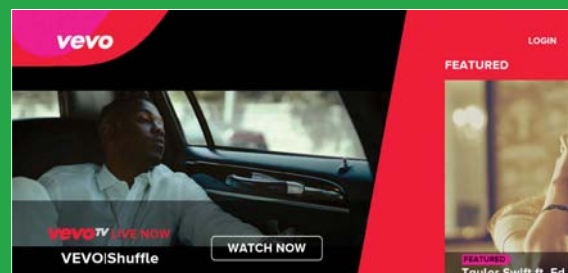
VEVO

For people who like watching music videos, the Vevo app is a great free option. Vevo's eye-catching design works superbly with touchscreen devices, and the service streams live concerts and more than 75,000 HD music videos. Don't feel like sifting through Vevo's massive collection of music for suitable gems? It also offers personalised playlist capabilities and Vevo TV – in essence a digital version of a broadcast music channel.
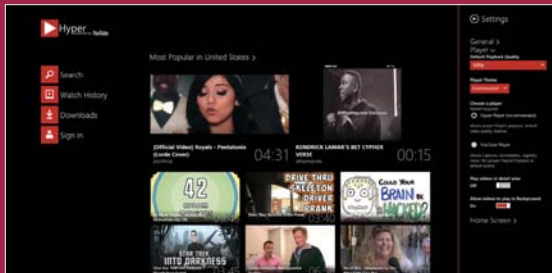
HYPER FOR YOUTUBE

Although dozens of YouTube players have sprung up in the Windows Store to fill the void created by the absence of YouTube itself, most are uninspired web wrappers. Hyper is streets ahead of its rivals. Besides sporting a usable and attractive black-and-red design, it offers video quality options and YouTube Account support. The start screen shows most popular and favourite videos, and you can download videos.

TWITTER

The Windows 8 app for Twitter isn't as seamless as the social network's web client. But Twitter's central stream-based design works very well with Microsoft's Modern interface, and the app is much easier to poke and prod than the web version. The Twitter app also ties in well with various Windows 8 extras – in particular, the ability to snap the app to the side of your screen and receive system-wide notifications.
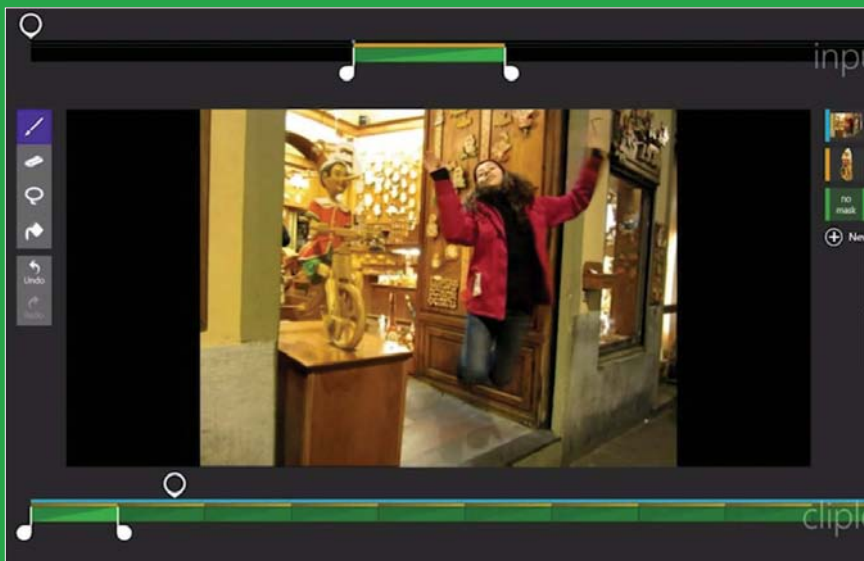

BLINK CLIPLETS

A creative product of Microsoft Research, Blink Cliplets makes it possible for you to upload a video clip, select a single frame and set it as a static image, then select elements of the video to leave in motion over that static image. For example, you could put together a (mostly) still picture of an Italian fountain in which the water flows, or an image of a fire in a fireplace with flickering flames and curling wisps of smoke.

COCKTAIL FLOW

You could spend countless happy hours browsing the collection of intriguing drink recipes available at Cocktail Flow, all of them searchable through various filters and the Charms bar. Cocktail Flow also includes extras such as bartender guides, recommendations for drinks similar to the one you're currently viewing, and the ability to keep track of your favourite drinks as well as all the booze you keep stocked in your drinks cabinet.
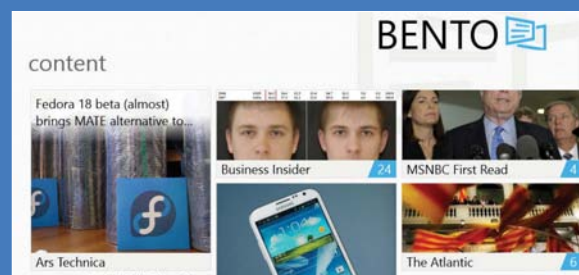
NEWS BENTO

In a world without the now-defunct Google Reader, the Windows 8-exclusive News Bento has a lot going for it. This newsreader is done up in the usual Flipboard style, but its newspaper-inspired look matches the overall feel of Microsoft's OS – and its visual format suits touchscreen devices nicely. If you're looking for a way to keep track of the flood of news from your favourite websites, get this app. You can also add any RSS feed you like. ⊠

Audiophile computing

Listening to music on your PC is great when you're surfing the web or to take the drudgery out of sorting out the home finances but the audio quality often leaves something to be desired. Mike Bedford explains how to take your audio to the next level

If you tend to listen to music on your PC while you're doing something else, you won't be giving it your undivided attention but, even so, you'll still want to experience good quality audio. If, on the other hand, you want to build a home media centre around a computer – which isn't our main theme here, although it's an option you might want to consider – then sound quality will be absolutely paramount.

Yet all too often, the quality of music reproduction on a PC is far from perfect. The good news, though, is that it doesn't have to be that way as we demonstrate here. First, we'll look at the various audio-related hardware components in a PC, with a view to helping you to upgrade your hardware for better quality music. This will go a long way to improving your listening experience but, for the ultimate, you also need to trade in those MP3 tracks for music that's recorded in a higher quality format. Accordingly, we'll then discuss the alternatives to MP3, so you can get the most out of your new hardware

and we'll look at the software you'll need to handle these high performance standards.

Upgrade philosophy

If we ignore the hard disk or the CD/DVD drive on which the music is stored, three audio components are required for music reproduction on a PC although the second and third are often combined. First, there's either a so-called sound card or, more commonly, an audio chipset on the PC's motherboard. This performs several tasks, although in the context of listening to pre-recorded music from a CD or the hard disk, it acts as a digital to analogue converter (DAC) that converts the digital data to a signal that our ears can hear.

The output from the sound card or chipset is too weak to drive a speaker or headphones directly, so the next component is an audio amplifier. The final component is the speaker or headphones, although in the realm of computer hardware, speakers often have a built-in amplifier.

In all probability, these will be below par, so there's an argument for replacing them all. If your budget is limited, though, or if you want to upgrade in stages, it's important to identify which upgrade will provide the biggest improvement so you can prioritise.

Audiophiles debate this ad infinitum and opinions differ, but a commonly held view is that it pays to give priority to the early stages of the reproduction. After all, no component can improve a poor quality signal that's passed to it. This implies that the sound card or chip is the most important, followed by the audio amplifier, with the speaker or headphones being the least important. While favouring an upgrade of the early stages in the chain makes sense if all the components are of similar quality, this often isn't the case, with the speakers usually being particularly poor, especially in a laptop. In this instance, therefore, the exact opposite would be recommended.

Such contradictory guidance makes it tricky to decide what to upgrade, but

we'd suggest that speakers are usually the weakest link so would be the top priority. If you decide to buy passive (non-amplified) speakers, though, this upgrade path would also involve investing in an audio amplifier. Like any other piece of PC hardware, you'll undoubtedly draw up a shortlist by perusing the specifications, and while this is an important first step, in the realm of audio, it's not easy to equate figures with performance.

Paradoxically, your ears often provide a better way of comparing, and it's not uncommon for one product to outperform another with a better specification. In the realm of hi-fi (as opposed to PC music), the 'try before you buy' philosophy applies, with top-end dealers offering customers the option of auditioning equipment before buying. This is the best way to decide on your upgrade path and it will often be possible to try out upgrades on your PC if you choose a small local shop instead of going to a big name store or buying online. It may also be possible if you're thinking of upgrading with hi-fi gear instead of equipment intended specifically for use with a PC.

Hardware components

Let's take each of the components in turn. For every one, we'll consider what you should take into account when choosing an upgrade and provide some indication of what you might end up paying.

Onboard sound cards or chipsets are usually very basic, and can suffer from interference from other electronic components on the motherboard. This leads to unwanted noise through your speakers instead of a clean, interference-free sound. That's why it's worth bypassing this altogether and replacing it with hardware that does a better job.

A new sound card could be either a replacement internal PCI-Express card (only for desktop PCs) or a separate box that connects to your PC via a USB port. In addition to the obvious reason for upgrading, you might also need to upgrade it to support some of the higher quality music formats that we discuss later.

If you're going to be using it purely for listening to music, you should look for a card that's intended primarily for this application. However, if you're also interested in gaming and perhaps watching movies, a dedicated gaming card will offer features such as surround sound but, possibly, at the expense of the ultimate in audio quality.

Creative Labs has traditionally addressed the gaming market, but now also offers audiophile products. Asus and Auzentech

are also well-respected. In addition, for music but not for gaming, some of the hi-fi companies such as Arcam are now addressing the PC market. Bear in mind, though, that products from hi-fi companies, for example the Arcam rPAC, will often be DACs (so search for 'USB DAC' instead of 'sound card'), so will not offer the other functions of a general purpose sound card. Expect to pay at least £100 for hardware that will make a substantial difference to your existing setup, although you could pay several hundred pounds.

Turning to the speakers, those that are marketed as PC components usually have a built-in amplifier. Commonly, they also support surround sound by the provision of several satellite speakers that attach to a central subwoofer, which also houses the amplifier. However, unless you really need surround sound, we suggest that you pick stereo speakers instead.

After all, if you go for just two speakers, you're likely to get a higher quality product than if you buy six or seven for the same price. Perhaps because of the commonly held, but not necessarily correct, view that the speaker is the most important element of an audio system, numerous companies address this market, so you're going to have to do your homework. Prices range from £15 offerings that are unlikely to provide you with any improvement, to a few hundred pounds, although products around the £100 mark should provide a reasonable upgrade.

As an alternative to buying a set of PC speakers, you could also consider using a lower cost set of speakers aimed at the hi-fi

The **ARCAM RPAC** is a hi-fi quality DAC, not a general purpose sound card

market. You'd also need a separate audio amplifier, but it's possible that a speaker plus amplifier could outperform a set of dedicated PC speakers at the same price point.

High quality music formats

The MP3 format might be considered the de facto standard for music reproduction on a PC or on handheld devices, but it's really a leftover from a former age. When MP3 was developed, data storage was expensive, so the major requirement was to make tracks tiny and this was achieved using a so-called 'lossy' method of data compression.

The result was that the audio quality was not as good as that of the CD that uses a lossless form of compression. Using lossless compression, and hence experiencing CD quality, isn't the ultimate, though. Many audiophiles still consider that the quality of CDs is inferior to that of vinyl records. This is because digital music is only ever an approximation to the real world analogue

These hi-fi speakers from **CAMBRIDGE AUDIO** might improve sound quality

signal it represents and CD uses a fairly crude approximation.

In particular, sound is sampled 44,100 times per second (44.1kHz) and is represented by a 16-bit binary number – this is referred to as 16/44. Newer standards employ higher sampling rates and word lengths, most commonly combinations of 96- or 192kHz, and 16- or 24 bits.

It should now be clear that you'll experience better quality music by trading in MP3 for a better format. Indeed, if you've decided to upgrade your hardware, then you ought to use a high quality music format to make the most of that improved hardware. It's even been suggested that MP3 can sound worse with a better sound card or DAC because it's better able to reproduce the compression artefacts: the 'damage' that the lossy compression causes to the music.

In choosing a better audio file format, either for downloading tracks or for ripping tracks from a CD, the most important thing is to either use an uncompressed format or one that employs lossless compression. Then, the next stage (although this doesn't apply to ripping CDs since using a higher resolution can't create information that isn't there) is to go for a higher sampling rate and word length, probably 24/96 or 24/192, although you'll find that the difference between 96- and 192kHz is minimal. What's more, some of the audiophile DACs don't support 192kHz yet outperform some sound cards that do.

Thinking of specific file formats, if you insist on your files being tiny, then use AAC instead of MP3. Both formats employ a lossy method of compression needed for such small files, but AAC degrades the music quality less. WAV is the most common uncompressed format, but popular lossless compressed formats – which are as good as uncompressed but about half the size – include FLAC, AIFF, and Apple Lossless (referred to as either ALAC or ALE). All these support the full range of sampling rates and word lengths. Before choosing a format and sampling rate, though, ensure that your hardware/software combination supports it.

Software issues

Windows Media Player 9 (WMP) is restrictive in the types of audio files that it'll handle, so if you decide to step up to higher quality formats, you'll need new or upgraded software that can handle them. You can get alternative media players that will reproduce music in these various formats and tools for ripping CDs into high definition standards and if you're happy to work with totally new software this might be a good solution.

Popular third-party players include the VLC Media Player and the Standard version of MediaMonkey, both of which are free. However, most people will already be familiar

with WMP and many would prefer not to have to start from scratch with different software. Our emphasis here, therefore, is upgrading WMP to work with these new formats.

First the good news. WMP 12 already handles the totally uncompressed WAV format and will work with sampling rates up to 24/192. However, as installed with Windows, it won't play AAC or FLAC files nor many of the less-common formats employing lossless compression. This is because, for each format it requires a codec (coder-decoder), yet it ships with a limited number.

If you install the relevant codecs, though, WMP 12 will be able to play these additional formats. You could add codecs individually, but a better option is to install a well-respected codec pack that includes support for lots of additional video as well as audio formats: the K-Lite Codec Pack, which you can download from codecguide.com.

It comes in four different editions – Basic, Standard, Full and Mega. All are free, but each represents a larger download and installation than the previous one. Make sure that you pick the correct edition for your chosen file formats.

Once you've installed your new codecs (just follow the onscreen instructions) you'll find that WMP will play the supported formats in just the same way as MP3 or WAV tracks. However, Windows still won't recognise them as audio files, which means that you won't be able to include them in your Music Library. This drawback is overcome using the free WMP Tag Plus utility that you can find at tinyurl.com/lzqptys.

Something else that new codecs won't do is allow you to rip your CDs in WPM to formats other than those initially supported. Third-party software for ripping to high definition compressed formats is available, but if you want to stick with WMP the solution is to rip to WAV and
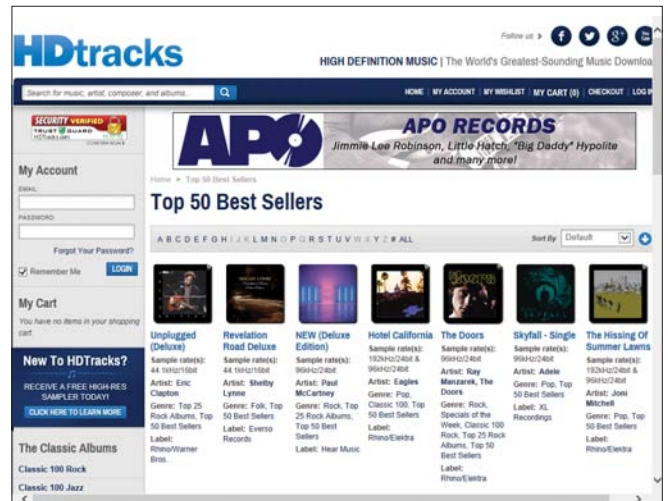
then convert the WAV file. A useful tool that provides conversion between audio formats (and a whole lot more) is Free Studio from dvdvideosoft.com.

In ripping and converting, though, do bear in mind that no high-definition format can generate information that isn't there on the CD. So, because CDs use lossless compression, ripping to WAV will give better results than ripping to MP3 and if you subsequently convert that WAV file to FLAC you'll save disk space without sacrificing any quality. However, because CDs are sampled at 16/44, ripping them to 24/96 or 24/192 would be futile, using up more disk space for no improvement in quality.

Each of the upgrades we've seen here will go some way to improving your listening experience and they don't have to cost a fortune. Yet if you do decide to push the boat out, perhaps upgrading the whole audio reproduction chain and also using higher quality audio formats, you'll find that the quality will improve quite considerably. ⊠

HD audio on your computer

High-resolution digital audio offers better sound quality than your CD collection. Dominik Tomaszewski reveals everything you need to know about hi-res music: how to buy it and how to optimise your PC to enjoy all the detail it has to offer

As we explain in our guide to getting better quality audio from your computer (page 94), MP3 files created from your CDs or bought o=nline, offer lower quality than the original recordings. Even if you've already ripped your CD collection to lossless 16-bit/44.1kHz FLAC or ALAC files, you're still missing out on the best quality available: high-resolution digital music tracks in 24/96 or better.

High-resolution, or 'hi-res', digital music is considered digital audio recorded at 24-bit/44.1kHz or better. But for most listeners, it'll need to be 24/88.2 or higher,

with the most common options found today being either 24/96 or 24/192.

It's been commercially available since the introduction of DVD video in 1997. At the turn of the century there were also plans to replace the CD with a high-resolution music disc, based on the higher-capacity DVD format, although two incompatible systems actually appeared leading to a format war between them – the Super Audio Compact Disc (SACD) and DVD-Audio (DVD-A).

Both formats effectively lost, with consumer demand for 'free' and 'easy' leading to the supremacy of worse-than-

CD music formats like MP3 and AAC. More recently, audio enthusiasts have been able to rip SACDs by using hacked Sony PS3 consoles. But the music files on these discs are in an unusual format, Direct Stream Digital (DSD), which requires special software and capable hardware to play.

Getting high-res music

However, in the past couple of years, online music stores and specialist recording labels have slowly started offering hi-res digital music downloads, including HDTracks, Linn Records and Bowers & Wilkins.

You can buy high-resolution albums in various digital formats such as FLAC, WAV, ALAC and AIFF for download on to your computer, ready to be played. High-resolution 24-bit files are more expensive to buy than 16-bit CD-quality files, by varying amounts. We found it was possible to get the 24-bit versions for about 30 percent more.

You're unlikely to find many top 40 albums on offer, as the big labels are quite protective of their hi-res studio masters and have offered only very limited numbers of high-res tracks on these sites. If your music taste leans towards jazz, blues and classical, you should find plenty of choice, though.

Playing HD audio files

You can play high-res audio files on most PCs, in iTunes or using Windows Media Player with suitable codecs, but better results are usually found with specialist software such as Audirvana Plus, J-River or Bit-Perfect. You'll also need to check that your PC is set up correctly in its audio preferences, to ensure music isn't down-sampled to CD quality again.

A good music system helps you enjoy hi-res music even better. Using your PC speakers alone to listen to these files, you're less likely to hear the differences. You can compare this to using an old TV set to play Blu-ray films; yes you can watch them but you're not getting the full HD experience.

Specialist audio companies, such as KEF, Bowers & Wilkins and Cambridge Audio, sell hi-res capable active speakers that plug into your PC or laptop via USB, and can support audio to at least 24-bit/96kHz quality.

If you already have a decent hi-fi music system and good speakers or headphones, you might only need a digital-to-analogue convertor (DAC) that supports hi-res audio. Most USB outboard DACs support 24/96 audio, while the better units now also support 24-bit/192kHz files.

Look out for those that support synchronous-mode USB, as these far exceed the sound quality available from older USB

audio devices that relied on the PC's digital audio clock in adaptive-mode USB.

Besides playing your high-res files from your computer, there are now many easier options available – the most popular is the audio streamer, such as the Chordette. These range in price from a few hundred to several thousand pounds, and usually have a built-in DAC or can be bought as a complete mini hi-fi system (just add speakers).

Playback can be as simple as plugging in a USB stick, loaded with your 24-bit high-res music to play. Slightly more complicated, but vastly more convenient when working properly, is to play your music from a Network Attached Storage (NAS) drive through your home network. This allows you to serve all your music files to the streamer, wired or wirelessly, controlling playback via an iPad, iPhone or Android device.

If you're after a more portable setup, there are now several players that are hi-res-capable. Astell & Kern, Sony and Fiio – to name a few – make iPod-sized players, while some smartphones are beginning to support hi-res audio. LG's G2, for example is capable of playing 24-bit, 192kHz music in FLAC or WAV format. Remember that a good pair of headphones will be crucial to get the best out of high-res audio here.

Is HD audio all worth the hassle?

Hi-res 24-bit audio should have a clear advantage in sound quality over CD-quality audio and is a major upgrade to low-res MP3. Music will become more involving and alive. Instruments will sound more natural and be more separated from each other in busier sections of music, rather than confused and congested together. The bass will seem to be go lower and the treble will be cleaner and less tiring to listen to.

But – and there is a but – the most important factor remains how well the music has been recorded and mastered in the first place. Many albums today are mixed to sound good on low-quality headphones and car stereos. These mixes all too often include dynamic compression to make them sound 'loud' and more impressive. And in doing so lose all the subtleties of the original recording. Even though you might have an album in 24-bit format, it might sound little better than the CD version.

The good news is that many online hi-res audio stores provide sample files, so that you can download and try them for free first to see if you can hear a difference. ⊠

Fix it fast

Facing a Windows, hardware, software, network, internet or mobile-device crisis? Here's how to take quick corrective action

Your PC is a machine of many talents. It can serve as a photo editor, a gaming machine, a workspace and a home cinema. But sometimes something in your system fails just when you need it most. Whether you're dealing with a dead monitor, a corrupt Windows installation or a new operating system, you can solve many common PC headaches in a flash once you know where to look. To that end, we've collected a few of our favourite quick fixes for the hardware, software and services you use. With these tricks, you won't just be better prepared to fix an ailing system – you'll be able to tweak your PC to work stronger, faster and better than before.

QUICK PC FIXES

End spontaneous shutdowns

5 MINUTES: If your PC regularly shuts down or restarts without any logical explanation, and if you don't see any other signs of trouble – such as error messages, a blue screen of death or graphical glitches suggesting that your GPU might be failing – you probably have a heat problem on your hands.

The simplest way to cool down things is to open your PC's case and gently brush out any accumulated dust, dirt or other debris. If you built the PC yourself and still have some thermal paste lying around, it's a good idea to clean off the old thermal paste from the CPU and reapply a fresh coat.

If this doesn't solve the problem, the underlying difficulty may be that your power supply isn't delivering enough juice to keep your PC running under the pressure of heavy use. If your PC often spontaneously shuts down while you are playing games and plenty of air is flowing into the freshly cleaned case, your power supply is probably to blame.

Another possibility is that your beefy power supply may be starting to fail; or perhaps you've recently upgraded your PC with a power-hungry component such as a second graphics card, and your old power supply can't deliver enough juice. If the latter is true, simply remove the component until you are able to upgrade your power supply.

Prevent Windows Firewall nagging

30 SECONDS: Windows 7 users know how needy the operating system's built-in firewall utility can be – and on all new Windows 7 PCs it's switched on by default. If you tire of its constant nagging, or if you've accidentally blocked an application from accessing the internet, you can tweak the firewall settings in the Control Panel.

Press the Windows key, type **Allowed Applications** into the search field, and press Enter. You should see a window that lists every application on your PC. Click the Change settings button to start making adjustments, blocking applications from

accessing the internet or flagging them so that they can access the web only through specific networks.

Clean out a PC case

2 MINUTES: A dirty PC is prone to overheating, so take the time to clean out the dust and debris from your case every few months. Having switched off your PC, unplugged it from the mains and earthed yourself, simply open the case and use a small brush or handheld vacuum to gently remove all the loose debris and rid the flat surfaces of as much dust as you can.

Don't use a high-power vacuum and don't drag its hose or nozzle along the surface of your PC's circuit boards. The last thing you want to do is to knock off a surface-mounted capacitor or resistor and suck it into the vacuum. Use the vacuum sparingly, and focus on the largest bits of debris that have settled inside the case and on fans and heatsinks.

Fix a misbehaving monitor

4 MINUTES: Monitor problems can be frustrating, but they usually aren't difficult to fix. When your screen starts misbehaving, try the simplest solution first: disconnect and reconnect the cables to ensure all connectors are firmly plugged in. Often that's all it takes.

If the problem persists, a cable or one of the ports on either the monitor or the PC may have degraded. Try using a spare cable

(or borrow one from a friend). If the problem persists, check whether using an alternate port offers a fix.

If you still have problems with a blank screen, and your system has a dedicated graphics card installed, it's time to open up the case. Switch off your PC's power, unplug the power cable, earth yourself, then open the case. Reseat the graphics card, then check to confirm it's firmly attached to the PCI port. While you have open the case, make sure all the cooling fans are clean and dust-free, especially those attached to the graphics card. Graphics cards often exhibit graphical glitches and colour errors when they overheat or are on the verge of failing.

Fix a malfunctioning keyboard

1 MINUTE: If you're typing away on your keyboard and suddenly notice that nothing is happening onscreen, you probably have a faulty keyboard. Before you buy a new one, make sure the problem isn't merely a port issue: unplug the keyboard from your PC and plug it into a different USB port.

If your keyboard doesn't connect via USB then it's probably an older PS/2 model. You may need to download the appropriate driver software to tell your PC how to understand it. You can find Microsoft's generic PS/2 keyboard drivers at tinyurl.com/o5yw43f.

Shorten lengthy boot times

3 MINUTES: Many PCs take much longer than they should to boot up Windows because they waste time loading programs you don't need at startup. You can switch off most such programs, known as startup services, with little risk. By doing so, you'll shave precious seconds off your boot time, and you can always manually launch the programs if you want to use them later.

To shut down unnecessary startup services press the Windows key, type **Run**, and then press Enter. In the resulting command box type **msconfig** to launch the System Configuration utility, then open the Services tab. Here you'll see a list of all of the programs that start up with Windows.

BLUE SCREEN OF DEATH Frequent shutdowns are a sign that your PC is battling a heat problem

ALLOWED APPS In this window you can specify apps that you would like Windows Firewall to permit access to the web

For safety's sake, enable the option to 'Hide all Microsoft services before you make any other changes'. Now disable every utility that doesn't need to automatically start when you switch on the PC.

Fix a too-hot CPU

4 MINUTES: If your PC is overheating and you're comfortable working inside the case, consider replacing the old thermal paste. The thermal interface material (or TIM) used between CPUs and GPUs and their heatsinks breaks down over time and becomes less effective at conducting heat away from a PC's components.

To replace the thermal paste, carefully remove the heatsink and use isopropyl alcohol (or any other alcohol-based cleaner that won't leave residue) to clean the old thermal paste from the base of the heatsink and the surface of the chip on which it was mounted. Now apply a few drops of fresh TIM and remount the heatsink.

Disable AutoPlay

30 SECONDS: If you're tired of clicking through the annoying AutoPlay pop-up window every time you plug something into your PC, just disable it. First plug the offending device – a camera or smartphone, for example – into your PC and allow the device to install any necessary drivers. Close the AutoPlay window when it pops up, safely disconnect the device, then plug it back in.

When the AutoPlay window pops up select 'View more AutoPlay options in Control Panel'. This will open the Control Panel; scroll down the list of recognised devices to find the latest addition, then change the 'Choose a default' option to 'Take no action'. Click Save, and AutoPlay should never trouble you about that specific device again.

If you want to switch off AutoPlay completely, select 'View more AutoPlay options' at the top of the screen and disable 'Use AutoPlay for all media and devices'.

Run old software

30 SECONDS: Need to run a program written for an older OS? You can tweak Windows to deceive applications into thinking they're running on Windows XP, 2000 or even 95.

If you have an old program that doesn't play well with Windows 7 or 8, right-click it and select Troubleshoot compatibility. Next, choose Troubleshoot program and skip through the troubleshooter by clicking 'I don't see my problem listed'. On the next screen you can pick an older version of Windows to emulate while running the application – click 'Start the program' to test whether your application will run in an older Windows OS.

If this works, make permanent the arrangement by clicking 'Yes, save these settings for this program'.

Fix cable creep

2 MINUTES: Some people tend to the cables and twist ties that trail behind their desks as though these extensions were Zen garden elements, raking, pruning and manicuring every last one. But cable management need not be such a painstaking task. Follow these three simple steps when you connect a device to your PC and you'll discover cable bliss.

First, always label each cable. Masking tape and a pen will do the job, or use a label maker. Attach a label at each end, so that the cable is easy to identify.

Next, label your chargers and plugs. And finally, prevent cable chaos by setting up some simple routing channels. Running cords through a toilet-roll tube will do the trick.

Automate maintenance tasks

2 MINUTES: The best way to stay ahead of common PC problems is to prevent them from happening in the first place. You should regularly perform maintenance tasks such as
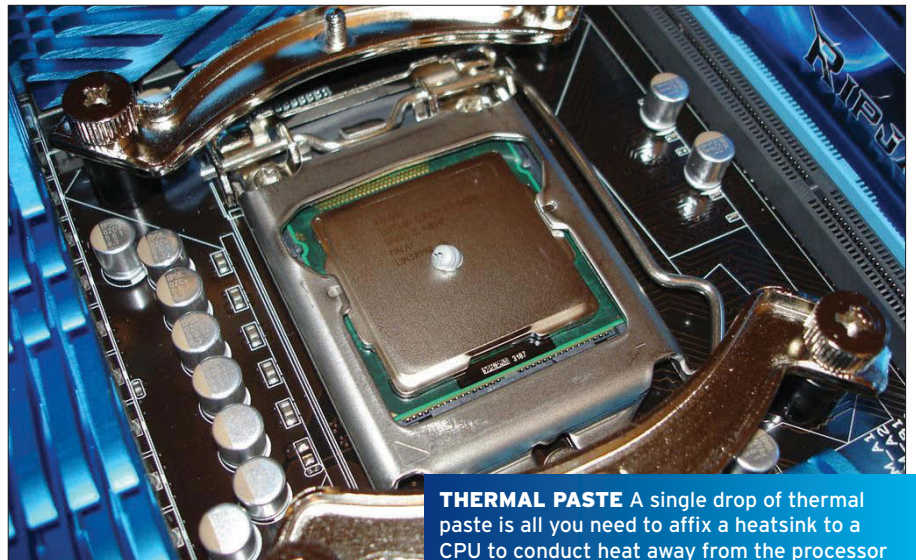

THERMAL PASTE A single drop of thermal paste is all you need to affix a heatsink to a CPU to conduct heat away from the processor

defragmenting your hard drive. Conveniently enough, you can arrange for your computer to handle these critical tasks on your behalf through the Windows Task Scheduler utility.

Launch the Task Scheduler by typing **Task Scheduler** in the Start menu. Choose the 'Create Basic Task' option. The wizard will walk you through the process of selecting which application to run and then specifying how often it should occur.

Of course, the Task Scheduler can only launch a program; to make the program perform an action automatically – for example, setting up CCleaner to automatically run a complete scan – you'll have to modify the program's command line in Task Scheduler to include specific arguments. If you're using CCleaner, for example, you can modify the command line to read **ccleaner.exe /AUTO** to make CCleaner launch and automatically run a system scan that

conforms to your custom settings. You can usually find a list of command-line arguments for a piece of software on its developer's site.

WINDOWS 8 TRICKS

Avoid the password screen

3 MINUTES: If you're the only person who ever uses the PC, it's silly to waste time punching in your Windows 8 password every time you start a work session.

To circumvent this hurdle, log into Windows 8 and press Windows, X. Select 'Command Prompt (Admin)' from the menu in the screen's lower-left corner, type **control userpasswords2** in the text field, and press Enter. In the User Accounts menu that appears, deselect 'Users must enter a user name and password to use this computer'. Click Ok, and give Windows your password – twice – to verify your identity, then reboot your computer. You shouldn't need to enter this password on your next login.

Bring back hibernation mode

1 MINUTE: Putting a PC into hibernation mode reduces its power use to a trickle – even less than it uses in sleep mode (although PCs do take longer to wake from hibernation than sleep). Hibernation mode isn't available by default in Windows 8, but you can easily turn on the feature.

First, access your PC power settings by pressing the Windows key and searching for **power**. Then, from the Windows 8 Settings menu, select 'Change what the power buttons do', followed by 'Change settings that are currently unavailable'. Scroll down until you reach the Shutdown settings section; here, enable Hibernate, and click Save changes.

You can now choose the hibernate option from the Windows 8 Power menu, or set the PC to enter hibernation when you close the lid or tap the power button via System settings, 'Power and sleep button settings'.

Eliminate the lock screen

1 MINUTE: On a deskbound PC, the Windows 8 lock screen isn't very useful. To get rid of it, press Windows, R to open the Run command dialog box, type **gpedit.msc** into the text box, then press Enter. Windows 8 will respond by opening the Local Group Policy Editor, in which you can switch off the lock screen. Using the left navigation menu choose Computer Configuration, Administrative Templates, Control Panel, Personalization. Double-click 'Do Not Display the Lock Screen', then click the Enabled radio button and hit Ok.

Picture passwords

3 MINUTES: Picture passwords let you create a unique gesture to unlock your PC. To set up a picture password, open the Start menu and search for **Picture Password**. Under the Settings category of results, select 'Change to create picture password' to launch the picture password wizard.

On the resulting page of PC settings, click 'Create picture password' and enter your plain-text password to prove your identity. Choose a picture to serve as a palette, then use a combination of taps/clicks, straight drags and circles to create a gesture password. Remember the order and direction of all the gestures you draw onscreen; if you draw a line from left to right, for example, you will have to draw the line from left to right when you want to unlock your system.

Boot straight to the desktop

2 MINUTES: If you haven't updated to Windows 8.1, you can use the Task Scheduler to trick your PC into automatically launching the desktop each time you boot up, enabling you to skip the Start screen. Open the Task Scheduler (Control Panel, 'System and Security', Administrative Tools, Schedule Tasks), and select Create Task from the Task Scheduler Library. You can name your new task whatever you like – we recommend something simple such as 'Boot to desktop'.

Open the Triggers tab, choose New, select the 'At log on' trigger from the 'Begin the task' drop-down menu, and click Ok. Open the Actions tab, choose New, and type **explorer** into the Program/script field to instruct your PC to automatically boot to Windows Explorer – and thus to the Windows desktop – each time you log into Windows.

Make your family PC child-safe

4 MINUTES: Limit your child's web browsing to age-appropriate sites, and block or allow specific sites as needed, with the Windows 8 Family Safety system. You can impose time
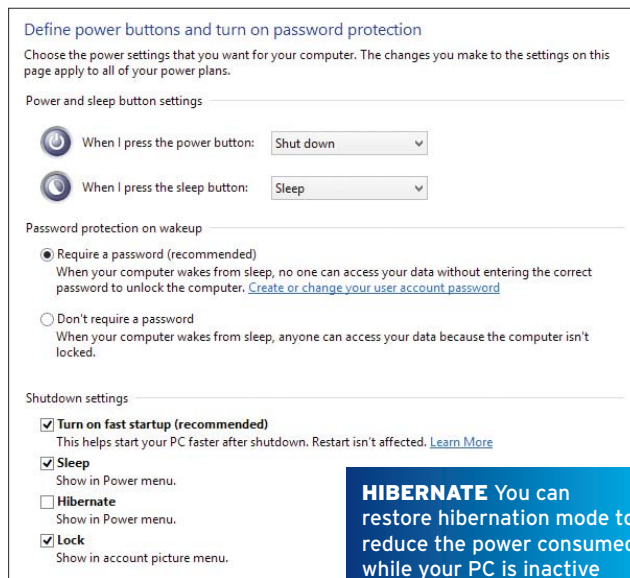
limits, perhaps locking down the PC during hours when you're at work and not available to supervise. You can also control what games and apps your child can play and buy.

First, set up an account for your child by opening the Charms bar and navigating to 'Change PC settings', Users, 'Add a user'. If your child already has a Microsoft account (say, for Xbox Live), you can enter that account, or sign them up to a new account.

If the PC you're setting up is the only one your child will be using, you can sign in without a Microsoft account and then tap Local account. Tick the box marked 'Is this a child's account?' and click Finish.

You can now use Windows 8 to set limits on your child's allotted computer time, accessible apps, and many other security options. Once you've completed this setup, you'll also be able to keep tabs on your child's activities from this PC or from your own.

Add a Shutdown button

1 MINUTE: The default Windows 8 shutdown process forces PC users to scramble for power option menus or try to drag in charm bars. Don't do it. Instead, set up a custom shutdown button with this simple fix.

Log into Windows 8, right-click any empty spot on your desktop, then select New, Shortcut. Type **shutdown /s /t 0** (that last character is a zero) into the Location field and press Next. Name the shortcut Shut down and click the Finish button.

The shortcut will pop up on your desktop with a default icon, which you should swap out for a big red power button by right-clicking the shortcut and selecting Properties. Next, open the Shortcut tab, click the Change Icon button, and select the image you prefer from the list. Be careful, though: clicking the power button will immediately shut down your PC, without any 'Are you sure you want to shut down?' prompt.

Define power buttons and turn on password protection

Choose the power settings that you want for your computer. The changes you make to the settings on this page apply to all of your power plans.

Power and sleep button settings

When I press the power button: Shut down

When I press the sleep button: Sleep

Password protection on wakeup

⦿ Require a password (recommended)
When your computer wakes from sleep, no one can access your data without entering the correct password to unlock the computer. Create or change your user account password

○ Don't require a password
When your computer wakes from sleep, anyone can access your data because the computer isn't locked.

Shutdown settings

☑ Turn on fast startup (recommended)
This helps start your PC faster after shutdown. Restart isn't affected. Learn More
☑ Sleep
Show in Power menu.
☐ Hibernate
Show in Power menu.
☑ Lock
Show in account picture menu.

HIBERNATE You can restore hibernation mode to reduce the power consumed while your PC is inactive

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Stop apps autoloading

2 MINUTES: Windows 8 offers a slew of preinstalled utilities, such as Music, Photos and Reader, but these are inferior to free desktop counterparts such as Adobe Reader and VLC Media Player. You might even prefer using the default Windows Preview utility to loading a separate app for viewing photos on your desktop.

To reassign the default programs your PC uses to open common file types, right-click in the lower-left corner of your desktop to open Control Panel and then navigate to Programs, Default Programs, 'Set your default programs'. Or search for **Default programs** in the Start screen. The Set Default Programs menu shows a list of all of your installed desktop programs; you can scroll down and assign your favourites to function as the default when you open specific file types.

SECURITY TIPS

Remove malware

5 MINUTES: If you suspect that your PC has a malware infection, boot into Windows' Safe mode by restarting your PC and pressing F8 to jump to the Windows Advanced Options menu (if this doesn't work, consult your motherboard's documentation for instructions on booting into Safe mode). From the Windows Advanced Options menu, select 'Safe mode with Networking' and press Enter.

In Safe Mode, run the Windows Disk Cleanup utility. (It's in the Accessories, System Tools menu.) Next, start your antivirus utility or malware scanner. If you don't have one installed, download either Microsoft's Malicious Software Removal Tool (tinyurl.com/4q6gc3y) or Malwarebytes' Anti-Malware (tinyurl.com/wq6tn) – both are free – and run a thorough scan to find and eliminate malware. Then install a better antivirus program. AVG Internet Security (avg.com) and Microsoft Security Essentials (tinyurl.com/48eL92q) are good free utilities.

Lock down your Facebook account

3 MINUTES: Enabling two-factor authentication for your Facebook account is a snap. Log into Facebook, click the blue gear icon, then click Account Settings. Select the Security option in the navigation bar on the left side of the screen, click Login Approvals under Security Settings, and tick the box next to 'Require a security code to access my account from unknown browsers'. Facebook will guide you the rest of the way, explaining how to receive a unique alphanumeric code to enter when you want to log in.

To get that code you must download a mobile authenticator app (which generates codes each time you log in) or give Facebook your mobile phone number so it can send you authentication codes via SMS. We prefer the authenticator app: it's simple to use and you don't have to wait for Facebook's servers to text you the code. You can also add a mobile phone number as a backup.

In its mobile app, Facebook includes a neat Code Generator feature that generates time-based one-time password (TOTP) codes for your account, but you can use any TOTP authenticator app if you're willing to subvert Facebook's setup process. If you use Google's mobile authenticator app to manage two-factor authentication across multiple services, for example, you can set it up to provide authenticator codes for your Facebook account, too.

To start the Code Generator setup process, click 'Set up Code Generator' under Login Approvals in your Facebook security settings. When the time comes to open the Facebook mobile app, click the 'Having trouble?' link. Facebook will ask you to click a Get Key button and enter the provided 16-character key – but you can enter that key into almost any authenticator app.

Fix a broken password

2 MINUTES: Upgrading a weak password is easy. The trick is to use a passphrase – multiple words strung together – rather than a single word, so hackers can't easily crack your password using a dictionary attack. Use at least eight characters, and avoid obvious subjects such as names, birthdays and football teams. Use numbers, upper- and lowercase letters, and even a symbol or two. Pick a phrase that will be easy to remember, and be as creative as you like.

Repair a corrupt Win 7 Installation

5 MINUTES: If your PC runs Windows 7, you can install a clean copy of the OS without wiping your PC and reinstalling Windows. The first step is to back up all your critical files to an external storage device. Next, get your hands on a Windows 7 CD that matches the version of Windows 7 your PC is running.

Start the repair process by popping your installation disc into your CD drive and running the Setup utility – if the disc doesn't automatically launch Setup. Click Install Now, choose whether to download the latest Windows updates – if your PC has a working Internet connection, you probably should download these – and then approve the Windows licence agreement. When asked to choose either an Upgrade installation or a Custom installation, choose Upgrade: this will yield a fresh installation of the OS without wiping your settings and personal files.

The utility will run a quick compatibility check to confirm that your PC plays well with Windows 7; then you'll click the Next button to start the repair process. This part of the process isn't so fast: it usually takes between 15 minutes and an hour, depending on how much of your data the utility needs to carry over. Once the installation is complete you'll need to answer a few quick setup questions, and then you should be good to go with a clean copy of Windows 7.

BUSINESS CORRECTIONS

Fix a malfunctioning network

5 MINUTES: If your network adaptor is external, unplug it and then plug it back in. USB Wi-Fi sticks can be finicky. Next, restart your router: unplug it, wait 30 seconds, then plug it back in. You may want to reboot your PC while you wait.

This therapy will heal most network ailments. If it doesn't work, try to access the internet from other PCs on the network. If they can't reach it either, your service provider may be to blame. Try rebooting the cable or DSL modem connected to your router using the method described above.

Also check your machine's IP address to see whether the router is properly configured: press the Windows key and type **CMD** in the search box to launch the command prompt; then type **ipconfig /all**. To find the proper adaptor, scroll down the list and look for the 'IPv4 Address' item. On most home- and small-office networks, the first three numbers (separated by dots) of the IP address should match the first three listed for DHCP Server. If not, you might need to reconfigure or reset your router, which may have suffered a glitch.

If you use a software firewall, the program might be interfering with network access. Try turning it off via the Windows Firewall menu in Control Panel.

Finally, if you're on a wireless network, try plugging in an ethernet cable and connecting your PC directly to the router. If this works, the problem is probably your wireless adaptor. Update your wireless adapter driver by downloading it from your PC manufacturer.

Tidy Outlook's address book

1 MINUTE: Outlook's People module lets you pull contact information from all over the web, including Facebook and LinkedIn, but using this data often leads to multiple contact entries for a single person. To eliminate redundant clutter you can link multiple entries to a single contact.
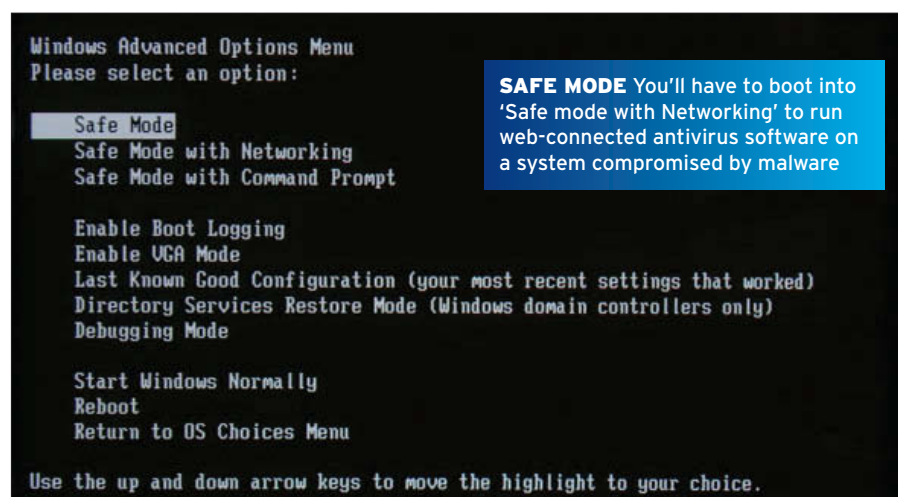
Click the contact you're interested in, and view the person's information by choosing Home, People. On the right of the screen click Link Contacts. A dialog box with a contact entry or entries for that person will open. In the Search People box type some identifying information for that person, and Outlook will return other contact entries that may be a match for that person. Click any of the entries that are for the same person to link the details.

Stop Office autocorrecting you

1 MINUTE: No-one likes having a PC overrule their style decisions. If you don't want three full stops (...) to become an ellipsis, or three hyphens (---) to turn into a page-wide horizontal line, or if you dislike any other default automatic 'correction' that Office performs, here's how to put a stop to it.

Type the word or character sequence you want to change – and stop typing when the AutoCorrection occurs. A small icon with a lightning bolt will appear onscreen next to the correction. Click the box and select the menu's second option ('Stop Automatically Correcting [whatever it just autocorrected]') to terminate the autocorrection behaviour.

For more-detailed AutoCorrect settings, or to remove specific words from Office's list of automatic typo fixes, click the Office button and go to Word Options, Proofing, AutoCorrect Options. Check the 'AutoFormat As You Type' tab for more settings. ⊠


```
Windows Advanced Options Menu
Please select an option:

    Safe Mode
    Safe Mode with Networking
    Safe Mode with Command Prompt

    Enable Boot Logging
    Enable VGA Mode
    Last Known Good Configuration (your most recent settings that worked)
    Directory Services Restore Mode (Windows domain controllers only)
    Debugging Mode

    Start Windows Normally
    Reboot
    Return to OS Choices Menu

Use the up and down arrow keys to move the highlight to your choice.
```

SAFE MODE You'll have to boot into 'Safe mode with Networking' to run web-connected antivirus software on a system compromised by malware

PAUL
MONCKTON

YOUR QUESTIONS ANSWERED

Expert computing advice

We tackle readers' hardware and software conundrums

WINDOWS 8.1 WATERMARK

Q I recently installed Windows 8.1 on my Intel-based PC, and I now have a watermark permanently displayed on my desktop with the following message:

Windows 8.1 Pro
SecureBoot isn't configured correctly
Build 9600

I received no such message when running Windows 8 and my BIOS settings haven't changed since I upgraded. Is there a security issue with my PC and how can I get rid of this message from my desktop?

First of all, your PC is no less secure under Windows 8.1 that it was when running Windows 8. All that's changed is that the new version of the operating system is more aggressive at prompting you to enable and configure the Secure Boot feature in your PC's firmware.

If your PC doesn't support Secure Boot, this message shouldn't appear. It's designed to inform you that the feature is available but not currently working. Secure Boot helps protect your PC from being hijacked by malware during the boot process so, if you're running Windows 8 or newer, it can be a good idea to set it up properly.

However, some hardware, such as certain graphics cards, isn't compatible with Secure Boot, and you won't be able to use it if you want to run older versions of Windows or other operating systems such as Linux. So if you have incompatible hardware, or you're dual-booting your system with another operating system, you won't be able to set up Secure Boot in order to remove the nagging message.

If you don't want to use, or simply don't care about, Secure Boot, you can remove the watermark using the following patch from Microsoft: tinyurl.com/k7zsgbw.

This should also become available via Windows Update eventually.

If you would rather use the Secure Boot feature to protect your computer, you'll need to make a few changes to your UEFI configuration. The exact steps will vary from system to system, but should broadly fit the description below.

First, you'll need to enter your PC's BIOS configuration menu. This is usually achieved by turning the computer on and immediately pressing a key during startup. The key you need to press may be displayed briefly on the screen; if not you'll need to consult your manual to find the correct key (page 109).

Otherwise you can perform an Advanced Startup from within Windows: go to the Settings Charm and select Change PC settings, then Update and Recovery followed by Recovery, then Advanced Startup. Click the 'Restart now' button.

When your computer restarts, select Troubleshoot, then Advanced Options: UEFI Firmware Settings. Then click the Restart button.

Your PC should now restart into the UEFI configuration screen. Look for your boot configuration options (you may have to enter an advanced menu first) and find Secure Boot. Make sure Secure Boot is enabled.

Now look for an option marked 'Install Intel Platform Key'. Select it and restart.

If this doesn't clear the message, you may have to contact your PC manufacturer or install a BIOS update.

For more information, take a look at tinyurl.com/le5wrqn.

FREEVIEW TV ON A PC MONITOR

Q I've just bought a new PC monitor that has sound and HDMI ports. Is there a way to turn this into a Freeview TV as well? I don't want to turn on the PC whenever I watch the TV. I want to watch either the TV or the computer, but not use the PC for watching TV.

This is very easy if you have a spare HDMI port. Just buy a Freeview set-top box and plug it into the empty HDMI connector. All you have to do now is make sure the sound is turned on and set at an appropriate level on the monitor. The set-top box will come with its own remote control, but won't be able to control the volume setting on the monitor itself. All you need to do then is switch between the two inputs on your monitor to go from PC to TV and back.

Another thing to keep in mind is that the settings you've chosen for your monitor may not look good for both your PC and your TV viewing. If your monitor has different modes such as 'Text', 'Movie' and 'Photo', you may want to experiment with which one looks best for each type of use.

Tech Help

CRYPTOLOCKER

Q I've read about a new piece of malware called CryptoLocker and I'm worried that I might be vulnerable to losing all my files. How can I ensure I'm protected against it? I believe that many antivirus programs can't get rid of it.

Your concerns are valid as CryptoLocker is a particularly nasty piece of malware that can effectively destroy files on Windows-based PCs beyond the ability of any data recovery process (see page 16). Unlike other viruses, which may simply delete your files, allowing for the possibility of some file recovery, CryptoLocker will securely encrypt them, making recovery impossible without the encryption key held by the attackers. This is offered only in exchange for a ransom payment.

Paying the required fee is also no guarantee that your files will be decrypted and restored to you. Other malware has employed similar tactics in the past, but CryptoLocker's encryption is much more secure and is currently not possible to crack.

The steps to guard against CryptoLocker are essentially the same good practices that

should be employed to guard against any malware attack or hardware failure:

Make sure you're using antivirus software and that it's kept up to date. Thankfully, most antivirus applications can now detect and remove CryptoLocker, but are only of use if they catch it before the encryption occurs.

Also make sure that you regularly back up all your data. These backups should be in a form that's disconnected from your computer, as CryptoLocker will seek out any connected USB drives and network shares, and attempt to encrypt those files, too. This can also apply to files being synced to Cloud services, although you should often be able to retrieve previous, and therefore unencrypted, versions of these files via the Cloud service

provider. Users of Windows starting with XP Service Pack 2 may also be able to retrieve previous (and therefore unencrypted) versions of their files, by right-clicking on an encrypted file and selecting Properties, then 'Previous Versions'.

For peace of mind, it's a good idea to perform an image backup right now and store it on a USB drive that you don't keep permanently connected.

Email is CryptoLocker's primary mode of attack, so avoid opening any email attachments from untrusted sources or that

DELETE AN INDIVIDUAL ATTACHMENT FROM FACEBOOK

If you've ever been chatting on Facebook from your browser and sent a message or attachment to the wrong person, or simply wished you hadn't sent it in the first place, you can remove it without deleting your entire conversation.

You'll need to be viewing the full conversation to start with, so if you're chatting in a pop-up conversation window, click the gear wheel towards the top right of the pop-up and select 'See Full Conversation'. Otherwise, you can click the Messages link in your favourites to enter your inbox as normal and click on the conversation containing the messages you want to delete.

With the relevant conversation selected, click on the Actions button at the top right and the select 'Delete Messages'. This will place a checkbox next to each message in the conversation. Now click the box next to any messages you wish to delete and press the Delete button at the bottom of the page.

Facebook will now give you one last chance to cancel the operation if you're not sure you've selected the right messages. If you're sure, go ahead and click the 'Delete messages' button to permanently remove all selected messages.

appear in any way suspicious. This should include attachments sent from banks or financial institutions and, particularly in the case of CryptoLocker, from courier companies or from Companies House. Also ensure the email scanning feature of your antivirus software is configured and enabled.

If you want to check right now whether CryptoLocker has found its way onto your PC, you can download and run MalwareBytes Anti-Malware from malwarebytes.org. This will scan for the Trojan and remove it for you if discovered.

If CryptoLocker has already encrypted your files, then it will display a message demanding payment. Unfortunately, by this time it's too late to recover your files if they are not backed up. You will then have to consider whether to give in to the attackers' demands for the slim chance of receiving a decryption key.

BLOCK CANDY CRUSH REQUESTS

Q I've given up playing the game Candy Crush Saga and I've removed the app from my phone, but I still keep getting loads of extra lives and similar requests on Facebook from other players. Why does this keep happening?

Removing the game from your phone isn't enough as you probably still have the application installed on Facebook. Candy Crush players can send you requests at any time, and if you don't entirely remove yourself from the game, they won't know not to continue sending you the requests.

The simplest way to avoid the troublesome requests is to block the Candy Crush Saga app on Facebook.

Sign into your Facebook account using your browser and select the small cog icon in the top-right corner to drop down a menu. Here, select Account Settings.

Now, on the left-hand side of the page, select Blocking. This will present you with five different types of blocks you can place on your account. The bottom one is for blocking apps, and here you can prevent any chosen app from being able to contact you or access your information.

To add Candy Crush Saga to the list, start typing the name of the app into the box next to 'Block apps'. You'll then be able to select the app you want from a drop-down list of apps matching what you've typed so far.

When you've done this, Candy Crush Saga will show up in a list of blocked apps. If you want to unblock the app at a later stage and resume playing, you can click the 'unblock' link next to your chosen app.

Alternatively, if you want to turn off the notifications without blocking the app, you can wait until you receive one, then hover your cursor over the notification.

BLOCK CANDY CRUSH REQUESTS
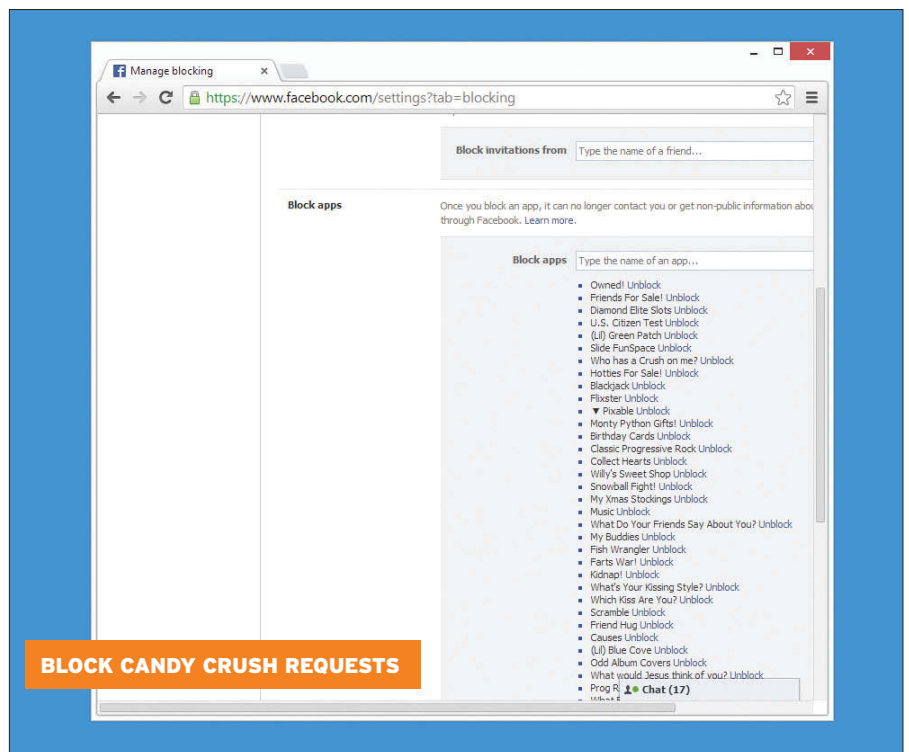
A little circle and an 'x' should appear. Click on the 'x'. You will now be presented with two buttons, one to turn off notifications from this all and the other to keep them on. Click 'Turn off' and you should stop receiving the notifications.

IMPROVE A PC'S AUDIO QUALITY

Q I use my PC as my main way of playing music. I have a decent amplifier and speakers, but I'm less than happy with the quality of audio coming from my computer. I've tried a plug-in sound card from Creative Labs and this has improved the quality somewhere, but my main issue is that there seems to be a lot of audible interference coming from the computer itself. During quiet passages of music, it's as though I can hear the PC 'thinking' in the form of a quite unpleasant screeching noise. What can I do to achieve something approaching hi-fi quality?

Upgrading your sound card can indeed improve quality, although there are a few different types, and while all of them will be designed to sound as good as possible, they don't all have an emphasis on high quality music reproduction.

For example, many are designed to accelerate the processing of effects for gaming or produce surround sound designed for multiple speaker setups. These functions are unnecessary for simple music playback.

The best way to isolate your audio from the noise produced inside your PC is to take the sound generation outside the computer's case altogether. If your amplifier or active speakers come with a digital input, either co-axial or optical, you can use a digital output from your PC if it has one.

This will use the Digital to Analogue Converter (DAC) in your amplifier/speakers, rather than the sound card in your PC, to generate the sound which should be clean of interference from within the case.

IMPROVE A PC'S AUDIO QUALITY

If you don't have a digital input to your speakers, you can add an external USB sound 'card' to your computer. These can be almost trivially inexpensive: a quick search on Amazon reveals examples costing under £2 – although we wouldn't expect hi-fi quality from these. A better example would be a Cambridge Audio DacMagic XS for around £100 or an HRT microStreamer for £180, although you can of course spend considerably more than this.

Be aware, though, that these particular devices are purely for playing back audio and not recording it (see page 94).
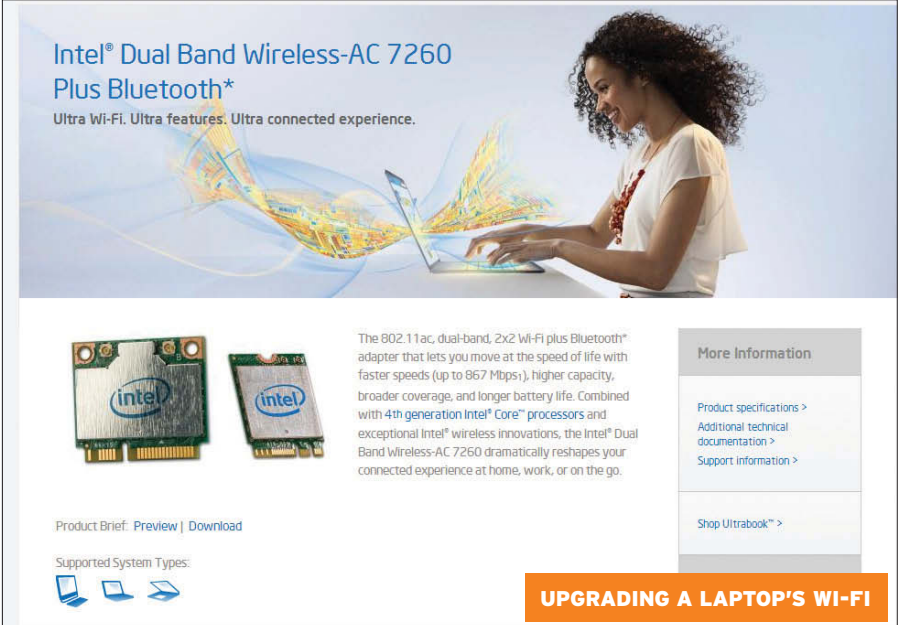
UPGRADING A LAPTOP'S WI-FI

Q I recently purchased a new high-speed 802.11ac router for use at home. My MacBook Air works really well with it, but is it possible to upgrade my wife's Intel-based laptop, which only supports 802.11n, to take advantage of the higher speeds and increased range? It's not getting a very good signal at the moment.

I know there are USB dongles I can buy, but my wife doesn't like using them. What I'm hoping to do is perform some sort of internal upgrade. Is this possible?

The answer is maybe, depending on your exact model of laptop. First of all, it will need to have its existing Wi-Fi adaptor located on a plug-in card, rather than soldered into the motherboard so you can replace it – or at least it must have a spare PCIe Half Mini Card/M.2 slot to allow one to be fitted.

Secondly, it will also need to have the right sort of Wi-Fi antenna built in, for connection to the replacement card. If the laptop supports currently supports dual-band operation – both 2.4GHz and 5GHz bands – you may be in luck.

Thankfully the card you need isn't very expensive, so it's worth giving it a try. Intel's Dual Band Wireless-AC 7260 is available for under £20 and should be a simple plug in replacement for your existing Wi-Fi card. It has driver support for Windows 7, Windows 8 and Linux.

If you can't get this to work, then you'll have to go down the USB route. Be careful if you're tempted to go for a physically small example, as they often support lower maximum speeds. Also go for a USB 3.0 model rather than USB 2.0 – assuming your wife's laptop supports USB 3.0.

Intel® Dual Band Wireless-AC 7260 Plus Bluetooth*

Ultra Wi-Fi. Ultra features. Ultra connected experience.

The 802.11ac, dual-band, 2x2 Wi-Fi plus Bluetooth* adapter that lets you move at the speed of life with faster speeds (up to 867 Mbps₁), higher capacity, broader coverage, and longer battery life. Combined with 4th generation Intel® Core™ processors and exceptional Intel® wireless innovations, the Intel® Dual Band Wireless-AC 7260 dramatically reshapes your connected experience at home, work, or on the go.

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Additional technical documentation >
Support information >

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UPGRADING A LAPTOP'S WI-FI

MSATA DRIVE

Q I've recently upgraded my PC's motherboard and CPU, and I was hoping to move my SSD from the old motherboard over to the new one. Unfortunately, I forgot that my SSD is an mSATA card that plugs directly into the motherboard, and my new one doesn't have an mSATA slot.

Is there a way to install my mSATA SSD in my new system or will I have to by a new SSD with a SATA connector?

All you'll need to do is to attach an mSATA device to a standard SATA port using an adaptor, though, check the specifications carefully to ensure compatibility with your

---

TECH JARGON BUSTER

FIRMWARE: Firmware is program code stored in non-volatile memory in an electronic device. It often forms a bridge between the hardware device itself and the higher-level software that runs on it. A typical example would be a PC's BIOS and UEFI software. In modern devices such as smartphones, the entire operating system could be thought of as firmware, with new versions of Android, iOS or Windows Phone being considered firmware updates.

MSATA: Mini-SATA, more commonly referred to as 'mSATA', is a compact version of the SATA interface designed for use in smaller devices such as netbooks and the thinnest laptops. Rather than using the standard SATA power and data connectors, mSATA uses a connector, which is physically the same as a PCI Express Mini Card interface.

NVIDIA G-SYNC: Created by nVidia, G-Sync is a technology that enables compatible monitors to synchronise with the variable frame rates of certain nVidia graphics cards rather than the graphics cards synchronising to a standard monitor refresh rate (typically 60Hz). This allows the graphics cards to run at their maximum speed without creating a 'tearing' effect on screen.

RANSOMWARE: This is a form of malware that attempts to extort money from its victims by holding their data to ransom until a fee is paid. A recent example is CryptoLocker, which securely encrypts the victim's documents, offering a decryption key only when the ransom has been paid.

SECURE BOOT: A standardised method of ensuring that a PC will boot only from trusted firmware and operating systems, Secure Boot prevents malware from installing and hiding underneath the operating system, where it would be difficult to detect or remove.

S/PDIF: Sony/Philips Digital Interface Format, or 'S/PDIF', is a digital audio connection for consumer-grade audio equipment. It comes in both coaxial and TOSLINK variants, the former using standard copper cables and connectors and the latter using fibre-optic cable with optical transmission.

MSATA DRIVE

SEARCH THE *PC ADVISOR* FREE ONLINE HELPROOM
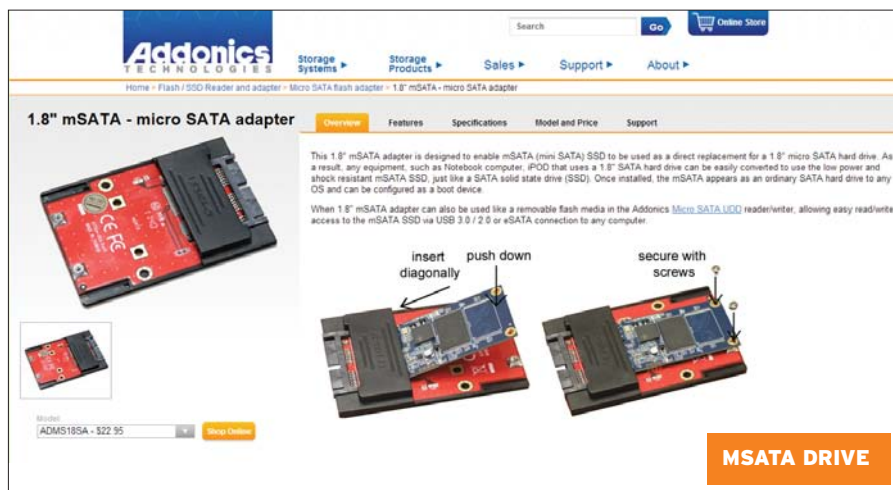
particular mSATA drive as there are different types. Specifically, there are those that use SATA and those which use PCI Express, although both use a connector, which is physically identical.

Adaptor boards are available for both types. If your mSATA device supports SATA III, you should also make sure you get an adaptor which supports SATA III.

PHONE'S ERROR MESSAGE

Q I recently bought a Samsung Galaxy Note 3 and transferred my SIM over from my old Galaxy S3 phone. My son has since been using the Galaxy S3 without a SIM and connecting via Wi-Fi, but there's now an annoying error message that pops up again and again.

At the bottom of the screen the message, 'Currently unable to download. Please try again later' appears. I've checked my downloads and I can find nothing pending. I've also removed all browsers and still can't find what's

causing this error. It keeps popping up repeatedly, so I can't really ignore it.

This error can often appear when the phone is attempting to download an MMS message in the background. Because MMS messages require use of the mobile network, the handset can't download the message when connected only via Wi-Fi and the result is the error message you describe.

To clear this, open up the messaging app and look for any MMS messages. Deleting these should clear the problem. Also in the Messaging app, go to Settings and scroll down to Multimedia message (MMS) settings. In this section, make sure the option Auto-retrieve is not selected.

Of course, this problem will go away if you perform a full factory reset of the device, and we'd definitely recommend doing this if you've giving the phone to someone else – especially as, from your description, it probably still has your personal messages and information stored on it.

The *PC Advisor* online Helproom contains an indispensable database of answers to common questions regarding all aspects of PC problems. This ranges from general Windows issues to problems with specific apps, and covers all types of PC hardware and software, including system components and peripherals.

Alternatively, you can ask for help from the experts on our online forums. Sign up to be a registered user – which is free – and then browse to one of the discussion forums. In the Helproom your first stop should be the searchable database of frequently asked and previously answered queries. With more than 1.5 million forum posts, you'll almost certainly find your answer in this archive of queries – just enter a few keywords.

If our online database can't solve your problem, try posting a question in the Helproom forum, where more than 200 queries are answered every day. The forum is manned by our team of Helproom Angels, who are ready and willing to lend a hand with anything from system crashes to virus alerts.

helproom@pcadvisor.co.uk
pcadvisor.co.uk/helproom

CONTACT US ✉

Email your Helproom questions to helproom@pcadvisor.co.uk. Please use 'Helproom' as the subject header and give your full name, the operating system you're using and other product details. We will let you know by email if your query has been selected for inclusion in these pages. If your query is urgent, you may find it useful to visit our forum at pcadvisor.co.uk/helproom.

Helproom aims to give you the best assistance possible. But, given the

limitations of this type of advice, we can't guarantee what we say will work and we can't accept responsibility for any damage arising as a result.

Always back up your system before you make any changes, including software installations.

Please note that we are unable to respond to letters or telephone requests, but we will endeavour to answer queries submitted by email or via our Helproom forum.

Enter the BIOS to change your PC's settings

Accessing your PC's BIOS is easily done, if you know which key to press. Jim Martin explains everything you need to know about entering the BIOS

Your PC's BIOS (Basic Input Output System) is responsible for controlling the basic functions of the computer. It holds the time and date, along with configuration settings such as the boot order and the speeds at which the processor and memory run. It also determines whether certain components are enabled or disabled, such as USB ports and the on-board audio processor.

A common reason to enter the BIOS is to change the boot order. Perhaps you've installed a new hard drive, or need to boot from a CD or USB flash drive. You'll need to alter the list that determines in what order devices are tried to see if they contain bootable software.
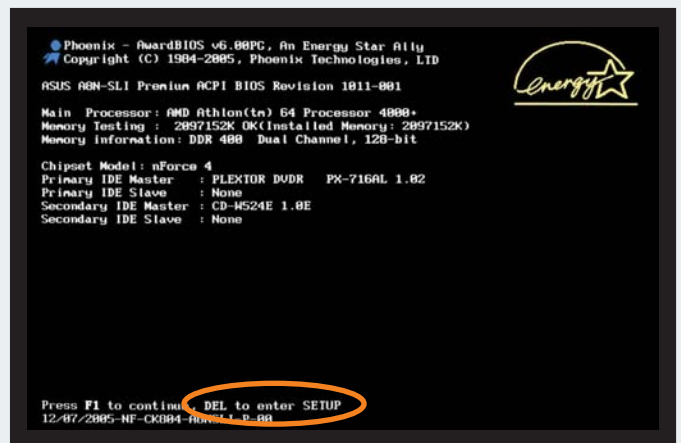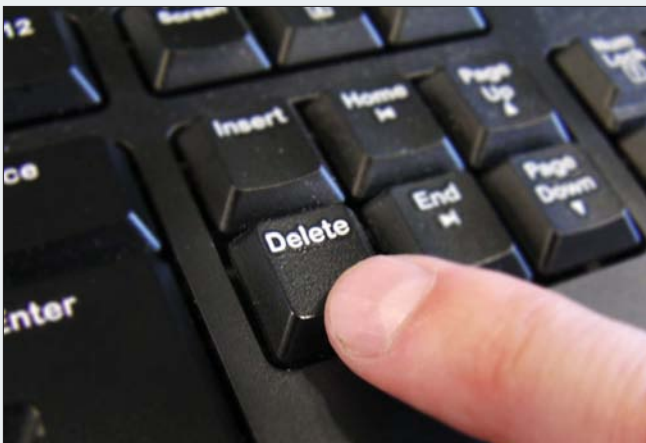
START Press your PC's power button and wait until an image appears on the monitor. Press the appropriate key – common keys are Delete and F1,. Some wireless keyboards may not work before Windows loads, so use a wired keyboard.

2 If you don't know which key to press, look for a message onscreen during the POST (Power-on Self-Test), which tells you. If you miss the message, press Ctrl-Alt-Delete together to restart it, or hold the power button down until it turns off.
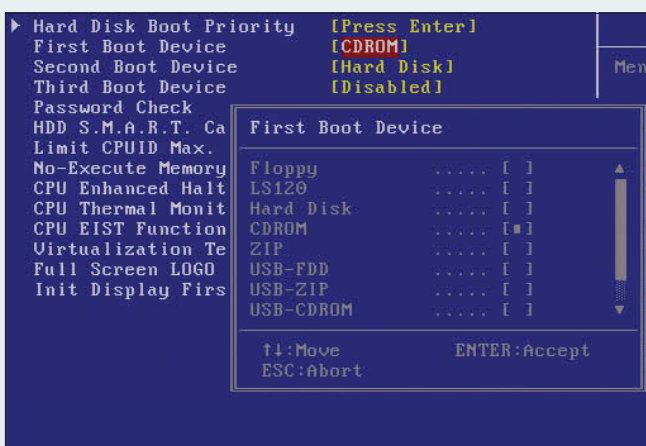
3 Once in the BIOS, you can use the cursor keys to navigate through the menus. There's usually a guide onscreen showing which keys to press to make changes, save settings and exit the BIOS. Esc or F10 are commonly used for exiting.
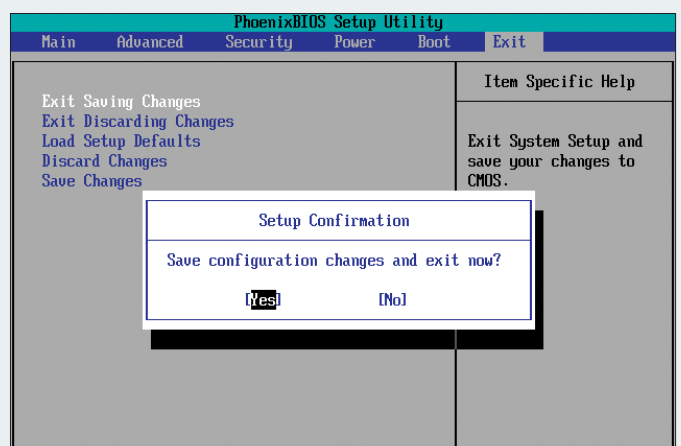
4 Once you've made your changes, make sure you save the settings before exiting the BIOS. You should see a prompt, such as 'Save changes before exiting: y/n?' Hit the appropriate key and your PC should restart. ⊠

Network your PC

Whether you want to connect Windows computers the traditional way to share files and folders or use homegroups, Roland Waddilove shows you how

If you have two or more computers on a network, be it wired or wireless, you'll be able to share photos, videos, documents and music. Doing so became a lot easier with Windows 7 and 8's homegroups, but what if your computer is running Vista or XP? They can't join homegroups, so you'll need to resort to old-style file sharing.

Here we'll begin by explaining how to configure Windows to share files the old-fashioned way, and then in the second half of the tutorial we'll look at homegroups for Windows 7 and 8. If you encounter any problems, turn off your PC's firewall, get sharing working, and then turn it back on.
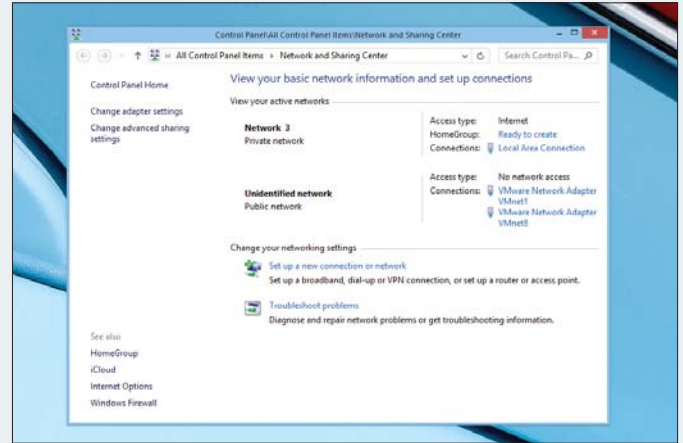
START On each computer, open the Control Panel and then the Network and Sharing Center. You first need to make some configuration changes, so click the 'Change advanced sharing settings' link on the left.
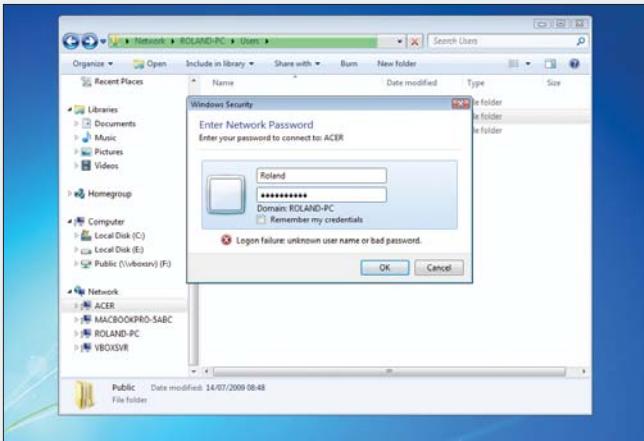
4 We've been using a Windows 8 computer so far, but Windows 7 works exactly the same. To access files on the Windows 8 machine, open an Explorer window and in the Network section you'll see the PC. Select it and enter a username and password.
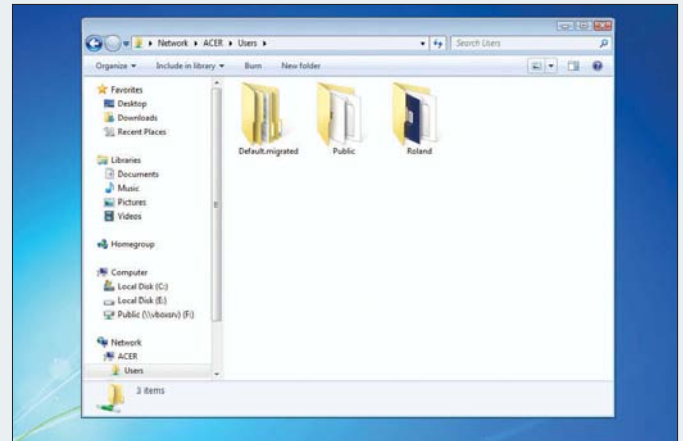
5 Providing the user exists on the other computer, you're logged in and can see the user's personal folder and the Public folder in the C:\Users folder. You can't access any other files or folders, just the public ones and the user you logged in as.
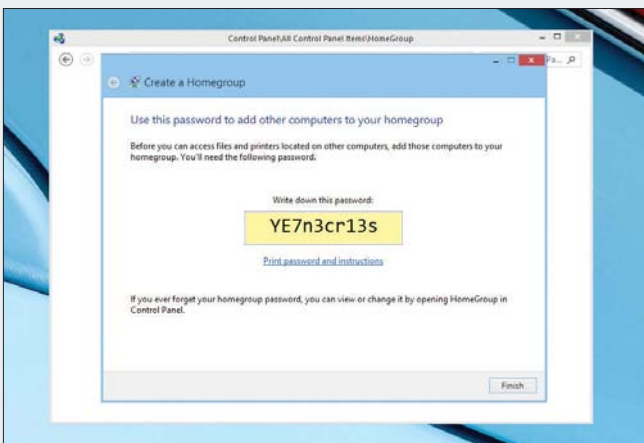
8 When a homegroup is created, Windows assigns it a password made up of random numbers and letters. Other PCs need this in order to join. If a homegroup was already running in Step 6, Step 7 wouldn't be necessary and you could just show the password.
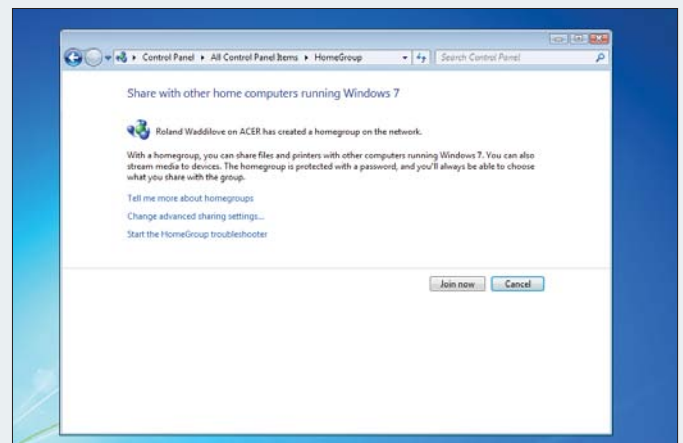
9 Switching to the Windows 7 computer, open Homegroup in the Control Panel and it will scan the network. It will automatically detect if another PC has created one and if so, it will show the details at the top. Click the Join now button to join the homegroup.
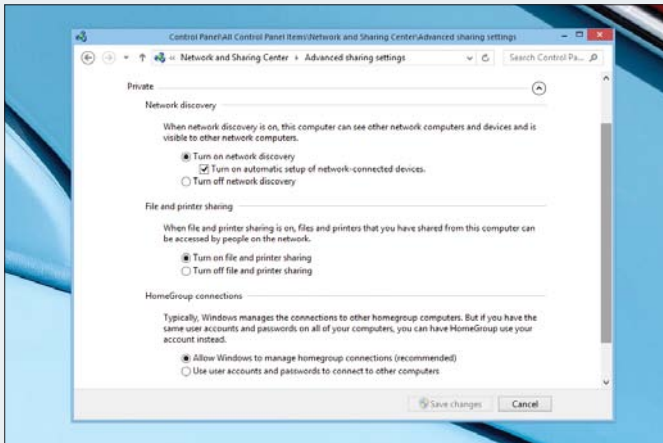
2 There are three sections labelled Private, Guest or Public, and All Networks. Expand the Private section by clicking the arrow, then turn on 'Network discovery' and 'File and printer sharing'. Allow Windows to manage homegroup connections, too. We'll need it later.
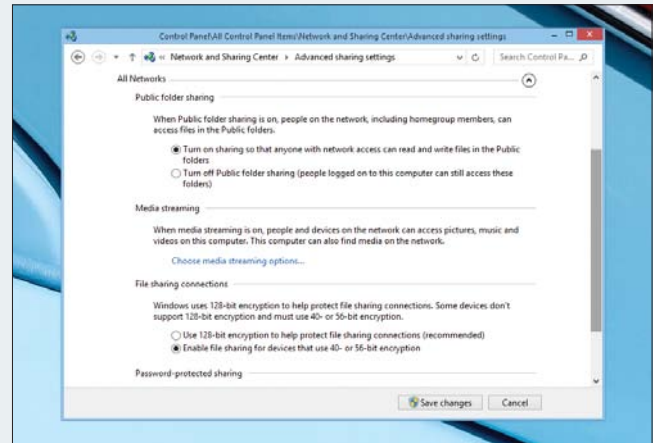

3 Scroll down and Expand the All Networks section of Advanced sharing settings. Turn on sharing and use the same encryption for all computers, so choose 128-bit if it's not selected. Turn off password-protected sharing.
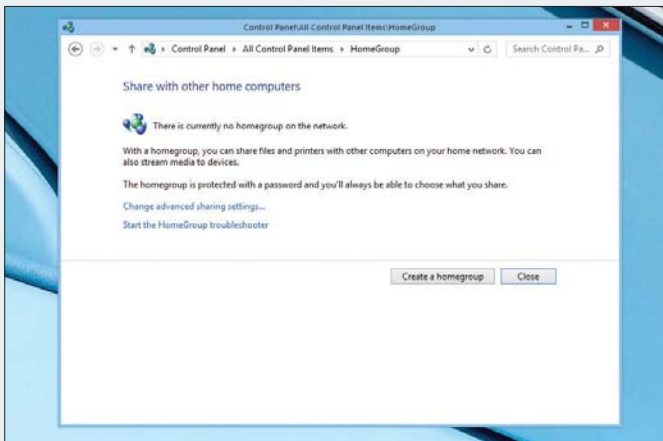
6 If all the PCs use Windows 7 or 8, you can make a homegroup. Open the Control Panel and then open Homegroup. If one is already running, you can use the option to leave it or show the password. There isn't one on this computer, so we'll create one.
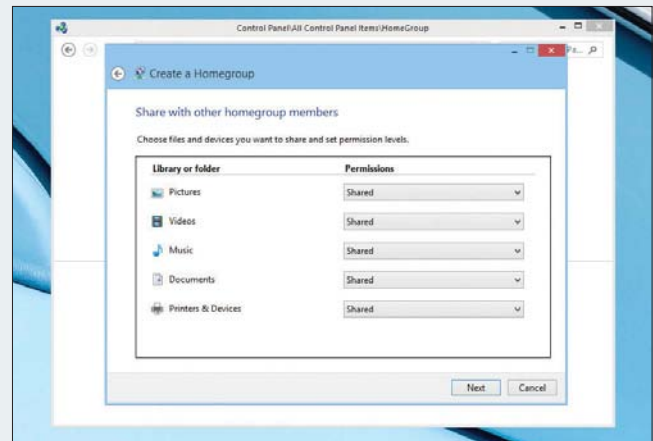
7 Instead of sharing public and personal folders, as we saw earlier, homegroups share libraries or folders, printers and devices. A list is displayed and you can use the permissions column to choose which items you want to share with other people.
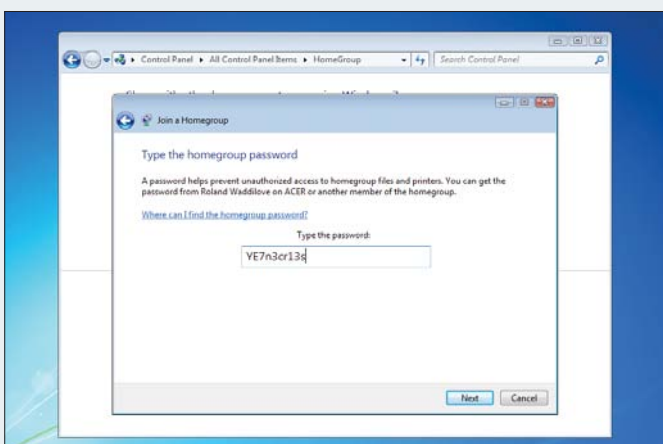
10 When the homegroup was created in Step 8, the password was displayed. This is only available on that computer, so you'll need to either access it yourself or ask the person using it to tell you the password. All you need to do then is enter it and click Next.

11 Once you've joined a homegroup, any computer can access the shared resources on any other system. Open an Explorer window and click Homegroup to see the members. Expand a member and select a shared resource, such as Videos. ⊠

Share one printer with all of your computers

One of the advantages of networks is that it's possible to share resources – so, for example, just one printer can be used by everyone. Roland Waddilove explains how

These days, we print less thanks to PDFs, online documents and forms, emailed receipts from stores, online photo albums, and so on, but sometimes we really need to print out a hard copy. It doesn't make sense to buy a printer for every computer in the office – instead share one on a network, so that any computer, tablet or smartphone can access it.

There are two ways to network a printer – it can either be plugged into a PC, which then shares it, or connected directly to a network. Any computer can share a printer that's plugged in to its USB port, and providing the PC is switched on, a limitation that can be irritating, any other device on the network can connect to it and print. The network can also be wireless or wired, and printers can be shared using traditional Windows file and printer sharing or via Windows 7/8's Homegroups.

Connecting a printer directly to a network has the advantage of not requiring a computer – all you need is a connection. Wi-Fi in printers is increasingly common and is even found in budget models. They do need to be configured, though, and you'll need to know the SSID (network name) and WPA security key.

Many home routers and printers support WPS (Wireless Protected Setup). Press the WPS button on the router, select WPS on the printer's LCD menu, and the device will automatically be configured for network use. Then install the printer software on the PC. If WPS isn't available, you'll either need to use the printer's LCD menu to input the network info, or plug it into a PC's USB port and install it like a USB printer. During installation, it's

configured for Wi-Fi and the USB cable is then unplugged. Some printers, mainly those designed for office use, have a network port for a wired ethernet connection. You can connect the printer to your router directly, or use a powerline networking adaptor if your router is in a different room. You'll then need to install the printer driver on each computer.

It's also possible to add a network connection to a printer that doesn't have Wi-Fi or a LAN interface, though, this will add to the cost. Search for 'print server' and you'll find devices such as TP-Link's Single USB 2.0 Port Fast Ethernet Print Server. Plug in a USB printer and LAN cable to the router and the device is on the network, all for around £20. Print servers with Wi-Fi, sockets for multiple printers and even more features are available.

To print from Android tablets and smartphones, you'll need an app from the printer's manufacturer. Google Cloud Print prints to any supported printer attached to a computer. Support for iPhones and iPads is more limited and requires printers that support AirPrint such as the Canon Pixma MG6450 (pictured below). Alternatively, you can buy a box such as Lantronix's xPrintServer Home Edition, which costs around £80 and lets you print to virtually any printer from your iPad or iPhone.
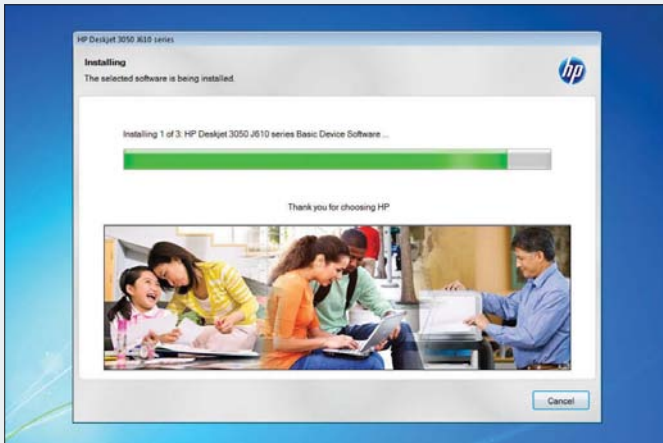
START Whether you have a wireless or USB printer, the first step is to install the driver. The CDs supplied with printers are not always completely up to date and it's best to download the latest printer software from the manufacturer's website.
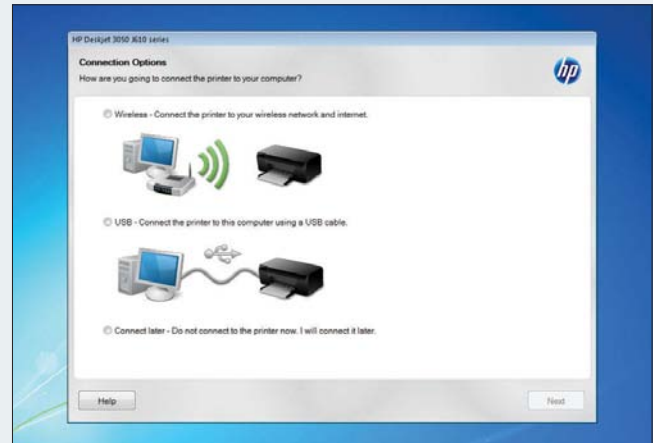

2 The software for printers varies and this is just one example from HP. As the software is installed, it stops at this point and asks whether you have a wireless or USB printer. Select Wi-Fi and you're done – here we'll continue with a USB printer.
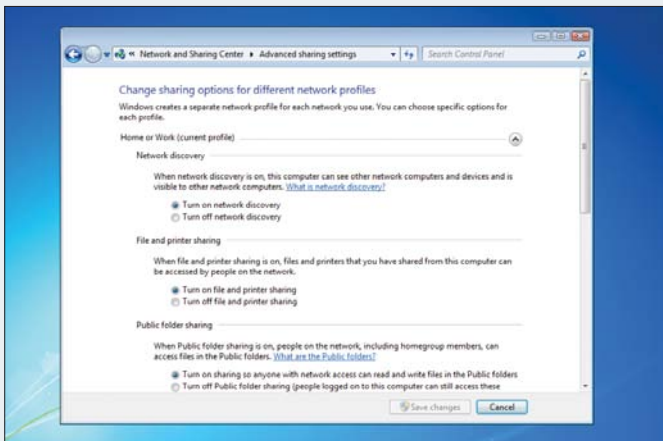
3 After installing the printer, open Control Panel, Network and Sharing Center, Advanced Sharing settings. Turn on network discovery, file and printer sharing, and public folder sharing. Scroll down and turn off password protected sharing for simplicity.
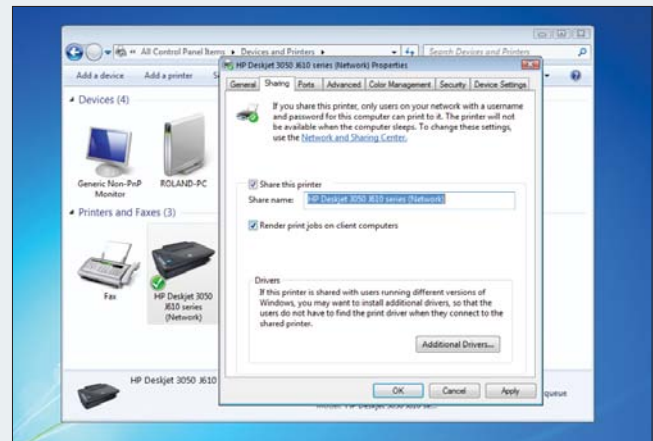
4 Open the Control Panel, Devices and Printers. Right-click the printer you just installed and select Properties. On the Sharing tab, tick Share this printer. The printer name is inserted automatically, but you can change it.
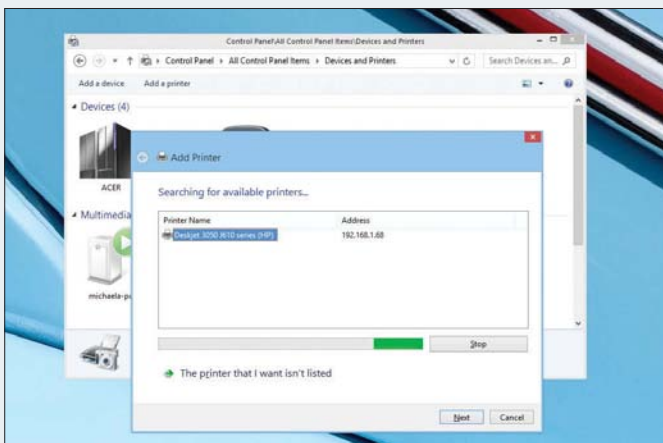
5 Switching to a Windows 8 PC, we'll add that shared printer. Open Control Panel, Devices and printers and click Add a printer – it found a wireless printer. If, however, your model isn't shown, you'll need to click The printer that I wanted isn't listed.
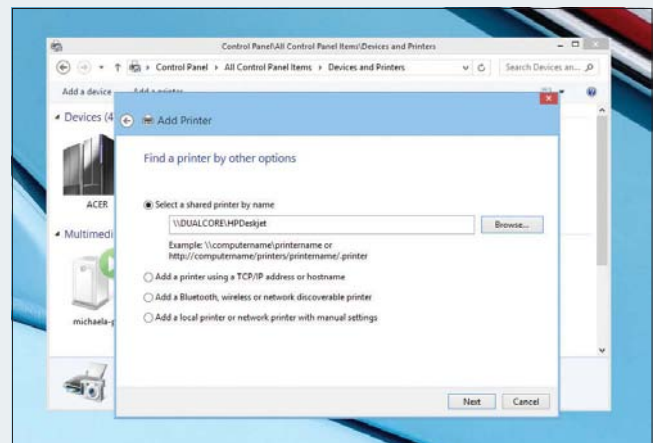

6 Choose Select a share printer by name. Click the Browse button to see a list of all the computers on your network. Next, click the computer with the printer and select the printer. The rest is easy and the printer will automatically install. ⊠

# Put together a presentation using Prezi

Microsoft's PowerPoint was once the de facto presentation tool, but as Mike Bedford explains, Prezi you can give your presentations an exciting new look

As a key element of Microsoft Office, PowerPoint is most people's first choice for designing slides for a presentation, but it's not your only option. Certainly there are alternatives such as the free LibreOffice Presentation, but the end result is very similar to that which is achievable with PowerPoint. Prezi, on the other hand, provides a totally new way of designing a presentation. Instead of it being arranged as a sequence of slides, it's organised hierarchically so that the presenter can show an overview and then zoom in on areas to provide more detail. Here we use the free online Prezi editor, but look at 'Prezi – the Wider Picture' to see the extra facilities available if you pay a subscription.
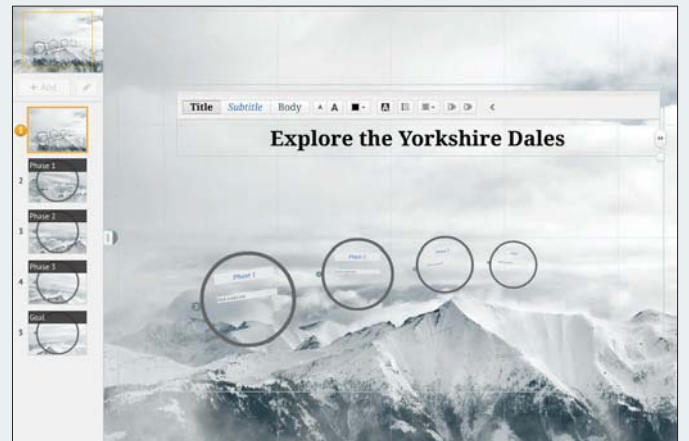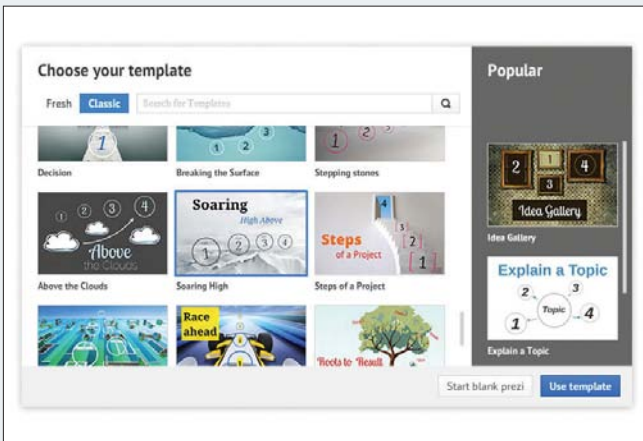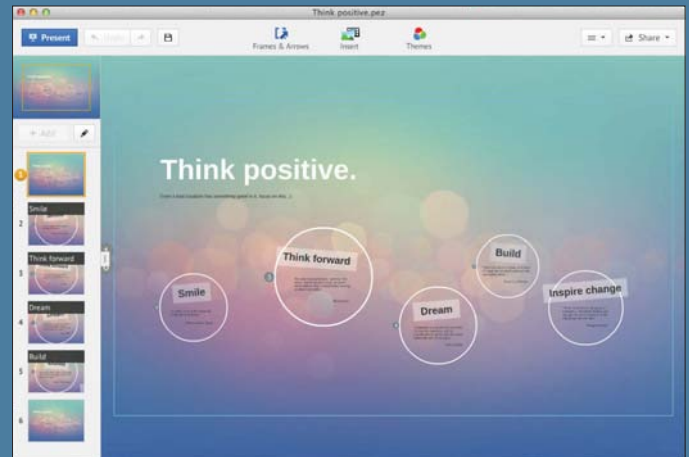
START Sign up for a free Prezi Public account at prezi.com and log in. Although you'll have more flexibility designing from scratch, here we'll use a template. Click on 'New Prezi', search through the templates, select your choice and click 'Use template'.

2 An overview of a presentation, based on your chosen template, will appear. Your first requirement is to give it a suitable title, so click where it says 'Click to add title' and enter your text, selecting the font, size and colour accordingly.
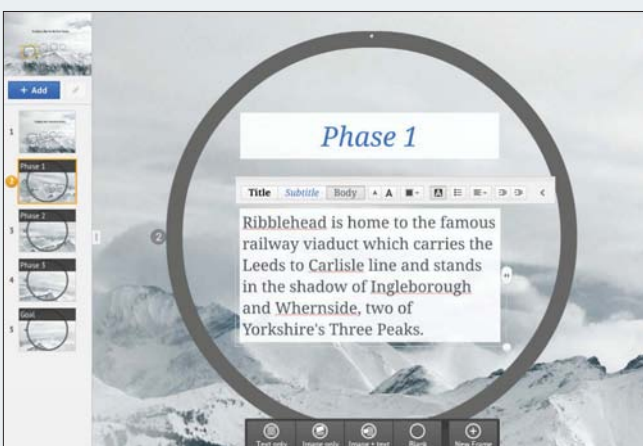
3 Whichever template you choose, your presentation will appear as an overview with several areas you can zoom into. Double-click to zoom into one and click on 'Click to add text'. Now add the main body text for that part of your presentation.

4 When you zoom in you'll also see titles for that part of your presentation, but no instruction to click on it. However, if you do click on it, buttons will appear to make it larger or smaller, delete it or edit it. Change it as necessary.

Prezi: the wider picture

Our walk through uses the free Prezi Public, although you'll need to sign up for an account – available at prezi.com. The downside is that all your presentations will be available online for anyone to see, they'll all show the Prezi logo, and you're limited to 100MB of online storage space.

Both the Enjoy ($59 [£36] per year) and the Pro ($159 [£97] per annum) packages allow you to keep confidential presentations private, you can use your own logo instead of Prezi's, the amount of available storage is increased to 500MB and 2GB respectively, and the Pro option lets you edit your presentation offline on your own computer. A 30-day free trial is available for both Enjoy and Pro.

Even though you'd need to sign up to Prezi Pro to edit your work offline or to present from your PC without an internet connection, Prezi Public users can download an iOS app to work offline. No app is currently available for Android devices. In addition to providing means of offline editing and presenting, the apps synchronise with your cloud storage, so you'll always have access to the
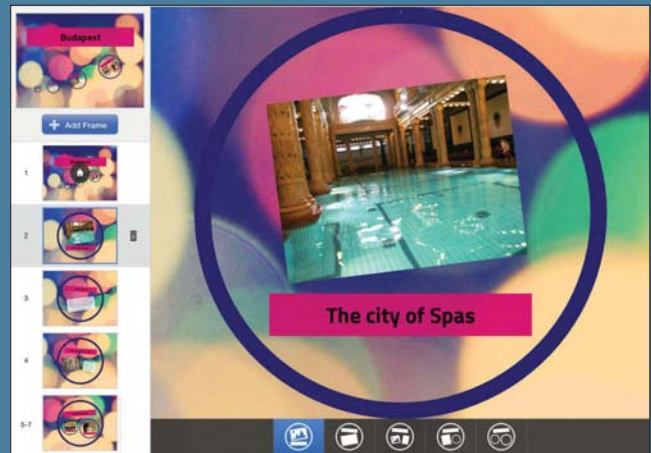

latest version, irrespective of whether you last worked on your presentation on- or offline. Touchscreen devices also provide an ideal ways of navigating through presentations.
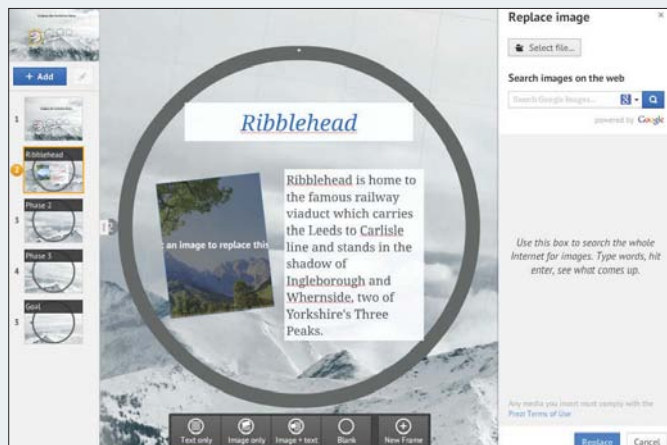

5 If you want to add an image to this part of the presentation, click on the 'Image + text' button. An image will appear, though, you'll want to change this, so click on 'Replace image' and select your picture. You can also select to have an image with no text.
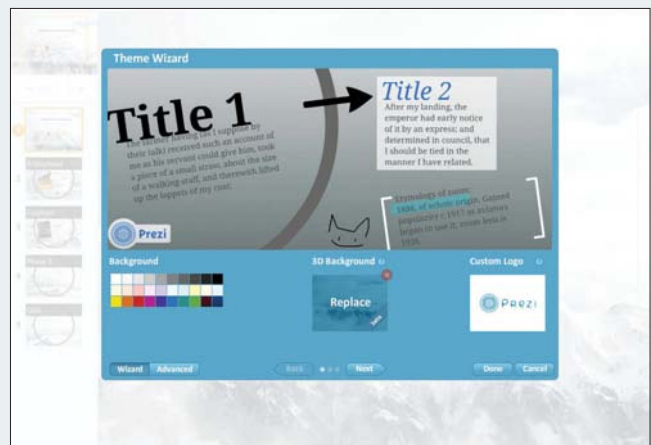
6 Use the navigation bar at the left to move around your presentation or back to the overview. Enter text and add images to each section. To change the background, right-click on it, select 'Change background' and then '3D background'.
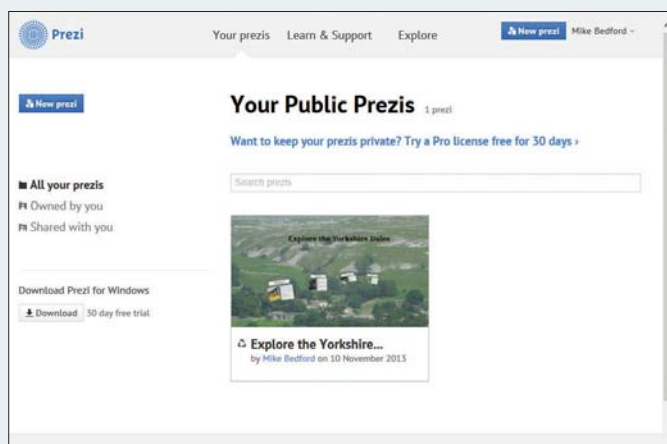
7 When you're done, or if you want to save it to complete later, click the Exit button at the top right of the screen. It doesn't need a filename as Prezi will use the title you provided in Step 2.
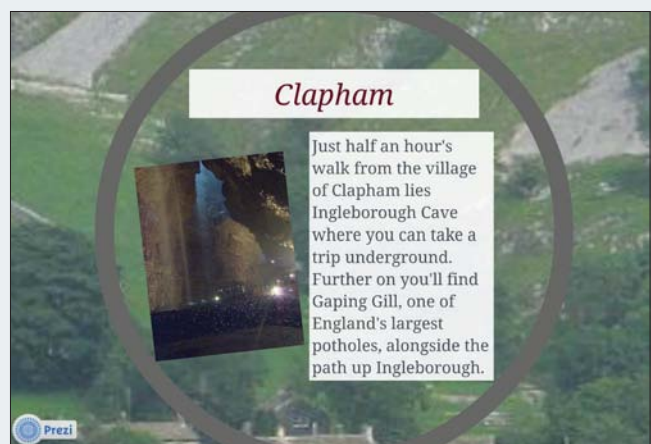
8 Later, to present your creation, log in and open your presentation. Click 'Present online' and then 'Start online presentation'. The overview will appear and you can zoom into any section by clicking on it. Click again to zoom back out. ⊠

Make your PC games run faster and smoother

Jim Martin explains how to give your favourite games a performance boost without having to shell out on new hardware. Here are his top five tips

Unlike a games console where developers optimise their games for a specific set of hardware, PCs come in all shapes and sizes. Some rely on a graphics chip that's integrated into the main CPU, while others have blazing-fast PCI Express graphics cards.

No matter what your setup, here are some general tips on how to eke out extra frames per second (fps) from what you have. Of course, if you've just bought the latest shooter, MMORPG or racer, and have found that it's completely unplayable even after trying all these tricks, you may need to invest in better hardware.

However, you can improve performance without spending a single penny on new hardware. Here are our top five tips.

1. Get the latest drivers for your graphics card

Running old drivers isn't a good idea if you want the best performance, but a surprising number of people fail to update to the latest versions. It's much easier these days since pop-up notifications tell you when a new driver is available.

First, find out which graphics card you have, and also check which version of Windows your PC is running. Head to Device Manager in the Control Panel and click on 'Display adapters'. You'll see the name of your graphics card.

To discover the specific version of Windows, right-click on My Computer and choose Properties (or click on System in the Control Panel). This will tell you whether you have the 32- or 64-bit, as well as exactly which version of Windows is installed.

Next, head to the relevant website to get the latest drivers. This will be either Intel, nVidia or AMD. Don't go to the card manufacturer's site, such as Asus, MSI, Gigabyte or Sapphire. Make sure that you choose the correct model of card, and the appropriate operating system. Once downloaded, install the drivers and reboot your PC if necessary. Depending on the game, you might get up to 30 percent better performance with just a driver update. Similarly, check whether there's an update to the game itself. If you bought it via Steam, it should be updated automatically. Otherwise, check the game developer's website.

Finally, make sure that Windows itself is fully up to date. Unless you chose to disable the feature, updates should be installed automatically. If they're not, search the Start menu (or Start screen in Windows 8) for Windows Update.

2. Optimise game settings

Updating drivers will get you only so far. The biggest gains in frames per second come from tweaking and compromising on graphics settings. Ideally, you want to run your game at your monitor's native resolution. For most PCs that's 1920x1080; on a laptop it's likely to be 1366x768. To find out your monitor's resolution, right-click on the desktop in Windows 7 or 8 and click on Screen resolution. In earlier versions, click Properties instead.

The highest selectable resolution should tell you the native resolution, and should say 'recommended'. You can also search Google for your monitor's make and model if you're still unsure.

Lowering the resolution should give you more frames per second, but don't adjust the resolution here. Instead, load your chosen game and look for the graphics settings. Here you can change the resolution and many other settings.

Anti-aliasing is one setting to watch out for. It smooths out jagged lines, but incurs a performance penalty. Typically you'll see a slider, but it might be just a number, such as 2x. First, try disabling AA altogether and see how your game plays. If it's fast enough, you can enable it again at the lowest setting and progressively increase it until you find the best balance between quality and performance.

Anisotropic Filtering
Increases the sharpness of textures viewed at a distance or on an angle.
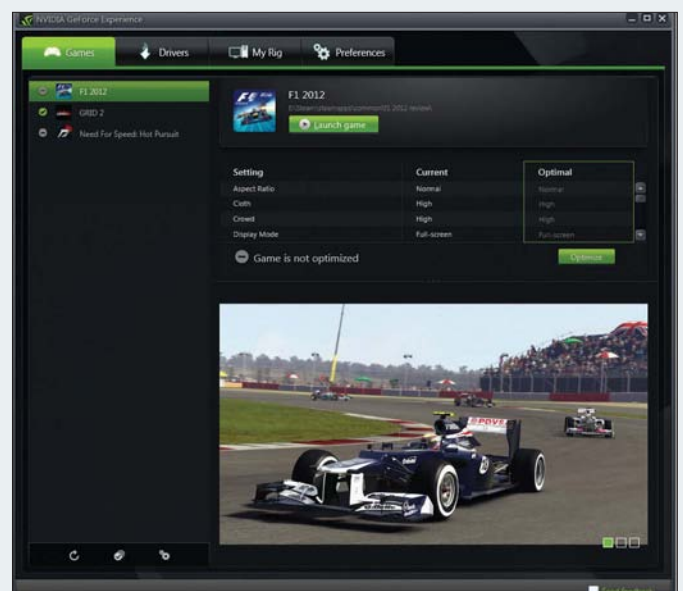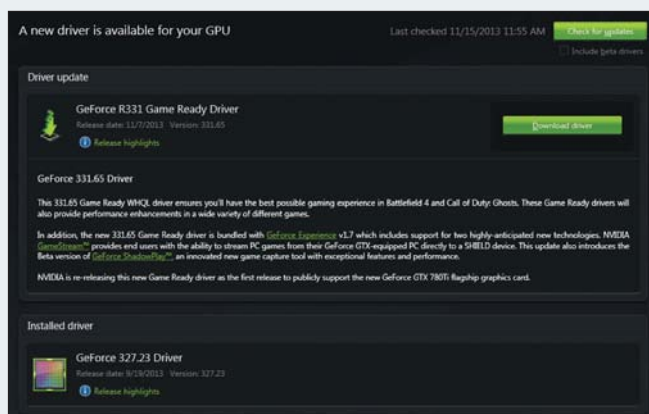
The same sentiment goes for most other graphics settings, including draw distance and shadows. Lighting effects, including shadows, tend to be real performance drains, so if you can live with basic effects, you can make the difference between a game being unplayable and playable.

Essentially, it's a process of trial and error. Unless, that is, your graphics card drivers can optimise each game's settings to work well using the hardware available. For example, the nVidia card in our test PC has drivers which can do precisely that.

3. Check your fps

If your game has a frames per second readout (you will need to enable this somewhere in the options, or install a third-party utility such as FRAPS), you'll be able to see how fast it's running. The minimum figure (on average) that you want is 25fps. Anything less looks jerky.

The frames per second will vary depending on what's happening onscreen. When there's lots of action, it can drop considerably, so aim for graphical settings at which the game will run acceptably when that happens.
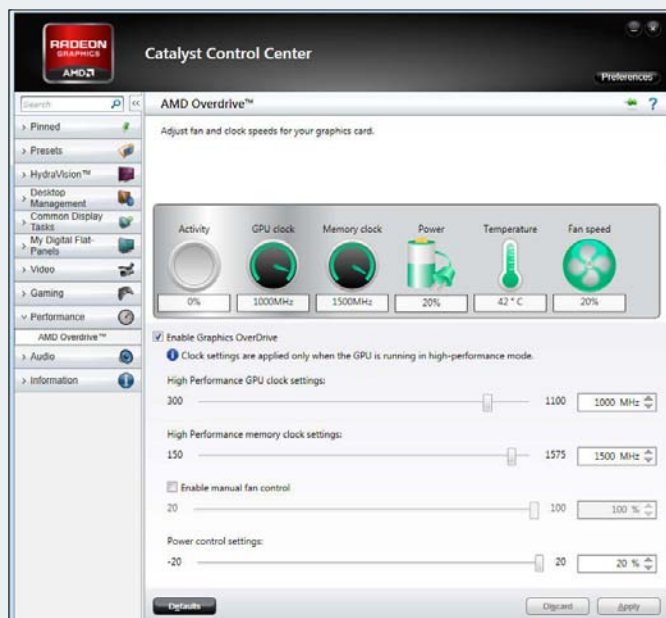
4. Overclock your hardware

This isn't something we recommend for everyone, but if you know what you're doing and understand that there's a risk of breaking your graphics card, CPU and RAM, you can run them faster. This should give you a few extra frames per second.

Your first port of call should be the graphics card, since this has the most direct impact on frames per second. You may find an option to overclock the GPU in the driver (launch the interface from the relevant icon in Windows' Notification area). Alternatively, you may need to track down third-party software. Overclocking the CPU and RAM is easier, as you should find the settings in your PC's BIOS. Simply reboot, press Delete (or whichever key takes you to the BIOS) and look for the performance settings.

5. Use software to optimise your PC

Lots of programs run in the background in Windows, and they use up resources including memory and CPU time. You can use PC optimisation utilities to ensure there are no superfluous processes running that could hamper game performance. You can also clear out temporary files and defragment your hard drive (don't do this on an SSD, though). Windows includes some optimisation tools, but you can also try Razer Game Booster (tinyurl.com/p4l3xjc), which does a lot of the hard work for you. One version works with Windows Vista 7 and 8, and there's a separate download for XP. ⊠

Stop your children accessing certain websites

If you're concerned that your kids are being distracted by the attractions of the web, then Jim Martin gives his top tips for preventing them visiting certain websites

Children today are growing up in a connected world where every computer, from a PC or laptop to a smartphone or tablet, can access the internet. That's an amazing privilege, but not every website is suitable for kids. And it isn't simply the 'darker' side of the web that you might want to keep your kids away from: watching endless YouTube videos or checking what their friends have been up to on Facebook is probably distracting them from doing their homework. There are many different ways to block websites, and we can't cover them all in depth here, so instead we'll provide more general guidance so you can be sure you're one step ahead of your tech-savvy offspring.

1. Blocking sites within a web browser

Depending on the web browser and the exact version, it may or may not be possible to block websites by changing settings. Internet Explorer 7, for example, allows you to block or allow certain sites, but later versions, such as IE10, do not. (If you have IE7, click Tools, Internet Options, then the Content tab, then Content Advisor. Click Enable and then use the Approved sites tab to choose which sites to block.)

However, this method is useful only if the computer has no other web browsers installed and the user account is a 'Standard' rather than 'Administrator' account, so that your child can't install another browser, which would – by default – let them access any website. It also assumes that the child has no access to other devices that allow them unfettered access to the internet. If they do, you'll need to set up the same restrictions on those as well.

Many people let their kids use their own account on a laptop or PC, which is fine if you're supervising them. It's best, though, to create separate user accounts for each child: don't be tempted to give them administrator accounts to make your life easier.

Blocking sites using a so-called 'black list' within either a web browser or in Parental Control software (see below) can be tricky. It requires you to block not only facebook.com, but also any other addresses that can be used to access the site, such as m.facebook.com – the mobile version of the site. If you miss any, chances are your child might be able to get around your restrictions.

2. Parental control software

As with the method described above, parental control software needs to be installed on any computer or device that you child has access to. Such software typically performs web filtering, which should include a regularly maintained list of inappropriate websites that are blocked. Usually, you can choose which categories from the list to block or allow, but the software manufacturer should keep the list up to date. You should also be able to allow or block specific sites in addition to this main list.

Parental control software typically has other functions as well, including limiting the amount of time a child can spend on various activities such as web browsing or playing games. You can also set the times at which these activities (or general access) are allowed.

3. OpenDNS – free website blocking software

Rather than installing and configuring software on each computer and in each user account it's far easier to block sites by changing a couple of settings in your router. Your router will use your ISP's web filtering (which may be disabled by default) but you can choose to use OpenDNS instead.

This is a free service that filters out inappropriate sites: all you have to do is change one or two settings in your router's web interface. The one disadvantage of this is that sites will be blocked for all devices which connect to the internet through the router – including tablets and smartphones. That means if you block Facebook and YouTube, you won't be able to access them either. Of course, savvy kids (and adults) can switch off Wi-Fi on a smartphone or 3G-equipped tablet and browse the web freely by bypassing the router altogether.

4. Tablets and smartphones

While we've talked about blocking websites on PCs and laptops – and 'global' blocking using OpenDNS – it's possible to block websites on a tablet or smartphone as well. Most kids' tablets have reasonably good software which filters out inappropriate websites, and can block internet access entirely. You can read our kids' tablet reviews to find out more (tinyurl.com/nvz7vmg). If you own a Windows Phone 8 handset you can use the Kid's Corner feature to restrict access to the web this way, as well as preventing children from accessing your email and messing up other settings. ⊠
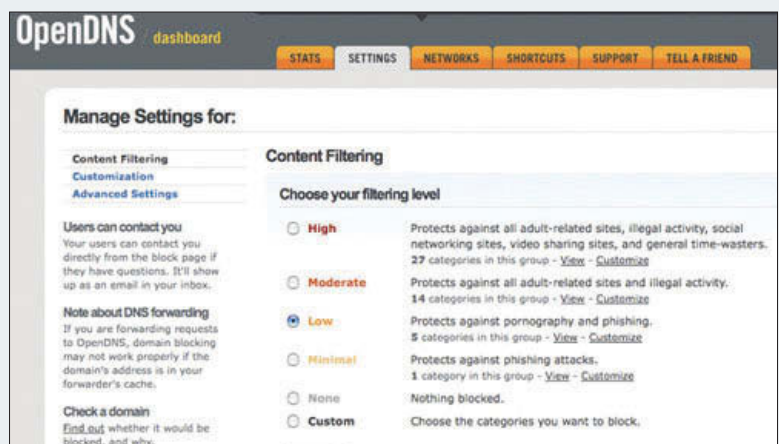
LETITIA
AUSTIN

ONLINE REGISTRATION REQUIRED

Panda Internet Security 2014

FULL PROGRAM (SIX-MONTH LICENCE) AVAILABLE ONLY ON THE DISC+

Installation details

Go to My Computer. Right-click the disc icon and open the disc. Select Files 224\Panda Internet Security 2014 and open the file

Online registration required: follow the links during installation before 12 Mar 2014

System requirements

300MHz processor; Windows XP/Vista/7/8; 128MB RAM (1GB recommended); 275MB drive space; Internet Explorer 6.0 or later

Panda Internet Security 2014 offers the most advanced protection against the dangers of the web.

• Protect your identity while browsing the web

• Protect your PC and networks against viruses and other threats

• Chat and use your email without worrying about fraud or spam

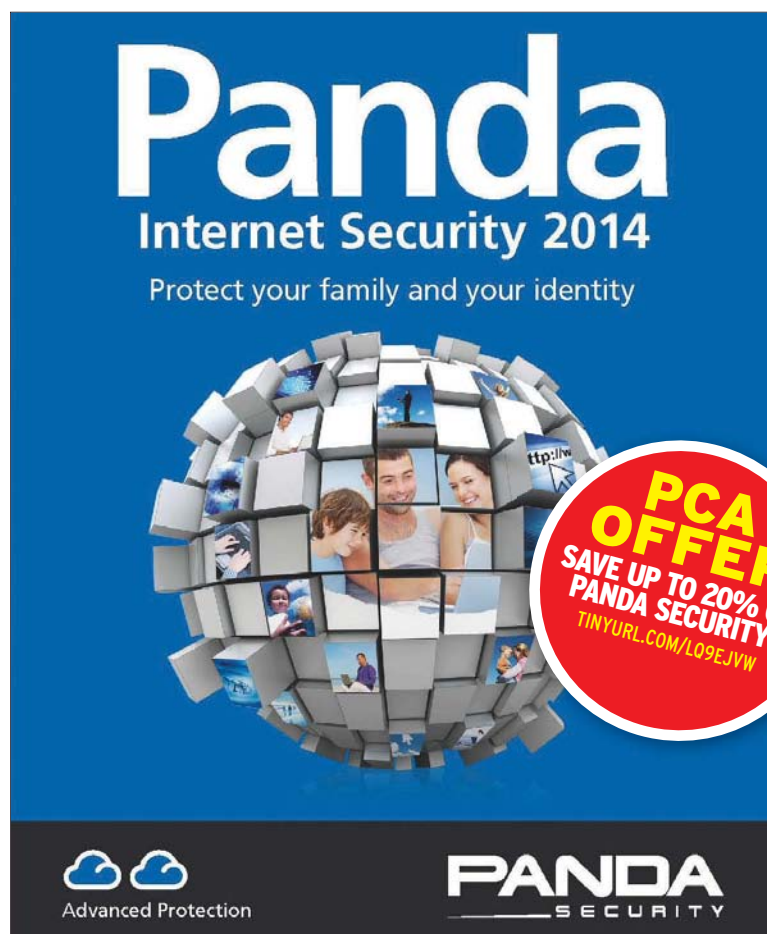• Back up your data in case you have problems with your PC

Start your computer in safe mode and disinfect it in emergency or critical situations. Share it with anybody you want and help them clean their PCs.

Panda Internet Security 2014 protects your family from inappropriate content. Shielding your documents and confidential data, so you can relax knowing that your private files are safe.

The software also protects you against online fraud, identity theft, phishing and other varieties of theft used by cybercriminals.

Enjoy a new, modern and intuitive user experience in line with that of the latest operating systems.

You don't have to be an expert, Panda Internet Security 2014 does everything for you: install it and forget about viruses and spyware. ⊠

Panda Internet Security 2014

Protect your family and your identity

Advanced Protection

PANDA SECURITY

PCA OFFER
SAVE UP TO 20% ON PANDA SECURITY!
TINYURL.COM/LQ9EJVW

Panda Internet Security 2014 — My account

Protected | Files scanned **4.574** | Threats blocked **12**

Valid until 03/06/2014 | Last updated 03/06/2013

Scan | Reports and quarantine | Services | Multi-device protection | Backup copies

Antivirus | Firewall | Identity protection | Anti-spam | Parental control

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Visit our website for more software special offers: pcadvisor.co.uk/special-offers

Abelssoft StartupStar 2013
FULL PROGRAM

Installation details

Go to My Computer. Right-click the disc icon and open the disc. Select Files 224\Abelssoft StartupStar 2013 and open the file

Online registration required: follow the links during installation before 12 Mar 2014

System requirements
Windows XP/Vista/7/8

Take control of your apps

Did you know that the average PC automatically launches more than 20 applications when you start up your computer? A lot of these are unnecessary and they mean that your PC takes longer to boot up.

Autostart firewall

StartupStar's firewall mode alerts you whenever an application tries to add itself to your computer's startup list.

Delay entries

You can delay the launch of applications, thus reducing the number of programs trying to open when your PC is booting up.

Help creating new entries

With StartupStar, you can instantly create new startup entries, and decide when and where the entries will be launched. You even have the possibility to start programs with administrator rights without UAC (User Access Control).

Security through backups

If you accidentally delete an entry, you can easily restore it using the backup – Abelssoft StartupStar logs every change. ⊠
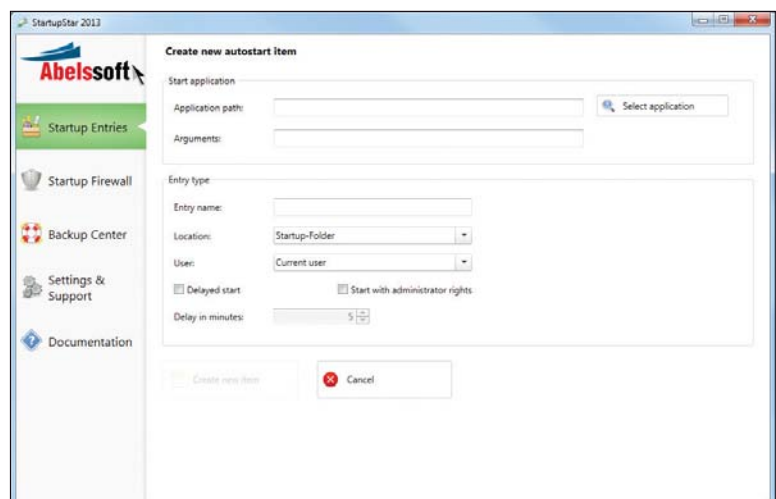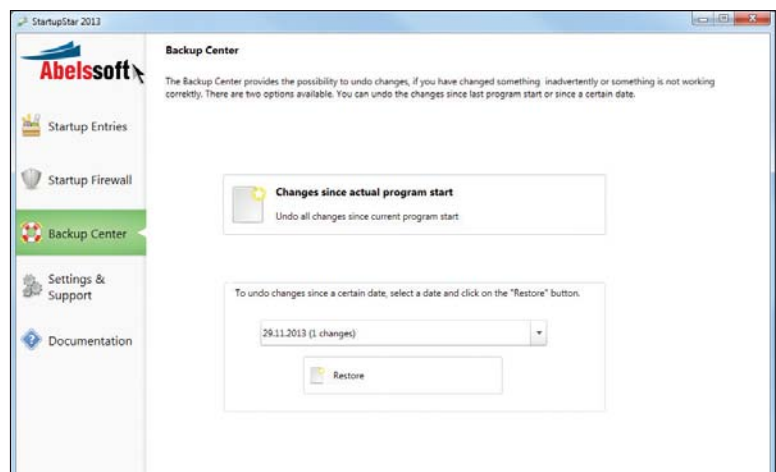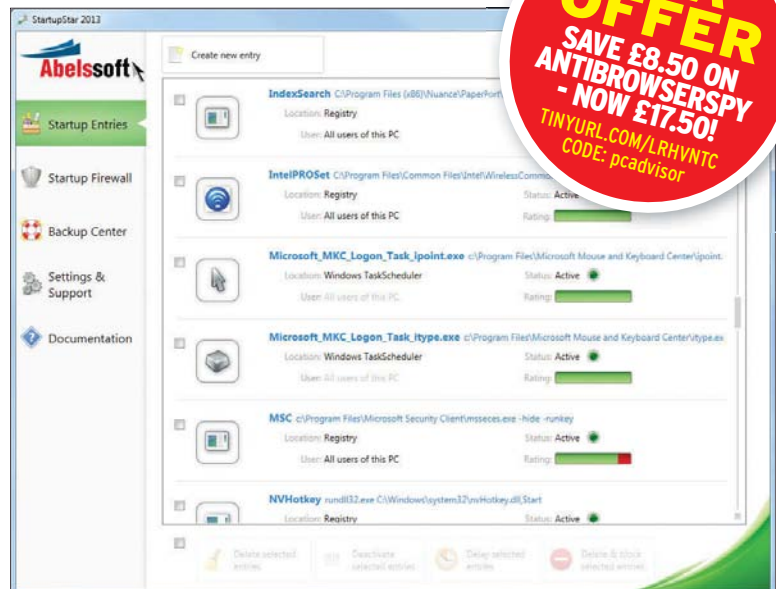
Ashampoo Snap 6
FULL PROGRAM AVAILABLE ONLY ON THE DISC+

Installation details

Go to My Computer. Right-click the disc icon and open the disc. Select Files 224\Ashampoo Snap 6 and open the file

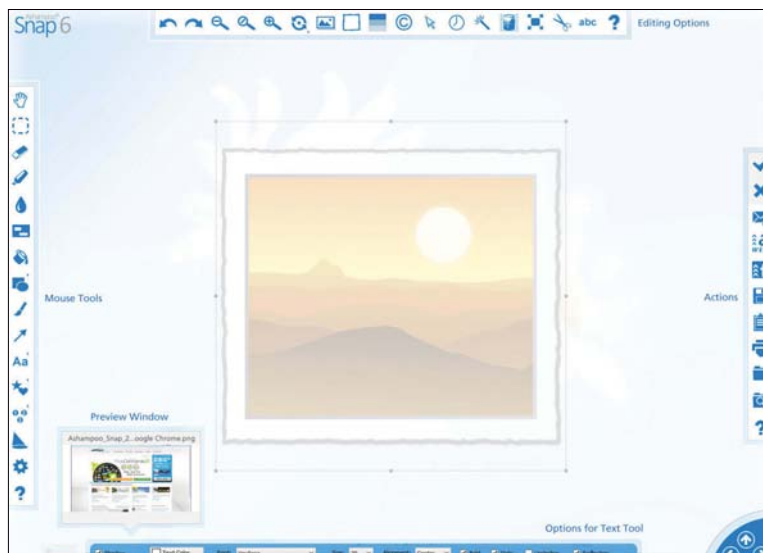**Online registration required:** follow the links during installation before 12 Mar 2014

System requirements
Windows XP/Vista/7; 1024x768 display; 256MB RAM; 50MB drive space

Ashampoo Snap 6 is the ideal solution if you need to quickly capture screens. It lets you record and document anything on your screen as an image or video screencast with audio support.

Whether you need to create images, tutorials, screencasts and presentations, or simply share information with friends and colleagues, Ashampoo Snap 6 is a useful tool for communicating your thoughts and ideas.

Ashampoo runs silently in the background, but is always ready when you need it. The program is ideal for both beginners and experts, with a highly intuitive user interface. ⊠

1-abc.net Synchronizer 6
FULL PROGRAM AVAILABLE ONLY ON THE DISC+

Installation details

Go to My Computer. Right-click the disc icon and open the disc. Select Files 224\1-abc.net Synchronizer 6 and open the file

**Online registration required:** head to tinyurl.com/ybcjv87 before 12 Mar 2014

System requirements
Windows XP/Vista/7

Saving data to internal or external hard drives, USB sticks, SD cards and other rewriteable media always has one big disadvantage: keeping track of the latest version of a file.

Maybe you've copied documents to a USB stick, made changes to the file, and then forgotten to overwrite it later on your computer. Or you've saved a file on a network drive to allow other users to make changes, but haven't updated the file for your own local use.

Synchronizer is able to compare folders, detecting new files as well as modified ones, and saves the latest versions to both folders. You can manually start synchronisation or create a schedule. ⊠
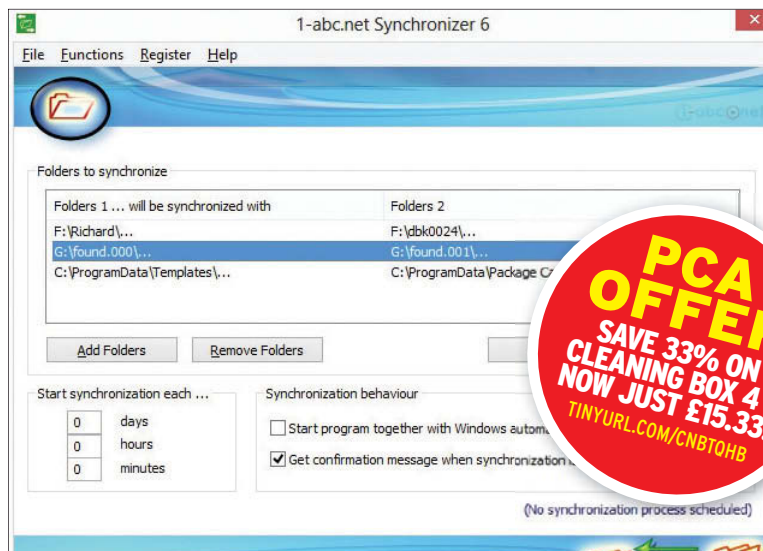
DISC INSTRUCTIONS

Place disc in drive. Open the file 'Click here to begin.pdf' for extra information.

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Flat-panels under £200
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Index

Ultraportable laptops

	Apple MacBook Pro 13in Retina	Apple MacBook Air 13in	Apple MacBook Air 11in	Dell XPS 12	Samsung Series 7 Ultra
	1 PC ADVISOR GOLD	**2** PC ADVISOR GOLD	**3**	**4** PC ADVISOR RECOMMENDED	**5**
Price	**£1,499 inc VAT**	**£949 inc VAT**	**£849 inc VAT**	**£1149 inc VAT**	**£1,000 inc VAT**
Website	Apple.com/uk	Apple.com/uk	Apple.com/uk	Dell.co.uk	Samsung.com/uk
Build rating	★★★★★	★★★★½	★★★★½	★★★★½	★★★★☆
Features rating	★★★★½	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Performance rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Value rating	★★★★☆	★★★★½	★★★★☆	★★★★☆	★★★★☆
Overall rating	★★★★½	★★★★½	★★★★☆	★★★★☆	★★★★☆
Processor	2.6GHz Intel Core i5	1.3GHz Intel Core i5-4250U	1.3GHz Intel Core i3-5250U	1.8GHz Intel Core i7-4500U	1.8GHz Intel i5-3337U
RAM	8GB DDR3L	4GB DDR3L	4GB LPDDR3	8GB DDR3L	6GB DDR3
Storage	512GB SSD	128GB SSD	128GB SSD	256GB SSD	128GB SSD
Screen size	13.3in glossy (anti-glare)	13.3in glossy (anti-glare)	11.6in glossy (anti-glare)	12.5in glossy touchscreen	13.3in glossy touch
Screen resolution	2560x1600	1440x900	1366x768	1920x1080	1920x1080
Graphics	Intel Iris Graphics	Intel HD Graphics 5000	Intel HD Graphics 5000	Intel HD Graphics 4400	AMD Radeon HD 8750M
Video memory	N/A	N/A	N/A	N/A	1GB
Wireless	802.11a/b/g/n/ac	802.11a/b/g/n/ac	802.11a/b/g/n/ac	802.11b/g/n	802.11a/b/g/n
Ethernet	Optional	Optional	Optional	None	Gigabit
Bluetooth	✓	✓	✓	✓	✓
USB	2x USB 3.0	2x USB 3.0	2x USB 3.0	2x USB 3.0	1x USB 3.0, 2x USB 2.0
FireWire	✗	✗	✗	✗	✗
Thunderbolt	✓	✓	✓	✗	✗
DisplayPort	✗	✓	✓	✓	✗
HDMI	✓	✗	✗	✗	✓
DVI	✗	✗	✗	✗	✗
VGA	✗	✗	✗	✗	✗
eSATA	✗	✗	✗	✗	✗
Media card slot	✓	✓	✓	✓	✓
Audio	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic
Optical drive	N/A	N/A	N/A	N/A	N/A
Extras	HD webcam, multitouch trackpad, backlit keyboard	HD webcam, multitouch trackpad, backlit keyboard	HD webcam, multitouch trackpad, backlit keyboard	None	HD webcam
Operating system	Mac OS X 10.9 Mavericks	Mac OS X 10.9 Mavericks	Mac OS X 10.9 Mavericks	Windows 8 64-bit	Windows 8 64-bit
Bundled software	iLife 11	iLife 11	iLife 11	None	None
Fear (Max detail)	Not tested	Not tested	Not tested	27fps	Not tested
Battery	71.8Wh lithium-polymer	54Wh lithium-polymer	38Wh lithium-polymer	Not stated	57Wh lithium-ion
Battery life	9 hrs 55 mins	12 hrs 57 mins	8 hrs 56 mins	6 hrs 45 mins	5 hrs
PC Mark 7 score	Not tested	4602	4080	5205	4889
Dimensions	314x219x18mm	325x227x4-17.5mm	300x192x17mm	317x215x20mm	324x224x19mm
Weight	1.57kg	1.35kg	1.08kg	1.52kg	1.65kg
Warranty	1-year return-to-base	1-year return-to-base	1-year return-to-base	1-year enhanced	2-year return-to-base
Verdict	• Gorgeous Retina IPS display • Fast storage • Superb battery life • Good performance • Stunning build quality	• Haswell processor • 802.11ac Wi-Fi support • Stunning battery life • Unsurpassed build • Good performance	• Elegant lightweight design • Good performance • Strong on games • 11.6in screen rather small • Very decent battery life	• Can slip into tablet mode • Sharp screen quality • Strong performance • Not great for games • Good battery life	• Attractive design • Twin-GPUs deliver impeccable performance • Battery life poor compared to latest Macs
FULL REVIEW	TINYURL.COM/M3TNC29	TINYURL.COM/KNXWZW3	TINYURL.COM/K64ZPKB	TINYURL.COM/QBAWKLC	TINYURL.COM/NV6TOQD

>> Buying advice

Ultraportable laptops

Apple's MacBook Air sets the standard for thin-and-light laptops, which are usually referred to as Ultrabooks or ultraportable laptops.

Most run fast and silent SSDs for storage, which can partly explain their higher retail price, but some manufacturers are now fitting slim 7mm hard disks.

All Ultrabooks run Intel CPUs (AMD variants are known as Sleekbooks), often a low-power version identifiable by its U suffix. The 1.7GHz Intel Core i5-3317U is a popular example.

Beware of cheap glossy panels with poor contrast and colour gamut and, if possible, judge in person the screen quality and viewing angles before you buy.

Ports are limited due to space constraints, but look for built-in ethernet or dongles that allow full-size ports to be connected.

A smaller chassis means a smaller, often non-removable battery. Expect six-plus hours of life.

There's no room for an optical drive, but you can always connect an external USB version. READ MORE: TINYURL.COM/CEAHEZK

Sub-£500 laptops	**1** PC ADVISOR BEST BUY Dell Inspiron 14z	**2** HP Pavilion 14	**3** Compaq CQ58-300sa	**4** Acer Aspire V3-571	**5** Lenovo G505s
Price	**£420 inc VAT**	**£340 inc VAT**	**£260 inc VAT**	**£465 inc VAT**	**£390 inc VAT**
Website	Dell.co.uk	Saveonlaptops.co.uk	Saveonlaptops.co.uk	Acer.co.uk	Lenovo.com/uk
Build rating	★★★★☆	★★★½☆	★★★☆☆	★★★★☆	★★★½☆
Features rating	★★★★☆	★★★★☆	★★★★☆	★★★★★	★★★★★
Performance rating	★★★★☆	★★★☆☆	★★☆☆☆	★★★★½	★★★★☆
Value rating	★★★★☆	★★★★☆	★★★★★	★★★★½	★★★★☆
Overall rating	★★★★☆	★★★½☆	★★★½☆	★★★★½	★★★½☆
Processor	1.9GHz Intel Core i3-3227U	1.8GHz Intel Core i3-3217U	1.4GHz AMD E1-1200	2.5GHz Intel Core i5-3210M	2.8GHz AMD A8-4500M
RAM	4GB DDR3	4GB DDR3	2GB DDR3	8GB DDR3	4GB DDR3
Storage	500GB HDD + 8GB SSD	320GB HDD + 32GB SSD	320GB HDD	750GB HDD	1TB
Screen size	14in glossy	14in glossy	15.6in glossy	15.6in glossy	15.6in glossy
Screen resolution	1366x768	1366x768	1366x768	1366x768	1366x768
Graphics	Intel HD Graphics 4000	Intel HD Graphics 4000	AMD Radeon HD 7310	Intel HD Graphics 3000	N/A
Video memory	N/A	N/A	N/A	N/A	N/A
Wireless	802.11b/g/n	802.11b/g/n	802.11b/g/n	802.11a/b/g/n	802.11b/g/n
Ethernet	10/100	10/100	10/100	Gigabit	Gigabit
Bluetooth	✓	✓	✓	✓	✓
USB	2x USB 3.0	2x USB 3.0, 1x USB 2.0	3x USB 3.0	1x USB 3.0, 2x USB 2.0	1x USB 3.0, 2x USB 2.0
FireWire	✗	✗	✗	✗	✗
Thunderbolt	✗	✗	✗	✗	✗
DisplayPort	✗	✗	✗	✗	✗
HDMI	✓	✓	✓	✓	✓
DVI	✗	✗	✗	✗	✗
VGA	✗	✗	✓	✓	✓
eSATA	✗	✗	✗	✗	✗
Media card slot	✓	✓	✓	✓	✓
Audio	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic
Optical drive	8x DVD±RW	N/A	8x DVD±RW	8x DVD±RW	8x DVD±RW
Extras	Webcam	Webcam	Webcam	Webcam	Webcam
Operating system	Windows 8 64-bit	Windows 8 64-bit	Windows 8 64-bit	Windows 7 Home Prem 64-bit	Windows 8 64bit
Bundled software	None	None	None	Microsoft Office Starter	PowerDVD
Stalker (720p)	22fps	23fps	9fps	Not tested	Not tested
Battery	44Wh lithium-ion	37Wh lithium-ion	47Wh lithium-ion	48Wh lithium-ion	41Wh lithium-ion
Battery life	5 hrs 10 mins	4 hrs	4 hrs 45 mins	5 hrs 18 mins	3 hrs
PCMark 7 score	3486	2547	1094	123 WorldBench 6 points	2700
Dimensions	347x240x21mm	347x238x21mm	376x247x33mm	380x253x33mm	380x260x26mm
Weight	1.9kg	1.8kg	2.3kg	2.6kg	2.4kg
Warranty	1-year return-to-base	1-year return-to-base	1-year return-to-base	1-year collect-and-return	1-year return-to-base
Verdict	• Clear 14in screen • Portable, despite DVD drive • Solid build, firm keyboard • Trackpad a little small • Good battery life	• Good performance • 32GB SSD • Modest gaming capabilities • Sharp 14in screen • Decent speakers	• Extremely low price • Modest performance • Poor for gaming • Keyboard firm, but rattles • Respectable battery life	• Strong general performance • Excellent trackpad, keyboard • Reflective screen • Decent battery life • Supplies starting to dwindle	• Pleasant screen that's not overly reflective • Comfortable keyboard • Modest performance • Not great battery life
FULL REVIEW	TINYURL.COM/LV5BLHU	TINYURL.COM/L4TSYE7	TINYURL.COM/MT67W8X	TINYURL.COM/CQKL4PD	TINYURL.COM/MOGTN5T

>> Buying advice

Sub-£500 laptops

Budget laptops are quick enough for most people, but economies are often made in build quality.

At the top end of the category you should find a highly capable Intel Core i-series processor. This will probably be a second-gen Sandy Bridge chip (ix-2xxx part number), but look out for a newer Ivy Bridge model (ix-3xxx).

Windows 7 and 8 run on 2GB of RAM, but 4GB or more is useful.

Hard disks are the norm at this price, with 250GB enough for most people. If you're a video hoarder look for 500GB or more.

Wi-Fi is standard, but Bluetooth is not a given at the price.

The bodywork and display are the main areas in which costs are cut. Expect creaky plastic bodies,

bendy frames and faux-metal paint jobs. Keyboards and trackpads are also likely to feel cheap and erratic.

Gloss screens hide inferior image quality. Colours are vivid, but the contrast may be poor. Check the visibility at an angle.

Some laptop manufacturers scrimp on the battery. Look for a rating of 48Wh or more.
READ MORE: TINYURL.COM/CA9EXZ6

£501-£1,000 laptops	**1** Chillblast Defiant Mini 13 PC ADVISOR RECOMMENDED	**2** MSI CX61 PC ADVISOR RECOMMENDED	**3** Scan 3XS LG155	**4** PC Specialist Optimus V	**5** Lenovo IdeaPad Z500 Touch
Price	£899 inc VAT	£650 inc VAT	£909 inc VAT	£937 inc VAT	£650 inc VAT
Website	Chillblast.com	Saveonlaptops.co.uk	3xs.scan.co.uk	Pcspecialist.co.uk	Lenovo.com/uk
Build rating	★★★★☆	★★★★☆	★★★★☆	★★★☆☆	★★★★☆
Features rating	★★★★☆	★★★★☆	★★★★☆	★★★★★	★★★★★
Performance rating	★★★★★	★★★★☆	★★★★☆	★★★★★	★★★★☆
Value rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Overall rating	★★★★½	★★★★☆	★★★★☆	★★★½☆	★★★½☆
Processor	3.4GHz Intel Core i7-4700MQ	2.2GHz Intel Core i7-4702MQ	2.4GHz Intel Core i7-4700MQ	2.4GHz Intel Core i7-4700MQ	2.2GHz Intel Core i7-3632QM
RAM	8GB DDR3	8GB DDR3	8GB DDR3	8GB DDR3	8GB DDR3
Storage	1TB HDD	1TB HDD	1TB HDD hybrid	1TB hard drive + 120GB SSD	1TB HDD
Screen size	13.3in matt	15.6in matt	15.6in	17.3in	15.6in glossy touchscreen
Screen resolution	1920x1080	1920x1080	1920x1080	1920x1080	1366x768
Graphics	GTX 765M/Intel HD 4600	GT 740M/Intel HD 4600	GTX 765M/Intel HD 4600	GTX 765M/Intel HD 4600	Intel HD 4000/GT 740M
Video memory	2GB	2GB	2GB	2GB	2GB
Wireless	802.11b/g/n	802.11b/g/n	802.11b/g/n	802.11b/g/n	802.11b/g/n
Ethernet	Gigabit	Gigabit	Gigabit	Gigabit	10/100
Bluetooth	✓	✓	✓	✓	✓
USB	3x USB 3.0, 1x USB 2.0	2x USB 3.0, 1x USB 2.0	2x USB 3.0, 2x USB 2.0	3x USB 3.0, 1x USB 2.0	1x USB 3.0, 2x USB 2.0
FireWire	✗	✗	✗	✗	✗
Thunderbolt	✗	✗	✗	✗	✗
DisplayPort	✗	✗	✗	✗	✗
HDMI	✓	✓	✓	✓	✓
DVI	✗	✗	✗	✗	✗
VGA	✓	✓	✓	✓	✓
eSATA	✗	✗	✓	✓	✗
Media card slot	✓	✓	✓	✓	✓
Audio	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic
Optical drive	N/A	BD-ROM	8x DVD±RW	4x BD-ROM	8x DVD±RW
Extras	Webcam	Webcam	Webcam	Webcam	Webcam
Operating system	Windows 8 64-bit	Windows 8 64-bit	Windows 8 64-bit	Windows 8 64-bit	Windows 8 64-bit
Bundled software	None	None	None	None	None
Stalker scores	150/90fps	58/39fps	68/62fps	Not tested	Not tested
Battery	62Wh lithium-ion	49Wh lithium-ion	77Wh lithium-ion	76.9Wh lithium-ion	48Wh lithium-ion
Battery life	4 hrs	3 hrs 5 mins	4 hrs	3 hrs 29 mins	4 hrs
PCMark 7 score	4720	3241	4700	6099	3011
Dimensions	330x227x35mm	383x249x38mm	374x250x43mm	413x278x44mm	370x255x30mm
Weight	2.1kg	2.4kg	2.7kg	3.2kg	2.7kg
Warranty	1-year return-to-base	1-year return-to-base	2-year return-to-base	3-year return-to-base	1-year return-to-base
Verdict	• Strong gaming performance • Colourful matt display • Good runtime for gaming PC • Average speakers • Keyboard a little small	• Haswell processor • Low price • 15.6in matt screen is particularly good • Blu-ray drive	• Strong gaming performance • Good all-round speed • Comfortable keyboard • Decent battery life • A little hefty and inelegant	• Decent spec for the price • Fast • Proficient at gaming • Not the most portable • Battery life lacking	• Ordinary overall speed • Decent gaming potential • Touchscreen • Display not full-HD • Not the lightest 15in laptop
FULL REVIEW	TINYURL.COM/PBZPA65	TINYURL.COM/NXLB4E7	TINYURL.COM/KYSYQGK	TINYURL.COM/Q5QRFJ2	TINYURL.COM/NXRQO2Q

>> Buying advice

£501-£1,000 laptops

If you're prepared to pay more than £500, you can get a laptop with a better selection of internal components, a higher-quality build, and faster performance.

Most laptops at this price have 15.6in widescreen displays, but beware of budget panels with a coarse resolution – 1366x768 pixels is wide, but creates fuzzy text and images. Look for anti-glare matt panels rather than glossy screens.

Intel introduced its third-gen Core chips in 2012, aka Ivy Bridge, which offer integrated GPUs capable of half-decent gameplay. You'll also find 2011's Sandy Bridge chips, identifiable by a leading 2 rather than 3 on the part number.

Battery life can stretch to six hours, but don't take it as a given.

Expect at least one USB 3.0 port, which allows for faster data transfer with compatible peripherals. Gigabit ethernet is now standard, and you may find even faster ports such as eSATA or Thunderbolt at this price.

Look for 8GB of RAM, and an SSD if you don't mind offloading media files to external storage. **READ MORE: TINYURL.COM/BUHSEAR**

PC ADVISOR TEST CENTRE

£1,001+ laptops	1 Chillblast Messiah 17 GTX780M	2 Alienware 14	3 Dell Precision M4700	4 MSI GS70 Stealth	5 Schenker XMG P503
Price	£1,799 inc VAT	£1,539 inc VAT	£3,542 inc VAT	£1,679 inc VAT	£1,515 inc VAT
Website	Chillblast.com	Alienware.co.uk	Dell.co.uk	Uk.msi.com	Mysn.co.uk
Build rating	★★★★☆	★★★★½	★★★★½	★★★★½	★★★★☆
Features rating	★★★★½	★★★★½	★★★★★	★★★★★	★★★★★
Performance rating	★★★★★	★★★★☆	★★★★★	★★★★★	★★★★★
Value rating	★★★★☆	★★★½☆	★★★★☆	★★★★☆	★★★½☆
Overall rating	★★★★½	★★★★☆	★★★★½	★★★★☆	★★★★☆
Processor	2.7GHz Intel Core i7-4800MQ	2.4GHz Intel Core i7-4700MQ	2.9GHz Intel Core i7-3920XM	2.4GHz Intel Core i7-4700HQ	2.4GHz Intel Core i7-4700MQ
RAM	16GB DDR3	8GB DDR3	8GB DDR3	8GB DDR3	8GB DDR3
Storage	1TB + 250GB SSD	1TB + 256GB SSD	512GB SSD	750GB + 2x 128GB SSD	750GB + 256GB SSD
Screen size	17.3in matt	14in matt	15.6in matt	17.3in matt	15.6in matt
Screen resolution	1920x1080	1920x1080	1920x1080	1920x1080	1920x1080
Graphics	nVidia GeForce GTX 780M	nVidia GeForce GTX 765M	AMD FirePro M4000	nVidia GeForce GT 765M	AMD Radeon HD 8970M
Video memory	4GB	2GB	1GB	2GB	4GB
Wireless	802.11b/g/n, WiDi	802.11b/g/n	802.11a/b/g/n	802.11b/g/n	802.11b/g/n
Ethernet	Gigabit	Gigabit	Gigabit	Gigabit	Gigabit
Bluetooth	✓	✓	✗	✓	✓
USB	3x USB 3.0, 1x USB 2.0	2x USB 3.0, 1x USB 2.0	2x USB 3.0, 2x USB 2.0	4x USB 3.0	3x USB 3.0, 1x USB 2.0
FireWire	✗	✗	✓	✗	✓
Thunderbolt	✗	✗	✗	✗	✗
DisplayPort	✓	✓	✗	✓	✓
HDMI	✓	✓	✓	✓	✓
DVI	✗	✗	✗	✗	✗
VGA	✗	✗	✗	✓	✗
eSATA	✓	✗	✓	✗	✓
Media card slot	✓	✓	✓	✓	✓
Audio	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic
Optical drive	BD-RE	DVD drive	N/A	N/A	BD-ROM
Extras	2.1Mp webcam	Webcam	HD webcam	HD webcam	2Mp webcam
Operating system	Windows 8 64-bit	Windows 8 64bit	Windows 7 Ultimate 64-bit	Windows 8 64-bit	Windows 8 64bit
Bundled software	None	None	None	None	None
Stalker scores	64.3fps	77fps	93.4fps	85.7fps	Not tested
Battery	77Wh lithium-ion	69Wh lithium-ion	97Wh lithium-ion	Lithium-ion	77Wh lithium-ion
Battery life	4 hrs 15 mins	4 hrs 29 mins	6 hours	3 hrs 31 mins	2 hrs 40 mins
PCMark7 score	6316	6044	5300	6060	6205
Dimensions	412x276x55mm	334.8x261.2x42mm	376x256x36.5mm	419x287x22mm	375x268x50mm
Weight	3.9kg	2.8kg	2.87kg	2.6kg	3.4kg
Warranty	2-year collect-and-return	1-year NBD	3-year NBD	2-year warranty	2-year collect-and-return
Verdict	• Stunning gaming and general performance • Capacious RAM, storage • Not too heavy for its size • Blu-ray writer included	• Great looks and build • Very fast performance • Decent gaming power • Matt IPS panel • Keys have plenty of travel	• Incredibly powerful • Heavy-duty graphics • Stunning performance • Expensive • Large and heavy	• Svelte chassis • Fantastic overall speed • Strong gaming • Excellent keyboard • Not cheap	• High performer • Great gaming speed • Good screen • Not the best-looking laptop • Battery life not great
FULL REVIEW	TINYURL.COM/PCJP94Q	TINYURL.COM/NZOPDVU	TINYURL.COM/PORAGXU	TINYURL.COM/L5YXXVA	TINYURL.COM/9WTG6MP

>> Buying advice

£1,001+ laptops

Invest £1,000 or more in a laptop, and you can be reasonably sure of getting a high-quality PC.

Sometimes that money will be spent on getting a thin-and-light laptop, with good performance to boot. Alternatively, you may prefer a rugged laptop that's able to withstand wear and tear on the road, or a performance-first high-powered workstation. Whatever your need, accept no compromises in build quality.

The best laptops should offer very good screens. Beware of glossy shiny panels that allow distracting reflections in certain lighting conditions.

Ultraportables may have 256GB or more of solid-state storage, but won't have an optical drive or GPU.

Workstation laptops will have faster – often quad-core – CPUs and a mobile graphics processor.

Rugged laptops are engineered for strength, at the expense of light weight and sleek design. Look out for milspec standard ratings, such as MIL-STD-810G.

You'll find a wide range of ports, high-grade components and extras. **READ MORE: TINYURL.COM/CC3KBMM**

Tablets

Tablets	Google Nexus 7 (2013)	Apple iPad Air	Apple iPad mini (1st gen)	Google Nexus 10 by Samsung	Sony Xperia Tablet Z
	1 PC ADVISOR GOLD	2 PC ADVISOR RECOMMENDED	3 PC ADVISOR GOLD	4 PC ADVISOR RECOMMENDED	5 PC ADVISOR RECOMMENDED
Price	£199 inc VAT	£399 inc VAT	£269 inc VAT	£319 inc VAT	£399 inc VAT
Website	Play.google.com	Apple.com/uk	Apple.com/uk	Play.google.com	Sony.co.uk
Overall rating	★★★★½	★★★★☆	★★★★½	★★★★½	★★★★☆
Platform	Android 4.3 Jelly Bean	Apple iOS 7	Apple iOS 7	Android 4.4 KitKat	Android 4.1 Jelly Bean
Screen size/resolution	7in/1280x800	9.7in/2048x1536	7.9in/1024x768	10.1in/2560x1600	10.1in/1920x1200
Storage/media card slot	16GB/none	16GB/none	16GB/none	16GB/none	16GB/microSDXC
Connectivity	802.11b/g/n, Bluetooth 4	802.11a/b/g/n, Bluetooth 4	802.11b/g/n, Bluetooth 4	802.11b/g/n, Bluetooth 4, NFC	802.11a/b/g/n, Bluetooth 4, NFC
Processor	1.5GHz Snapdragon S4 Pro	Apple A7	1GHz Apple A5	1.7GHz Cortex A-15	1.5GHz SnapDragon S4 Pro
RAM	2GB	1GB	512MB	2GB	2GB
Claimed battery life	9 hrs	10 hrs	10 hrs	9 hrs	10 hrs
Cameras (front/rear)	1.2/5Mp	1.2/5Mp	1.2/5Mp	1.9/5Mp	2.2/8.1Mp
Dimensions	114x200x8.7mm	169x240x7.5mm	135x200x7.2mm	264x178x8.9mm	266x172x6.9mm
Weight	299g	469g	308g	603g	495g
Warranty	1 year	1 year	1 year	1 year	1 year
Verdict	• Pricier than original • Best screen of any 7in tablet • Slimmer and lighter • Fast and slick	• Incredibly light for its size • Superb graphics • Breathtaking display • Decent battery life	• 7.9in screen large for a mini • Vibrant but not Retina screen • Decent performance • Very good cameras	• Very fast • Highest screen resolution • Excellent value • Can't match iPad on build	• Striking design • Very thin and light • Waterproof, dustproof • Not the fastest tablet
FULL REVIEW	TINYURL.COM/QYUDY5C	TINYURL.COM/LSB84EE	TINYURL.COM/CLJWUVS	TINYURL.COM/ARL2KDG	TINYURL.COM/ODTP6B8

Smartphones

Smartphones	LG G2	Motorola Moto G	Apple iPhone 5s	Google Nexus 5	Sony Xperia Z1
	1 PC ADVISOR GOLD	2 PC ADVISOR RECOMMENDED	3 PC ADVISOR GOLD	4 PC ADVISOR RECOMMENDED	5 PC ADVISOR RECOMMENDED
Price	£399 inc VAT	£135 inc VAT	£549 inc VAT	£299 inc VAT	£599 inc VAT
Website	Lg.com/uk	Motorola.co.uk	Apple.com/uk	Play.google.com	Sonymobile.com
Overall rating	★★★★½	★★★★½	★★★★½	★★★★☆	★★★★½
Platform	Android 4.2 Jelly Bean	Android 4.3 Jelly Bean	Apple iOS 7	Android 4.4 KitKat	Android 4.2 Jelly Bean
Processor	2.26GHz Snapdragon 800	1.2GHz Snapdragon 400	1.3GHz Apple A7	2.3GHz Snapdragon 800	2.26GHz Snapdragon 800
Storage/media card	16GB/none	8GB/none	16GB/none	16GB/none	16GB/microSDXC
Screen size/resolution	5.2in/1920x1080	4.5in/720x1280	4in/640x1136	4.95in/1920x1080	5in/1920x1080
Input method	Capacitive multitouch	Capacitive multitouch	Capacitive multitouch	Capacitive multitouch	Capacitive multitouch
Connectivity	4G, HSPA+, Bluetooth, Wi-Fi	HSDP+, GSM, Bluetooth, Wi-Fi	4G, HSPA+, Bluetooth, Wi-Fi	HSPA+, Bluetooth, Wi-Fi ac	4G, HSPA+, Bluetooth, Wi-Fi
Battery life (talk/standby)	Not specified	Not specified	10 hrs/250 hrs	17 hrs/300 hrs	14 hrs/880 hrs
Camera	13Mp, 1080p video	5Mp, 720p video	8Mp, 1080p video	8Mp, 1080p video	20.7Mp, 1080p video
GPS	A-GPS	A-GPS	A-GPS, Glonass	A-GPS	A-GPS
Dimensions, Weight	71x139x9.4mm, 143g	66x130x11.6mm, 143g	59x124x7.6mm, 112g	69x138x8.9mm, 130g	144x74x8.5mm, 169g
Warranty	1 year	1 year	1 year	1 year	1 year
Verdict	• Excellent value • High-end specification • Impressive design • No microSD slot	• Fantastic price • Great battery life • Sharp 4.5in display • 16GB costs just £24 more	• Very fast performance • Superb 4in screen • Beautifully balanced weight • Fingerprint reader	• Best-value flagship phone • Good performance • Not the best build quality • Average battery life	• Powerful specification • Larger and heavier than original Xperia Z • Expensive
FULL REVIEW	TINYURL.COM/PAFK4SZ	TINYURL.COM/NBUTSET	TINYURL.COM/MZ8JHLF	TINYURL.COM/PAFK4SZ	TINYURL.COM/NJPM4DE

>> Buying advice

Tablets

Tablet PCs combine the mobility and connectivity of a smartphone with a larger screen and more powerful processor. Rather than Windows, most run a lightweight, touch-focused OS.

You have two main choices: a tablet running iOS or Android. iOS is slick, supremely easy to use, and has a library of hundreds of thousands of apps. But the iPad is expensive, it doesn't support memory cards, and the whole system is locked down.

Android tablets are available at lower prices. Many have ports for adding storage and connecting devices, and plenty of apps are available via Google Play – although Google doesn't vet them.

Look for a dual-core processor for smooth operation and good multi-tasking. Opt for a capacitive rather than resistive touchscreen if possible, and consider a smaller screen to minimise weight.

3G/4G tablets are available on subsidised tariffs, but it's usually cheaper to buy them outright. READ MORE: TINYURL.COM/7YGVBQ6

PC ADVISOR TEST CENTRE

Mini PCs	**1** PC ADVISOR RECOMMENDED	**2** PC ADVISOR RECOMMENDED	**3**	**4**	**5**
	Intel NUC D54250WYK	**Fujitsu Esprimo Q520**	**Chillblast Fusion Brix**	**Zotac Zbox nano ID65 PLUS**	**Lenovo IdeaCentre Q190**
Price	**£525 inc VAT**	**£389 inc VAT**	**£549 inc VAT**	**£530 inc VAT**	**£380 inc VAT**
Website	Intel.co.uk	Fujitsu.com/uk	Chillblast.com	Zotac.com	Lenovo.com/uk
Build rating	★★★★½	★★★★½	★★★★½	★★★★½	★★★★½
Features rating	★★★★½	★★★½☆	★★★★☆	★★★★½	★★★★½
Performance rating	★★★★★	★★★½☆	★★★★½	★★★☆☆	★★☆☆☆
Value rating	★★★★☆	★★★★½	★★★★☆	★★★★½	★★★★½
Overall rating	★★★★½	★★★★½	★★★★½	★★★★☆	★★★½☆
Processor	1.36GHz Intel Core i5-4250U	2.9GHz Intel Core i3-4130T	1.9GHz Intel Core i3-3227U	2GHz Intel Core i7-3537U	1.4GHz Intel Core i3-2365M
CPU cooler	Fan cooler	Passive cooler	Custom semi-active cooler	Smart fan	Fan
RAM	8GB DDR3	4GB DDR3	8GB DDR3	4GB DDR3	4GB DDR3
Storage capacity	180GB Intel 530 mSATA SSD	320GB HDD	120GB Intel 525 mSATA SSD	500GB HDD	1TB HDD
Power supply	65W internal	65W internal	65W external	19V 3.42a external	19V 1.7A external
Motherboard	Intel Wilson Canyon	Fujitsu motherboard	Intel HM77	HM77 Express	Lenovo custom
Operating system	Not supplied	Windows 8 Standard or Pro	Windows 8 64-bit	Not supplied	Windows 8
Graphics	Intel HD Graphics 5000	Intel HD Graphics 4000	Intel HD Graphics 4000	Intel HD Graphics 4000	Intel HD Graphics 3000
Sound	Onboard	Onboard	Onboard	Onboard	Onboard
Connectivity	802.11b/g/n/ac, gigabit ethernet, Bluetooth	Gigabit ethernet	802.11b/g/n, gigabit ethernet, Bluetooth	802.11b/g/n, gigabit ethernet, Bluetooth	802.11b/g/n, gigabit ethernet
Ports	4x USB 3.0, HDMI, Mini DisplayPort	2x USB 3.0, 4x USB 2.0, DVI, DisplayPort	2x USB 3.0, HDMI, Mini DisplayPort	4x USB 3.0, 2x USB 2.0, HDMI, DisplayPort, S/PDIF, eSATA	2x USB 3.0, 4x USB 2.0, HDMI, VGA, S/PDIF
Card reader	None	None	None	MMC/SDXC/MS/MS Pro/xD	SDXC/MS Pro
Other	Integrated VESA mount, Microsoft Office, PowerDVD	Integrated VESA mount, Microsoft Office, PowerDVD	VESA mounting bracket	Webcam, VESA mounting bracket, PowerDVD	VESA mounting bracket, desktop stand
Dimensions	117x112x35mm	185x188x54mm	29.9x107.9x114.6mm	127x127x45mm	192x155x22mm
Weight	1kg	1.6kg	400g	1kg	1.2kg
PC Mark Overall	4681	2988	4094	2882	1905
Aliens vs Predator (fps)[1]	7/5	6/Low	7/5	6/Low	Not tested
Power consumption[2]	7W/27W	10W/46W	10W/42W	11W/36W	11W/34W
Warranty	Varies	1-year onsite	2-year collect-and-return	2-year return-to-base	1-year return-to-base
Verdict	• Barebones kit: memory and storage not supplied • Excellent speed in this configuration • Four USB 3.0 ports • No operating system is supplied	• Relatively large • Internal PSU • Powerful, but hard drive and low RAM dampen speed • Strong ergonomics	• The tiniest mini PC here • Strong performance • Limited connectivity • Not much storage	• Slightly larger than norm • Excellent processor • 500GB hard drive is capacious, but slower than an SSD • No operating system is supplied	• Looks good • Sizeable 1TB storage • Poor performance • Graphics also sluggish
FULL REVIEW	TINYURL.COM/KDBLVND	TINYURL.COM/KS56DVT	TINYURL.COM/PWX38WW	TINYURL.COM/PRSOKRD	TINYURL.COM/KT4MNQ8

[1] Alien Vs Predator tested at 720p and 1080p, High Quality respectively [2]Measured when idle and under load respectively

>> Buying advice

Mini PCs

Mini PCs look good, fit into the smallest of spaces, and usually offer cooler, quieter operation and lower power consumption than their desktop counterparts.

However, there are a few down sides. For example, a mini PC doesn't have enough internal space for a discrete graphics card or a desktop (3.5in) hard drive. All other upgrades and expansion will usually be achieved externally.

With this in mind, pay particular attention to the connectivity options. If you want to hook up external storage, look for USB 3.0 ports. For connecting the PC to a standard LCD monitor you can use HDMI. If you have an external music system with digital inputs you may also want an S/PDIF connector on your mini PC. Mini PCs typically ship without a keyboard or mouse, and often come without an OS. Remember to factor in the cost of these items.

Changes in exchange rates and component supply issues mean we can't guarantee PCs listed here will be available as specified. All our prices include delivery charges. **READ MORE: TINYURL.COM/D29YONN**

Gaming PCs	1 PC ADVISOR BEST BUY	2 PC ADVISOR RECOMMENDED	3 PC ADVISOR RECOMMENDED	4	5
	Chillblast Fusion Uzi	Wired2Fire Diablo Predator	PC Specialist Vanquish GT1	Vibox Envy	Computer Planet ND 3000
Price	£1,249 inc VAT	£1,699 inc VAT	£1,279 inc VAT	£630 inc VAT	£1,100 inc VAT
Website	Chillblast.com	Wired2fire.co.uk	Pcspecialist.co.uk	Vibox.co.uk	Computerplanet.co.uk
Build rating	★★★★☆	★★★★★	★★★★☆	★★★★☆	★★★★☆
Features rating	★★★★★	★★★★★	★★★★★	★★★☆☆	★★★★★
Performance rating	★★★★½	★★★★★	★★★★½	★★★★☆	★★★★½
Value rating	★★★★½	★★★☆☆	★★★★½	★★★★☆	★★★★½
Overall rating	★★★★½	★★★★½	★★★★½	★★★★☆	★★★★☆
Processor	3.4GHz Intel Core i5-4670K (OC 4.4GHz)	3.4GHz Intel Core i5-4670K (OC 4.4GHz)	3.4GHz Intel Core i5-4670K (OC 4.2GHz)	4.2GHz AMD FX 4350 (OC 4.4GHz)	3.4GHz Intel Core i5-4670K
CPU cooler	Corsair H55 Liquid Cooler	Corsair H100 Liquid Cooler	Corsair H60 Liquid Cooler	Raijintek Aidos	Corsair H60 Liquid Cooler
Memory	16GB DDR3	16GB DDR3	16GB DDR3	8GB DDR3	8GB DDR3
Storage	120GB SSD + 2TB HDD	240GB SSD + 1TB HDD	120GB SSD + 2TB HDD	120GB SSD + 1TB HDD	120GB SSD + 1TB HDD
Power supply	750W Corsair	650W Corsair	650W Corsair	550W Corsair	650W Corsair
Motherboard	Gigabyte GA-Z87N-Wi-Fi	Gigabyte GA-Z87-D3HP	Asus Z87-K	Gigabyte 970A-UD3	Gigabyte GA-B85M-D3H
Operating system	Windows 8 64bit	Windows 8 64bit	Windows 8 64bit	None supplied	Windows 8 64bit
Screen	23.6in Iiyama X2377HDS	24in AOC G2460PQU	23.6in AOC i2369vm IPS	None supplied	23in AOC
Graphics	MSI nVidia GeForce GTX 770, 2GB VRAM	nVidia GeForce GTX 780, 3GB VRAM	Palit nVidia GeForce GTX 770, 2GB VRAM	MSI AMD Radeon HD 7850, 2GB VRAM	Gainward nVidia GeForce GTX 770, 2GB VRAM
Sound	Onboard	Onboard	Asus Xonar DG	Onboard	Onboard
Connectivity	2x Gigabit ethernet, 802.11n Wi-Fi	Gigabit ethernet	Gigabit ethernet	Gigabit ethernet	Gigabit ethernet
Ports	6x USB 3.0, 2x USB 2.0, S/PDIF	8x USB 3.0, 2x USB 2.0, 2x DVI, HDMI, DisplayPort	3x USB 3.0, 6x USB 2.0	3x USB 3.0, 10x USB 2.0, FireWire	3x USB 3.0, 5x USB 2.0
Optical drive	Pioneer BD-ROM/DVD±RW	DVD±RW	Lite-On DVD±RW	Lite-on 24x DVD±RW	Samsung 24x DVD±RW
Case	BitFenix Prodigy Blue	Corsair C70 Black	InWin GT1	Vibox Predator Green Gaming	Cooler Master K-350
Keyboard	Gigabyte M6800	Gigabyte K3	Roccat Isku	None supplied	Logitech MK260
Mouse	Force K3	Gigabyte M6980X	Roccat Kova	None supplied	As above
Other	Optional family pack	Extra fans	None	None	Splinter Cell: Blacklist
PC Mark 7	7045	6974	6763	4216	6550
Alien vs Predator	118/64	165/87	120/65	77/45	122/66
Final Fantasy XIV	70 (1080p)	209/96	117/73	Not tested	186/68
Sniper Elite V2	300/143/37	315/180/44	307/145/37	174/69/19	284/146/37
Power consumption	52W/310W	60W/403W	70W/315W	Not tested	46W/250W
Warranty	2-year collect-and-return	3-year return-to-base (2-year parts, 3-year labour)	3-year collect-and-return	1-year return-to-base	1-year collect-and-return
Verdict	• Stunning performance in general use • Also pretty strong on games • Small-form-factor PC great for portability • Cool in running • Slightly bouncy case	• Sizzling performance • Best for gaming power • Reasonably expensive • Smooth flat-panel • No Blu-ray drive	• Good all-round performance • Nicely priced • Strong drive options • Dedicated sound card • Keyboard and mouse ideal for gamers	• Very low price • Performance a little lacking – a 4670K chip would make a huge difference • Quiet and low on power • Extreme/OC and Liquid-Cooled models available	• Solid performance • None of the components are overclocked • Low power output • Motherboard a little cheap • Only a one-year warranty
FULL REVIEW	TINYURL.COM/P58MMMG	TINYURL.COM/NDUHD3L	TINYURL.COM/PL5EUPW	TINYURL.COM/MUYYZUU	TINYURL.COM/MNBXXHF

All gaming scores given in fps. Alien vs Predator 720p, Max/1080p, Max. Final Fantasy 720p, Med/1080p, Max. Sniper Med/Ultra

>> Buying advice

Gaming PCs

Gaming PCs put performance and upgradability before subtlety and quiet operation. Many run overclocked CPUs to eke out every bit of available speed.

Intel's Core i5-3570K is a popular choice of CPU, but will require a decent cooler and beefy PSU. The HyperThreaded i7-3770K is slightly faster, but dearer.

Cooling is essential for stability. Liquid-cooling systems, dust filters, fan-speed controls and good cable-management can aid airflow.

Most important of all is the graphics card; vendors will often skimp on storage, networking and other features and throw all their budget at the graphics card.

nVidia's GTX 680 delivers unparalleled performance – but at a price. Cheaper solutions include the GeForce GTX 660 and 670.

Look for wired peripherals and a headset. Good warranty terms are crucial for overclocked PCs.

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READ MORE: TINYURL.COM/CZXH443

All-in-one PCs	1 **PC ADVISOR** BEST BUY	2 **PC ADVISOR** RECOMMENDED	3 **PC ADVISOR** RECOMMENDED	4	5
	Dell XPS 2720	**Apple iMac 27in**	**Medion Akoya P2002**	**Chillblast Fusion AIO Ultima**	**MSI Wind Top AE2712G**
Price	**£1,749 inc VAT**	**£1,599 inc VAT**	**£449 inc VAT**	**£1,199 inc VAT**	**£1199 inc VAT**
Website	Dell.co.uk	Apple.com/uk	Medion.com/gb	Chillblast.com	Uk.msi.com
Build rating	★★★★½	★★★★★	★★★★☆	★★★★☆	★★★★☆
Features rating	★★★★½	★★★★½	★★★★☆	★★★★☆	★★★★★
Performance rating	★★★★½	★★★★★	★★★½☆	★★★★☆	★★★½☆
Value rating	★★★½☆	★★★★☆	★★★★★	★★★★½	★★★★½
Overall rating	★★★★½	★★★★½	★★★★☆	★★★½☆	★★★½☆
Processor	3.1GHz Intel Core i7-4770S	3.2GHz Intel Core i5	3.3GHz Intel Core i3-3220	3.1GHz Intel Core i7-3770S	2.9GHz Intel Core i5-3470S
RAM	16GB DDR3	8GB DDR3	4GB DDR3	16GB DDR3	4GB DDR3
Storage capacity	2TB HDD + 32GB SSD	1TB HDD	1TB HDD	1TB HDD + 120GB SSD	1TB HDD
Screen	27in IPS touchscreen	27in IPS	23.6in TN	21.5in IPS touchscreen	27in TN touchscreen
Screen resolution	2560x1440	2560x1440	1920x1080	1920x1080	1920x1080
Graphics card	nVidia GeForce GT 750M	nVidia GeForce GTX 755M	Intel HD Graphics 2500	Intel HD Graphics 4000	nVidia GeForce GT 630M
Video memory	2GB	1GB	N/A	N/A	2GB
Wireless	802.11b/g/n	802.11b/g/n	802.11b/g/n	802.11b/g/n	802.11b/g/n
Ethernet	✓	✓	✓	✓	✓
Bluetooth	✓	✓	✗	✓	✓
USB	6x USB 3.0	4x USB 3.0	2x USB 3.0, 4x USB 2.0	4x USB 3.0, 2x USB 2.0	2x USB 3.0, 4x USB 2.0
FireWire	✗	✗	✗	✗	✗
Thunderbolt	✓	✓ (x2)	✗	✗	✗
HDMI	✓	✗	✓	✓	✓
Media card slot	✓	✓	✓	✓	✓
Max disc speeds	BD-ROM/DVD±RW	None	DVD±R	BD-ROM/DVD±RW	BD-ROM/DVD±RW
Extras	2.1Mp webcam, wireless keyboard and mouse	1.3Mp webcam, wireless keyboard and mouse	Wireless keyboard and mouse, CyberLink software	Webcam, Microsoft Wireless Desktop 3000	2Mp webcam, DVB-T TV tuner, Wireless keyboard and mouse
Operating system	Windows 8	Mac OS X 10.9 Mavericks	Windows 8	Windows 8	Windows 8
Power consumption	54W (idle), 220W (load)	53W (idle), 243W (load)	34W (idle), 92W (load)	32W (idle), 119W (load)	44W (idle), 110W (load)
Sniper 2 Elite (High)	6fps	12fps	5fps	5fps	5fps
Sniper 2 Elite (Low)	94fps	197fps	16fps	28fps	17fps
PCMark 7 score	6091	4141	3298	5195	3138
Dimensions	492x664x72mm	650x203x516mm	580x196x430-460mm	338x541x61mm	672x483x66mm
Weight	16kg	9.5kg	10.3kg	9kg	13kg
Warranty	1-year next-day in-home	1-year return-to-base	1-year return-to-base	2-year collect-and-return	2-year collect-and-return
Verdict	• Screen offers stunning array of colours • Great general performance • Solid, but not amazing gaming framerates • Quite heavy • Next-day in-home support	• Still svelte and cool-looking • Decent performance • Class-leading gaming • Stunning display • No touchscreen	• Low price • Decent performance for the money • Built-in TV tuner • Lacks SSD and Blu-ray • No touchscreen	• Good-looking and well built • Blistering Windows performance • Disappointing gaming • IPS panel offers inferior colour fidelity to iMac and Dell • Many of the ports are difficult to reach	• Low price for a 27in all-in-one PC • Fully featured all-in-one with TV tuner and Blu-ray • Lacklustre gaming • Disappointing performance
FULL REVIEW	TINYURL.COM/KWZ4KLL	TINYURL.COM/A95Q9VY	TINYURL.COM/MEVSJ9D	TINYURL.COM/LQ4U8FW	TINYURL.COM/MUGFKQ7

>> Buying advice

All-in-one PCs

All-in-one PCs build into a large (21- to 27in) monitor all the components they require to run, making them an excellent- and stylish solution for saving space.

However, with limited internal space for cooling, all-in-one machines tend to include less powerful components than traditional desktops. Expect to find integrated or laptop graphics processors and mobile CPUs inside.

All-in-ones aren't usually easy to upgrade, but many are pre-packed with Wi-Fi, Bluetooth, speakers and even Blu-ray players.

Touchscreen displays are likely to become more desirable once Windows 8 is released. If you buy one now, ensure the image quality hasn't been compromised and that it's sufficiently responsive to touch. The quality of the supplied keyboard and mouse (usually wireless) is critical. TV tuners and HDMI ports are welcome additions.

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READ MORE: TINYURL.COM/87VW5KJ

PC ADVISOR TEST CENTRE

Business PCs	1 **PC ADVISOR RECOMMENDED** Aria Gladiator N200-3220M	2 Chillblast Fusion Opal	3 Wired2Fire Business Accelerate	4 Dino PC Synergy 4430	5 Eclipse Precision A856F85
Price	£509 inc VAT	£549 inc VAT	£689 inc VAT	£569 inc VAT	£519 inc VAT
Website	Aria.co.uk	Chillblast.com	Wired2fire.co.uk	Dinopc.com	Eclipsecomputers.com
Build rating	★★★★½	★★★★☆	★★★★☆	★★★★☆	★★★☆☆
Features rating	★★★★☆	★★★★★	★★★★½	★★★★★	★★★½☆
Performance rating	★★★★☆	★★★★☆	★★★★★	★★★★☆	★★★½☆
Value rating	★★★★☆	★★★½☆	★★★☆☆	★★★★☆	★★★★½
Overall rating	★★★★☆	★★★½☆	★★★½☆	★★★½☆	★★★½☆
Processor	3.3GHz Intel Core i3-3220	3.2GHz Intel Core i5-4570	3.4GHz Intel Core i5-4670	3GHz Intel Core i5-4430	3.6GHz AMD Trinity A8-5600K
RAM	8GB DDR3	8GB DDR3	8GB DDR3	8GB DDR3	8GB DDR3
Storage capacity	500GB HDD + 80GB SSD	1TB HDD	120GB SSD	1TB HDD	1TB HDD
Motherboard	Gigabyte GA-B75M-D3H	Asus B85M-G	ASRock B85M-HDS	Gigabyte GA-H87M-HD3	Asus F2A85-M LE
CPU cooler	Arctic Cooling Alpine 11 Quiet	Standard Intel cooler	Standard Intel cooler	Standard Intel cooler	Standard AMD cooler
Power supply	Corsair 430W	CiT 500W	Xigmatek 400W	CiT 500W	Alpine 600W
Screen	21.5in AOC E2260SWDA	23.6in Iiyama X2377	2x 21.5in AOC E2260SWDA	23in Iiyama XB2380HS-B1	23in AOC i2369Vm
Screen resolution	1920x1080	1920x1080	1920x1080	1920x1080	1920x1080
Graphics	Intel HD Graphics 2500	Intel HD Graphics 4600	Intel HD Graphics 4600	Intel HD Graphics 4600	Integrated
Video memory	N/A	N/A	N/A	N/A	N/A
USB	2x USB 3.0, 4x USB 2.0	3x USB 3.0, 6x USB 2.0	2x USB 3.0, 8x USB 2.0	4x USB 3.0, 4x USB 2.0	4x USB 3.0, 4x USB 2.0
Sound	Onboard	Onboard	Onboard	Onboard	Onboard
Speakers	Not specified	Not specified	Not specified	Not specified	Not specified
Case	Cooler Master N200	CiT Fortress	In-Win Em040	CiT Templar	K2 Gamer
Keyboard	Microsoft Desktop 400 keyboard and mouse (wired)	Cherry J82-16001 keyboard, M-5450 mouse (wired)	Gigabyte K6800 keyboard, M6800 mouse (wired)	Logitech K120 keyboard, B110 mouse (wired)	Microsoft Optical Desktop 800 (wired)
Optical drive	24x DVD±RW	24x DVD±RW	DVD±RW	Samsung DVD±RW	Samsung DVD±RW
Operating system	Windows 7 Home Prem 64-bit	Windows 8 Professional	Windows 7 Pro 64-bit	Windows 7 Home Prem 64-bit	Windows 8 Professional
Bundled software	None	None	None	None	None
PCMark7 overall score	3524	4257	5667	3458	2349
Power consumption	27/69W	47/124W	37/135W	37/115W	34/145W
Warranty	1-year return-to-base, phone support	2-year collect-and-return, phone support	2-year return-to-base, phone support	3-year return-to-base (2-year parts), phone support	1-year return-to-base, phone support
Verdict	• Exceptional value for money • Sticks with older Ivy Bridge processor technology • Not the best performance • SSD, Wi-Fi connectivity and memory card included • Only a one-year return-to-base warranty	• Haswell processor • Impressive Iiyama IPS flat-panel • No SSD • No cable management under the lid • Warranty is collect-and-return rather than return-to-base	• Expensive Haswell processor technology, but the fastest PC here • 120GB SSD • Logitech keyboard flamboyant for office use, but comfortable • Two flat-panels included for improved productivity – could save money by specifying just one	• Not the fastest system here • No SSD, but hard drive has a generous 1TB capacity • High-quality Iiyama IPS flat-panel • Detailed warranty • Windows 7 ideal for business use • No cable management under the lid	• Sluggish performance • 1TB hard drive, but no SSD • Pleasing AOC monitor with excellent IPS technology • Gamer case inappropriate for office environments • Warranty just one year
FULL REVIEW	TINYURL.COM/OSW55A8	TINYURL.COM/KGGE98T	TINYURL.COM/PCSKWVS	TINYURL.COM/PF8LUXD	TINYURL.COM/MQFWJ3R

>> Buying advice

Business PCs

Provided you have sufficient RAM (at least 2GB, preferably 4GB), any modern CPU will provide enough power for low-level admin tasks. Intel's Core i3 provides ample performance for general use and come with integrated graphics, saving you the cost of buying an additional card. In a typical networked business environment there will be storage available on the LAN, so you're unlikely to need a large hard drive. A 500GB drive should be ample.

Wireless keyboards and mice can cause issues in the workplace due to interference between adjacent workstations. A decent wired kit is ideal, while quiet-typing keyboards can be less distracting. For small businesses with just one or two PCs, Windows 7 Home Premium is cheaper but can't connect to servers. The Pro edition is a better option for businesses, especially if you need compatibility with older software.

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Family PCs	1 PC ADVISOR BEST BUY	2 PC ADVISOR RECOMMENDED	3	4	5
	Chillblast Fusion Commando	Quiet PC Serenity Home Value	Dino PC Raging Lizard	CyberPower Ultra Scylla SE III	Computer Planet F2000 Family
Price	£799 inc VAT	£696 inc VAT	£899 inc VAT	£699 inc VAT	£930 inc VAT
Website	Chillblast.com	Quietpc.com	Dinopc.com	Cyberpowersystem.co.uk	Computerplanet.co.uk
Build rating	★★★★☆	★★★★☆	★★★★☆	★★★★½	★★★★☆
Features rating	★★★★☆	★★★☆☆	★★★½☆	★★★½☆	★★★☆☆
Performance rating	★★★★½	★★★☆☆	★★★★★	★★★☆☆	★★★★☆
Value rating	★★★★☆	★★★★☆	★★★½☆	★★★★☆	★★★☆☆
Overall rating	★★★★½	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Processor	3.2GHz Intel Core i5-4570	2.9GHz Intel Core i5-3475S	3.2GHz Intel Core i5-4570	4.2GHz AMD FX 4350	3.4GHz Intel Core i5-3570
RAM	16GB DDR3	16GB DDR3	16GB DDR3	8GB DDR3	8GB DDR3
Storage capacity	1TB HDD + 120GB SSD	500GB HDD hybrid	1TB HDD + 128GB SSD	2TB HDD	2TB HDD + 120GB SSD
Motherboard	Asus B85M-G	Gigabyte GA-H61M-USB3V	Gigabyte GA-Z87M-HD3	Asus M5A78L-M/USB3	Gigabyte B75M-D3H
CPU cooler	Arctic Cooling Freezer 7 Pro	Standard Intel cooler	Standard Intel cooler	Standard AMD cooler	Arctic Cooling Freezer 7 Pro
Power supply	CiT 600W	Zalman ZM450-GS 450W	Corsair VS450 450W	Cooler Master 500W	Cooler Master 600W
Screen	23in Iiyama X2377	Not supplied	23in AOC i2369Vm	24in BenQ GL2450E	23.6in Iiyama X2377
Screen resolution	1920x1080	N/A	1920x1080	1920x1080	1920x1080
Graphics card	Zotac nVidia GeForce GTX 650 Ti	Intel HD Graphics 4000	Gigabyte nVidia GeForce GTX 650 Ti	MSI AMD Radeon HD 7770	Gainward nVidia GeForce GTX 660
Wireless	802.11b/g/n, gigabit ethernet	802.11b/g/n, gigabit ethernet	802.11b/g/n, gigabit ethernet	802.11b/g/n, gigabit ethernet	802.11b/g/n, gigabit ethernet
USB	3x USB 3.0, 6x USB 2.0	2x USB 3.0, 6x USB 2.0	6x USB 3.0, 2x USB 2.0	2x USB 3.0, 6x USB 2.0	2x USB 3.0, 7x USB 2.0
Media card slot	✗	✗	✓	✓	✓
Sound card	Onboard	Onboard	Onboard	Onboard	Onboard
Speakers	2x Logitech LS220	None	None	None	None
Case	Cooler Master Force 500	Zalman ZM-T1	Xigmatek Asgard 382	Cooler Master Elite 430	Cooler Master Elite 335U
Keyboard	Logitech MK260 wireless combo	Gigabyte GK-KM7580 wireless combo	Logitech MK260 wireless combo	Logitech MK330 wireless combo	Logitech MK260 wireless combo
Optical drive	LG BD-ROM/DVD±RW	Sony DVD±RW	Lite-On BD-ROM, Samsung DVD±RW	Lite-On BD-ROM/DVD±RW	TSSTcorp 24x DVD±RW
Operating system	Windows 8 64-bit	Windows 8 64-bit	Windows 8 64-bit	Windows 8 64-bit	Windows 8 64-bit
Bundled software	None	None	None	None	None
Sniper (Low/Med/Ultra)	147, 59, 14fps	26, 7, 5fps	154, 62, 14fps	130, 43, 9fps	205, 59, 15fps
Alien vs Predator (720p/1080p)	52, 27fps	8, 5fps	53, 27fps	47, 24fps	77, 41fps
PCMark 7	6177	4464	6282	2957	6134
Warranty	2-year collect-and-return	2-year collect-and-return	3-year return-to-base	3-year return-to-base	2-year return-to-base
Verdict	• Strong performance • Good GTX 650 graphics • Great 23.6in Iiyama IPS screen • Wi-Fi only through USB adaptor • Temperature and noise kept low	• Near-silent operation • Good power for the money • Strong RAM complement • Limited gaming power • Hard drive capacity a little stingy	• Best performance here • Good gaming potential • Stylish AOC IPS monitor • Strong components • Not cheap	• Pedestrian performance in our benchmarks • Solid gaming scores • No SSD • Large screen lacks colour fidelity and decent viewing angles • High-quality Logitech MK330 keyboard and mouse combo	• Most expensive of the systems here • Powerful performance • GTX 660 the best card here • Strong storage options • No Blu-ray drive
FULL REVIEW	TINYURL.COM/KF6G3T7	TINYURL.COM/KPE3BAD	TINYURL.COM/RAGLIZ	TINYURL.COM/QHT5X2H	TINYURL.COM/NEVWQ4U

>> Buying advice

Family PCs

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A family PC needs to offer decent performance in every area, able to cater for the needs of each individual – but there are some areas where you can cut costs.

If you're not itching to play the latest games, opt for integrated rather than dedicated graphics. AMD processors are more adept in this regard, while Intel CPUs offer faster application performance.
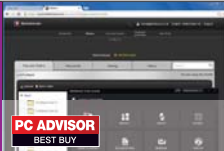
Intel's Core i5-3570K will form the core of a powerful home PC, although the older Core i5-2500K may be offered at lower cost and supports easy overclocking.

Consider 4GB of RAM and a 500GB hard drive as the minimum; both are easy to upgrade later.

Screen quality is crucial, with the best displays using IPS tech. A Blu-ray drive will help make the most of a 23.6in full-HD monitor.
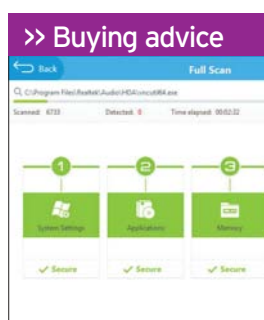
For Skyping, watching films and listening to music, decent speakers and a webcam are essential. **READ MORE: TINYURL.COM/BL4UREB**

PC ADVISOR TEST CENTRE

Internet security suites

	Bitdefender Total Security	Qihoo 360 IS 4.3	Symantec Norton 360 2014	Kaspersky Pure 3.0 TS	GData TotalProtection 2014
Annual price	£55 inc VAT	Free	£60 inc VAT	£60 inc VAT	£50 inc VAT
No of devices	3	Unlimited	3	3	3
Portable support	Android	Android	Android	Android	Android
Website	Bitdefender.co.uk	360safe.com	Norton.com/uk	Kaspersky.co.uk/pure	Gdatasoftware.com
Overall rating	★★★★½	★★★★½	★★★★☆	★★★★☆	★★★★☆
Anti-malware/Anti-spam	✓✓	✓x	✓✓	✓✓	✓✓
Firewall/Parental control	✓✓	xx	✓✓	✓✓	✓✓
Online storage	2GB	N/A	2GB	2GB	N/A
50GB AV scan time	140 mins (1.39M files)	39 mins (68,100 files)	20 mins (176,000 files)	81 mins (334,000 files)	32 mins (8,800 files)
Scan rate (files/sec)	166	29	148	69	5
1GB copy with/without AV	41/48 secs	45/55 secs	43/69 secs	44/71 secs	52/54 secs
Verdict	• Fares very well in testing • Comprehensive scanning • Lots of features • Control screen a little busy	• Free to use • Combines three AV engines • Prevents unauthorised webcam access	• Fares well in most areas • Efficient automatic features • Basic tune-up module • Can impact PC performance	• Cloud option via Dropbox • Not great scan speed • Can impact PC performance • UI puts looks above features	• Fairly modest price • Strong interface • Two separate AV engines • No online storage
FULL REVIEW	TINYURL.COM/L9KNK29	TINYURL.COM/LY557M7	TINYURL.COM/LEZ8AHC	TINYURL.COM/N4ER2X2	TINYURL.COM/LZBQKEM

GLOSSARY: • IS: Internet Security • TS: Total Security

Antivirus software

	Norton AntiVirus	Bitdefender Antivirus Pro	G Data AntiVirus	Kaspersky Anti-Virus	Trend Micro Titanium AV+
Annual price	£39 inc VAT	£24 inc VAT	£34 inc VAT	£39 inc VAT	£39 inc VAT
Licence terms	3 PCs, 1 year	3 PCs, 1 year	3 PCs, 1 year	3 PCs, 1 year	3 PCs, 1 year
Website	Norton.com	Bitdefender.co.uk	Gdatasoftware.com	Kaspersky.co.uk	Uk.trendmicro.com
Overall rating	★★★★½	★★★★½	★★★★☆	★★★★☆	★★★½☆
Signature-based detection	98.7%	97.5%	99.4%	95.7%	98.4%
Malware blocking (full)	96%	68%	84%	88%	88%
Malware blocking (partial)	0%	20%	4%	4%	8%
Clean-up of active malware	80%	80%	80%	80%	80%
On-demand scan speed	121 secs	126 secs	111 secs	103 secs	187 secs
On-access scan speed	272 secs	327 secs	336 secs	310 secs	249 secs
Interface design	Very good	Very good	Very good	Very good	Very good
Verdict	• Smooth user interface • Large 'Fix Now' button • Moderate impact on system performance	• Very good performance for malware removal • Average scan speeds • Three interface tiers	• Strong malware detection, blocking and removal • Good user interface, but poorly translated	• Well-designed interface • Easy to use • On-demand single-file scans • Impacts PC performance	• Set-it-and-forget-it security • Cloud-based protection • Requires web connection • Good performance
FULL REVIEW	TINYURL.COM/4P5YCXP	TINYURL.COM/66SK77U	TINYURL.COM/6BFXWCS	TINYURL.COM/6HQA2WB	TINYURL.COM/4HUORV3

>> Buying advice

Security software

Every connected PC should have at least antivirus, antispyware and a firewall, and it's important that each is kept up to date. Avoid installing more than one real-time scanning component.

We work with world-renowned independent security testing lab AV-Test.org to evaluate the effectiveness of security software.

No security software is foolproof, but some are significantly better than others. And factors such as ease of setup, scan speeds, interface design and ability to deal with new threats set them apart.

The best products will offer parental controls, cloud protection, anti-phishing, anti-rootkit, virtual web browsers and keyboards, link and file scanners, gaming modes, online backup and more.

The best value is usually offered by a three-user licence, but you can save some cash if your household has only one PC.

There are some good free antivirus products, but you get what you pay for.
READ MORE: TINYURL.COM/7NR8FSM

Sub-£150 printers

	1 Samsung Xpress M2070W	2 Pantum P2050	3 Brother HL-3140CW	4 HP Photosmart 7520	5 Canon Pixma MX525
Price	£130 inc VAT	£49 inc VAT	£140 inc VAT	£110 inc VAT	£80 inc VAT
Website	Samsung.com/uk	Pantum.com	Brother.co.uk	Hp.com/uk	Canon.co.uk
Overall rating	★★★★½	★★★½☆	★★★★☆	★★★★☆	★★★½☆
Technology	Mono laser	Mono laser	Colour laser	Colour inkjet	Colour inkjet
Max print resolution	1200x1200	1200x600	2400x600dpi	9600x2400	4800x1200
Actual print speed	B=17.1ppm	B=15.8ppm	B=15.9ppm C=8.6ppm	B=17.6ppm C=7.9ppm	B=11ppm C=5.5ppm
Scan/fax facilities	1200x1200 scans	None	None	1200x2400 scans	1200x2400 scans, fax
Supported interfaces	USB 2.0, 802.11b/g/n, NFC	USB 2.0	USB 2.0, 802.11b/g/n	USB 2.0, 802.11b/g/n, HP ePrint	USB 2.0, 802.11b/g/n, ethernet
Cost per page	B=3.8p	B=2.4p	B=2.3p C=11.1p	B=2.4p C=4.8p	B=3.5p C=5.5p
Media card/auto duplex	✗✗	✗✗	✗✗	✓✓	✓✓
Input capacity	150 sheets	150 sheets + manual	250 + 1 sheet	125 sheets + 20 tray + 25 ADF	100 sheets + 30 ADF
Dimensions	406x360x253mm	380x260x236mm	410x465x240mm	454x551x220mm	458x385x200mm
Weight	7.4kg	6.1kg	17.4kg	8.6kg	8.7kg
Warranty	1 year	1 year	1 year	1 year	1 year
Verdict	• Strong print quality • Mobiles connect via NFC • Good specifications • No auto-duplex	• Now available for just £49 • Decent design • No fancy features • Solid running costs	• Fast, high-quality colour • Substantial paper handling • Expensive running costs • Wi-Fi, but no ethernet	• Nice 4.3in touchscreen • Separate photo/ADF trays • Good speed for an Inkjet • Competitive running costs	• Above-average photo quality • Decent running costs • Includes fax, ethernet, Wi-Fi • Stylish looks
FULL REVIEW	TINYURL.COM/OYZKJKE	TINYURL.COM/C764SZ2	TINYURL.COM/P2P27TA	TINYURL.COM/98G9XTE	TINYURL.COM/ON28THH

HP Photosmart 7520 — PC ADVISOR RECOMMENDED

£151+ printers

	1 Kyocera Mita FS-1320D	2 HP OfficeJet Pro X551dw	3 Canon i-Sensys LBP7780Cx	4 Lomond EvoJet 2 Office	5 Xerox Phaser 3610DN
Price	£170 inc VAT	£485 inc VAT	£440 inc VAT	£50-£150 per month	£445 inc VAT
Website	Kyoceramita.co.uk	Hp.com/uk	Canon.co.uk	Lomond.com	Xerox.co.uk
Overall rating	★★★★½	★★★★½	★★★★½	★★★★½	★★★★☆
Technology	Mono laser	Colour inkjet	Colour laser	Colour laser	Mono laser
Max print resolution	1200x1200	2400x2400	9600x600	1600x1600	1200x1200dpi
Actual print speed	B=26.1ppm	B=42.9ppm C=15.8ppm	B=23.2pp C=16.7ppm	B=41.4ppm C=23.1ppm	B=40ppm
Scan/fax facilities	None	None	None	None	None
Supported interfaces	USB 2.0	USB 2.0, ethernet, 802.11b/g/n	USB 2.0, ethernet	USB 2.0, ethernet	USB 2.0, gigabit ethernet
Cost per page	B=1.4p	B=1p C=4.3p	B=1.3p C=7.5p	Variable	B=1.3p
Media card/auto duplex	✓✓	✗✓	✗✓	✗✗	✗✓
Input capacity	250 sheets	500 + 50 sheet	500 + 100 sheets	250 + 20 sheets	700 sheets
Dimensions	375x393x250mm	517x399x414mm	517x530x401mm	542x455x265mm	393x426x315mm
Weight	12kg	17.1kg	31kg	12.8kg	13kg
Warranty	2 years	1 year	1 year	1 year	1 year
Verdict	• No frills business laser • Lacks Wi-Fi and ethernet • Modest running costs • Auto-duplex support	• Capable of immense speed • Potential 1050 sheets input • Very cheap running costs • Text not the darkest	• Immense 1100-sheet capacity • Auto-duplex at 19.9ppm • Excellent colour depth • Secure Print	• Monthly payment plans rather than outright purchase • Stunning speed • No auto-duplex	• Great for up to 10 users • Very fast • Good print quality • Handles substantial volumes
FULL REVIEW	TINYURL.COM/6GG9UKV	TINYURL.COM/CZO5P65	TINYURL.COM/CCAPAJF	TINYURL.COM/CLQAQ5V	TINYURL.COM/PB5CUJU

Kyocera Mita FS-1320D — PC ADVISOR BEST BUY; HP OfficeJet Pro X551dw — PC ADVISOR GOLD; Canon i-Sensys LBP7780Cx — PC ADVISOR RECOMMENDED; Lomond EvoJet 2 Office — PC ADVISOR RECOMMENDED

GLOSSARY: • B: mono • C: colour • ppm: pages per minute

>> Buying advice

Printers

Most printers are inkjet or laser models, and there are colour and mono flavours of each. Lasers tend to be more expensive to buy, but provide better-quality output, particularly where text is involved.

The price you pay instore is only the beginning; also consider the cost of replenishing the ink and paper. Duplexing lets you print to both sides of a sheet, saving paper but slowing output.

Multifunction printers can save you money if you also require scanning facilities; some models include copy and fax functions, too.

A USB port lets you connect a printer to a single PC, but built-in wireless networking allows it to join a home or office network.

A memory card slot will let you bypass a PC for printing.

Never trust a manufacturer's claimed print speeds; we run our own tests to properly assess each printer's performance.

High-capacity paper trays and auto document feeders are also worth looking for. READ MORE: TINYURL.COM/BUX9QMO

Blu-ray drives

	Pioneer BDR-208EBK Retail	Pioneer BDR-208DBK OEM	LG BH16NS40	LG BP40NS20	Lite-On IHES112-115
	1	2	3 PC ADVISOR RECOMMENDED	4	5
Price	£62 inc VAT	£64 inc VAT	£70 inc VAT	£90 inc VAT	£54 inc VAT
Website	Pioneer.eu/uk	Pioneer.eu/uk	Uk.lge.com	Uk.lge.com	Liteonit.eu
Overall rating	★★★★½	★★★★½	★★★★½	★★★★☆	★★★½☆
Blu-ray speeds	15x -R, 14x -R DL, 2x -RE, 12x -ROM	15x -R, 14x -R DL, 2x -RE, 12x -ROM	16x -R, 12x -R DL, 12x -RE, 12x -ROM	6x -R, 6x -R DL, 2x -RE, 6x -ROM	12x -ROM
DVD speeds	16x ±R, 8x ±R DL, 6x -RW, 8x +RW, 16x -ROM	16x ±R, 8x ±R DL, 6x -RW, 8x +RW, 16x -ROM	16x ±R, 8x ±R DL, 6x -RW, 8x +RW, 12x -RAM, 16x -ROM	8x ±R, 6x ±R DL, 6x -RW, 8x +RW, 5x -RAM, 8x -ROM	8x ±R, 8x ±R DL, 6x -RW, 8x +RW, 8x -ROM
Max storage	128GB	50GB	50GB	100GB	8.5GB
Interface type	SATA (internal)	SATA (internal)	SATA (internal)	USB 2.0 (external)	SATA (internal)
Label technology	None	None	LightScribe	None	None
Software	ArcSoft TotalMedia Extreme	None	CyberLink Blu-ray Suite	PowerDVD, PowerProducer	None
Dimensions	148x180x42mm	148x180x42mm	146x170x41mm	160x153x22mm	158x145x22mm
Weight	740g	740g	749g	380g	700g
Warranty	1 year	1 year	1 year	1 year	2 years
Verdict	• Retail pack includes software • Supports 128GB BD-XL media • Very well priced • Matches 208DBK on speed	• OEM only – no software • Great performance on BD-R • Doesn't support BD-XL • 208EBK offers better value	• Pioneer offers faster BD-R • Good RE speed • Doesn't support BD-XL • Comes with software	• Attractive external model • Maxes out at 6x BD-R (most media is only 6x) • Supports triple-layer BD-R	• Playback only • No software included with many bundles • Pioneers offer better value
FULL REVIEW	TINYURL.COM/LD47X7K	TINYURL.COM/LD47X7K	TINYURL.COM/8YTUJEF	TINYURL.COM/BS8UAFF	TINYURL.COM/8SYECMW

Wireless routers

	Apple AirPort Extreme	TP-Link Archer C7	D-Link N600	Asus Wireless-AC1900	TP-Link TL-WDR4900
	1 PC ADVISOR BEST BUY	2 PC ADVISOR RECOMMENDED	3	4 PC ADVISOR RECOMMENDED	5
Price	£169 inc VAT	£105 inc VAT	£60 inc VAT	£189 inc VAT	£80 inc VAT
Website	Apple.com/uk	Tp-link.com	Dlink.com	Uk.asus.com	Tp-link.com
Overall rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Standards supported	802.11b/g/n/ac	802.11a/b/g/n/ac	802.11a/b/g/n	802.11a/b/g/n/ac	802.11a/b/g/n
Frequency modes	2.4GHz/5GHz (concurrent)	2.4GHz/5GHz (concurrent)	2.4GHz/5GHz (concurrent)	2.4GHz/5GHz (concurrent)	2.4GHz/5GHz (concurrent)
Antennae	6x internal	3x external, 3x internal	2x internal	3x external, 3x internal	3x external, 3x internal
128bit/256bit WEP	✓✗	✓✗	✓✗	✓✗	✓✗
Modem/Parental Control	✗✓	✗✓	✗✓	✗✓	✗✓
Firewall	NAT/SPI	NAT/SPI	NAT/SPI	NAT/SPI	NAT/SPI
Ports	Gigabit WAN, 3x gigabit LAN, USB	Gigabit WAN, 4x gigabit LAN, 2x USB	Gigabit WAN, 4x gigabit LAN, USB	Gigabit WAN, 4x gigabit LAN, 2x USB	10/100 WAN, 4x 10/100 LAN, 2x USB
Average power use	Not tested	Not tested	Not tested	Not tested	Not tested
Throughput (near, far, ac)	124, 105, 578/540Mbps	110, 89, 505/468Mbps	142, 115Mbps, N/A	98, 69, 610/570Mbps	127, 111Mbps, N/A
Dimensions, weight	98x168x98mm, 945g	32.5x243x160mm, 508g	111x93x145mm, 330g	160x83x220mm, 640g	243x161x33mm, 1.1kg
Warranty	1 year	3 years	1 year	2 years	1 year
Verdict	• Good all-round performance • Striking design • Easy to get working • Few advanced features	• Good price for 802.11ac • Decent performance • Bland but detailed interface • Stylish	• Cloud features • Parental controls • Interesting looks • Up slightly in price	• Outstanding on 802.11ac • Middling on 802.11n • Clear software interface • AiCloud included	• Fast processor • Excellent features set • 5GHz didn't deliver high speed at short ranges
FULL REVIEW	TINYURL.COM/MFDLLSC	TINYURL.COM/KKJMPCE	TINYURL.COM/9LGFF8Y	TINYURL.COM/K4ZATKV	TINYURL.COM/MUXCBNM

>> Buying advice

Blu-ray drives

A single Blu-ray Disc holds the equivalent of 35 CDs or five DVDs. It might look like a DVD, but its shorter wavelength and narrow blue laser beam allow it to hold greater capacity. It's the storage method of choice for HD and 3D video content.

External drives are easier to install, portable, and can be shared between PCs, but they will cost you considerably more than internal models, and may not be as quick.

If you opt for an internal drive, ensure you have enough space inside your PC. Most internal drives use the SATA interface, so check you've got a compatible port.

Look for a drive that also supports several DVD formats, but don't obsess about write speeds.

You should be able to get 16-speed DVD writing, but it's not worth paying more to save seconds.

You may find that the Blu-ray media currently on the market isn't fast enough to enjoy your chosen drive's maximum write speeds. Six-/eight-speed BD-R capabilities are standard, but even six-speed BD-R media is still rare.
READ MORE: TINYURL.COM/70EPYL6

External hard drives

	1 WD My Passport Edge for Mac	2 G-Technology Professional	3 LaCie Little Big Disk TB	4 G-Technology Thunderbolt	5 Toshiba Stor.E Basics
Price	£70 inc VAT	£250 inc VAT	£919 inc VAT	£599 inc VAT	£100 inc VAT
Website	Wdc.com/en	G-technology.com	Lacie.com/uk	G-technology.com	Toshiba.co.uk
Overall rating	★★★★½	★★★★☆	★★★★☆	★★★★½	★★★★☆
Capacity tested	500GB	4TB	1TB	8TB	2TB
Capacity range	500GB	2TB to 4TB	512GB to 2TB	4TB to 8TB	320GB to 2TB
Disk size	2.5in	3.5in	2.5in	3.5in	2.5in
Spin speed	5400rpm	7200rpm	5400rpm	7200rpm	5400rpm
Transfer speed	94MB/s (USB 3.0)	N/A	635MB/s	329MB/s	94Mb/s (USB 3.0)
Encryption	Password protection	None	None	None	None
Other interfaces	None	FireWire 800	None	None	none
Software	WD utilities	None	LaCie Backup Assistant	None	None
Dimensions	112x83x11mm	235x130x46mm	40x140x85mm	235x130x85mm	119x79x21mm
Weight	164g	1.35kg	650g	2.3kg	215g
Warranty	3 years	3 years	1 year	3 years	1 year
Verdict	• Not just for Macs • Password protection • Faultless build quality • Great value	• 120Mb/s average real-world performance • Clearly audible • Suits both PCs and Macs	• Delivers fantastic performance • Needs mains power • Fan creates plenty of noise	• Fast Thunderbolt interface • Real-world speed can exceed 200MB/s • Pricey, but huge capacity	• Good value for money • Unashamedly simple • No backup or encryption • Slow speed
FULL REVIEW	TINYURL.COM/BMG7SW9	TINYURL.COM/NV7F32F	TINYURL.COM//KRCL3VZ	TINYURL.COM/CXEF6MH	TINYURL.COM/LBHC8EL

NAS drives

	1 Synology DS413j	2 Synology DS1813+	3 Synology DS413	4 Qnap TS-1079 Pro	5 Zyxel NSA325
Price	£276 inc VAT (diskless)	£775 inc VAT (diskless)	£407 inc VAT (diskless)	£2,265 inc VAT (diskless)	£85 inc VAT (diskless)
Website	Synology.com	Synology.com	Synology.com	Qnap.com	Zyxel.co.uk
Overall rating	★★★★☆	★★★★½	★★★★☆	★★★★☆	★★★★½
Drive bays	4	8	4	10	2
Processor	1.6GHz Marvell mv6282	2.13GHz Intel Atom D2700 dc	1067MHz Freescale P1022 dc	3.3GHz Intel Core i3-2120	1.6GHz processor
Memory	512MB DDR3	2GB DDR3	1GB DDR3	2GB DDR3	512MB DDR2
Remote access	✓	✓	✓	✓	✓
eSATA	✗	✓	✓	✓	✗
USB port	2x USB 2.0	2x USB 3.0, 4x USB 2.0	2x USB 3.0, 1x USB 2.0	2x USB 3.0, 4x USB 2.0	2x USB 2.0
Raid options	0/1/5/6/10/JBOD	0/1/5/6/10/JBOD	0/1/5/5+s/6/10/JBOD	0/1/5/5+hs/6/6+hs/10/10+hs/JBOD	0/1/JBOD
Software	DSM 4.1	DSM 4.3	DSM 4.1	Qnap QBack, MyCloudNAS	zPilot
Dimensions	184x168x230mm	175x340x233mm	165x203x233mm	218x327x321mm	108x205x147mm
Weight	2kg	5.2kg	2kg	9.8kg	1.8kg
Warranty	2 years	3 years	2 years	2 years	1 year
Verdict	• Best-value Synology • Aimed at small-office and home users • No USB 3.0 or eSATA	• Massive eight bays • Impressive data delivery • Excellent construction • A few coding errors	• DS413 is better value • DS1813+ has more bays • Versatile, friendly interface • Cloud Station indispensable	• Up to 10 bays • Very powerful processor • Fast performance • Strong specifications	• Cheapest drive here • Decent performance and features for the money • Complex interface
FULL REVIEW	TINYURL.COM/PL8XM8S	TINYURL.COM/PWO4M6J	TINYURL.COM/B562XW3	TINYURL.COM/PAAYD4Y	TINYURL.COM/7B9EPW8

>> Buying advice

NAS drives

NAS drives are ideal for businesses or home users who require large amounts of dependable and secure storage, accessible to anyone logged into the local wired or wireless network.

Instead of connecting a hard disk directly to one PC, the NAS is connected to a network via a router. Many NAS drives are typically supplied without disks, letting you add your own selection.

Most NAS drives allow virtual partitions, letting you keep data such as PC backups separate from media files. Home-oriented NAS drives also include media servers to allow easy streaming of content.
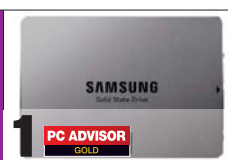
To augment data integrity, access speed, capacity, or all three, individual hard disks can be combined in a number of Raid configurations. Raid 0 'stripes' data across multiple drives to increase access speeds. Raid 1 mirrors the contents of one drive on to another, providing a cloned backup. Raid 5 is available with three-plus drives and combines both advantages.
READ MORE: TINYURL.COM/7H3HCNR

PC ADVISOR TEST CENTRE

Projectors

Projectors	1	2	3	4	5
	Epson EB-1945W	BenQ W1070	Asus P2B	ViewSonic PJD7820HD	Dell M900HD
Price	£1,339 inc VAT	£635 inc VAT	£450 inc VAT	£650 inc VAT	£754 inc VAT
Website	Epson.co.uk	Benq.co.uk	Asus.com/uk	Viewsoniceurope.com/uk	Dell.co.uk
Overall rating	★★★★⯪	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Projection technology	3LCD	DLP	DLP	DLP	DLP
Resolution (pixels)	1280x800	1920x1080	1280x800	1920x1080	1280x800
Brightness[1], Contrast	4200, 3000:1	2000, 10000:1	350, 3500:1	3000, 15000:1	900, 700:1
Image size	280in	235in	20-120in	300in	80in
Supported aspect ratios	16:10, 16:9, 4:3	16:9	16:10, 16:9, 4:3	16:9, 4:3	16:10, 16:9, 4:3
Noise levels (dB)	37 (29 eco)	33 (30 eco)	32 (24 eco)	35 (29 eco)	38 (34 eco)
Connections	VGA, HDMI, DP, CM, USB, ET	VGA, HDMI, CM, USB	HDMI, USB, microSD	VGA, HDMI, CM, USB	HDMI, USB, WiDI
Lamp/lamp life	Not supplied/2500 hrs	240W/6000 hrs	LED/30000 hrs	Not supplied/5000 hrs	LED/30000 hrs
Dimensions	377x271x108mm	312x244x109mm	143x130x35mm	268x221x84mm	232x164x43mm
Weight	3.9kg	2.65kg	1.4kg	2.1kg	1.59kg
Warranty	5 years	2 years	1 year	3 years	1 year
Verdict	• Incredibly easy to find optimum image quality • Strong spec and quality • Not particularly portable	• Good home cinema output • Short-throw lens creates big picture • Very good SmartEco option	• Very stylish and portable • Short-throw lens creates large picture • Easy to set up	• 3000 ANSI lumens • Short-throw lens • Good colour depth • 3D option	• Wonderfully petite, portable • WiDi and Miracast for wireless/portable devices • Will struggle in light offices
FULL REVIEW	TINYURL.COM/CP95P7G	TINYURL.COM/LXADR7Q	TINYURL.COM/JWV6PD6	TINYURL.COM/D2HO4CV	TINYURL.COM/MAXQRG3

[1]Ansi lumens GLOSSARY: • CM: component • CP: composite • ET: ethernet • SV: S-Video

Solid-state drives

Solid-state drives	1	2	3	4	5
	Samsung 840 EVO	Plextor M5 Pro	Crucial M500	Samsung 840 Pro	Integral 512MB
Price	£389 inc VAT	£174 inc VAT	£270 inc VAT	£365 inc VAT	£277 inc VAT
Website	samsung.com/uk	Plextor.com	Crucial.com/uk	Samsung.com/uk	Integralmemory.com
Overall rating	★★★★⯪	★★★★⯪	★★★★⯪	★★★★☆	★★★⯪☆
Capacity tested	750GB	256GB	480GB	512GB	512GB
Price per GB	52p	68p	56p	71p	54p
Memory cache	1GB LPDDR2	512MB DDR3	512MB DDR3	512MB LPDDR2	N/A
Controller	Samsung MEX (3-core ARM)	Marvell 88SS9187	Marvell 88SS9187	Samsung MDX (3-core ARM)	Phiso
Encryption	AES 256-bit	AES 256-bit	AES 256-bit	AES 256-bit	None
Flash	Samsung 19nm Toggle NAND	Toshiba Toggle NAND	Micron 20nm MLC NAND	Samsung 21nm Toggle NAND	Toshiba NAND
Firmware updated via	SSD Magician for Windows	ISO boot disc	ISO boot disc	SSD Magician for Windows	N/A
ATTO peak sequential	R: 554MB/s; W: 537MB/s	R: 547MB/s; W: 457MB/s	R: 539MB/s; W: 433MB/s	R: 562MB/s; W: 519MB/s	R: 557MB/s; W: 511MB/s
CDM peak IOPS	104k (read)	103.3k (read)	89.8k (read)	103.8k (read)	92.8k (read)
AS SSD (points)	1141	1124	1038	1094	1057
Warranty	5 years	5 years	3 years	5 years	2 years
Verdict	• Lightning performance • 840 Pro is slightly faster • Great value for money • Good longevity	• High performance figures • Nowhere near the value per gigabyte of the EVO • Very durable	• Best value of all SSDs here • Good security • Decent speed • Multiple OS support	• Impressive speed • Three-core ARM processor • Limited platform support • Bluetooth issues on test	• Relatively slow for SSD • Good value for money • Incredibly small and light • No UASP support
FULL REVIEW	TINYURL.COM/L5EDQOY	TINYURL.COM/PTYGG27	TINYURL.COM/M2NCSMJ	TINYURL.COM/OU4LEJG	TINYURL.COM/PN5Z67G

>> Buying advice

Projectors

Projectors designed for home use don't tend to be as bright as office models – anything offering fewer than 1000 ANSI lumens will be usable only in a dark room. And don't forget that the brightness drops as the image size increases.

The cheapest home-cinema models offer a 720p resolution, but you'll notice the extra detail of 1080p when watching Blu-ray films on a large screen.

If you can't place the projector square-on to the screen, look for a model with lens shift. Keystone correction is a cheaper alternative, altering the image digitally, but degrading quality in the process.

A zoom function offers more flexibility over how far from the screen you can site the projector. If it's to go in a small room, get a short-throw model that produces a large image over a short distance.

DLP projectors offer better contrast and punchier colours than LCD models, but can suffer from the distracting and sometimes nauseating 'rainbow effect'. READ MORE: TINYURL.COM/6MTMWJX

Sub-£150 graphics cards

	1 MSI GTX 650 Ti OC Boost	2 Sapphire HD 7770	3 HIS HD 7790	4 MSI GeForce GTX 650	5 Sapphire Radeon HD 7750
Price	£140 inc VAT	£90 inc VAT	£100 inc VAT	£80 inc VAT	£80 inc VAT
Website	Uk.msi.com	Sapphiretech.com	Hisdigital.com	Uk.msi.com	Sapphiretech.com
Overall rating	★★★★½	★★★★☆	★★★½☆	★★★★☆	★★★½☆
Graphics processor	nVidia GTX 650 Ti Boost	AMD Radeon HD 7770	AMD Radeon HD 7790	nVidia GeForce GTX 650	AMD Radeon HD 7750
Installed RAM	2GB GDDR5	1GB GDDR5	1GB GDDR5	1GB GDDR5	1GB GDDR5
Memory interface	192-bit	128-bit	128-bit	128-bit	128-bit
Core/memory clock	1033MHz/1502MHz	1GHz/1125MHz	1075GHz/1.6GHz	1071MHz/1250MHz	800MHz/1125MHz
Ramdac	400MHz	400MHz	400MHz	400MHz	400MHz
Stream processors	768	640	896	384	512
Power connectors	1x 6-pin	1x 6-pin	1x 6-pin	1x 6-pin	None
Interface	PCI Express	PCI Express	PCI Express	PCI Express	PCI Express
DirectX	11	11.1	11	11	11
Digital interface	2x DVI, HDMI, DisplayPort	DVI, HDMI, Mini DisplayPort	2x DVI, HDMI, DisplayPort	2x DVI, Mini HDMI	DVI, HDMI, DisplayPort
Warranty	3 years	3 years	3 years	3 years	2 years
Verdict	• Fantastic performance • 192-bit memory interface • Boost clock to 1098MHz • Fairly quiet for the power	• Faster than 650 and 7750 • Decent value for money • Plenty of stream processors • Low sound levels	• 650 Ti Boost much faster • Becoming better value • Only 128-bit memory • Low noise	• Marginally slower than 7770 • Superb overclocking • Very different to 650 Ti • MSI version has second fan	• Cheapest card in the chart • Low specs include 800MHz core clock • Lacks power in some games
FULL REVIEW	TINYURL.COM/DYE3OW8	TINYURL.COM/BWJ7BL9	TINYURL.COM/BPRUYS5	TINYURL.COM/AKT2XOM	TINYURL.COM/7ZB5OE3

£151+ graphics cards

	1 HIS R9 280X iPower IceQ X2	2 MSI GeForce GTX 760 OC	3 Asus GeForce GTX 770 2GB	4 Asus GeForce GTX 780 3GB	5 XFX 7970 3GB GDDR5
Price	£240 inc VAT	£190 inc VAT	£280 inc VAT	£430 inc VAT	£270 inc VAT
Website	Hisdigital.com	Uk.msi.com	Uk.asus.com	Uk.asus.com	Xfxforce.com
Overall rating	★★★★½	★★★★½	★★★★½	★★★★☆	★★★½☆
Graphics processor	AMD Radeon R9 280X	nVidia GeForce GTX 760	nVidia GeForce GTX 770	nVidia GeForce GTX 780	AMD Radeon HD 7970
Installed RAM	3GB GDDR5	2GB GDDR5	2GB GDDR5	3GB GDDR5	3GB GDDR5
Memory interface	384-bit	256-bit	256-bit	384-bit	284-bit
Core/memory clock	850MHz/1.5GHz	1006MHz/1502MHz	1058MHz/1752MHz	863MHz/1502MHz	925MHz/1375MHz
Ramdac	400MHz	400MHz	400MHz	400MHz	400MHz
Stream processors	2048	1152	1536	2304	2048
Power connectors	2x 8-pin	1x 6-pin, 1x 8-pin	1x 6-pin, 1x 8-pin	1x 6-pin, 1x 8-pin	1x 6-pin, 1x 8-pin
Interface	PCI Express	PCI Express	PCI Express	PCI Express	PCI Express
DirectX	11	11	11	11	11.1
Digital interface	DVI, HDMI, 2x Mini-DP	2x DVI, HDMI, DisplayPort	2x DVI, HDMI, DisplayPort	2x DVI, HDMI, DisplayPort	DVI, HDMI, 2x Mini DisplayPort
Warranty	2 years	2 years	3 years	3 years	2 years
Verdict	• Only a little slower than 770 • Much faster than 760 • Great value for money • Nothing radically new	• Significantly lower performance than 280X • Not many stream processors or texture units	• 280X only slightly slower, but much cheaper to buy • High performance • Good clock speeds	• Getting more affordable • Removes the Titan's Compute capabilities • Best choice for gaming	• Performance barely superior to cheaper 760 • 3GB of RAM • Look out for price drops
FULL REVIEW	TINYURL.COM/OWVAP37	TINYURL.COM/OPSNB5K	TINYURL.COM/OAG6277	TINYURL.COM/PN43VTL	TINYURL.COM/6UZRVXC

>> Buying advice

Graphics cards

The key feature of a graphics card is its GPU. Produced by AMD or nVidia, this determines the quality of images displayed and their refresh speed. The more powerful the GPU the better, but you can get away with a lesser card by turning down a game's detail levels.

Even those on a budget should be able to get at least 1GB of DDR video memory. Look for GDDR5 rather than GDDR3 RAM. This in effect quadruples the clock speed (GDDR3 merely doubles it).

The memory interface (or bus) governs how much data can be sent at once, so a 256-bit interface lets through twice as much data as a 128-bit interface. Graphics cards with the best combination of memory interface size and clock speed should produce the best performance.

DirectX 11.x support is required for advanced, modern games; cheaper cards lack the firepower to do such titles justice, however.

Check that a card will fit inside your PC and you have sufficient connections from the power supply unit before you buy.
READ MORE: TINYURL.COM/7BPUHQE

PC ADVISOR TEST CENTRE

Sub-£200 flat-panels

	1 Dell S2440L	2 Samsung S24C650PL	3 ViewSonic VP2365-LED	4 BenQ GW2750HM	5 Hanns-G HL249DPB
Price	£198 inc VAT	£195 inc VAT	£171 inc VAT	£200 inc VAT	£116 inc VAT
Website	Dell.co.uk	Samsung.co.uk	Viewsoniceurope.com/uk	Benq.co.uk	Hannsg.com
Overall rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Screen size	24in	23.6in	23in	27in	23.6in
Panel type	Vertical alignment	Plane-to-line switching	In-plane switching	Vertical alignment	Twisted nematic
Native resolution	1920x1080	1920x1080 pixels	1920x1080	1920x1080	1920x1080
Pixel pitch	0.28mm	0.27mm	0.27mm	0.31mm	0.27mm
Brightness	239cd/m²	250cd/m²	238cd/m²	313cd/m²	247cd/m²
Static contrast ratio	1200:1	760:1	681:1	1530:1	740:1
Response time	6ms	5ms	6ms	6ms	5ms
Ports	HDMI, VGA	HDMI, DP, VGA	DVI	HDMI, DVI, VGA	DVI
Dimensions	568x191x418mm	555x357x224mm	548x433x250mm	654x489x191mm	563x211x403mm
Weight	3.6kg	5.5kg	5.4kg	5.6kg	3.8kg
Warranty	3 years	3 years	3 years	3 years	3 years
Verdict	• Recent price drop • Premium build quality • Very good VA panel • Calibrate for best results	• Simple but attractive design • Good image quality • PLS tech similar to IPS • Passive USB 2.0 hub	• Can't match Dell's quality • Still strong value • Good viewing angles • DVI port only	• Price up as supplies fall • Massive 27in screen • VA panel is excellent • Colour accuracy not perfect	• Low price • Pleasing image quality • Low power consumption • Only a TN panel
FULL REVIEW	TINYURL.COM/CXWJJLM	TINYURL.COM/LU88PY7	TINYURL.COM/5WMJLR9	TINYURL.COM/BQKT65S	TINYURL.COM/C95859A

£200+ flat-panels

	1 BenQ GW2760HS	2 LG 29EA93	3 Philips 272P4	4 Asus PA248Q	5 AOC I2757Fm
Price	£216 inc VAT	£365 inc VAT	£273 inc VAT	£320 inc VAT	£228 inc VAT
Website	Benq.co.uk	Uk.lge.com	Philips.co.uk	Asus.com/uk	Aoc.co.uk
Overall rating	★★★★☆	★★★★½	★★★★☆	★★★★☆	★★★★☆
Screen size	27in	29in	27in	24in	27in
Panel type	A-MCA	In-plane switching	Plane-to-line switching	In-plane switching	In-plane switching
Native resolution	1920x1080	2560x1080	2560x1400 pixels	1920x1200	1920x1080
Pixel pitch	0.31mm	0.26mm	0.23mm	0.27mm	0.31mm
Brightness	300cd/m²	300cd/m²	300cd/m²	201cd/m²	237cd/m²
Static contrast ratio	950:1	560:1	530:1	630:1	660:1
Response time	4ms	5ms	6ms	6ms	5ms
Ports	HDMI, DVI, VGA	3x USB 3.0, 2x HDMI, DVI, DP	3x USB 3.0, DVI, DP, 2x HDMI	4x USB, HDMI, DVI, DP, VGA	2x HDMI, VGA
Dimensions	472x191x623mm	700x209x387mm	639x580x242mm	557x416x235mm	622x449x130mm
Weight	4.5kg	5.2kg	8.5kg	6.4kg	5.7kg
Warranty	2 years	2 years	3 years	3 years	3 years
Verdict	• Stunning value for a 27in screen this good • Almost true 1,000:1 contrast • Great performance	• 21:9 ultra widescreen • Very accurate colours • Hardware calibration support • Three-port USB 3.0 hub	• Great performance • Pivot, height-adjust stand • USB 3.0 connectivity • Advanced features	• For graphics professionals • Good control over image • Very accurate colour • 16:10 display ratio	• Nice 27in IPS panel • Versatile viewing angles • MHL Android hook-up • Last few remaining
FULL REVIEW	TINYURL.COM/NF3WVFY	TINYURL.COM/CTR7AAW	TINYURL.COM/QXX22QC	TINYURL.COM/CPYX7MQ	TINYURL.COM/C53K8KP

>> Buying advice

Flat-panel displays

You'll spend most of your working day staring at the screen, so it makes sense to choose one that's comfortable to view.

The panel size will largely depend on your budget and amount of desk space, but those measuring 22in and above tend to offer a full-HD resolution. All bar the cheapest models also have at least one digital interface (DVI, HDMI or DisplayPort). VGA (or D-Sub) is an analogue interface, and won't provide as clean a signal.

The panel technology is important. Twisted nematic (TN) is the budget option, offering fast response times but limited viewing angles. Multiple vertical alignment (MVA) and patterned vertical alignment (PVA) screens offer better viewing angles and higher contrast ratios than TN, but slower response times. Advanced MVA screens are more responsive.

In-plane switching (IPS) panels offer excellent viewing angles, contrast and colour accuracy, but they can be rather pricey.

Get a matt rather than gloss coating for fewer reflections.
READ MORE: TINYURL.COM/6RMBVR6

MATT EGAN

Why a Windows PC is much better than a Mac

T he battle between Windows and Mac is both less important and less clear cut than once it was. But it still matters and *PC Advisor* is here to fight for Windows.

Only the Windows world offers variety. Apple produces only five kinds of OS X computer: two laptops, the Mac mini, the iMac and the Mac Pro. Missing from Apple's arsenal: convertible laptop-tablets, tablets (iPads don't run OS X), and gaming rigs.

More importantly, you can't buy a Mac for less than £499, and that's the Mac mini – hardly a workhorse. You can pick up a decent Windows laptop from Dell, HP or Lenovo for as little as £350. Less if you are prepared to shop around.

Most Macs offer decent value, but they are not cheap. And they cater to a wealthy, high-end clientele. If you want a value computer you need to look to the Windows world.

Then there is gaming. This is the golden age of Mac gaming, and it sucks. Yes, lots of big-name franchises have ports that work on Mac, and yes, there is no inherent reason for Macs not to run demanding games. You can also access Steam from a Mac.

But no serious gamer is going to be trapped into Apple's walled garden. There are infinitely more games available for Windows, from casual games up to the biggest, baddest games. You could get a decent Windows gaming rig for the cost of a Mac mini – and with onboard graphics the mini is useless for playing all but the simplest games.

"There are no viruses in the OS X world," I hear Mac users say. And "You don't need antivirus on a Mac." The first statement is untrue; the second debatable. You are less likely to be infected by a virus if your computer is a Mac. This is partly because OS X (a UNIX-based system) is built in such a way that it is more difficult to infect than is a Windows PC.

It is also true that fewer criminals attempt to hack Macs because there is a smaller user base.

But Macs are not inherently secure. They get malware, and that will become a bigger deal as Mac market share grows. Moreover, the vector of attack these days tends to be social rather than technical. You are more likely to be phished for bank details, or persuaded to click a dodgy link on Facebook, than you are hit by a driveby malware exploit.

Windows is far from perfect. But at least Windows users know that. We are more likely than our Mac brethren to run security software. Windows 8 comes with antivirus baked in. It is, as Kylie once sang, better the devil you know.

And finally: software support. There are plenty of programs to run on your Mac. Most major programs have Mac versions. But that's most, and not all. And they are often ports of software developed for Windows.

The Windows world is a feast of free- and shareware, downloads that do just about anything. On the Mac side you have to change the settings to install anything that isn't approved by Apple itself. It means the software all works well, but your choice is limited.

So, go for a Mac if you have money to burn, aren't a serious gamer, and value a controlled experience over freedom of choice. Go for Windows for variety, value and the option to customise.

Basically, get a Windows PC. ⌧

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TEST CENTRE Gaming PCs
The PC is still king when it comes to gaming, no matter what Xbox and PlayStation aficionados say. We've rounded up the best-value gaming systems.

TEST CENTRE Android Antivirus
The open nature of Android makes the threat of malware and viruses very real. We reveal which security app is the best.

Get fit with tech kit
As a new year begins, we show you how to get in shape by using wearable tech to monitor and motivate you to leave your computer desk and get active.

Best web browsers
Do you use Internet Explorer to browse the web? We benchmark six of the most popular browsers and show you what's on offer in Firefox, Chrome and more.

Keep your data safe online
We explain how to encrypt your data in the cloud, whichever online storage service you use.

Double the screen, double the excitement
The UltraWide 21:9 display with Multiview

298X4QJAB

Take your viewing experience to the limit with the UltraWide 298X4QJAB display with Multiview. Connect and view two different sources at same time in picture-by-picture or picture-in-picture mode. Follow the game while checking email or watch a movie while chatting on social media – you can access nearly any device with the HDMI, DVI and DisplayPort connections. The sleek Ultra Narrow Bezel maximizes your viewing area with a touch of style. No matter what you're doing, you'll be impressed by the ultra-high 2560 x 1080 resolution and IPS panel that delivers true-to-life colors and unbelievable 178-degree viewing angles.

IPS AH

multiview

Ultra Narrow Bezel

Crystalclear

SS← dvi HDMI D SmartConnect

PHILIPS

Philips Displays are available from the following Distributor partners:

BT Business Direct   SCAN computers   MISCO.co.uk   Insight