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A keyboard is the gateway to your computer, and the component with which you'll literally have the most hands-on time. We get dexterous with eight high-quality mechanical keyboards.

70 Soundbars on test
Sick of putting up with sound that's as thin as your TV? We review six soundbars that are easy to set up, look stylish in your living room, and boost your audiovisual viewing pleasure.

80 Microsoft Office 2013
Designed for touchscreens as well as traditional PCs, Microsoft Office 2013 is accessible on the latest-generation mobile devices. We take an in-depth look at the 2013 instalment of Microsoft's productivity suite, introducing the all-new Word, Excel, PowerPoint, Outlook, OneNote, Publisher and Access.

88 3D printing
Apple has launched the iPhone 17. Rather than queueing up to get your hands on this shiny new 9G handset with holographic display and 1,024-core CPU, you simply download the design from Apple's site and print it out at home. 3D printing is what makes this insane idea a potential reality.

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It's that time of year again, as we present our roll-call of honour for the best of the past year's technology, and our guide to the brands you can trust and the sites from which you can buy.

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Tech Help

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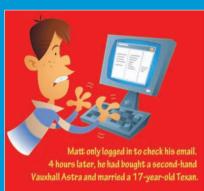
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MATT EGAN

All-in-one PCs: everything to everyone

Make your next PC an all-in-one and you can dispense with your PC, TV and set-top box

Recently I was fortunate enough to spend a day with *PC Advisor* readers. No, not all 5.2 million of you; I am but one man. I hung out with 10 competition winners testing Windows 8 tablets, laptops and an all-in-one PC.

Their reaction to the variety of form-factors available in the Windows world was intriguing. Each device was admired and coveted, but for a variety of different uses. So, the reader who is a father to young children liked a robust touchscreen laptop with which his kids could play. A travelling businessman wanted a tablet-laptop hybrid that allowed him to create a presentation on the move, and then present it in tablet format. Lots of people wanted the tablet for lots of reasons, and we know how popular laptops are – particularly when they are fast and portable.

The popularity of the all-in-one PC intrigued me, though. It shouldn't have been a surprise that our current Best Buy – the stunning 27in Dell XPS One 27 Touch – was a hit. (You can read why it's so good on page 58.) But I was interested by the versatility our readers saw in all-in-ones.

One person thought a big-screen PC would be ideal for his work-life, allowing him to do away with his multiple-monitor setup and save desk space. Several people envisioned an all-in-one PC as the centrepiece to the living room – a PC, yes, but also a touchscreen TV, movie theatre, photo frame and video-caller. One reader fancied an all-in-one as a gaming rig, which would live in his bedroom, but is portable enough to sling in the car and take to a mate's house. Yet another wanted a PC that could reside in his home office, but easily move to the front room for movie nights, and the kitchen for when he was cooking up a storm.

There's something about all-in-one PCs. They're the last great hope for the desktop – the only category of PC not built for mobile use that you can expect to continue to grow. Yet all-in-ones are, on the face of it, less versatile than traditional desktop PCs. It's difficult to upgrade the components, and you are stuck with the display with which they are built.

But as smartphones, tablets and Ultrabooks proliferate, we expect our computers to behave like consumer goods. We want to pick up something off the shelf, plug it in, and use it. And that's it. Desktop PCs require setting up; all-in-ones don't.

We want our PCs to look good, too – typically, all-in-ones fulfil this requirement. Indeed, a good all-in-one PC can replace both the TV and set-top box in your lounge. Pair one of the soundbars from our group test (page 70) and you'll have a web-connected multimedia hub that can also run Office 2013 (see page 80), and on which you can check your email and write a report – or pretend to do so as you watch the footy or play Crysis 3 (see page 48). ☒

Reader comments

letters@pcadvisor.co.uk

International barriers

We possess the most incredible data system the world has ever known. The internet removes international barriers by allowing us to access information on any place, and freely communicate with people anywhere.

We can also enjoy our choice of entertainment – to an extent. Why is it that invisible barriers are still able to prevent us from accessing certain content broadcast elsewhere in the world?

Likewise, whereas eBay and Amazon permit worldwide buying and selling, some companies continue to live in the Dark Ages, and refuse to accept any currency other than their own. It's time action was taken. **Michael Wilson**

Better to be safe than sorry

Despite what you say about internet security (May issue, page 31), I'd rather be out of pocket than go it alone. It's a scary world out there. **Brian Martin**

pcadvisor.co.uk

Smart watches

Samsung is the latest company to announce that it will produce a Galaxy-branded smart watch (tinyurl.com/cpsstcy). Previous gadget watches have failed to take off, but whether the new product category will prove popular remains to be seen (see page 146 for comment). "Let's wish it more success than the great Sir Clive Sinclair's Black Watch," wrote *Murray Snudge*.

Bigger, but not better

Today's flagship smartphones are a darn sight larger than those of a year ago (see page 12), and not everyone is happy about it. "What's up with these phones – they keep on getting bigger and bigger. If you want a phone this big, go out and buy a tablet," wrote *Mrabboh* on our Galaxy S4 vs S III comparison (tinyurl.com/cjb4sp4).

TV signal at risk

With the news that 4G networks could wipe out the signal on more than 40,000 TV sets and cause problems for 2.3 million homes (see page 14), readers were up in arms.

Dale Walford wrote: "I was under the impression that significant whitespace

had been bought up to prevent this kind of silliness. I hope I'll be able to claim back the cost of my filter from 4G providers."

Grumpy Pensioner chirped in: "I certainly don't have the money to pay out for a filter or an engineer to fit it, nor pay for Sky TV – Freeview is all most pensioners can afford (and there is still more than enough rubbish, without paying for even more of the same!)."

Dagonwalker added: "It's not so long ago I had to buy a set-top box for the digital switchover – not that I've enjoyed using the extra channels. There's very little quality entertainment, unless you like shopping programmes or repeats. If the signal is lost then it's the TV authorities loss, not mine."

Flagged: Star letter

More money than sense

I read the first paragraph of the T+A E-Series Music Receiver review (May issue, page 40) before glancing across to the price... £2,690. How much?! A powerful amplifier, CD player, analogue tuner and wired/wireless network receiver, internet radio, blah, blah, blah. All for the bargain price of £2,690. It got me wondering why people buy these products. With their dated, fluorescent displays, these unattractive boxes seem to be living in another age.

Why not look instead to the £1,249 13in Apple MacBook Pro 2.5GHz with Retina display. Rather than look at a little fluorescent display, you can view album art at a startling resolution from across the room. A CD/DVD drive is easily added with Apple's Smart Drive (£69), and all other connectivity is covered.

iTunes, free, takes care of playback; Apple TV, £99, handles streaming of your media across the network. You could probably even afford an HDTV to plug it into, and a quality home-cinema system, including speakers, or a hi-fi amplifier, and still spend less than £2,690. Best of all, you could even use the Macbook for other stuff when not listening to music. *John Miles*

Our Star letter writer wins a six-month subscription to Netflix. Sign up at Netflix.co.uk to watch instantly. For your chance to win, tell us your thoughts on any tech issue:

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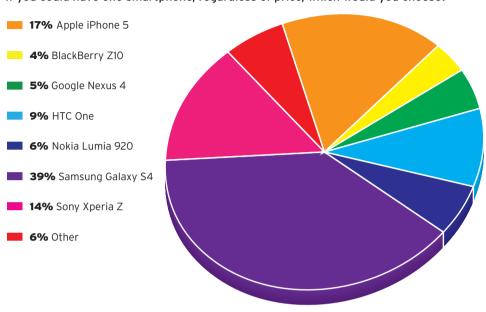
pcadvisor.co.uk/polls

If you could have one smartphone, regardless of price, which would you choose?

- **17%** Apple iPhone 5
- **4%** BlackBerry Z10
- **5%** Google Nexus 4
- **9%** HTC One
- **6%** Nokia Lumia 920
- **39%** Samsung Galaxy S4
- **14%** Sony Xperia Z
- **6%** Other

Based on 4,480 votes, tinyurl.com/d3hhd35

Android's era

Apple's iPhone is the phone to beat, and the only plausible reason for not owning one is that you can't afford to. Cash-strapped users are instead forced kicking and screaming to use an Android, Windows Phone or BlackBerry handset, which, aside from a cheaper price, have no discernible advantages over the iPhone.

That's certainly how some people regarded the mobile market only a year or two ago. In reality, the now-mature Android, as well as Windows Phone and BlackBerry, present serious competition to Apple's premium handset.

Our recent poll, left, asked which smartphone you would choose if money was no object. We saw some very interesting results: while the iPhone remains undoubtedly popular, it no longer leads public opinion.

amonra I would like the new Galaxy S4 just to lord it over my other half.

mordwydd I already have the phone I want: a Galaxy Note. The screens are too small on the others.

bremner As a dedicated Apple fan it would take a great deal to lure me away from the iPhone. It integrates seamlessly with my iPad, iMac and Apple TV. But the iPhone 5 has been very underwhelming and the Galaxy S III seems to offer much more. The next iPhone will have to be very good to keep up, and extremely good to overtake Samsung.

Woolwell The Galaxy S III is very good, has more features than the iPhone 5, is cheaper and, as a phone, may be better, but the overall package swayed me toward the iPhone. It is only after you have used the iPhone and seen how it seamlessly integrates with even a Windows PC that you realise how far behind the competitors are. ⊠

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Windows 8 price drop

In March Microsoft 'accidentally' dropped the price of its Windows 8 Pro upgrade from £190 to £44 (see page 13). Not all of you jumped to take advantage, though.

Kevin Campbell: It's because it can't sell the rubbish and it needs to boost the numbers so Windows 8 doesn't look like a massive failure. Long live Windows 7!

Tara O'Brien: I would not pay £5.99 for it!

Brett Nocturnus Caporato: Last week I bought a new laptop with Windows 8 preinstalled. Words can't say how awful it is. The worst operating system ever, in my opinion. I would rather use Windows 3.1 than this load of tosh!

Alan McClean: The price needs to come down to £25 as it is still an expensive update.

Ian Mann: I love Windows 8, and I have been using it since October 2012.

Paul Drew: I love Windows 8! I've still got Windows 7, but I hardly use it now.

Samsung targets the iPhone

Our Facebook fans have been lapping up any snippets of information on the Galaxy S4, which was announced by Samsung as we went to press. One such nugget correctly claimed the S4 would feature eye-tracking technology that enables you to scroll up and down a web page using only your eyes. "Perhaps Samsung will rename the S4 as the eye-phone," joked *Lee Batchelor*. We're sure Apple's lawyers are waiting.

Save your money

Mark Blackford can't see the sense in paying over the odds for a high-end smartphone when the same functionality is available at much lower cost. "The problem with all these high-end smartphones is you pay a premium for the phone package when you don't need all the included minutes and texts. Most people have a home broadband connection for getting online, too," he wrote. "With my most recent upgrade I managed to keep my costs at £15 per month with all-I-can-use data, many minutes and texts that I'll never get through, and a workable device. I could pay twice as much, but I'd do so only to feel as though I am in fashion."

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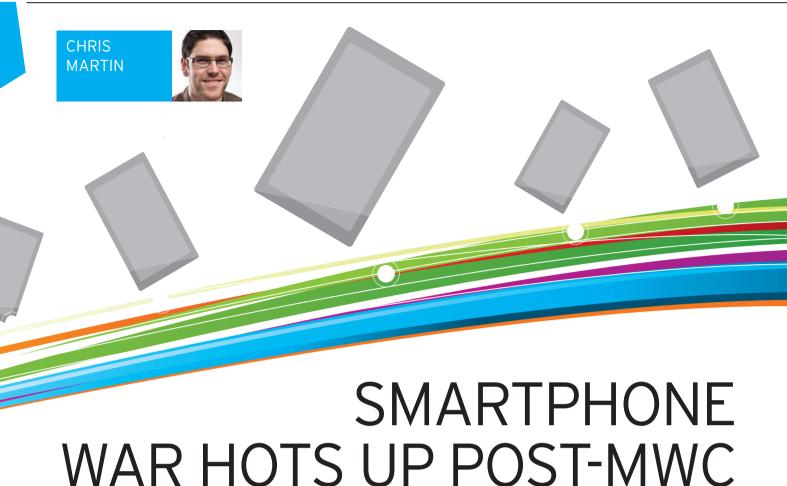
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SMARTPHONE WAR HOTS UP POST-MWC

New 'phablets' product category joins the already congested smartphone, tablet and hybrid market

The never-ending battle for best smartphone has reached new heights post-Mobile World Congress (MWC). This year's show, held in Barcelona, saw an influx of smartphone-and-tablet hybrids known as 'phablets'. In essence small tablets with calling functionality, a typical phablet will also include a stylus.

Device makers including ZTE, Samsung, LG and Asus displayed phablets of all sizes at MWC. See New Products (page 24) to check out the Samsung Galaxy Note 8.0, Asus Fonepad, ZTE Grand Memo and more.

For those who would rather carry a single device than both a phone and a tablet, a phablet may well appeal. The results of a recent PCA poll suggests that 35 percent of respondents plan to buy one this year.

There has also been plenty of big smartphone launches of late, with the Sony Xperia Z, HTC One (both reviewed on page 36) and Samsung Galaxy S4 stealing many of the headlines. Nokia is making an increasing number of Windows Phone 8 handsets at all price points, and even BlackBerry is hoping for a comeback with its BlackBerry Z10 smartphone running BlackBerry 10 OS.

> **By the end of 2017 IDC forecasts 1.5 billion smartphones will be shipped worldwide**

As usual, the year has kicked off with smartphone launches at both CES and MWC. However, reminiscent of Apple's keynotes, more vendors are holding their own events to launch flagship devices.

It makes sense: at a huge show such as MWC, each manufacturer is fighting for the attention of media attendees. Having a solo launch means the spotlight is directed on a single device.

Samsung waited some time after MWC 2012 to launch its Galaxy S III, which surfaced in May last year. HTC also managed to successfully steal the limelight by announcing its One at a London launch event just before MWC 2013. Samsung's Galaxy S4, meanwhile, was announced as we went to press a month after MWC.

We're awaiting further details on the arrival of the Google Nexus 5 and Apple's next iPhone handset, too.

Research firm IDC forecasts that for the first time manufacturers will ship more smartphones than feature phones in 2013. The firm predicts smartphone shipments will surpass 918 million units worldwide.

This figure is based in part on the falling price of smartphones, as well as increased availability and consumer interest worldwide. The rollout of 4G LTE networks has also had a positive impact.

"By the end of 2017 IDC forecasts 1.5 billion smartphones will be shipped worldwide" said IDC.

The competition has become so fierce that even the manufacturers have resorted to criticising rival products. Following the launch of the S4, HTC released a statement that said its plastic build "pales in comparison to the all-aluminium unibody HTC One". And Apple marketing CEO Phil Schiller has openly condemned the Android OS for its fragmentation.

MICROSOFT DROPS WINDOWS 8 PRICE 'IN ERROR'

Software giant's 'accidental' Windows 8 Pro price cut rumoured to be a cunning marketing ploy

Microsoft dropped the price of Windows 8 Pro in March, which it claims was an error.
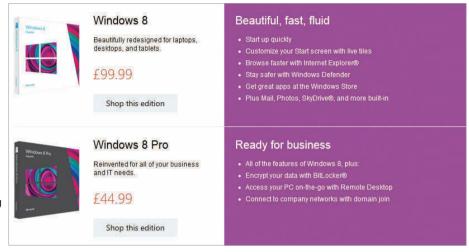
With no announcement, Microsoft slashed the price of a Windows 8 Pro operating system upgrade from £190 to just £44 in its UK online store. With a regular Windows 8 licence costing £99, the Windows 8 Pro licence had dropped to less than half its price.

The unexpected change came just over a month after Microsoft ramped up the price of Windows 8 following its initial £25 upgrade offer.

Microsoft waited a day before confirming its error and correcting the price. It has promised to honour any sales of Windows 8 Pro at the cheaper price.

It said: "Due to an error in our system, Windows 8 Pro was available on the Microsoft Online Store in the UK at a price that was advertised lower than our regular Microsoft Store price.

"This pricing error has been corrected and we are honouring all legitimate purchases that occurred while we worked to resolve the issue. We sincerely apologise

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for any inconvenience our customers may have experienced."

Genuine error or marketing ploy?

Windows 8 has seen disappointing sales since its launch. It is debatable whether Microsoft made an innocent mistake or the price drop was in fact a clever marketing ploy to reignite interest in Windows 8.

However, Microsoft has deliberately discounted OEM licence sales to encourage new computer sales.

"If you think about the components in a PC, almost every one has dropped off a [price] cliff," said Allan Krans of Technology Business Research. "Except for the OS. Microsoft's pricing is the one lever it has left that can impact PC prices."

Google Play celebrates 1st birthday with a sale

Microsoft, BlackBerry play catch-up as app sales hit record-breaking levels

In March 2012 Google rebranded Android Market as Google Play, adding to its app store music and books. Movies, magazines and hardware devices have since found their way into Google Play. To celebrate its first anniversary, the one-stop shop held a sale across all its content categories.

Google said: "Since no birthday is complete without presents, we're celebrating with a bunch of special offers across the store on songs, TV shows, movies and books."

The firm also announced new payment methods in the UK, including the ability to add a purchase to your mobile phone bill or pay using a gift card.

Google Play now has more than 700,000 apps and games on offer in the Play Store, plus more than five million books and 18 million songs. Apple's App Store, meanwhile, has 775,000 apps for iPhone, iPad and iPod touch, and in January it announced it had hit 40 billion downloads.

Eddy Cue, Apple's senior vice president of internet software and services, said: "Developers have made over $7bn on the App Store, and we continue to invest in providing them with the best ecosystem so they can create the most innovative apps in the world."

Meanwhile, the BBC has announced it will bring its iPlayer catch-up TV service to Windows Phone, but the OS remains on a serious catch-up mission with around 130,000 apps. It's still missing big-name apps such as Dropbox and Instagram, too.

BlackBerry 10 launched with a web-based version of iPlayer, yet its app store, now known as BlackBerry World, has even fewer apps than Windows Store. At press time it had 100,000 apps.

Thousands of apps are added on a weekly basis, although many of the big-name apps BlackBerry said would be forthcoming, including Skype and Kindle, have yet to make an appearance.

O2 takes on Skype with TU Go

O2 has unveiled a service called TU Go that will rival Skype, allowing customers to send and receive calls and text messages on multiple devices. The TU Go app is initially available for O2 pay-monthly customers only. It brings calls and text messages to devices including desktop PCs, laptops and tablets.
MORE: tinyurl.com/c5rsq8t

Tesco to launch Blinkboxmusic

Tesco has announced it will launch a music-streaming service called Blinkboxmusic later this year. The service follows Tesco's June 2012 acquisition of We7, and is hoped to rival popular alternatives such as Spotify. Tesco will also launch Blinkboxbooks, and the two will sit alongside Clubcard TV.
MORE: tinyurl.com/cgszr9p

KFC to offer free Wi-Fi service

KFC has said it will offer a free Wi-Fi internet service in partnership with The Cloud. Customers will automatically be taken to a landing page with restaurant information, menus and special offers, but can also gain access the wider web.
MORE: tinyurl.com/c69328v

4G WILL DISRUPT TV SIGNAL FOR MILLIONS OF USERS

40,000 viewers could completely lose their television signal later this year

Up to 2.3 million UK TV viewers could experience disruption when 4G LTE mobile services are launched over the next few months.

A further 40,000 users could have their TV signal entirely wiped out, and may need to have an engineer install a filter to rectify the problem.

Ofcom has recently announced the winners of its 4G auction (see *Ofcom names 4G LTE auction winners*, below), in which UK mobile operators bid for spectrum to be used as 4G on their networks. One of the frequencies offered, 800MHz, sits alongside the 700MHz spectrum used for Freeview.

EE has been providing 4G on the 1,800MHz spectrum for the past few months; the other band used for 4G is 2.6GHz. Neither will interfere with 700MHz television broadcasts.

Homes within a 1.25-mile radius of a 4G mast are at risk of losing their TV signal, which may affect viewers in London, the Midlands, north-west England, Yorkshire and Scotland. The worst affected may have to use satellite or cable TV.

There have been no public advertisements or warnings over the issue. However, DMSL, the agency overseeing the launch, has been provided with a £180m budget from operators. This fund will be used to set up a website and a call centre from which affected users can obtain information, order a filter and book an engineer to fit it.

SKY BUYS OUT O2 AND BE BROADBAND

Sky has announced a £180m deal with Telefonica to buy O2 and Be Broadband.

The acquisition will make Sky the second-largest broadband provider in the UK, behind BT and ahead of Virgin Media, with more than half a million new customers.

Jeremy Darroch, chief executive of Sky, said: "Sky has been the UK's fastest-growing broadband and telephony provider since we entered the market six years ago. From a standing start in 2006, we have added more than 4.2 million broadband customers. The acquisition of Telefonica UK's consumer broadband and fixed-line telephony business will help us accelerate this growth."

Depending on how successfully customer migration is dealt with by Telefonica, Sky may offer it a £20m bonus.

O2 and Be Broadband customers will be moved on to Sky's 'fully unbundled' package.

The acquisition is expected to be completed by the end of April 2013.

Ofcom names 4G LTE auction winners

4G mobile broadband services coming soon to O2, Vodafone, BT and Three

Ofcom has announced the winners of the UK's 4G LTE mobile spectrum auction. The telecoms regulator has confirmed that EE, Three, Vodafone, Telefonica (O2) and Niche Spectrum Ventures Ltd (a subsidiary of BT) have each won 4G spectrum. Ofcom expects networks to be rolled out in spring or early summer 2013.

Ed Richards, chief executive of Ofcom, said: "This is a positive outcome for competition in the UK, which will lead to faster and more widespread mobile broadband, and substantial benefits for consumers and businesses across the country."

Although the £2.3bn made from the auction is greater than the £1.3bn reserve, it falls short of the government's £3.5bn estimate.

Ofcom estimates that almost the entire UK population will be able to access 4G mobile services by the end of 2017. ⊠

FUTURE ECONOMY: BITCOIN

Martyn Casserly investigates the growing digital currency that is unaffected by inflation, and untouchable by international government and banking institutions

While many of the world's currencies are struggling to emerge from a global recession, there is one that continues to increase in value. Bitcoin is not issued by any bank, controlled by any government, nor available in physical form – yet, in February this year, the fledgling currency was valued at more than £180m.

Bitcoin is an online, decentralised crypto-currency that is monitored and administered by the peer-to-peer network that uses it. The currency has several online exchanges that trade in the commodity, one of which – Bitcoin Central – recently partnered with a French bank to become a registered Payment Services Provider under EU law. This means it can offer Bitcoin customers debit cards, account insurance and other banking facilities. The currency has also seen mainstream adoption through companies such as Wordpress and Reddit, which accept payment in Bitcoins for their services.

"Bitcoins are a wonderful way to transfer money across borders at very, very little cost," says Jan Piotrowski of the *Economist*. The charges will normally hit the roof when you transfer money between banks, he explains, but exchanges such as Bitcoin Central let you convert Euros to Bitcoins at a very cheap rate, then transfer Bitcoins or pay for a service in Bitcoins in any country you wish. "The system is globally distributed, and there are no borders within the virtual peer-to-peer network that governs it," Piotrowski says.

The currency is the technically brilliant brainchild of a shadowy figure who goes by the pseudonym Satoshi Nakamoto. No-one knows his true identity, but this is of less importance than you might think: Bitcoin is in essence a mathematical protocol and a set of principles released in open-source form by Nakamoto in 2009.
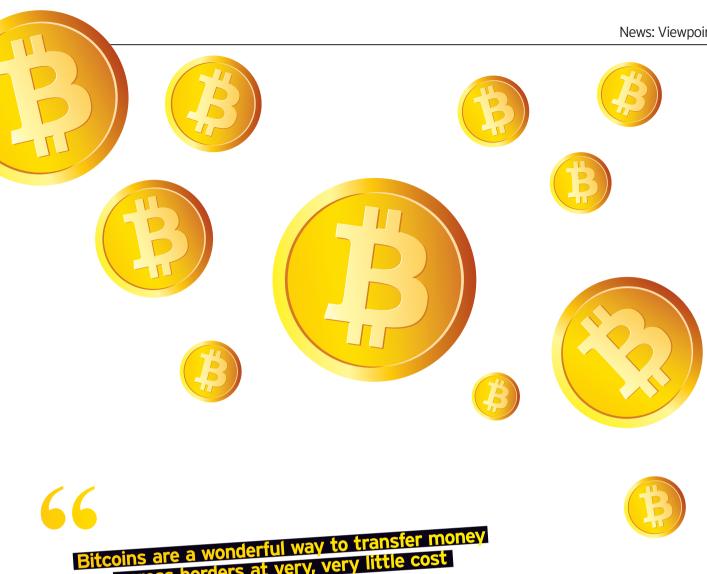
Beating inflation

Bitcoins (written as BTC) are created by a process called mining, which involves computers solving incredibly complex mathematical problems. These processes require intense amounts of computational power, which deliberately restricts the rate at which Bitcoins can be created. This ensures scarcity, which in turn controls inflation and helps protect the value of the currency. In many ways it reflects the use of Gold as a currency: at first it was reasonably easy to find, but became increasingly valuable as sources depleted.

Editor of *Reason* magazine Katherine Mangu Ward argues that Bitcoins can protect people from their own governments. "Just by devaluing the currency, the Federal Reserve can make the money you have less valuable. Bitcoin takes that power away from the government and gives it to individuals," she says.

Bitcoins are a limited commodity, and no central government or bank can issue new units. New currency is created only by the

> **Bitcoins are a wonderful way to transfer money across borders at very, very little cost**

completion of tasks, and it isn't possible to speed up this process through more efficient mining with a supercomputer; the algorithm will maintain a steady rate of creation. No more than 21 million Bitcoins will ever exist, although this amount won't be reached until 2140.

PayPal, now a ubiquitous online payment system, initially set out with a vision of becoming a stateless currency such as Bitcoin.

"This was the dream of PayPal," says Mangu Ward. "It wanted to be a currency outside of governments. The weak point of PayPal was that there was a central place that could be shut down. You could go to the PayPal servers and say 'we're gonna clamp down on this'. Bitcoin is different: it's stored on lots of different computers. It's a diffuse peer-to-peer technology, so there's no one place you can go."

Controversy

The anonymous, unregulated nature of Bitcoin has invited controversy, too. Most famously, visitors to online marketplace Silk Road take advantage of the untraceable nature of Bitcoins to buy and sell contraband. Silk Road is thought to be earning more than £1m per month from the sale of cannabis, cocaine, heroin – even guns.

This has led US senator Chuck Schumer to declare the currency an "online form of money laundering used to disguise the course of money, and who's selling and buying drugs". Online gambling sites have also appeared, with Bitcoins as their payment of choice. One of the biggest, Ireland-based SatoshiDice, reported profits of nearly £400,000 in the first six months of trading.

Financial security

One major concern for potential investors is its security, given the online nature of the currency. Mt. Gox, the world's largest Bitcoin exchange, had around 500,000 coins (valuing $8.75m) stolen in 2009, causing a devaluation of the currency from $17.50 to $0.01 per BTC in the space of a day. A year later the Bitfloor exchange lost currency worth $250,000.

Sceptics have also voiced concerns of potential vulnerabilities that will appear as new, more casual users start to enter the Bitcoin arena, with malware already known to be circulating online.

Despite these setbacks, the currency has recovered and is now worth around $30 per BTC. The financial sectors are also taking note as venture capitalists begin to invest in Bitcoin-related businesses, with electronic processing service Bitpay receiving over $500,000 at the start of the year.

It's still early days for the currency, but with goods and services increasingly moving online, and confidence in the banking sector seriously eroded, Bitcoin may have emerged at just the right time. ⊠

Five trends seen at Mobile World Congress

Mikael Ricknäs has spotted five trends at Mobile World Congress 2013 that will affect the smartphone and tablet markets over the coming year

This year's Mobile World Congress (MWC) may have been lacking in high-end smartphone launches, but lower-cost models are needed to open up the mobile-phone market globally.

Here are some trends seen at MWC that indicate where the mobile market is headed.

New operating systems

Mozilla's smartphone operating system, Firefox OS, got the most attention, but the Tizen camp led by Samsung and Intel, Jolla and its Sailfish, as well as Canonical, which is hard at work on Ubuntu for smartphones and tablets, were all at MWC.

Alcatel One Touch, LG and ZTE are all developing smartphones based on Firefox OS, with prices expected to be below $100. Huawei also said it will launch Firefox OS products later this year. Sony has voiced its support, but hasn't made a final decision on whether it will develop commercial products.

Smartphones using the other three platforms are also likely to arrive this year.

Even though they are doing more to improve the smartphone user experience, Canonical and Jolla are in for an uphill struggle. The advantage they have is that their size means they don't have to sell as many phones as a company such as BlackBerry to make a go of it.

HD Voice spreads to the low-end

According to the latest research from GSA, 160 products with support for HD Voice have been announced – 120 percent more year on year. Showing it is a technology for phones in all price ranges, Nokia introduced the 301, a feature phone that costs around £56.

The improved quality HD Voice offers is possible thanks to the use of AMR-WB, a speech-compression algorithm that increases the range of voice frequencies transmitted.

Investment in mobile networks and devices with HD Voice will accelerate in 2013. All manufacturers are urged to ship their feature phones and smartphones with AMR-WB activated by default, according to Alan Hadden, president of the GSA.

For HD Voice, both caller and receiver need a compatible phone, and the network also needs to support the technology.

LTE smartphone price drop

As 4G technology continues to roll out worldwide, there is a growing need for LTE-capable phones in lower price ranges.

Smartphones that cost around $200 will emerge toward the year's end, starting with mid-tier phones from Huawei, LG, Samsung and Orange.

This development will continue as processor vendors such as nVidia develop new processors that are customised for use in cheaper LTE smartphones and tablets.

Experimentation with screen size

Whatever screen size your heart desires, there is probably a smartphone or tablet to suit. At MWC Samsung launched the Galaxy Note 8, which has an 8in screen, and ZTE introduced the Grand Memo, a 5.7in-screen phablet. The Memo's existence owes to the success of the Note and Note II but, without Samsung's brand and marketing might, ZTE may struggle to replicate its success.

The dual-screen form-factor made a comeback at MWC. The Medias W from NEC has two 4.3in (540x960) screens that are separated by a hinge that allows the device to be folded in the middle.

The battle for enterprise

Enterprises that want to equip their employees with smartphones and tablets have a growing number of options.

Just before MWC began Citrix Systems launched XenMobile MDM, an integrated mobile-device-management offering based on the company's acquisition of Zenprise, and IBM presented MobileFirst. At the show, Samsung also launched Knox, which separates business and personal use of a mobile device. ☒

Intel gets serious about wireless

Intel is moving in the direction of integrating a modem inside an Atom processor for smartphones, tablets and Ultrabooks, says Agam Shah

The fact that 4G LTE connectivity is becoming more popular in smartphones and tablets isn't lost on Intel, which aims for its baseband processors to be used in more mobile devices and base stations.

Intel is optimising LTE modems to be closely paired with its smartphone, tablet and Ultrabook chips. Ultimately, the chip maker plans to integrate baseband processors, which manage radio functions, inside its mobile chips.

Intel wants to increase its shipments of baseband processors independent of application processors. At Mobile World Congress (MWC) the firm announced plans to start shipping its first multi-mode LTE modem for smartphones, tablets and Ultrabooks. The XMM 7160 modem supports 15 LTE bands, plus 3G and EDGE.

"We are going after a number of different branches of customers to help them get into the market fast," said Hermann Eul, vice president and general manager for Intel's Mobile and Communications Group.

Intel's wireless communications business began with the acquisition of Infineon Wireless in early 2011. Eul joined Intel with that acquisition, and was picked to lead the Mobile and Communications Group along with Mike Bell, a former Palm and Apple exec.

Intel has aggressively invested in the development of low-power chips, and a number of smartphones and tablets with low-power Atom chips have shipped. The firm has accelerated the development of mobile chips to take advantage of its latest manufacturing processes, which will bring more performance and power savings. However, company officials declined to provide a specific date when the baseband processor would be integrated with the application processor.

"We are looking at a time frame, but we have not spoken about it," Eul said. "The integration will certainly happen."

Addressing customer needs

Integration of the application and baseband processor is important to Intel, but customers have different needs. The communications processor business is key in providing a range of chip offerings to customers who are looking to build cellular and data connectivity in mobile devices and other equipment, Eul said.

LTE is now a big priority for Intel, he continued. Intel is projecting that LTE connections will double to around 120 million over the next year, and in mobile devices the LTE chipset is as important as the application processor, he said.

"LTE is the backside that speaks to the network. If that doesn't work you'll be disappointed," Eul said.

Another priority for Intel is to expand the number of LTE bands supported by its wireless chips. That will help smartphones and tablets work on multiple LTE networks in different countries.

"This multiplies in LTE's case," Eul said. "We're counting 39 bands; a year back we were counting 13 bands."

System on a chip

As Intel focuses on mobile devices, the ability to provide a baseband processor is a step in the right direction, said Dean McCarron, principal analyst at Mercury Research.

"What we're seeing is the evolution of what the expected architecture is going to be. You are going to get your application and baseband processor from the same vendor," McCarron said.

The industry has moved in the direction of including more smartphone components inside a chip. Qualcomm was the first to integrate a modem inside its Snapdragon chips, while nVidia has introduced Tegra 4i, which integrates an LTE modem with a Cortex-A9 ARM processor.

"I wouldn't say it's the last remaining piece, but it's a critical piece," he said. ⊠

Memory prices set to rise

Demand exceeding supply will likely cause DRAM prices to stabilise or even rise, according to analysts. Agam Shah investigates

Following years of double-digit drops, prices for DRAM could stabilise as demand exceeds supply and the number of memory makers dwindles.

The average selling price for DRAM in January jumped by about 13 percent compared to January 2012. That's a sign that prices could stabilise or even increase this year after incessant price drops over the last few years, said Brian Matas, vice president for market research at IC Insights.

"The DRAM market is extremely volatile. If there is more demand than supply then prices skyrocket," Matas said.

DRAM demand has weakened over the past three years, partly hurt by reduced demand for PCs. Memory makers have been spending less on capital equipment, and the output of memory has declined to meet the slowdown in demand. As the market adjusts, supply may fall to the point where demand is higher, resulting in price stabilisation.

IC Insights is projecting an average DRAM selling price this year of $1.85 per unit, although prices typically vary on the capacity and memory type. Memory prices hit a low of $1.56 per unit last year, a drop from $1.88 in 2011 and $2.41 in 2010. IC Insights is projecting DRAM sales this year to reach $30.7bn with shipments of 16.6 billion units.

Nand flash prices to fall

Whereas DRAM prices are expected to stabilise, the price for non-volatile Nand flash memory is expected to fall, Matas said. The Nand flash supply currently exceeds demand, but the growing markets for smartphones and tablets could change that. So, manufacturers are ramping up on Nand flash to keep up with demand.

For 2013, IC Insights is projecting Nand flash sales of $30.9bn, and 8.8 billion in unit shipments, which means double-digit growth in both areas compared to 2012. The research firm is projecting an average selling price of $3.49, a decline of about 7 percent.

But neither DRAM price stabilisation nor the Nand price drop will affect the cost of mobile devices, Matas said. Device makers typically do not change mobile device prices, but instead add more DRAM or Nand flash.

No DRAM boost in sight

Despite the expected stabilisation of DRAM prices, demand is not likely to improve unless the US and European economies recover, Matas said. Asian countries such as China have a smaller share in overall DRAM demand and less of an impact on the market.

Demand for DRAM also took a hit because Windows 8 does not require more minimum memory than Windows 7.

The number of DRAM manufacturers is also declining, with Taiwanese memory makers such as Nanya Technology and Powerchip Technology failing to keep up with competitors in output and technology. The market will further consolidate when the third-largest memory maker, Micron, acquires Japanese memory maker Elpida.

Samsung is currently the largest memory maker with around 40 percent market share, followed by SK Hynix, with around 25 percent, then Micron and Elpida.

IC Insights is projecting desktop PC demand to remain flat through 2017, with laptop demand increasing at a rate of about 5 percent per year.

One bright spot for DRAM is the growing demand for smartphones and tablets. Low-power DRAM has a 20 percent margin premium compared to PC DRAM, Matas said, adding that a lot of manufacturing capacity is being moved over to low-power memory.

PCs now use DDR3 DRAM, but new DDR4 memory will come out by the end of this year; its effect on the market will be felt starting next year. DDR4 DRAM is faster and more power-efficient than DDR3. Servers are expected to be the first to get DDR4 memory and initial adopters will pay a premium. Prices of new DRAM usually fall as the memory is used in more computers. ⊠

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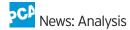
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Tablet makers experiment to attract sales

Device makers are bringing to tablets versatility with waterproofing, connectivity and multiboot capabilities. Agam Shah investigates

Try this, try that and see what entices customers. That's the mantra for tablet makers that are experimenting with new features in the elusive quest to deliver the next big hit.

Sony and Fujitsu are waterproofing their latest tablets, while Samsung is pushing multitasking by enabling users to simultaneously watch video, take notes and send email with the Galaxy Note 8.0. Asus is bringing Android and Windows dual-boot capabilities to its Transformer AiO tablet-desktop hybrid, too.

Device makers are flooding the market with new tablet designs to see what consumers are willing to pay for, said Jack Gold, principal analyst at J Gold Associates.

"Part of the problem is nobody knows what's going to stick," Gold said. "It's really about vendors wanting to differentiate and how they can get an advantage."

The tablet market is very young, and like the smartphone and PC markets it will go through many changes, he said.

Waterproofing

Given their penchant for introducing innovative features to gadgets, it's not surprising that Japanese tablet makers are the first to offer waterproof tablets. Sony will soon begin worldwide shipments of its Xperia Tablet Z, a waterproof and dust-resistant tablet running the Android OS. Fujitsu will also ship its Arrows Tab Q582/F tablet, which has similar features and runs Windows 8. The tablets can be submerged in up to 1m of water for up to 30 minutes. It's a handy feature for clumsy tablet users who tend to drop devices or like to use them in the bath.

Ultimately, this feature could come by default as tablet makers add ruggedness to their devices.

The Xperia Tablet Z has a 10.1in screen, is 6.9mm thick and weighs 495g. It has a quad-core Qualcomm Snapdragon processor and runs Android 4.1 Jelly Bean. Other features include an 8Mp rear camera and a 2Mp front camera. The screen displays images at 1920x1200 pixels. It will become available in the second quarter of 2013, although pricing has not been announced.

Fujitsu's Arrows Tab Q582/F tablet has an Intel Atom Z2760 processor and an integrated Fujitsu LTE modem. It has 64GB of solid-state storage and 2GB of RAM. The

Samsung's Galaxy Note 8.0 is primed for **MULTITASKING**

tablet provides an estimated 10 hours of battery life. It is due to ship imminently in Japan for $1,330, but worldwide availability has not yet been confirmed.

Multitasking

Samsung is emphasising the ability to simultaneously do multiple things with its Galaxy Note 8.0, which will ship in the second quarter of 2013. In demonstrations, Samsung officials showed that users could watch video and take notes at the same time, and link a note to a mapping application while the video was playing. This multitasking was aided by extensive use of Samsung's S-Pen stylus.

Multitasking on the Galaxy Note 8.0 doesn't seem as seamless as it is on a PC, but Samsung gets points for trying. It's difficult to switch between applications or to adjust window sizes on a small touchscreen interface, but Samsung is listening as customers demand more from their tablets.

Right now, multitasking is not a make-or-break feature for tablet usage, which revolves around tasks such as email and video streaming, but not intense video editing, said Roger Kay, principal analyst at Endpoint Technologies Associates. But multitasking is being heavily touted by Android tablet makers as a key feature.

The Galaxy Note 8.0 has Android 4.1 and a 1.6GHz quad-core ARM processor.

Sony's Xperia Z tablet is **WATERPROOF** to 1m

The screen displays images at 1280x800 pixels. Other features include a 5Mp rear camera and 1.3Mp front camera, 16- or 32GB of storage and 2GB of memory. Samsung will release pricing details at a later date.

Multiboot

Asus recently announced it would ship a dual-boot Transformer AiO PC that can be either an Android 4.1 tablet or a Windows 8 desktop when connected to a wireless PC docking station. With an 18.4in screen the tablet is oversized, but the dual-boot feature provides an interesting twist to a market in which tablets are closely tied to operating systems. The oversized tablet can also connect wirelessly to the docking station to become a remote Windows 8 virtual desktop. In the future, we may see dual-boot tablets offering the option to load Windows or Linux-based operating systems.

The 2.3kg tablet runs an ARM processor and is said to provide five hours of battery life. It features 2GB of RAM, a front-facing camera, a mini-USB 2.0 port, a microSD slot and Wi-Fi. The docking station has typical PC hardware, with an Intel Core i5 processor based on the Ivy Bridge microarchitecture, an nVidia GeForce GT 730M graphics processor, a 1TB hard drive, 8GB of DRAM, USB 3.0 ports, an HDMI port and Wi-Fi. The tablet will be available in the second quarter of 2013 and cost from $1,299.

Connectivity

At Mobile World Congress Asus also introduced a phablet named Fonepad, which is a standard 7in tablet with 3G connectivity. During a demonstration, Asus chairman Jonney Shih held a Fonepad to his ear as if to indicate the tablet can be used as a supersized phone.

Lenovo has also introduced Android tablets with 3G connectivity for use in developing countries where 4G isn't available.

More tablets are being released with 3G and 4G chips included, but many opt not to use mobile networks and find Wi-Fi enough for Internet access, said Gold.

There are a lot of people who don't want to pay $40 to $50 a month for 3G or LTE connectivity, he said.

But whether users like it or not, connectivity to 3G and 4G networks is being integrated into the Wi-Fi chip. The feature will increasingly become available by default.

Screen resolution

The race to improve screen resolution is already under way, with the next goal perhaps being 4K resolution (four times today's HD screens.) Panasonic at International CES showed a 20in tablet capable of displaying images at a 4K resolution of 3840x2160 pixels. The best available resolution today is on Google's Nexus 10 tablet, which displays images at 2560x1600 resolution, and Apple is a close second with the iPad's 2048x1536 resolution. Right now, Panasonic considers its 4K tablet a niche product, relevant mostly for multimedia tasks such as video editing. But as gaming and movie companies begin offering 4K content, higher-resolution screens will become more relevant.

Other

Screen sizes and prices apart, there's a lot of untapped potential in the tablet market and many designs will appear as companies try to figure out what works for buyers, said Kay.

Tablets are already being pitched as gaming consoles and mobile-payment terminals, and they are now being touted as the centrepiece of living rooms to operate TVs and other multimedia devices.

Asus' Transformer AiO **DUAL-BOOTS** Android and Windows 8

The cloud is encouraging the development of specialised tablets and gadgets that fit snugly into corporate environments or for delivering online services such as video streaming, Kay said. There will be devices built in the vein of Amazon's Kindle Fire, which allows users to purchase books, video and music from Amazon's online retail store.

Companies are already showing such devices. For example, HP has showed off some tablet designs with different screen sizes, some of which might come out this year or the next.

But the tablet market has changed tremendously in the few years since Apple's iPad was released. The market will continue to evolve, with some tablets succeeding, and a lot failing.

"Not all of them will be positioned quite right or priced quite right," Kay said. ⊠

Panasonic unveiled a **4K TABLET** at CES 2013

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MWC SPECIAL:
PHONES, TABLETS & PHABLETS

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Samsung Galaxy Note 8.0 «

Phablet

The Galaxy Note 8.0 is an example of an emerging category of product known as a 'phablet' – in essence a hybrid smartphone and tablet in one. There's an 8in screen and, like all Galaxy Notes, it comes with an S Pen stylus. The Galaxy Note 8.0 has a quad-core processor, dual-cameras and an infrared sensor for controlling your TV.

Price TBC

samsung.com/uk

HTC One ‹‹

Smartphone

HTC's flagship smartphone is simply the One. Running Android Jelly Bean and the Sense 5 overlay, the handset has an all-aluminium design and a 4.7in full-HD screen. In an attempt to stand out from the crowd, HTC has specified an Ultrapixel camera that is said to capture 300 percent more light than a comparable 13Mp smartphone camera. Read our full review on page 36.

£519 inc VAT
htc.com/uk

›› Sony Xperia Tablet Z

Tablet

The Xperia Tablet Z is the tablet version of Sony's Xperia Z smartphone, and it shares a similar-style dust- and waterproof design. The 6.9mm-thick Tablet Z runs Android 4.1 Jelly Bean and has a 10.1in screen with 1920x1200 pixels.

£399 inc VAT (Wi-Fi only)
sony.co.uk

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Nokia Lumia 520

Smartphone

The budget-friendly Lumia 520's 4in screen means it's positively pint-sized compared to the most recent smartphones hitting the market. The Lumia 520 runs Windows Phone 8 and, in common with other Lumia devices, offers interchangeable-colour covers.

Around £170 inc VAT
nokia.com/gb-en

Huawei Ascend P2

Smartphone

A Cat 4 LTE chip has enabled Huawei to brand its Ascend P2 the "world's fastest 4G smartphone". In theory, it can achieve download speeds up to 150Mbps. The Ascend P2 is an Android 4.1 Jelly Bean smartphone with a 4.7in screen and a 13Mp rear camera.
Price TBC
huaweidevice.co.uk

HP Slate 7

Tablet

The Slate 7 is HP's version of Google's Nexus 7 tablet. For even less money than its £169 rival, the HP offers a 7in screen, 1GB of RAM and 8GB of internal storage. It has a stainless steel design and two cameras.

£129 inc VAT
hp.com/uk

<< **Motorola Razr HD**
Smartphone
Motorola's latest Kevlar-wrapped Razr smartphone has made its way to the UK. Motorola has fitted the Razr HD with a 4.7in HD screen, an 8Mp rear camera and 4G connectivity.
Around £400 inc VAT
motorola.co.uk

⌃ **Nokia Lumia 720**
Smartphone
Nokia's new mid-range smartphone is the Lumia 720. This handset runs Windows Phone 8 and comes in various colours. The Lumia 720 features a 4.3in ClearBlack display and a 6.7Mp rear camera with a Carl Zeiss lens.
Around £300 inc VAT
nokia.com/gb-en

<< **ZTE Grand Memo**
Phablet
Although it doesn't come with a stylus, the Grand Memo's large 5.7in screen means it's a phablet. It's one of the first devices to run Qualcomm's Snapdragon 600 processor, and it has 2GB of RAM and 16GB of internal storage.
Price TBC
zteuk.co.uk

Asus Fonepad >>
Phablet
Asus' offering in the phablet space is the Fonepad, not to be confused with the firm's Padfone range. A SIM slot enables this 7in tablet to make calls, but it doesn't have a stylus like its Samsung rival. The Fonepad is powered by an Intel Atom CPU and comes in champagne gold or titanium grey.
£179 inc VAT (16GB)
uk.asus.com ⊠

Sony Xperia Z **36**

33

36

39

ANDREW
HARRISON

Key sounds

Finding just the right product to solve a problem can throw up some confusing choices. Take soundbars: underslinging a narrow tube filled with miniature speakers is a logical way to upgrade the sound pumped out by your flatscreen telly.

You settled on a larger, wider, thin screen because you wanted a bigger picture without the bulk of an old tube-TV advancing into the room. (That, and the fact that you can no longer buy a CRT set.) But while microelectronics gadgets are getting smaller, the mechanical apparatus required to marshall air into movement to reproduce sound must still follow physical laws. Which means you need decent-size speaker cones.

Advances in audio engineering mean you can now get a more accurate sound from a smaller speaker – up to a point. But if you want to reproduce the natural sound of your music or films alongside the pictures, proper hi-fi speakers are your best option. Yet most people still settle on compromise with undersized cabinets. Because they'd welcome bulky speakers back into the lounge as much as the hulking glass cathode-ray-tube of the past.

Nevertheless, 'good enough' sound can be found, despite the compromises of low-energy/low-fidelity amplifiers and too-small speaker cones. Turn to page 70 to find what might provide suitable sound for the pound.

In another group test this issue, we pit the quintessential all-in-one PC, the Apple iMac, against its recent competition (see page 54). The game's evolved, though: Windows all-in-ones now tout huge touchscreen panels to anyone who's tempted to reach out and touch them. Meanwhile, Apple's evergreen one-stop PC has slimmed its panel edges, but retains its stubborn eschewal of touchscreen gimmickry. That's what its handheld devices are for, after all.

Far more importantly, the iMac's IPS display, already the best in the business, is now improved with a build process that brings the image closer, while knocking back reflections. State-of-the-art PC design was never more in reach.

But even the most trenchant of Windows holdouts would concede they still need a keyboard to keep productive on their touchscreen PC. And here there has been less innovation, since the dome-switch keyboard became 'good enough' for most users.

Their keys get stiffer with age, and they're rarely as satisfying for typing as a good mechanical keyboard. Conversely, real switches below each key can make for a keyboard as personal as your shoes. The prices are higher, but so is their value: a £100 premium keyboard will likely last more than 10 times longer than the £10 bundled clatterboard. Pay the full cost upfront, and you won't be labouring with a naff keyboard for 10 years. See page 62 for our round-up. ⊠

PC ADVISOR TEST CENTRE

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LAPTOP

Lenovo ThinkPad W530 2447

The ThinkPad W530 is billed as workstation-class, featuring high-specification processors, nVidia Quadro graphics, up to 1TB of storage and 32GB of memory. We looked at a 'mid-range' model with a 2.3GHz Intel quad-core processor, a 500GB hard disk, 4GB of memory and Quadro K1000 graphics.

The chassis feels reasonably tough, with the usual pointing stick in the keyboard supplementing a small, but high-quality trackpad. The display has 1600x900 pixels, with an option for full-HD and '92 percent Adobe RGB' colour to order. The TN LCD is matt and anti-glare, and viewing angles are usefully wide.

Lenovo understands the importance of a decent keyboard, and here uses its familiar concave shield-shaped keys. Removing clutter, there's a reduced count of obscure legacy Windows buttons. You won't see SysReq, Pause or Break, for example.

The top deck itself has some plasticky flex to it, bending when pressed, although you'll be unlikely to feel this just typing.

On the underside are separate access hatches for memory and storage, a desktop dock port, and a catch to release the DVD±RW drive from its bay. Drain holes to help evacuate liquids spilled on the keyboard can also be found here.

Other configurable options include a smart-card reader and a 3G modem.

Overall performance in our tests wasn't especially fast: helped by the decent 2.3GHz Intel Core i7-3610QM processor, and hindered by the relatively slow hard disk. PCMark 7 rated the notebook with just 2,554 points. You can elect to have a 256GB SSD preinstalled, which should speed up most tasks.

The nVidia Quadro K1000 graphics processor is here accompanied by 2GB of video memory. This is tuned principally for CAD use; in Fear it turned in a healthy 98fps at Maximum detail.

In use, fans could be clearly heard whirring at all times, becoming even louder under load.

The ThinkPad arrived with the largest wedge of preinstalled bloat we've seen for a while. While testing this machine, Adobe AIR and SimpleTap 3.1 pestered us for updates; Lenovo Solutions Center told us we needed its solution solving; and we were also made aware of VIP Access, Lenovo Solutions for Small Business, and Intel Management & Security Status.

To combat the long-standing problem of fleeting battery life from Windows laptops generally, and workstation models in particular,

Lenovo uses nVidia's Optimus switching technology. This should let the W530 use low-power Intel graphics whenever possible, switching to nVidia on demand.

A choice of three batteries: a six-cell 57Wh; nine-cell 94Wh; and a 62Wh 'slice' battery. Lenovo states you'll get up to 22 hours with the latter two combined. We find this doubtful, given that we recorded just 5 hours 30 mins from the 94Wh option when looping BBC iPlayer video over Wi-Fi.

Verdict

The Lenovo ThinkPad W530 is packed with ports and high-spec components. Its build quality is more than adequate, if more bendy than we'd like. But the out-of-the-box software experience is annoying, and this configuration didn't impress with great responsiveness or strong battery life. ⊠ Andrew Harrison

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LAPTOP

Lenovo ThinkPad X1 Carbon Touch

The Lenovo ThinkPad X1 Carbon Ultrabook now offers a 'Touch' suffix. Combining Windows 8 with a touchscreen, this version is both thicker and heavier, but neither too bulky nor too heavy.

The red trim matches the TrackPoint in the keyboard's centre. The lid folds right back so the laptop can lie flat on the desk.

Lid closed, the top of the chassis is a uniform sheet of black, save for the dot in 'i' in 'ThinkPad', which glows red when powered. The scrabble-tile keyboard is black on black, with the keys slightly shinier than the carbon body.

Typing is a good experience, with a caveat peculiar to Lenovo. At

extreme bottom-left is the Function key. If you're used to Ctrl there, you will make mistakes. The trackpad is smooth, responsive, and well sized.

Everything feels stylish and premium. The ThinkPad is principally made from carbon fibre, the finish strokably smooth without picking up fingerprints. It's a sleek design – with the lid closed the X1 Carbon Touch approaches the MacBook Air in profile.

This Touch version is heavier than the original, at 1.54kg rather than 1.36kg. You're less likely to notice that it's a smidgeon thicker.

Connection options include 3G and Wi-Fi. There's no ethernet, but you can plug in an adaptor to

the machine's sole USB 3.0 port. You also get an SD card slot and a fingerprint scanner.

There's a choice of Intel i5 or i7 processor, and 4- or 8GB of memory. The model we tested had a 1.8GHz Intel Core i5 with 4GB RAM and an 180GB SSD. Nearly a third of that space was consumed by Windows.

Windows 8 feels zippy. General office work, web streaming and movie playing were all snappy. Our PCMark 7 benchmark score of 4,783 points confirmed this decent speed.

The Carbon Touch is a business laptop with Intel integrated graphics, so less-intensive games at low settings is its gaming limit. It ran hot on the underside, too.

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

★★★☆☆

LAPTOP
HP Spectre XT TouchSmart 15-4000ea

HP's Spectre XT TouchSmart is an attractive and well-built laptop, but it does stretch to its limit the definition of the term 'Ultrabook'.

This HP has a similar design to the other models in the Spectre range, with a smart, brushed-metal finish and sleek edge-to-edge glass covering the screen. It's larger than its Spectral stablemates, though, with a 15.6in screen and a listed weight of 2.25kg.

The XT also measures a sliver over 22mm thick, a size that – according to our recent discussions with Intel – would seem to disqualify it from being called an Ultrabook (see tinyurl.com/bmuaysy).

In fairness, most 15.6in laptops weigh closer to 2.5kg, so the Spectre XT TouchSmart is a little lighter and more portable than many of its 15in rivals. The screen provides a full-HD resolution of 1920x1080 pixels, with a clear, sharp image that will be excellent for viewing photos and video. It's very bright, too, with a wide viewing angle that will work well for business presentations.

The keyboard and trackpad are large and comfortable to use. The only minor disappointment is the Beats Audio-branded quad-speaker system, which is loud but produces a tinny, metallic sound with weak bass.

Performance is good, although the Spectre XT is expensive for a model with a modest specification. Just one configuration is available, priced at £1,199 with a dual-core Intel Core i5 running at 1.7GHz, 4GB of RAM and a 500GB HDD.

We were a little concerned about the use of a slow hard drive, but this is backed up by a 32GB solid-state 'acceleration cache' that certainly seems to improve performance. The Spectre XT TouchSmart starts up in a snappy 10 seconds and produced a very respectable score of 4,042 points when running the PCMark 7 benchmark suite. It'll be more than enough to cope with day-to-day web browsing and running applications such as Microsoft Office.

As always, the integrated Intel HD Graphics 4000 processor lacks power for gaming. Running Batman: Arkham City at 1920x1080 resolution brought the TouchSmart to its knees with single-digit framerates. Even at 1280x720 and the lowest graphics quality the HP only just managed to scrape 27fps.

There are some useful features, though, including a touchscreen that feels smooth and responsive when using Windows 8. Plus you get a 10GBps Thunderbolt connector, and a large set of bundled software. The latter includes two years of Norton Internet Security, plus Photoshop Elements and Premiere Elements.

Battery life is respectable rather than impressive. When streaming BBC iPlayer video over Wi-Fi we recorded around 4 hours. For browsing the web the HP will most likely stretch to 6 hours. This isn't terrible, but it doesn't match the 5-hour results we're used to seeing from Intel Ultrabooks. ■

Verdict

A price of £1,199 isn't unusual for an Ultrabook with solid-state storage. But the HP Spectre XT TouchSmart has an ultra-price without the ultra-portability and -performance to go with it. The touchscreen controls and Thunderbolt interface may appeal to some users, but we can't understand the logic of presenting a hefty 15.6in laptop with a spinning disk as an Ultrabook. ⊠ **Cliff Joseph**

The X1 Carbon Touch has a 14in (1600x900) matt anti-glare display, which is easily usable under bright lights – and outdoors, at a pinch. You lose some of the vibrancy of a glossy panel, but we didn't find images at all washed-out. Viewing angles are good, although text loses legibility when viewed from above.

And it's a touchscreen. We weren't expecting to use it much, but it turns out Windows 8 and touch do work – even when you have a perfectly good keyboard and trackpad. This touchscreen is responsive to gestures and taps.

When selecting things, switching and closing programs, scrolling lists and connecting to a Wi-Fi network, we naturally reached out and touched, in both Modern UI and Desktop interfaces.

It's worth comparing the ThinkPad X1 Carbon Touch with Apple's MacBook Pro 13in with Retina display. The MacBook has in essence the same screen area, benchmarks as fast (4,596 points), lasts much longer on battery (around 9 hours), and costs less money. The ThinkPad may be touchable, but Apple's laptop has by far the better display.

Lenovo makes big claims for battery life, and says the ThinkPad X1 will last 8.2 hours. It fell short of the hype. We saw around 5 hours.

Verdict

The Carbon Touch offers decent performance in a portable package. We love its good build quality and striking design, and the screen is decent. Performance is solid, too. But it's far from cheap. ⊠ **Matt Egan**

Specification
1.1GHz Intel Celeron 847; 4GB DDR3 RAM; 320GB HDD; Intel HD Graphics; 1x USB 3.0; 3x USB 2.0; 802.11b/g/n; gigabit ethernet; VGA; HDMI; mic and headphone sockets; 65W power; 148x193x22mm; 530g

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

MINI PC
Sapphire Edge HD4

Whereas gamers and enthusiasts demand processing powerhouses, for most uses a modest PC will suffice. Businesses, for instance, often require little more than a machine that can handle office programs and email. Home users who want to surf the web and even take in a film can get by without multicore bells and whistles.

So it makes sense to trade in some of that unwanted power in exchange for a PC that's far less obtrusive than the typical Windows desktop. That's where a mini PC such as the Sapphire HD4 comes in.

It's sold without an operating system, which makes the Sapphire an interesting proposition for running Linux, for example.

Powering the Sapphire is a 1.1GHz Intel Celeron 847 dual-core chip, with a reasonably low TDP of 17W. It drew a modest 13.5W from the mains when idle, and just 33W when running our Stalker graphics test.

The HD4 isn't particularly loud in normal use (around 21dB), but the sound levels rose by around 26dB when pushed. It's not as noisy as most Windows desktops, but far from whisper-quiet.

The Sapphire is lovely to look at; photographs don't do justice to the way this slim device melts into the background. Less than 8in tall, it's also just 22mm thick.

If you want an inconspicuous PC that can lie hidden on a shelf, the Edge could prove a strong choice. A compartment at the front of the case opens to reveal two USB ports, one USB 3.0. Another pair of USB 2.0 is situated behind, along with HDMI and VGA, plus mic and headphone sockets.

Gigabit ethernet is included, and the Edge includes single-band 802.11b/g/n Wi-Fi, but no Bluetooth. Its 4GB of memory is sufficient, and the 320GB hard disk should be ample if you're not storing video.

Windows performance is poor, and the HD4 hit just 1,318 points in PCMark 7. Of course, this machine isn't designed to be a powerhouse, and it has plenty of performance for everyday applications. We were able to carry out word-processing and spreadsheet tasks without delays.

The HD4 is also fine for watching films. You don't get a Blu-ray drive (or, indeed, any optical drive), but if you have an external drive handy you should find the HD4 can smoothly play BD-ROMs by hardware-accelerating graphics.

It's pretty patchy for gameplay, though. Graphics are run by a basic Intel HD Graphics controller, and this device will make a poor job of any fast-moving titles. At 1280x720 and with Medium settings, the HD4 mustered just 11fps in Stalker.

In the less demanding Fear, it picked up just 12fps at Maximum settings, rising to 23fps with the detail dropped to High.

We got the Sapphire running Windows 7 and 8 with the help of an external optical drive. A drivers disc is included for various OSes. Most of these worked well, with the exception of those for HDMI.

The installation of an OS and drivers isn't for the faint-hearted, though, and will put off a good number of those who hanker for a simple and discreet PC that can hide in a corner of the room.

Verdict
The Sapphire HD4 looks great and consumes little power or space. Remember to budget for your OS, unless you plan to install a Linux operating system. ⊠ **Robin Morris**

Specification
1920x1080; Freeview HD; stereo speakers with 2x 10W amps; 3x HDMI; VGA; coaxial audio; ethernet; Wi-Fi; 2x USB 2.0; CI slot; 747x494x77mm; 13.3kg

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

32in TV
Loewe Connect ID 32 DR+

Loewe's Connect ID TV range is unapologetically premium. Hideously expensive by commodity gogglebox standards, yet boasting exquisite design, the Connect ID 32 DR+ is not your everyday flatscreen telly.

The ID suffix stands for Individual Design, and the set is certainly distinctive. The screen has a minimal piano-black bezel, offset by a grey fabric trim that disguises forward-firing stereo speakers. Our sample came with a crisp white back panel, but a variety of hues are available.

You can opt for a gloss black, silver, orange, green, beige or white wraparound finish.

The Connect is available in 32-, 40-, 46- and 55in screen sizes,

priced at £1,395, £1,595, £1,995 and £2,495 respectively.

The DR+ tag indicates that the set comes with the integrated 500GB personal video recorder option, which costs an extra £300.

Connectivity is awkward, but tidy. The main inputs face downward along the back panel, feeding into the pedestal's cable-management channel. There are two HDMI, an AV mini socket, VGA, ethernet, USB, coaxial digital audio in/outs and analogue audio outputs. Aerial inputs feed the Freeview HD tuner and two DVB-S satellite feeds. Wi-Fi connectivity is also built in.

Additional side-facing ports include a conditional access slot,

a third HDMI, a second USB, phono stereo inputs and S-Video.

The user interface is clean and unfussy. IPTV options sit alongside network UPnP devices, USB and the set's own recordings library in a general Media Net area.

Streaming options are limited principally to iPlayer, Daily Motion and Vimeo, plus subscription services Cartoon Network and Box Office 365. YouTube is notable for its absence. Additional branded content from Audi TV and others is unlikely to elicit much interest, but you do get Aupeo and TuneIn Radio music services. The set also offers a built-in web browser, but navigating pages via the remote control is

Specification
nVidia GeForce GTX Titan;
6GB GDDR5 memory;
837MHz core clock
(boosts to 876MHz);
1,502MHz memory clock
(6,008MHz DDR effective);
384bit memory interface;
2,688 stream processors;
224 texture units; 48 ROP
units; PCI Express; DirectX
11.1; 2x DVI; 1x HDMI;
1x DisplayPort; 1x 8-pin
and 1x 6-pin PSU
connector needed;
3-year warranty

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

★★★☆☆

GRAPHICS CARD
Asus GeForce GTX Titan

Developments in graphics card technology may be slowing, but the Titan offers a glimpse of the future. nVidia has taken a high-end workstation chip – the GK110 Tesla – and repackaged it for gamers.

It's a complex chip, with more than twice as many transistors as nVidia's fastest single-chip card, the GTX 680. While the 680 and 690 reach 3,090- and 5,621 single-precision Gflops respectively, the Titan sits in between with 4,500Gflops. Even double-precision floating-point operations hit a sizzling 1.3Tflops.

The problem is that raw 'compute' speed doesn't automatically convert into startling application performance. The gaming landscape is going to change but, for now, the amazing capabilities of the Titan remain of limited use to Windows gamers.

Besides gamers with deep pockets, the Titan is as likely to appeal to programmers and professionals who've hankered after the kind of number-crunching that prohibitively expensive workstation chips undertake. A sub-£1,000 price makes the Titan look affordable.

Many of the Titan's specifications are no better than you'd find on the GTX 680 or dual-chip GTX 690. Its standard 837MHz core-clock speed is considerably below the 1,006MHz

of the typical GTX 680. The memory clock of 1,502MHz (6,008MHz DDR effective) is only equal to the 680.

The Titan beats the GTX 680 with 224 texture units and 48 raster operations against 128 and 32 respectively. The GTX 690 has twice as many. A similar story is seen in the stream-processor tally, where the Titan's figure of 2,688 eclipses the 1,536 of the 680. But the GTX 690, with its two sets of 1,536 stream processors, is triumphant once again.

The Titan may be in a different class to the GTX 680, but in our tests it fell behind the dual-GPU 690, despite costing around £100 more.

The Titan got closest to the 690 in Crysis 2, finishing just 0.1fps behind on a 1900x1200 display – 75.7fps to the 690's 75.8fps. The 680 recorded 45.6fps.

The Titan fell back on our larger 2560x1600 display, finishing on 45.3fps compared to the 690's 48.1fps. In Stalker: Call of Pripyat the Titan is further off the pace, hitting 121.7- and 91fps at the top two resolutions, in comparison to the 690's 137.3- and 101.6fps. The 680 was again a long way back, on 86.4- and 62.1fps.

A similar situation was noted in BattleForge, where the Titan's 99.9- and 68.1fps were some way off the 690's figures of 113.2- and 82.3fps. Once more, the 680 languished, on 68- and 47.7fps.

The Titan fares well on power consumption, though. While the 680 and 690 have TDPs of 195W and 300W respectively, the Titan drew a relatively modest 250W.

The GTX Titan fared very well in noise pollution too, proving quieter than either a 680 or 690.

Verdict

The nVidia GeForce GTX Titan should prove popular among professionals who require workstation-like number-crunching. For consumers its benefits are less obvious. The Titan is likely to grow in stature in coming years, but for now the GTX 690 offers faster gaming at a lower price. And for less than half the price, the 680 remains the real value card. ⊠ **Robin Morris**

cumbersome, and it can't handle embedded video and the like.

Playback compatibility from networked devices is excellent. Whether you're streaming from a NAS or USB drive, the screen is

able to contend with a wide range of popular codecs and containers, including AVI, WMV, MKV, MOV, MP3, FLAC, Vorbis, AAC/M4A and WAV.

Image quality is generally impressive – with caveats. Pictures are dynamic, exhibiting a satisfying level of darkness. Colour fidelity is vibrant and HD looks suitably crisp, but sharpness must be locked to the minimum setting to avoid extreme edge emphasis and ringing.

A key weakness of the screen is motion resolution, and it struggles to offer more than 850 lines. A DMM Film Quality Improvement processor can iron out minor horizontal judder, but it also introduces motion artefacts around moving objects.

The upshot is this Loewe isn't a great set for fans of sport.

The screen employs Active Shutter 3D, although the glasses are an optional extra. Performance of its 3D is best described as functional. Disney's *Tangled*, for example, exhibits clear double imaging.

The audio quality is high, with clean stereo separation from the gutsy 2x 10W amplifier.

Verdict

The Loewe Connect ID 32 is a glamorous, but flawed screen. Build quality and design are superb, but its picture performance is less impressive. Enthusiasts should look elsewhere. ⊠ **Steve May**

SMARTPHONE
Sony Xperia Z

PC ADVISOR
GOLD

The square Xperia Z has a clean and uninterrupted look, with a tempered glass rear cover. Available in black, white or purple, our black sample had a blue tint in certain light.

The Xperia Z has a distinctly premium and desirable design. The build quality is excellent, and the attention to detail is mostly exemplary. However, a thin gap runs the circumference of the glass on both front and back. And the grime does accept that invite.

It's thin and light for phone this big, just 7.9mm and 145g. The handset is also dust- and waterproof

The 1.5GHz Qualcomm Snapdragon S4 Pro processor and 2GB of memory yielded a very good result of 1,986 points in Geekbench, which is just short of the similarly specified Nexus 4's 2,009 points.

With its Adreno 320 graphics the Z managed an impressive 30fps in the GLBenchmark 2.5.1 graphics test. The Sony did less well in the SunSpider test, with an average JavaScript render time of 1,791ms. Yet surfing the web with Google's browser is smooth and responsive.

It's the 5in Reality Display with a full-HD (1920x1080) resolution that makes the Xperia Z stand out. The screen is stunning. Content looks sharp, thanks to a whopping 441ppi resolution, and colours are rich and vibrant. It's like holding a TV in your

hand. But it's difficult to reach the top of the display when the device is held in one hand.

Sony's Mobile Bravia Engine 2 is designed to enhance the quality of photos and video, but mostly brings more saturation to colours. For some content it introduces an unrealistic tone. You can turn off the effect.

The Xperia Z has just 16GB internal storage, but a microSD slot lets you add up to 32GB. The now-standard connectivity roster includes Wi-Fi, Bluetooth 4.0, NFC and aGPS, plus DLNA certification. There's a Micro-USB charging port and a headphone socket, plus two metal contacts for a (currently unavailable) docking station. The Z also supports 4G LTE networks.

A 13Mp rear camera takes Sony's Exmor RS sensor. A burst mode operates at 10fps until the battery gives in or you run out of storage, and the Xperia Z is the first phone to support HDR for video recording as well as stills. There's also a decent 2Mp (full-HD) front camera, but no dedicated shutter button.

The Xperia Z runs Android 4.1.2, although an upgrade to 4.2 is promised. The lockscreen is basic, with access only to the notifications

menu, camera and music player controls. It does have an awesome visual blind effect, though.

Sony adds its own Music Unlimited and PlayStation Mobile apps. It's disappointing that many of the 'apps' in the menu open the Play Store or web browser and expect you to download them yourself.

We were pleased to find with moderate use and Stamina Mode switched on the Xperia Z lasted into a second day of usage.

Verdict
The Xperia Z is the first Android smartphone Sony has really nailed. We love the stylish, desirable and rugged design. The combination of excellent performance, a stunning screen and great cameras make the Xperia Z a force to be reckoned with.
⊠ **Chris Martin**

SMARTPHONE
HTC One

PC ADVISOR
GOLD

The HTC One's performance beats or matches the best of the rest. It has the fastest CPU we've tested: a 1.7GHz Qualcomm Snapdragon 600 quad-core processor, which it combines with 2GB memory. It aced our Geekbench 2 test, turning in a record score of 2,721 points.

You have a choice of 32GB or 64GB models, but storage is not expandable. There's the usual GPS, plus Glonass, and a digital compass, gyro sensor, accelerometer, proximity sensor and ambient light sensor. It's a 4G phone with a 3.5mm stereo audio jack, NFC, Bluetooth 4.0 and a Micro-USB 2.0 port with HDMI via MHL. For Wi-Fi, it lists 802.11ac – the first phone to do so.

In terms of feel and materials the HTC One is among the very best. It's like a larger iPhone 5 with the same style mirror-polished edges. Besides the aluminium and Gorilla Glass screen there's a slim plastic band around the edge.

At 144g it's big and solid, but light. The HTC feels as though it could withstand some life in the pocket. It's thin, too, at 9.45mm, and nicely balanced. The display isn't edge to edge, but the bezel is thin.

In our tests the HTC One became hot to the touch. Not too hot to hold, but enough to worry us.

Graphics aren't far behind the best, and GLBenchmark HD turned in 34fps. In the SunSpider test the

HTC One was again close to the best, and recorded 1,213ms. Our current gold standard is the iPhone 5 with 903ms. Web browsing is swift and snappy, but the browser lags when resizing and sliding pages.

The 4.7in Super LCD 3 display has the highest resolution of any phone. Its full-HD screen crams 468 pixels into every inch. Suffice to say it's sharp; brilliant at rendering details in photos and video. Viewing angles are also good and the touchscreen is pleasingly responsive.

With two front-facing speakers the HTC One delivers a big sound, but with the potential to clip at higher volumes. The bundled headphones provided a clear

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

★★★☆☆

iPHONE ACCESSORY

Schneider Optics iPro Lens Master Trio Kit 4/4S

The iPro Lens lets you attach a wide-angle or fisheye lens to the built-in camera of an iPhone 4 or 4S. This Master Trio Kit 4/4S adds a 2x telephoto lens.

The lenses come packed in protective plastic containers, one of which doubles as a handle/tripod mount and screws on to the side of the iPhone case for easier handling and steadier shooting. A bayonet mounting system clips each lens to the case as required. The cases also provide a 1/4in-thread tripod mount.

The wide-angle lens is said to give a 35 percent wider field of view than the iPhone's existing lens. The fisheye is specified with a 165-degree field, and creates a circular frame around your pictures.

The build quality is very good, and we were impressed with the attention to detail. The iPhone case is made from stiff plastic; good, but bulky, and not as attractive as rival designs. It's difficult to snap in and out the iPhone, so you'll probably leave the case attached.

Although small, the lenses protrude from the case some 10- to 20mm, making it impossible to stash the phone in your pocket. If you intend to carry them in your pockets, note that the lenses have no caps.

While there may be no practical alternative to adding more glass over the phone's own lens, the combination is likely to reduce the overall image quality. Nevertheless, in our tests the wide-angle lens produced decent shots, with softness just around the image edges. Shooting into the sun produced noticeable lens flare. Contrast was very good, although we saw blown-out highlights.

The new telephoto lens offers the best image quality. Our photos looked very sharp, with colours well reproduced. There was little perceptible degradation when compared to the stock iPhone lens, but our iPhone 4 struggled to lock the focus when close to a subject.

Despite the better image quality available from the 2x telephoto, the fisheye lens was the one we defaulted to on most occasions. It's certainly the most entertaining lens in the package, able to produce fun, unique images. It's great for video, too, although this mode crops out the circular frame.

As fun, bizarre and exciting as the fisheye images are, inevitable side effects include a softness in the image edges and purple fringing in areas of high contrast.

Shooting into the sun can produce extreme lens flare and softening of the image, while shooting away from the sun means you'll struggle to avoid capturing your own shadow in every shot.

With its 165-degree field of view, it's difficult to avoid photographing everything around you. And that includes your fingers.

An iPhone 5 kit is promised soon.

Verdict

These lenses fall short of their 'Pro' moniker. However, for getting more creative with your iPhone's camera, this kit is a good, if pricey, purchase. You will need to use the unappealing iPhone case, and remember to carry your spare lenses in their protective cases. ⊠ **Dominik Tomaszewski**

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and well-rounded sound. The combination of infrared and HTC Sense lets you use the smartphone as a TV remote, too.

There may be just a 4Mp camera at rear (and 2.1Mp at front), but a fast sensor allows you to quickly capture shots. You can change the exposure and contrast, tweak the ISO levels and adjust the sharpness. Our test shots we good: occasionally noisy, but decent in low light.

A new software feature, HTC Zoe, captures an HD video each time you take a photo by grabbing an image 0.6 seconds before you press the shutter button, and then rolling for three seconds afterwards. The images and videos from a given event are then stitched together to create a 30-second video that you can export in Mpeg4.

Android 4.1.2 has been heavily customised by HTC's Sense interface and a new content-flow feature called BlinkFeed. This offers a cascading flow of social updates and media similar to BlackBerry 10's Hub. We found it annoying; your opinion may differ.

Battery life is standard for an Android phone, with the HTC lasting one day of moderate use.

Verdict

Superb performance and excellent build is slightly spoiled by the handset becoming warm in use. You can't fault the One's feature set, and it matches other high-end phones on price. Alongside the Sony Xperia Z and Apple iPhone 5 this is as good a phone as you can buy. ⊠ **Matt Egan**

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

★★★★☆

TP-Link TL-WA850RE

The TP-Link WA850RE is a 2.4GHz wireless-n range extender. It lets you extend the range of your network in troublesome areas of your home by rebroadcasting the faint signal from your main wireless router.

The white housing is reminiscent of Apple's designs and feels chic and stylish. Even the usual flashing row of LED indicators has been swapped for a neat circular arrangement.

The mains plug is built into the unit's rear, although you may need an extension cable if the plug is too close to the skirting board.

Setup is initially straightforward. You plug in the device, connect to its SSID and follow the wizard. This requires you to select your existing network name, enter your password and click Finish.

The last part proved confusing. After clicking the finish button we waited for an indication that the device had rebooted and was ready; none came, and there was no change to the Wi-Fi signal lights. Disconnecting and reconnecting

the power spurred the device into life and it then joined the network without issue.

Once configured, you can unplug the TP-Link, move it into a different room, and it will retain its settings. This means you could extend the network to various dead spots in the house using a single device.

The extender includes a comprehensive set of tools such as MAC address filtering, DHCP and throughput data-rate, accessible via a browser. An ethernet port lets it connect printers or smart TVs.

We tested the TL-WA850RE by placing it on the stairwell of our building, around 5m from the router. This was as far as we could get from the router while maintaining a 4-out-of-5-step signal. We placed a laptop on floors 1- to 3 to measure a baseline speed without the range extender. On floor 1 we recorded 24Mbps; floor 2, 1Mbps; floor 3, 0Mbps. With the TL-WA850RE in place, these rates increased to 29-, 26- and 6Mbps respectively.

In our tests the compact TL-WA850RE beat the Linksys RE1000, and showed very similar performance to its larger, more expensive brother, the TL-WA830RE.

Verdict
The TP-Link TL-WA850RE is a stylish product that blends in well with its environment and offers good performance. If you need to extend your home wireless connection, it's a useful option. ☒ **John Taylor**

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

★★★★☆

Promise Pegasus J2

The Pegasus J2 is an SSD that connects via Thunderbolt. It's built around two mSATA modules, striped in a Raid 0 array for best performance, and is available in 256- or 512GB capacities.

Only 110mm long, the J2 is truly pocketable. It's slightly thicker at one end (21mm versus 18mm) to accommodate a fan, which ensures the device remains cool at peak performance.

And what a peak that can be. While the company's own Pegasus R6 just beat it in sequential read speeds, the J2 has a major advantage in random read/writes.

The build quality is satisfactory, if uninspired. The top is crafted from natural aluminium; the underside, rubbery black plastic. There's also a leather pouch with magnetic clasp.

The J2 can be operated by bus power, or using a small adaptor. With the latter it can work at full-speed, cleverly leveraging the cache.

Powered only by the port of a MacBook, the J2 proved the equal

to the Elgato Thunderbolt SSD, cruising at around 267MBps for sequential reads. Elgato's bus-powered drive recorded 270MBps in the same QuickBench test with the disk-cache effects disabled.

For write speeds on bus power it beat the Elgato, at around 310MBps. And in 4kB random read/write tests, the J2 achieved 15- and 28MBps. Averaged from 4kB to 1024kB, it scored 91- and 134MBps respectively.

The figures when powered are remarkable – 783MBps for large (20- to 100MB) reads, and a close 729MBps in sequential writes.

The top speed may be just below that of a six-disk Raid from Promise's own desktop R6, but small-file-transfer characteristics were better. For example, small random writes were around 50 percent quicker in our tests.

Long-term performance is harder to gauge, with Promise using less popular SSD controllers from Phison. Garbage collection and

wear-levelling strategies, crucial for maintaining long-term performance, are unknown.

In use the unit did get a little warm on adaptor power, followed by a faint whirr of the fan. We'd rather see a larger unit with a heatsink.

Verdict
The J2 is a smart drive with stellar performance, which can seamlessly switch from bus-only to bus-plus-external power. The clever cache side-steps one of Thunderbolt's in-room elephants: the paucity of power to operate today's chipsets. ☒ **Andrew Harrison**

TABLET

Lenovo IdeaTab A2107A

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

★★⯪☆☆

Lenovo's IdeaTab A2107A is the 7in version of the 9in A2109A. It costs just £150, with 3G connectivity as standard, plus 16GB of expandable storage. On paper, it appears to be a strong rival to pricier seven-inchers from Google, Amazon and B&N.

The design follows the larger IdeaTab, with a stylish glass front and a matt plastic rear. A rear panel slides up to reveal two SIM slots.

It's a chunky 11.5mm thick and feels sturdy, with no creaking or flexing. But it's heavy and, at 400g, uncomfortable to hold up for long.

Designed for use in portrait mode, it's suited to reading e-books and long web pages; the Android home screen displays only this way.

The 7in screen packs 1024x600 pixels, giving a 169ppi resolution. That's lower than its Android-based rivals, but just above the iPad mini's 163ppi. Viewing angles are shocking.

With 3G connectivity and a decent build for £150, there had to be a catch; you'll find this in the IdeaTab's basic performance. It was so slow in our benchmarks that we were convinced our sample was faulty, and we weren't reassured by a message that said the battery had overheated and the tablet should power down.

This Lenovo uses a budget MediaTek 6575 chipset designed for cheap smartphones in emerging markets. It combines a 1GHz ARM Cortex-A9 single-core processor with MediaTek's display tech and cellular connectivity; the dual-SIM capability is in fact one 3G plus 2G GSM. The 1GB of memory is insufficient to address the tablet's shortcomings.

We recorded just 368 points in Geekbench 2. For context, Google's Nexus 7 scored 1,452 points, and the slower Kindle Fire HD saw 1,124. Sub-400-point scores aren't acceptable for even super-budget smartphones these days, and you'll notice lag just swiping between the tablet's home screens.

The IdeaTab's graphics score in GLBenchmark 2.5 was embarrassing: we saw just 3.9fps in Egypt HD. In SunSpider, meanwhile, the IdeaTab managed a yawn-inducing 3,037ms.

Lenovo includes a rear camera – although it needn't have bothered, since this 2Mp job without flash is barely usable. A 0.3Mp webcam is grainy and awful in low light.

Battery life from the lithium pack is rated at 8 hours with 3G.

Verdict

We wanted to like the cheap and sturdy, 3G-capable IdeaTab, but it's slow and the screen is poor. We recommend spending an extra £19 on the Nexus 7. ⊠ **Marie Brewis**

---

iPOD SPEAKER

Sonoro cuboDock

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

★★★★⯪

Sonoro's cuboDock is a stereo speaker for the iPod and iPhone. It doesn't break new ground in electronic or acoustic design, but its simple aesthetics and quality construction may appeal. This slope-fronted all-plastic cabinet has a central dock, and comes in a range of colours and finishes.

The cuboDock can play music in three ways: directly from a docked iDevice; through the rear analogue line-in port; or from a phone or PC over Bluetooth.

There are no details of the audio technology inside the box. A bass-boosting reflex port on the rear lets the cuboDock sound about as fulsome as you could hope from a roughly 5l-volume cabinet.

At the top end, the mid-fi sound of a Class D amplifier may have been smoothed by 'textile tweeters' – we presume fabric soft domes, which are somewhat sweeter than the metal-dome alternatives.

We paired the cuboDock with our iPhone and laptop over Bluetooth, and saw sketchy results. The heavy compression of the wireless link was the principle culprit here, compounded by cascading AAC and Mpeg audio. Uncompressed music was milked MP3-like by Bluetooth A2DP, evident as mechanical artifice and grain that made music tiring.

The stereo spread is physically limited by the size of the box. The best sound was achieved with ALAC lossless music from a docked iPhone 4S. The cuboDock can certainly handle bass-rich music without any creaks or distress from the cabinet.

Treble is pronounced still, forward of the midband. Massive Attack's 'Teardrop', for example, impressed with a tight control of the bass-heavy mix at bedroom-filling volumes, although that toppiness was evident in pseudo-vinyl noise.

There are no tone controls, but the palm-sized remote lets you skip and pause tracks on a docked iPhone, and switch directly between Dock, Bluetooth or Aux. With the cuboDock paired to our PC, we also found we could use the remote to play and skip tracks from iTunes. This remote feels well-made, a solid lump with membrane buttons.

Verdict

The cuboDock is a neat one-box speaker, with a handy Bluetooth fallback. It follows the mid-fi sound of low-cost audio accessories, helped by decent yet not overblown bass, and can play reasonably loud without complaint from amp or cabinet. The Sonoro is expensive, but tidy. ⊠ **Andrew Harrison**

EDUCATIONAL APP

Sound Uncovered for iPad

Free

Contact
■ exploratorium.edu
Read more
■ tinyurl.com/ausLh7m

System requirements
iPad running iOS 6;
332MB storage

PC ADVISOR
RECOMMENDED
★★★★½
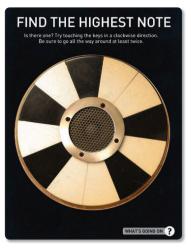
Just how much does your brain functionality affect what you hear? This is the question posed by the Exploratorium science museum's Sound Uncovered app for iPad. This fun, interactive app digs deeper into the world of sound.

Sound Uncovered is designed like an interactive magazine. It features articles, videos, sounds (of course), and interactive experiments to help users of all ages engage with sound, science, and learn how the two intersect.

The app is gorgeous, easy to navigate and fun to play with. Even though it's a sound app, it's also visually interesting, with lots of high-resolution photography and interactive images.

Getting started is simple – just open the app and you'll see a table of contents. You can jump directly to any chapter, or swipe page-by-page through the app. Double-tap on a page to bring up a navigation aid.

At launch, Sound Uncovered comes with 12 chapters, but the

FIND THE HIGHEST NOTE
Is there one? Try touching the keys in a clockwise direction.
Be sure to go all the way around at least twice.

WHAT'S GOING ON ?

PLAY IT BACKWARD
"Madam, I'm Adam" is a palindrome—spelled the same backward and forward. How does it *sound* backward?

Record a word or phrase, then play it backward.

Other palindromes to try:
racecar
senile felines
too bad I hid a boat

Now try:
say yes
oil
new moon
shiny nash
who's that

WHAT'S GOING ON ?

Exploratorium plans to add more. Each chapter consists of one page with several interactive elements. For example, the first chapter features a circular keyboard that you can play with your finger (above left). Another has an audio recorder that lets you record your voice and play it backward or forward (above right). There are lots of things to tap in this app, but you won't get lost – instructions and labels are plentiful.

In the bottom right corner of each chapter is a link that brings up more information on what's going

on in each experiment, video or article. The language used is easy to read and gives you a good general overview, but for more in-depth information you'll want to go online and do some of your own research.

Verdict

Sound Uncovered is a fun and informative way of discovering the science behind sound, and it proves that there's a lot more to sound than you may think. The app is well-produced and, better still, it's free. ⊠ **Sarah Purewal**

REFERENCE APP

Discworld: The Ankh-Morpork Map

£9.99 inc VAT

Contact
■ discworldapp.com
Read more
■ tinyurl.com/bdznxbr

System requirements
iPad running iOS 6;
730MB storage

PC ADVISOR
RECOMMENDED
★★★★½
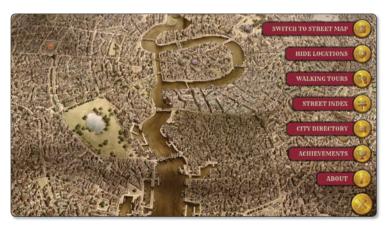
Discworld: The Ankh-Morpork Map is the first app to accompany Terry Pratchett's *Discworld* novels.

The app comprises two maps: the first is a top-down Google Maps-style affair, complete with buildings and road names; the second a 'living' interactive map. Both are hand-drawn with a huge amount of detail, giving the app a warm, charming essence.

The basic map is a useful accompaniment to Pratchett's novels, allowing you to get a real sense of having embarked on a journey with the individual characters. Each time a road name, pub or other location is mentioned, you'll be able to see on the map exactly where it is situated.

The other map is more exciting, mind. You can zoom in to reveal more detail. With smoking chimneys, 1,500 residents walking the streets and more, it's with this map that the app really comes to life.

Our main gripe with the app is that the ambient noise of the city

SWITCH TO STREET MAP
HIDE LOCATIONS
WALKING TOURS
STREET INDEX
CITY DIRECTORY
ACHIEVEMENTS
ABOUT

changes depending on your location. While fascinating, this quickly becomes annoying.

The maps are huge and you could spend hours exploring their nooks and crannies. There are more than 2,000 clickable businesses, services and landmarks; each returns information, quotes from the novels and hand-drawn placards.

Although it's not a game, Discworld includes a set of achievements. We particularly enjoyed tasks that required us to track down particular characters on the living map, including Death, Commander Vimes and Rincewind.

But while these challenges are fun, they won't entertain you on a long-term basis. Other attractions include three different walking tours, a street index and a city directory. But it's as a reference app and companion to Pratchett's novels that Discworld really earns its keep.

Verdict

It's expensive, but Discworld: The Ankh-Morpork Map is fun, informative and a must-have for Pratchett fans. It's one of the best-looking apps we've seen, with more features than you'd expect from any map. ⊠ **Chris Martin**

GAME
The Simpsons: Tapped Out

★★★☆☆

Daily Actions: 3/3
Collect Rewards and Vandalize buildings
KRUSTY BURGER
Other Springfield
Level 8 ★★★☆☆

As a child of the 80s, I was a mega-fan of *The Simpsons*. I had all the videos, posters, plush toys, hats, wallets, bubblegum cards… at six years old, I was even convinced I would someday marry Bart. (I'll *never* live that one down.) Naturally, when The Simpsons: Tapped Out mobile game appeared in Google Play, courtesy of Electronic Arts, I wanted to give it a try. Ay Carumba! I wish I hadn't: was the object of my childhood obsession really this naff?

EA claims Tapped Out is "life-ruiningly fun". Fun, no; life ruining, possibly. There's only so much of Homer calling out "Better them than me" to announce the completion of some menial task given hours previously that I can take. Audible notifications on my smartphone? Doh!

The game annoyed me so much I had to uninstall it for a few days, then reinstall it prior to the writing of this review. Although in most construction games this would mean having to start over, The Simpsons' requirement for an active internet connection means it is able to cleverly store your progress and you can pick up where you left off.

Jumping through hoops
Get past the irritating audible notifications, which can't be switched off in a settings menu, and the game continues to disappoint. Before you can begin playing you need to download the rather large 40MB game file, plus a further 72.8MB of updates (you'll want to toggle on Wi-Fi). You'll then need to wait a good couple of minutes for the game to load, then 'Tap to continue', then wait another minute for the game to begin.

If it's your first time playing The Simpsons: Tapped Out, you'll also have to sit through a cut-scene in which Homer is so busy playing on his iPad that he causes a meltdown at the nuclear power plant. Those Apple fans…

Finally into the game, it's your job to rebuild Springfield – or, at least, a version of the town (after all, Springfield is one of the most common city names in the US). You can even visit an alternative Springfield within Tapped Out, collecting dollars and *doughnuts* that help you to build up your own town. In the iOS version of Tapped Out you can also visit your friends' neighbourhoods.

You begin the game with only Homer, then gradually unlock other characters such as Lisa, Flanders, Cletus and Apu. Even Sideshow Bob makes an appearance: a truly undaunting experience in which you simply tap evil Bob to arrest him. (Chief Wiggum is never around when you need him – which makes sense, given the scarcity of doughnuts.)

Our main gripe is that there's absolutely no hint of a challenge within the game; you simply do as you are told. You're instructed when to build houses, plant trees, buy land, lay paving and so on. If Apu needs Tomacco for the Kwik E-Mart, you don't even get to figure out the solution for yourself (to build Cletus' farm and grow Tomacco).

Tap and wait…
A scrollable character menu on the left shows which tasks are currently available for each character; you simply pick one from the list. For each completed task you earn money and doughnuts, which are used to progress. If you're lucky, you might win some extra money and doughnuts with an Itchy & Scratchy scratchcard.

When a character is free to complete a task an exclamation mark appears in a speech bubble above them, and they wander aimlessly about Springfield until you give them new orders. Some tasks are completed very quickly; others take hours. For example, Apu can pray to Ganesh in 45 seconds, feed the octuplets in an hour, or spend four hours completing a shift at the Kwik E-Mart. Like all such games, you can trade physical money with virtual currency to speed up tasks.

With Lisa busy babysitting Rod and Todd, Apu relaxing in the Brown's house (whose house?), Cletus delousing the young-uns, Homer lounging in the pool and Flanders having a power walk, the only thing left to do is close the game and wait.

Every so often the characters interact with each other, but I struggled to buy into some of their conversations. As if Homer would really say to Apu: "Apu, you look exhausted. Why not treat yourself to a little R and R?" And why must the text appear letter by letter – can't we speed things up?

In the game's defence, the voices are authentic and the graphics are really very good. What you see onscreen is exactly what you imagine seeing on your TV.

As a word of warning, Apple has recently refunded one player whose eight-year-old son spent £980 on virtual doughnuts. To avoid this happening to you, check out our walkthrough at tinyurl.com/bkpoakp.

Verdict
I still love *The Simpsons*, but in this mobile game I really am Tapped Out. If you like the sort of game that shouts out in the middle of a packed commuter train that Apu has finished his Kwik E-Mart shift it's worth a download. ⊠ **Marie Brewis**

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1&1

1and1.co.uk

DISK UTILITY

Diskeeper 12 Home

£21 inc VAT (3 PCs)

Contact
- condusiv.com

Read more
- tinyurl.com/acw2xrk

System requirements
Windows XP/Vista/7/8; 18.3MB RAM; 60MB drive space

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

★★★★⯪

DISKEEPER 12 tackles disk fragmentation before it becomes a problem
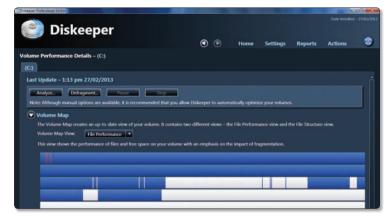
Files are often split up and saved to various parts of a hard drive, depending on where space is available. The need for Windows to later look in several places to stitch together and re-open that file can slow performance, so defragmenter utilities are used to reorder bits of files on the hard drive. A basic utility is provided with Windows, but there's also a market for more thorough apps such as Diskeeper.

Condusiv's defragmentation work operates continuously in the background, so your files never get the chance to become fragmented. This should result in faster file loading, backup and antivirus scans.

Diskeeper is designed to be installed and then forgotten. Upon installation you don't need to manually run a drive defrag, although by doing so you may see immediate benefits.

The main control panel appears dumbed-down, with big, bold icons that give very general information. For example, Diskeeper won't tell you the exact percentage of fragmentation on your drive following analysis, instead using terms such as 'little' and 'moderate'.

New features for version 12 include an alert mechanism for fragmentation and disk health, which seems odd when your drive is continuously defragmented.

Smart disk monitoring is built in, though, so it's useful to know when a drive may be about to fail. There is also better historical reporting of fragmentation not completed.

We tried the program on both a lightly and a severely fragmented Windows 7 PC. On the former PC Diskeeper needed 1 min 43 secs to rejoin 4,178 fragments, and it was able to decrease startup time by a reasonable 17 percent.

On the more heavily fragmented PC, Diskeeper took 45 mins to complete a defragmentation of 8,876 fragments. This resulted in a 47 percent improvement to startup, which is very worthwhile. Starting up Outlook was also 45 percent quicker. The improvements we saw shouldn't degrade over time either, since the program keeps intact files over contiguous runs.

To assess whether Diskeeper has an effect on system speed, we timed how long it took to duplicate a 10GB folder of mixed files with and without the software running. The difference amounted to just 4 secs over a 10-minute copy time.

Verdict

We've never before had our heads turned by defragmentation utilities, simply because the tool built into Windows is pretty good. However, Condusiv Diskeeper 12 is a rung above the rest, and by preventing rather than merely fixing fragmentation it can keep drives running smoothly. This software runs discreetly in the background and produced a measurable improvement to performance in our tests. It offers very good value at £21 for three PCs. ⊠ **Simon Williams**

PRINT UTILITY

EcoPrint2 Pro

$60 (£40)

Contact
- ecoprintsaver.com

Read more
- tinyurl.com/c8fw3u3

System requirements
Windows XP/Vista/7; 256MB RAM; 15MB drive space

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

★★★★☆

The biggest single gripe from people who regularly print documents or photos is the cost of ink. Costs can be kept down by printing in draft or toner-saver modes, but these result in low-quality prints and, depending on the printer maker, you can't easily determine how much ink or toner you're saving.

EcoPrint2 Pro reduces the use of consumables by printing fewer dots. This is achieved using proprietary algorithms that it claims give better reproduction than typical economy modes. You can specify the amount of saving required on each print, from zero- to 75 percent.

The program sits between Windows and the printer driver, which can be inkjet or laser, from any manufacturer. When you hit File, Print, you simply select the EcoPrint driver rather than your printer. This launches the EcoPrint2 Pro control screen.

EcoPrint2 Pro, also available in a $40 standard version, offers the facility to print more than one page per sheet. This is often offered by manufacturers' printer drivers, but ecoPrint also allows you to select which pages to print from a multipage document, and you can create a print job containing pages from different sources.

If you want to print, for example, a report from Word, with a table from Excel plus a photograph, open each in its respective application and print to EcoPrint2 Pro. The selected pages will appear together in the EcoPrint2 Pro print manager. Select Print and the combined document is then sent to the printer.

The print manager screen is straightforward to use and most options are accessible with a single click. Handy stats screens show how much you can save at the various settings, and how much you have saved in the current month.

The software offers a slider from zero- to 75 percent for ink saving; some fine detail, especially in blacks and greys, can be lost at the higher settings, so you'll need to experiment for best results.

VIDEO EDITOR
Magix Movie Edit Pro 2013 Plus

£50 inc VAT

Contact
■ magix.com

Read more
■ tinyurl.com/bvhvxhs

System requirements
2.8GHz multi-core processor; Windows XP/Vista/7/8; 4GB RAM; 2GB drive space

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

★★★★☆

Not one of the best-known video editors on the market and up against products such as Adobe Premiere Elements and Pinnacle Studio, Magix Movie Editor Pro 2013 Plus is still a popular alternative.

There's a video monitor at top left, which can be used to run clips or project video, a gallery section to the right, for displaying files, fades, titles and effects, and a timeline at the bottom.

Audio tracks can be separately displayed, or as part of the associated video track. Even on a large screen, though, this can cramp control selection.

If you're new to editing video, the range of formats and parameters can be confusing. But Movie Edit Pro 2013 Plus is good at presenting solutions, not problems.

Whereas most editors will tell you when the framerate or resolution of imported clips don't match an existing project, Magix offers to automatically change the settings.

And if you try to run camera clips via USB, the program spots the potential throughput problem and offers to copy the file to your hard drive prior to import.

The application supports ripple editing, locking together audio and video when you insert new clips. It can also handle 3D projects, but won't convert 2D to 3D.

MAGIX MOVIE EDIT PRO works smoothly and quickly to edit video footage

Magix is well known for its audio software, and sound editing is catered for with an eight-channel mixer, plus an effects rack, which includes reverb, equaliser, delay and compressor.

The main claim for the 2013 version of the application is a dramatic increase in the import speed for AVCHD video files. Those we tried certainly came in noticeably quicker than in Premiere Elements.

Whereas slow video import can interrupt your workflow if you're dealing with lots of small clips, rendering speed is important for any video. Here, too, Magix has made some improvement: around 50 percent for processing an AVCHD file, based on comparison with the older Movie Editor MX.

The improvements you see will depend on the particular video you're processing and your system's specification, of course.

The program now supports the AVCHD Progressive (50p) standard, offering 50fps at 1920x1080. However, you'll need a system with at least an nVidia GeForce 8000, AMD Radeon 5000 or Intel QuickSync GPU, and a quad-core processor to handle the data rates.

The 2013 product can also handle multicamera projects by using the audio track to synchronise clips.
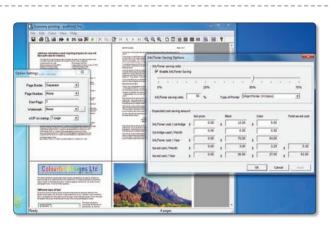
Output is burned to CD, DVD and Blu-ray, or uploaded to mobile devices, YouTube, Vimeo or Facebook.

Verdict

Magix Movie Edit Pro 2013 Plus offers much of the functionality of its better-known rivals, and works smoothly and quickly. A worthwhile contender. ⊠ **Simon Williams**

ECOPRINT 2 aims to lower your ink and paper usage

Our test samples were printed on an HP Envy 120 colour inkjet and a Pantum 2000 mono laser. The HP's regular print mode is very good, with dense blacks and bright colours. The draft mode is also good, showing lighter, less exciting colours and some greying of reversed text.

With EcoPrint2 set to 25 percent saving, we saw denser blacks and fainter colours. At 50 percent saving everything is fainter, but still easily readable and fine for everyday use.

With the Pantum laser, which lacks a draft mode, the 25 percent saving was barely noticeable, although greyscales began to fade at 50 percent.

We measured the HP's print speeds at 37 seconds in standard mode and 19 secs in draft, which matches its usual times. The Pantum shaved a second from its native print speed, at 11 secs.

The main thing missing from EcoPrint2 is a facility to customise pages; the most obvious being the

ability to remove advertisements from printed web pages. Since web pages can contain more than 50 percent unwanted ads, it makes sense to strip out this huge waste of valuable ink.

Verdict

EcoPrint2 Pro produces reduced-ink prints that can prove better in quality than equivalent printer drafts using ink-saver modes. With reported savings of 25 percent, there's little noticeable difference in appearance. EcoPrint2 Pro is available in a 50-use trial so you can easily compare output from EcoPrint with your printer.
⊠ **Simon Williams**

ILLUSTRATOR

Manga Studio 5

£55 inc VAT

Contact
- manga.smithmicro.com

Read more
- tinyurl.com/bwfj5ps

System requirements
2GHz processor; Windows XP/Vista/7/8/ OS X 10.6 or later; 2GB RAM; 2GB drive space; graphics card with 256MB VRAM; OpenGL 1.5

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

★★★★☆

Manga Studio 5 has a bit of everything for digital artists who create illustration and comics. The latest version features an overhauled user interface, and new brushes and tools.

Version 5 showcases new colouring tools, and the Layers panel now includes options such as Clip Layer, Multiply, Quick Mask and more. New brushes for watercolour, oil and pastel will be familiar to Painter users.

Artists can create and share custom brushes. The airbrush tool creates multiple effects for painting. Ink and pencil drawing tools have improved control options. For example, with the ink tool you can vary anti-aliasing.

Vector snapping of panels, type and speech balloons help you lay out comic pages. Type and panels are editable on the fly. Manga Studio is also loaded with zip tones and effects that you can colour for effect.

The 3D human models are a new and welcome reference. Artists

MANGA STUDIO 5 is a versatile illustration program at a reasonable price

can alter female and male models, then pose them using the built-in character rigging. Guidelines on these models assist in designing outfits. 3D models are clothed with swappable outfits, expressions and head details. A variety of poses and hand gestures are included.

Under the File menu you'll see a new item: Qumarion. Quma is a real-life model plugged in via USB. It's fully articulated, and the onscreen model mimics movement in real time.

Most standard features from Manga Studio EX 4 are included, although multiple comic page layout

and perspective rulers are not present. Expanded 3D options and more features will arrive in Manga Studio 5 Ex, expected this summer.

Files created in Manga Studio 4 or earlier are not compatible with Manga Studio 5, although the publisher says a fix is forthcoming.

Verdict

At £55, Manga Studio 5 is a great catch-all art program. New colouring tools with customisation, layers, panel creation, responsive drawing tools and 3D models makes it ideal for creating comics. ⊠ **Karen Luk**

IMAGE UPSCALER

PhotoZoom 5

£59 inc VAT

Contact
- benvista.com

Read more
- tinyurl.com/dytetf2

System requirements
Windows XP/Vista/7/8/ Mac OS X 10.5 or later; 1GB RAM; 45MB drive space

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

★★★★☆

If there's one phrase you never want to hear from a designer, it's that the photo you gave them is too small. You can often increase an image's size by around 20 percent before the edges become noticeably jagged. Beyond this, you need PhotoZoom 5, a dedicated resizing solution that installs as a standalone app or a Photoshop plug-in.

LaunchPhotoZoom and your image appears in the main panel, with options to the left. A thumbnail shows to which part of the image you're currently zoomed in.

Any changes you make appear in the preview pane. Moving the viewer or manually dragging the image triggers a fullscreen recalculation. This is faster than in previous versions but, if you simply wanted to see a bit more of part of the image, it's tedious to rescan and recalculate for everything onscreen.

Presets make it easy to increase the size of older digital images, while removing Jpeg artefacts and retaining background detail.

PHOTOZOOM can triple image resolutions with no noticeable loss of detail

There are plenty of viewing and resizing presets, or you can specify custom measurements. PhotoZoom can also decrease the image size to a specific crop and resolution.

Most resizing is achieved either by percentage, actual pixels or using measurements tied into the image density. The aspect ratio is usually retained, but this can be overridden.

Interestingly, PhotoZoom offers three S-Spline resizing methods for your selection. You'll barely notice a difference between them, but the upshot is you get to see just how bad a bilinear resizing looks by

comparison. There are parameters for unsharp masking, and you can fine-tune the result with sharpness, film grain and artefact reduction.

Even when increasing an image resolution threefold the system can retain and magnify detail, without the result becoming too painterly. For graphic items it's just as impressive, with smooth edges and plenty of sharpness.

Verdict

PhotoZoom's image upscaling is faultless. This is one of those utilities that pays for itself. ⊠ **Duncan Evans**

IP CAMERA MONITOR

iSpy Connect

From free

Contact
■ ispyconnect.com
Read more
■ tinyurl.com/bn5gadp

System requirements
Windows XP/Vista/7/8;
13.3MB drive space

Using a simple webcam, you can keep a close eye on what's happening in your home or office. iSpy is an open-source application that lets you connect to a number of cameras and microphones, monitor them for movement and sound, and automatically begin recording when activity is detected. Although iSpy is free to use, some of its features (such as remote viewing) are not. The free features provide plenty of functionality, though.

Getting started is easy: all you need is a webcam and a USB cable long enough to connect it to your PC. You can also use an IP camera connected to your network.

iSpy connects to the camera and shows the current view. You can define specific areas iSpy should watch for movement, and set a threshold value for the amount of motion that will trigger recording. You can also name the camera, configure the framerate and more.

When you want to view the recordings, double-click the iSpy

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

ISPY CONNECT lets you monitor and record multiple camera video feeds

icon and up pops the window with a list of time-stamped video thumbnails. Then, simply double-click a thumbnail to play the clip.

One area in which iSpy is lacking compared to competitor Vitamin D is search. Vitamin D has a custom search feature that lets you filter hundreds of captured clips to a more manageable subset. iSpy doesn't have this granularity, which means you may have to sit through a good few clips until you find the one you're looking for.

On the other hand, Vitamin D's free version doesn't let you connect

multiple cameras, whereas iSpy lets you connect as many as you want. It also lets you connect microphones for audio recording, and even import a map of your premises and specify where the cameras and microphones are physically located.

Some of iSpy's features require an online account with the service, which costs between £5.30 and £33 a month.

Verdict

If you have a webcam you want to use for security, iSpy lets you do a lot for free. ⊠ **Erez Zukerman**

GAME

The Elder Scrolls V: Skyrim – Dragonborn

£14 inc VAT

Contact
■ elderscrolls.com
Read more
■ tinyurl.com/acdquyv

System requirements
2GHz dual-core processor; Windows XP/Vista/7; 2GB RAM; 6GB drive space; DirectX 9 graphics card with 512MB VRAM

Dragonborn is an expansion on the role-playing game Skyrim. There's a large new area to explore, with new powers, a new arch-enemy, and a return to one of The Elder Scrolls' most beloved settings.

The third in the series was both the weirdest and the most open, and there's a feeling that freedom and creativity were sacrificed in favour of gloss in subsequent games.

Dragonborn revisits Solstheim, but it adds far stranger fare. There are towns built within the shells of giant crustaceans, a volcano forever belching smoke on the horizon, clusters of tower-block-sized mushrooms and so on.

Dragonborn is also home to a healthy clutch of side-quests. It's best when you're exploring, talking to people and wandering into sinister random caves. The game has an overarching campaign, but it's something into which you fall in and out as you stumble around.

The main campaign is a mixed bag. It offers amazing and inventive

★★★★☆

PC ADVISOR RECOMMENDED

DRAGONBORN is The Elder Scrolls in a new and weirder setting than ever

locales – notably, an other-worldly realm of malevolent books and Lovecraftian monsters. Yet its central promise, facing off against a rival 'Dragonborn', is a wash-out.

After a big build-up and the constant threat that you're up against a menace the likes of which this world has never seen, you expect a titanic fight against a guy who can ride dragons. Then he turns out to be just a dude with lots of health and a few spells, and is easily defeated by smacking him with a sword a few times.

Similar disappointment comes in riding the mighty dragons, which are

all but impossible to control: they fly in circles by themselves, and can launch awkward, weirdly ineffectual attacks on enemies on the ground.

Unusually, for latter-day Elder Scrolls, there are some memorable and engaging characters – people with whom it's a pleasure to chat.

Verdict

Its main campaign might peter out with a naff baddie, and the promised dragon-riding is underwhelming. But Dragonborn is bursting with new things to do and sights to see in Skyrim, and for its fans it's a must-have expansion. ⊠ **Alec Meer**

GAME

Crysis 3
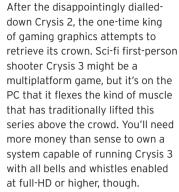
£31 inc VAT

Contact
■ crysis.com/uk
Read more
■ tinyurl.com/d35xwe4

System requirements
Dual-core processor;
Windows Vista/7/8;
2GB RAM (3GB Vista);
DirectX 11 graphics
card with 1GB VRAM

★★★★☆

CRYSIS 3 is set in a post-apocalyptic New York

After the disappointingly dialled-down Crysis 2, the one-time king of gaming graphics attempts to retrieve its crown. Sci-fi first-person shooter Crysis 3 might be a multiplatform game, but it's on the PC that it flexes the kind of muscle that has traditionally lifted this series above the crowd. You'll need more money than sense to own a system capable of running Crysis 3 with all bells and whistles enabled at full-HD or higher, though.

The jury's somewhat out on whether it's worth it, and whether this new title looks all that much better than 2008's still-graphics-card-troubling Crysis 1.

All in the detail

The sheer amount of detail on show in this sci-fi shooter, set in a post-apocalyptic New York, outdoes almost any other game you could name. But its tendency to be set in the dark, its pursuit of photo-realism rather than distinctive style and to populate its rogues' gallery with oddly shapeless aliens, means it's not as eye-catching as it deserves to be. Pore over still screenshots and there's much to be wowed by, but in motion it's oddly murky.

Going some way to make up for that is the sweeping scale of the levels – shattered skyscrapers on the horizon, mile-long dams, towering iron fortresses and flooded boulevards mean Crysis 3 isn't your common-or-garden grey-brown apocalypse.

Even so, it's not enough of a looker to justify an eye-watering outlay for a new graphics card. Console versions hold up well, given the machine's age, but

PROPHET's new crossbow lets you hang back and pick off enemies from afar

Xbox 360 and PlayStation 3 owners will be forgiven for thinking the next-generation's already here if they clap eyes on the PC edition.

This is especially true of the handful of character faces you get to see during in-engine cutscenes. They're flat-out incredible, not far from suitable for a cinema screen.

Play it your way

Unfortunately, you don't have free run of the ruins of New York. True, Crysis 3 is more open and generally free from the tunnels of its immediate predecessor, and it's not the sandbox of the oft-revered original game. But objectives and enemy locations are fixed, so while the road from A to B might be a very wide one compared to contemporaries such as Call of Duty and Medal of Honor, it's only ever going in one direction. The game's much more interested in evoking and outdoing the spectacle and scripting of a Modern Warfare game than further exploring the freedoms of the original Crysis or its predecessor Far Cry.

Far greater liberty than most of Crysis 3's peers can be had from the combat system, which allows free choice between all-out warfare, sniping or stealth. Pseudo-science-spouting protagonist Prophet wears a Nanosuit, able to temporarily imbue him with invisibility, bullet-proofiness or super-jumping, and how you employ those abilities has a dramatic effect on the kind of game you'll have.

If you want it to be a run-and-gun game, it can be that. If you want to sneak around silently snapping necks or avoiding enemies altogether, it can be that. If you want to hang back and pick off everyone from afar, the new crossbow – with its silent and one-shot-kill bolts – is your best friend.

As a Predator simulator, Crysis knows what it's doing – making it doubly a shame that it so regularly interrupts itself with the screeching, juvenile babble of its plot. It's Saturday Morning Cartoon nonsense – but it's rarely playful about it, instead taking itself deadly seriously when it bangs about System X and Alpha Cephs and New York being trapped inside a Nanodome. At least the cutscenes can be skipped.

Frankly, Crysis 3 would be a bore if it wasn't for the muscular, flexible combat. It remains a big step down in terms of strategy and freedom compared to the first Crysis, but it has recaptured some of its earlier spirit when played alongside the claustrophobic second game. It's a shame to not see any bars being raised, given developer Crytek used to be famed for doing just that. But as simply a flashy, noisy distraction, Crysis 3 does the trick.

Verdict

Crysis 3 is handily outdone by the first game in the series, but compared to most of the current crop of first-person shooters it's rich with tactical flexibility and grand, sweeping environments. ⊠ **Alec Meer**

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PRINTER

Canon i-Sensys LBP7780Cx

Specification
Colour laser printer; 768MB memory; 9600x600dpi print resolution; claimed print speed: B=32ppm, C=32ppm; actual print speed: B=23.2ppm, C=16.7ppm; 500- + 100- sheet input tray; gigabit ethernet; USB 2.0; USB drive port; Apple iPad/iPhone support; UFRII/PCL5c/PCL6/Adobe PS; toner cost: B=£160, C=£162 x3; print yield (pages): B=12,000, C=6400 x3; 517x530x401mm; 31kg

PC ADVISOR
RECOMMENDED

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

★★★★½

The LBP7780Cx colour laser printer builds on Canon's LBP7680Cx, boosting performance and improving the paper handling.

The 25kg LBP7680Cx wasn't exactly light, and the 31kg LBP7780Cx is heavier still. Build quality is good, with the various compartments folding out without any suggestion of fragility. That's just as well, since this printer is designed for high-volume.

The input tray takes 500 sheets, and another 100 can be loaded into the multipurpose tray – twice the capacity of the LBP7680Cx. An additional 500-sheet tray makes for a potential 1,100 sheets.

Added strength lets Canon push the suggested duty cycle from an already healthy 60,000 pages per month to 75,000.

Both models share the same controller and 768MB of memory, and can handle PostScript, PCL6 and PCL5c, as well as Canon's proprietary UFRII language.

Serious printers don't tend to offer colourful navigation, and the Canon's text display is typically forbidding to the uninitiated. Considerable levels of customisation are available for those who know what they're doing.

The multiple menus are accessible using different buttons, making it quick to set up advanced configurations. IT admins can remotely maintain the printer, too.

Secure Print lets you assign to your document a password, preventing it being printed before you are standing at the printer and ready to catch it. A front-mounted USB port also lets you print files directly from a USB stick, and an optional SD card reader can also be fitted.

Canon's business range now supports iPads and iPhones, although Android users are out of luck. The LBP7780Cx supports Canon's multifunctional embedded application protocol (MEAP) platform, allowing programmers to write Java apps for the printer.

In laser terms, the LBP7680Cx wasn't terribly fast, and we recorded just 13.8 pages per minute (ppm). This LBP7780Cx is significantly faster: it turned out text at 23.2ppm.

This improvement is partly due to a decrease to the startup time (from 16- to 10 seconds), but the LBP7780Cx also has more power.

Auto-duplexing saves on paper, and the speed drop is just 14 percent. We recorded an excellent double-sided figure of 19.9ppm. It's therefore no surprise to find auto-duplex is the default print mode.

Text output is clean and letters are reasonably formed, particularly with good-quality printing paper. The text isn't the darkest, but the overall effect is very easy to read.

The LBP7780Cx produced colour prints at 16.7ppm. The quality here is very good. Colour graduation is well handled and, provided you experiment with the colour modes, depth is strong. The LBP7780Cx is one of the better lasers we've seen for colour printing.

At 1.3p for a page of black text, mono costs are very low. Colour pushes the price up to 7.5p.

Verdict
Large and very powerful, this Canon offers good performance and a slew of modern features. Throw in high-quality colour printing and stunningly fast auto-duplexing, and the Canon sits among the top business models. ⊠ **Robin Morris**

PRINTER

Epson Expression Home XP-405

Specification
Printer/scanner/copier; 5760x1440 prints @15.8ppm (B)/13.2ppm (C); 100-sheet input tray; Wi-Fi; USB 2.0; 390x300x145mm; 4.3kg

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

★★★☆☆

Branded 'small-in-one', the products in Epson's new multifunction printer range are designed to reduce your deskspace as they do your bank balance. Look beyond the low purchase price, though, and you'll find a false economy.

The Expression Home XP-405's low-slung casing measures just 140mm from top to bottom, making it noticeably smaller than the average printer. But low height doesn't guarantee a small footprint: the XP-405 feeds paper from behind, and ejects prints at the front.

Epson promises a touchscreen, although what it delivers isn't especially satisfying. Rather than a large colour display that invites you to directly tap icons, the XP-405 splits these into two sections. You look at the main colour display when reading instructions or following the menu options, but the 'touch' buttons are placed offscreen.

The interface lacks the wonderful simplicity of a fully integrated touchscreen. That's not to say the XP-405 isn't reasonably easy to use, and the clean interface is logically set out. A little more onscreen help wouldn't go amiss, though.

In many respects, the XP-405 is finely specified for a cheap model. Given the features-to-price ratio, 'more-in-one' is perhaps an apt tag.

802.11n Wi-Fi is available, and a comprehensive card drive is included (it lacks Pictbridge). Epson Connect is also supported, so you can hook up the XP-405 to numerous tablets and smartphones.

This being an all-in-one, the Epson Expression has a built-in scanning component. The lid offers plenty of adjustability, so those wishing to scan from chunkier material will have a certain amount of flexibility. We were troubled by the thin and brittle lid, though, and suspect users will need to be especially gentle with this part.

For a £50 printer, the scan quality is generally good, if a little light, and speed is good. To scan a 300dpi photo it needed a mere 14 seconds, and up to 38 secs for A4.

Specification
DLP technology; Ti DMD 0.65 chipset; 1920x1080 native resolution; 16:9 aspect ratio; 3000 Ansi lumens; 15,000:1 contrast ratio; 35dB/29dB (eco) noise; HDMI; VGA; Mini-USB; RCA audio; audio in/out; video; display size: 30-300in; throw distance (wide): 1m-10m; throw ratio: 1.15-1.5:1; lamp life: 5,000 hours (normal), 6,000 hours (eco); speakers with 2W amp; 268x221x84mm; 2.1kg

PC ADVISOR
RECOMMENDED

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

★★★★½

PROJECTOR
ViewSonic PJD7820HD

Aimed at businesses that need to project vibrant images in meeting rooms, the £600 ViewSonic PJD7820HD, with its outstanding spec and full-HD resolution, looks like a true business bargain.

Keen not to restrict its target audience, ViewSonic believes the projector will also work effectively in home cinema. However, we think the 3,000 Ansi lumens brightness rating may be OTT in this scenario.

That figure does make it rather good in a light-filled conference room, though, and the PJD7820HD will project a clear image in almost any conditions.

Another asset is the short-throw lens, which lets the ViewSonic beam a 72in picture from a distance of just 2m. This makes it handy for compact meeting rooms, in which space is sometimes an issue.

The projector itself is rather smaller than a typical full-size model, and fits easily on to a desk. The glossy black casing gives it a more polished look than the average business model, although the host of ports at the back of the projector don't blend in so smoothly.

These include HDMI, VGA and Mini-USB. The usual composite and S-video connectors are included, too. The speakers pack plenty of volume and will do a very adequate job where space is restricted.

The ViewSonic lacks the advanced setup features of the Epson EB-1945W, and the vertical keystone correction doesn't match the Epson's more comprehensive keystone options.

However, the ViewSonic isn't without its aids. The Pattern feature, for instance, gives you some very useful test patterns to check the image quality during installation. At this price, though, you are sacrificing the ease of setup of some other business models in favour of the PJD7820HD's video capabilities.

And does the ViewSonic make up for this handsomely. The six-segment 7,200rpm DLP colourwheel is highly capable, and it's backed up by a nominal 15,000:1 contrast ratio. That manufacturer's figure may be overstated, but the PJD7820HD's colour depth is very good in HD, bringing out the darker shades in a manner that you wouldn't expect of a business model – certainly not one that also boasts strong brightness levels. Even in daylight, the picture is remarkably clear and sharp.

HDMI mode gives you only limited control over the colour settings, but good setup options on your Blu-ray player should fix this problem. The range of colour modes is nice, and these are easily cycled through using the dedicated button on the well-designed remote control. The ViewSonic also offers 3D for those with suitable equipment.

Under normal circumstances, lamp life is said to extend to 6,000 hours, although this can be pushed up to an advertised 8,000 hours by using the DynamicEco technology. This automatically adjusts the brightness levels to save money.

Even in eco mode its 29dB noise output is a little loud. In normal use, the 35dB of fan noise makes this projector's presence known.

Verdict
Home users should find a quieter and less bright model that's better suited to their needs. But for those in business who need to be able to project large, sharp and extremely accurate video and HD images in a variety of conditions, the PJD7820HD has great specifications and performance. ⊠ **Robin Morris**

A useful software bundle includes the ever-welcome ABBYY FineReader Sprint 9. It's not the latest in OCR, but does a very serviceable job.

Epson claims 33ppm print speeds but, in our testing, it struggled to muster even half that. The Expression topped out at 15.8ppm in poorest-quality fast text mode.

Decent-quality printing is available at 8.2ppm, though. The characters are a little smudged, although the text remains relatively clean – for a £60 inkjet anyway.

Colour graphics catch the eye, but tend toward the darker end of the spectrum. The depth isn't great, but the overall look of the images is decent at this price point.

It's not a fast graphics model, though. It produced prints at just 2.4ppm in standard mode, and 0.8ppm at the highest settings.

Given the low initial purchase price, it's unsurprising that running costs are steep. Even with the 'economical' high-capacity XL cartridges, costs per page of 3.6p and 8.7p (mono and colour respectively) will prove painful over the longer term.

Verdict
We're impressed with the Epson's connectivity and general feature set, given the price. Image quality is solid, although colour printing is slow – 2.4ppm in the standard mode means you're going to be spending plenty of time waiting for it to finish. Running costs are high, and frequent users will find a more expensive model will work out not only faster and better quality, but cheaper in the long term. ⊠ **Robin Morris**

PRINTER

Xerox WorkCentre 3325

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

★★★★☆

The Xerox WorkCentre 3325 is the copy company's latest top-of-the-range multifunction mono laser printer for small business. It combines the full set of print, copy, scan, fax and email modes.

You can usually spot a Xerox printer by its distinctive blue-and-cream exterior, with the blue highlighting the keypad area. While these colours are easy on the eye, Xerox's 'table'-style designs seem unnecessarily bulky on top – particularly when you consider that this class of printer is intended to have a small footprint.

The base occupies a relatively compact 469x458mm, but the fixed display panel juts out and hampers the retrieval of pages from below. The text-only display is bright and clear, but the role of some of its buttons isn't immediately obvious.

Storage is plentiful, with a 50-sheet A4 automatic document feeder on top, a 250-sheet input tray at the bottom and a further 50-sheet bypass tray (for less conventional paper and envelopes) that folds down from the front. Further expansion is possible with an optional 520-sheet tray (add £194). However, the basic input tray will fit A4 sheets only after you've slightly extended the paper-length guide at the back, and the bypass tray above feels a little rickety.

Connectivity is covered by ethernet, USB and Wi-Fi, and a USB memory stick port is discreetly tucked away under the right side of the keypad.

Since the 600MHz processor offers decent performance, Xerox is able to offer duplex printing as the 3325's default print mode. We recorded up to 36ppm for standard prints and 20ppm for duplex, with document copies available at 15ppm.

The text print quality is universally clean and solid, but graphics darken considerably and there's some evidence of banding in copies. Scans, by contrast, are marginally paler and softer than the original documents.

The standard 5,000-page toner translates to 1.9p per page, with the high-capacity 11,000-page version offering a slightly cheaper rate of 1.7p per page.

The WorkCentre 3325 also comes with 2GB of onboard storage, which is useful if you want to store stacks of emails and faxes.

Verdict

The Xerox WorkCentre 3325 is a fast, fully featured multifunction mono laser printer. It won't cost a fortune to run and offers mostly good print quality. ⊠ **Martyn Clayden**

PRINTER

Brother DCP-8110DN

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

★★★★☆

If Brother's DCP-8110DN mono laser all-in-one printer looks somewhat familiar, that's because it's part of the same series as the recently reviewed Brother MFC-8520DN.

These multifunction printers are intended to complement the single-function mono printers previously released by Brother. If you're on a tight budget for your home office or small business, the DCP-8110DN is the most affordable in the range.

The dimensions are identical to its brother (405x415x423mm), but it's a shade lighter at 15.6kg. It has one function fewer, too, and lacks the 8520DN's fax capability.

Paper handling is identical to the higher-spec printer, with a 250-sheet input tray in the base, a drop-down 50-sheet multipurpose tray above this and a 35-sheet automatic document feeder on top.

If your print volume is reasonably substantial, you can supplement this by adding a 500-sheet tray to the bottom (add £90).

Just like its brother, connectivity options include ethernet and USB. Both also have a five-line, 22-character display, rather than the more user-friendly touchscreen often seen on consumer printers. The button controls are clearly marked and well positioned.

One obvious sign of cost-cutting is with the auto-duplex capability, which is restricted here to printing only. The MFC-8520DN supported duplex copying and scanning, too.

There are no memory-card slots, but you do get a front-facing USB port for plugging in a thumb drive or PictBridge-enabled digital cameras.

If your main interest is in rapid, high-quality printing, the Brother DCP-8110DN will quickly prove its worth. In our tests it racked up speeds of 33ppm for standard print pages and 18ppm in duplex mode.

Print quality suffers noticeably when making copies – graphics, in particular, were considerably darker than the originals, and frequently looked almost black.

Once you've used up the limited sample toner, specified to 2,000 pages, you'll need to invest in either a 3,000-page cartridge (averaging 2.6p per page), or an 8,000-page option. The latter will set you back £122, but offers more competitive running costs of 1.5p per page.

Verdict

If your main priority is fast printing with good-quality results, Brother's DCP-8110DN mono laser printer is worth considering. In our tests it was marred by poor copy quality, however. ⊠ **Martyn Clayden**

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ALL-IN-ONE PCs

All-in-one PCs have once again been brought to the fore with the release of Microsoft's touch-friendly Windows 8 OS. Paul Monckton reviews six stylish machines

The all-in-one PC is enjoying a return to favour with the arrival of Windows 8. In the Windows world, it's the only way to get a large-format PC with a decent touchscreen – a feature that greatly enhances the Windows 8 experience.

An all-in-one also offers great space-saving advantages and has a much bigger screen than you'd find on a laptop. Some also double as entertainment centres capable of playing films, music and sometimes even games.

In choosing an all-in-one PC you should take into account much more than its performance. Sometimes used as family multimedia systems, all-in-ones will be subject to the same aesthetic considerations as any other home-entertainment system. The same goes for their reliability and freedom from technical maintenance.

Many Windows all-in-one PCs incorporate Blu-ray players and TV tuners, and are supplied with a remote control. Each of the Windows PCs reviewed here incorporates a touchscreen interface, freeing you from the keyboard and mouse during some activities.

Other all-in-ones, and most notably the two iMacs reviewed here, don't bother with the arms-length touch experience. Apple has avoided the technology simply because keeping one's unsupported arms outstretched for any length of time can be tiresome.

The move to Windows 8 has increased the demands made on touchscreens. Microsoft requests that hardware makers create flush, frameless screens with 10 touch points for a satisfactory experience.

It's wise to start by considering the screen size you need. Some all-in-one PCs have an HDMI input for plugging in a set-top box

Photography by Dominik Tomaszewski

or games console, for which you might want a large screen. HDMI outputs let you add another screen or projector. Only the Chillblast is unable to offer a full-HD screen resolution of 1920x1080 pixels, so you might also want a Blu-ray drive to get the best movie experience.

With all their components crammed into a thin housing, an all-in-one system must compromise between performance and noisy cooling. Some use mobile or low-power processors such as the Intel Core i3-3210M or i5-3335S to reduce heat and power consumption. These PCs are generally quieter in use, while third-generation Intel processors pack more than enough power for the vast majority of users. However, we wouldn't advise trying to save money by opting for processors slower than the ones reviewed here: Windows 8 may start to look rather less smooth.

Due to space and cooling constraints, all-in-one systems rarely offer strong gaming performance. Ivy Bridge processors provide enough graphics power for multimedia and low-level gaming, so for many people there's now no need to pay for discrete graphics.

However, most of the systems here incorporate a laptop-tuned nVidia processor to boost the graphics. If you really want to enjoy games to the full, the 27in iMac offers by far the quickest graphics of the group – at a price.

Most all-in-ones have flexible configuration options and can be tweaked to fit your requirements and budget. If a PC is too expensive for you, consider cutting back on some of the options. Faster versions of the less-expensive systems are often available by selecting a faster processor at the time of purchase.

ACER ASPIRE 5600U

£870 inc VAT • acer.co.uk • tinyurl.com/cg5f5hy

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

Sitting at the low end of the price range, Acer's Aspire 5600U is a pleasantly stylish 23in all-in-one with some great features. Its body is thinner than most and, with the stand tucked away, it'll fold completely flat. The stand adjustment lets you lean back the PC by 80 degrees, making it easier to operate the 10-point IPS touchscreen.

Its design incorporates a transparent plastic frame that reaches down to the desk to form the front support. It makes the PC appear to float in mid-air. The slimline keyboard echoes this transparent border design, and therefore appears slimmer than it is.

Our review model came with an adequate, but comparatively meagre 4GB of RAM and a 500GB hard drive. The Acer is the only sub-£1,000 PC here to include a discrete graphics processor, though. It's fitted with an nVidia GeForce GT 630M.

The Aspire 5600U is powered by a dual-core 2.4GHz Intel Core i3-3110M laptop processor, which isn't very fast. A PCMark7 score of 2,413 points puts this PC at the bottom of the performance pile.

Its lack of speed is noticeable. During our testing we found ourselves frequently waiting for the machine to respond, and this behaviour wasn't replicated by any of the other all-in-ones in our group test – even those only marginally faster. This sluggishness may have been exaggerated by the burden of lots of preloaded software.

The nVidia GPU gave the Acer a noticeable graphics-speed edge over systems relying on Intel alone, but it was still pretty weak – certainly not fast enough to transform the PC into a gaming system.

VERDICT: This is a good-looking all-in-one at a sub-£1,000 price, but it's noticeably slow and the nVidia graphics aren't enough to elevate gaming performance to truly playable levels. It offers a large bundle of preinstalled software and comes with good connectivity options, but offers only half the memory and storage of the competition.

APPLE iMAC 21.5in

£1,099 inc VAT • uk.apple.com • tinyurl.com/bk83eb8

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

PC ADVISOR RECOMMENDED

Apple's iMac is the all-in-one to buy if quality, style and desirability feature on your list of priorities. This version is slimmer than ever.

It may be the baby iMac, but the 21.5in model can hold its own against the competition. Its IPS display delivers the same 1920x1080 image as the 23in models in this group, and does so with far superior results and much more accurate colour reproduction.

This iMac also features a low-power 2.7GHz Intel Core i5-3335S quad-core processor, which delivered excellent results in the productivity and creativity sub-tests of our PCMark 7 benchmark.

The nVidia GeForce GTX 640M graphics processor enables casual gaming at a much higher level than systems that rely on Intel's integrated graphics and, like all AIOs, the graphics can't be upgraded.

This review sample is the £1,099 entry-level version. A faster version featuring a 2.9GHz processor and better graphics costs £1,249. Both models can also be supplied with additional memory or an external optical drive (one is not internally fitted). The faster model can also accept an even quicker 3.1GHz processor.

The 21.5in iMac's 2.5in hard disk is noticeably slower than the 3.5in version found in the 27in iMac, and performance can be transformed by opting for the hybrid Fusion drive. This adds 128GB of flash memory for an extra £200.

Connectors include four USB 3.0 and a pair of Thunderbolt ports, along with an SDXC reader and a headphone jack. Apple's built-in FaceTime HD webcam allows easy video-chat.

VERDICT: The 21.5in Apple iMac is more expensive than other small all-in-ones, and its performance is somewhat compromised by its size, but it delivers a great deal of performance and an excellent screen, while taking up very little space. Its design and build quality is unrivalled in the all-in-one market.

PC ADVISOR TEST CENTRE

APPLE iMAC 27in

£2,179 inc VAT • uk.apple.com • tinyurl.com/d2gd77d

The 27in iMac features the same impossibly thin design as its smaller brother, yet somehow seems even thinner and more impressive.

The screen is gorgeous. It's a 2560x1440 IPS panel that delivers a near-perfect image with excellent brightness and contrast, and the colours are spot-on out of the box. If you want an all-in-one for working with images or video, this is most definitely The One.

Our sample is the faster of the two available 27in models, and we've added plenty of optional extras – hence the £2,179 price.

For this amount of money you get a top-end 3.4GHz Intel Core i7-3770 quad-core processor, 8GB of memory and a 1TB Fusion drive. The latter automatically stores on an SSD your most frequently used files, and provides a cache to speed access to the rest. This iMac takes the optional nVidia GeForce GTX 680MX GPU, too.

This specification delivers awesome performance, whether you're running office applications, creativity suites or even games. Whereas the best of the rest struggled to reach 15fps in our Alien Vs Predator benchmark at 1080p, the 27in iMac effortlessly turned in 44fps.

The iMac also recorded a decent 4,114 points in PCMark 7, which isn't even able to exploit its Fusion drive (the iMac doesn't use flash storage when dual-booting Windows). This gave Dell's XPS One 27 Touch an unfair advantage in our tests.

If you're willing to cut back on the fastest CPU and GPU, you can have a 27in iMac for £1,499. The iMac is no longer fitted with an internal optical drive, so you may need to find an external USB drive.

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

PC ADVISOR
RECOMMENDED

VERDICT: The 27in iMac is an obvious choice for any creative designer. It's immensely powerful and delivers the best image quality. It also offers peerless design and impeccable build quality. This model is by far the quickest for running Windows games, although there's no touchscreen for finger navigation in Windows 8. It's very pricey, too.

CHILLBLAST FUSION FLEX 18 AIO

£649 inc VAT • chillblast.com • tinyurl.com/coo3ssg

Chillblast's Fusion Flex 18 AIO stands out in a number of ways – not all of them good. On the plus side it costs £649, which makes it £150 less expensive than any other competitor here. But the lesser build quality and crude design give away this budget price.

The construction is solid, but a proliferation of lumpy black plastic lends it a generic look that won't steal many admiring glances. The Chillblast comes with a Logitech MK260 wireless keyboard-and-mouse combo, which many will find easier to use than slimline models, but there's no continuity in design between PC and peripherals.

The Flex is also the smallest system here – screen-wise, at least. Its 18.5in panel supports a 1366x768 resolution and 10 touch points.

Built into the top of the screen is a 0.9Mp webcam and a microphone. A pair of USB 2.0 ports are provided at either side; there's USB 3.0 at the rear. No optical drive has been included.

The 3.3GHz Intel Core i3-3200 dual-core processor delivers reasonable performance, and this system certainly feels snappier in use than Acer's 5600U. Its integrated Intel graphics solution is much slower than that found in the Toshiba, though.

The limited screen resolution mitigates against the low graphics power somewhat, as it's less taxing on the GPU. To ensure a fair test we ran our benchmarks at 1920x1080 pixels, however.

The slower graphics processor not only gives poor gaming performance, but lower PCMark 7 scores, too. This is because this benchmark uses GPU processing in certain tasks.

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

VERDICT: This Chillblast Fusion Flex 18 AIO is a reasonably low-cost option that serves as an entry-level system. However, its small, low-resolution display is too cramped for serious work, and it can't show off HD content in its full glory. The Chillblast's generic looks are unappealing when compared to other designs.

DELL XPS ONE 27 TOUCH

£1,679 inc VAT • dell.co.uk • tinyurl.com/cqw5zy9

Dell's all-in-one PC offers excellent performance, superb build quality and a 27in IPS display with an iMac-like 2560x1440 resolution.

An articulated stand allows you to lean back the screen toward the horizontal, and also allows some degree of height adjustment.

The image quality from the IPS panel is very good, if not as accurate as that of Apple's iMacs.

Given the effort require to move around this huge and heavy PC, it's unfortunate that many of its ports are tricky to reach. USB 3.0, audio and a card reader are available on the left side, but the remaining connectors can be accessed only from the rear.

The front features a 2Mp webcam with a physical shutter, while the right edge of the screen has a slot-loading Blu-ray drive.

Four versions of the XPS One 27 exist; this is the most expensive, featuring a low-power 3.1GHz Intel Core i7-3770S processor and a 2TB hard disk, boosted through SRT with a 32GB SSD.

All models feature nVidia GeForce GT 640M graphics, which are powerful enough for a bit gaming (just don't try it at 2560x1440).

This combination delivered a superb PCMark 7 score of 5,876 points, which is the highest result in the group. Apple's 27in iMac ought to be faster, but it can't exploit its SSD when running Windows.

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

PC ADVISOR
BEST BUY

VERDICT: A premium 27in touchscreen all-in-one with ergonomic monitor adjustments and discrete nVidia graphics, the Dell XPS One 27 Touch is a delight to use. It's big and heavy, but offers an attractive design. It's fast from the moment you boot it up, and one of the best Windows 8 machines available. It'll cost you dearly, though.

	ACER £870 inc VAT ★★★⯨☆	APPLE £1,099 inc VAT ★★★★☆ PC ADVISOR RECOMMENDED	APPLE £2,179 inc VAT ★★★★⯨ PC ADVISOR RECOMMENDED	
Product name	Aspire 5600U	iMac 21.5in (Late-2012)	iMac 27in (Late-2012)	
Processor	2.4GHz Intel Core i3-3110M, dual-core	2.7GHz Intel Core i5-3335S, quad-core	3.4GHz Intel Core i7-3770, quad-core	
RAM	4GB 1,600MHz DDR3	8GB 1,600MHz DDR3	8GB 1,600MHz DDR3	
Storage	500GB HDD	1TB HDD	1TB Fusion Drive (hybrid HDD + SSD)	
Motherboard	Custom board with Intel HM77 chipset	Custom board with Intel Z77 chipset	Custom board with Intel Z77 chipset	
Operating system	Windows 8 64bit	OS X 10.8 Mountain Lion	OS X 10.8 Mountain Lion	
Display	23in (1920x1080) IPS 10-point touchscreen	21.5in (1920x1080) IPS	27in (2560x1440) IPS	
Graphics	nVidia GeForce GT 630M, 1GB VRAM	nVidia GeForce GT 640M, 512MB VRAM	nVidia GeForce GTX 680MX, 2GB VRAM	
Sound	Coneq 3D Sound, 2x 2W speakers	Onboard, stereo speakers	Onboard, stereo speakers	
Connectivity	802.11n, gigabit ethernet, Bluetooth	Dual-band 802.11n, gigabit ethernet, Bluetooth 4.0	Dual-band 802.11n, gigabit ethernet, Bluetooth 4.0	
USB ports	2x USB 3.0, 1x USB 2.0	4x USB 3.0	4x USB 3.0	
Other ports	S/PDIF, HDMI	2x Thunderbolt, optical digital audio, headphone, dual mics	2x Thunderbolt, optical digital audio, headphone, dual mics	
Keyboard & mouse	Wireless	Apple Wireless Keyboard, Magic Mouse	Apple Wireless Keyboard, Magic Mouse	
Optical drive	DVD±RW	None	None	
Other	Card reader, 2Mp webcam	SDXC card reader, 1.3Mp webcam	SDXC card reader, 1.3Mp webcam	
Weight	Not specified	5.68kg	9.54kg	
Dimensions	574x43x422mm	528x175x450mm	650x203x516mm	
Warranty	1-year return-to-base	1-year return-to-base	1-year return-to-base	
PERFORMANCE				
PCMark 7 Overall	2,413	3,100	4,114	
Alien Vs Predator[1]	8/15fps	11/22fps	44/81fps	
Power consumption[2]	42/56W	40/69W	77/132W	

[1]Measured at 1080p and 720p, High Quality respectively [2]Measured when idle and under load respectively

PC ADVISOR TEST CENTRE

TOSHIBA LX830-12W

£800 inc VAT • toshiba.co.uk • tinyurl.com/ckh5j9L

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

Toshiba's LX830-12W offers a good balance of performance and features, and is suitable as a family or student PC.

The Toshiba features a 23in full-HD IPS touchscreen with a simple picture-frame style stand at the rear. This has a handy HDMI input and four USB 2.0 connectors, which are supplemented by a pair of USB 3.0 ports and a card reader on the display's left edge.

Uniquely, in this group, the LX830-12W comes with a built-in Freeview TV tuner and a Windows Media Center remote. WMC itself adds £100 to the price, but Toshiba bundles ArcSoft TV 5.

The system can read and write to DVD, but not Blu-ray discs, although you can plug in a standalone Blu-ray player via HDMI.

The 2.5GHz Intel Core i3-2110M processor is just a tiny bit faster than the chip used in the Acer system, but overall performance seems much better – helped no doubt by the 8GB of memory.

The LX830-12W offers no discrete graphics chip, but the CPU includes Intel HD Graphics 4000. If you're not hooked on games, the graphics performance will be adequate.
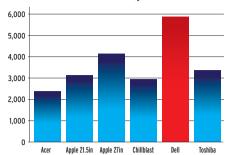
Several versions of the PC are available, starting as low as £599 with a basic Pentium processor, but we'd recommend sticking to this faster model or even upgrading to a Intel Core i5.
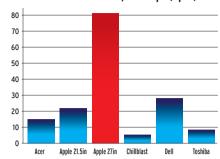
VERDICT: The LX830-12W offers a built-in TV tuner, an HDMI input and decent Onkyo stereo speakers, making it a reasonably priced multimedia hub. The lack of a discrete GPU means it struggles with gaming and, despite the inclusion of a WMC remote, it doesn't come with Media Center. It would benefit from a CPU upgrade.

CHILLBLAST £649 inc VAT ★★★☆☆	DELL £1,679 inc VAT ★★★★⯪	TOSHIBA £800 inc VAT ★★★⯪☆
	PC ADVISOR BEST BUY	
Flex 18 AIO	XPS One 27 Touch (D00X2S35)	LX830-12W
3.3GHz Intel Core i3-3220, dual-core	3.1GHz Intel Core i7-3770S, quad-core	2.5GHz Intel Core i3-3210M, dual-core
8GB 1,333MHz DDR3	8GB 1,600MHz DDR3	8GB 1,600MHz DDR3
640GB HDD	2TB HDD + 32GB SSD	1TB HDD
Custom board with Intel H61 chipset	Custom board with Intel H77 chipset	Custom board with Intel HM76 chipset
Windows 8 64bit	Windows 8 64bit	Windows 8 64bit
18.5in (1366x768) IPS 10-point touchscreen	27in (2560x1440) IPS 10-point touchscreen	23in (1920x1080) IPS 10-point touchscreen
Intel HD Graphics 2500	nVidia GeForce GT 640M, 2GB VRAM	Intel HD Graphics 4000
Onboard Realtek HD Audio, stereo speakers, 2x 5W amp	Waves MaxxAudio 4, Infinity Premium speakers	SRS Premium Sound 3D, 2x 3W speakers
802.11n, 2x gigabit ethernet	802.11n, gigabit ethernet, Bluetooth 4.0	802.11n, gigabit ethernet, Bluetooth 4.0
2x USB 3.0, 2x USB 2.0	6x USB 3.0	2x USB 3.0, 4x USB 2.0
HDMI, SATA, headphone, line-in/out	S/PDIF, HDMI, dual mics, line-in/out	HDMI, headphone, mic
Logitech MK260 wireless combo	Dell KM713 wireless combo	Wireless combo
None	BD-ROM/DVD±RW	DVD±RW DL
Chillblast family software pack (optional)	Card reader, 2Mp webcam	Card reader, 1Mp webcam, remote control
4.5kg	15.9kg	7kg
468x57x364mm	491x71x664mm	566x52x415mm
2-year collect-and-return	1-year next-day in-home service	1-year EU carry-in, local pickup & return UK & IRE
2,970	5,876	3,351
5/5fps	15/28fps	5/8fps
44/67W	79/138W	36/57W

>> How we test and our conclusion
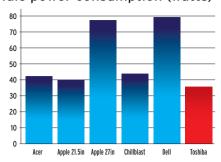
PCMark 7 Overall (points)

Alien Vs Predator, 720p (fps)

Idle power consumption (watts)

Conclusion

If your budget will be determining your choice of all-in-one then it's worth looking to see whether you can alter the specification of a top-end system rather than settling for a budget model.

If you need simply the cheapest system you can find, Chillblast's Flex 18 All in One PC may fit the bill. It offers a small, low-res screen, however, making it little more than a non-portable laptop.

Toshiba and Acer offer reasonably priced all-in-ones that can, with care, be made even cheaper via configuration. They offer larger 23in displays and are preloaded with useful software applications and extras.

The Toshiba system is the only one here to incorporate a Freeview tuner as standard, and it comes with a remote control for use as a TV out of the box. However, it's neither expensive nor difficult to add an external USB TV tuner to any of the competition.

The Acer and Toshiba aren't particularly quick, with the Acer's sluggish performance almost spoiling an otherwise slick and user-friendly all-in-one PC.

A decision you'll need to make is whether you want to use the Windows or OS X operating system. Whereas the iMac can run Windows 8, albeit without a touchscreen, Windows PCs cannot run OS X.

The iMac is incredibly good-looking, delivers great performance and comes with an excellent colour-accurate display. The 27in model is also the best here for gaming. However, if you demand built-in Blu-ray support, you'll need to look to one of the other PCs on test. Dell's XPS One 27 Touch, for example, delivers one of the best Windows 8 experiences we've seen.

Both the 27in iMac and Dell's XPS One are hugely impressive – and hugely expensive. Of the two, the Dell is more likely to come within budget. Thus it wins our Best Buy award, and the iMac scoops our Recommended badge.

How we test

Application performance

Core system performance is measured using PCMark 7, an industry-recognised test suite that uses 25 different workloads to measure areas such as storage, computation, image- and video manipulation, web browsing and gaming. We understand that results from this benchmark are not absolute, with Intel driver issues in Windows 8 meaning video-transcoding tests can present sub-optimal results. Nevertheless, the results give an idea of the relative performance.

As well as the overall PCMark 7 result, typically a point score between 3,000 and 7,000 with current hardware, we have also published results garnered from some of the suite's sub-routines. These are designed to gauge performance in, for example, creativity and entertainment scenarios. Another test highlights the difference between storage technologies. This is an area that impacts perceived speed more than ever, now that even the slowest modern CPUs are more than fast enough for everyday PC duties. PCMark also measures multimedia-transcoding performance, which can take advantage of GPU acceleration.

No gaming

Most all-in-ones aren't designed for gaming, although some do offer powerful discrete graphics chips. We've run a single game, Alien Vs Predator, at 720p and 1080p resolutions with High Quality settings enabled. This is enough to reveal differences in gaming performance.

No overclocking

We allow overclocking of the processor only in dedicated gaming computers. All other components are run at their stock speeds, with the exception of factory-overclocked graphics cards, which are designed and sold at boosted speeds.

Power consumption

We measure the power consumption of each PC while it's idling at the desktop and has settled down after booting up. We then measure again while pushing each PC to the limit by simultaneously running Prime95 (with the maximum number of available threads) and the storage test from PCMark7. Real-world power consumption will fall somewhere between these two measurements, depending on use.

Both of these tests are carried out with the screen at maximum brightness. Reducing screen brightness can considerably reduce power consumption.

Display quality

We use a Datacolor Spyder4 calibrator to measure colour gamut and accuracy, contrast and uniformity across the surface of the screen. We also take into account the viewing angles afforded by the display technology used by each panel.

Subjective assessment

It's not all about speed. We also pay close attention to the physical characteristics of each all-in-one PC, its noise output and build quality, and take note of important features such as the quality of components.

Warranty and support

Differences in warranty terms can affect our verdict. Obviously, longer warranties are better, but we also look at the terms and conditions – specifically, whether faulty systems must be returned to the vendor at your own cost, and if both parts and labour are included. ⊠

Switched-on Keyboards

Photography by Dominik Tomaszewski

A keyboard is the gateway to your computer, and the component with which you'll literally have the most hands-on time. With different styles and layouts, it makes sense to find one that suits you best. Andrew Harrison gets dexterous with eight high-quality mechanical PC keyboards

Professional programmers, typists and Windows gamers have in common an appreciation for a high-quality computer keyboard. For many aficionados, that means a Qwerty PC keyboard with traditional mechanical switches under every key top.

If you spend a reasonable amount of time working or playing on a computer, you can't beat a good mechanical keyboard. That's in contrast to much more common mass-produced models with soft-dome membrane switches under the keys.

Nearly all mechanical keyboards have ignored the wireless memo. Gamers demand wires, since wirelessly transmitting key presses introduces potentially game-losing latency. Serious typists also appear to accept the battery-free simplicity of a traditional PS/2 or USB cord that tethers the board to the PC.

A mechanical keyboard is made of individual electrical switches, with longer working life and typically a more tactile feel that doesn't deteriorate with use. Whereas a cheap membrane keyboard may have a lifetime of around 5- to 10 million operations per key, good discrete switches are rated at more than 50 million. That could be the difference between a keyboard that lasts two years and one that survives decades. Should a switch expire, you might even replace it rather than the entire keyboard.

Mechanical keyboards often allow faster, more satisfying typing, although key clatter can be distracting to neighbouring colleagues.

Cherry switches

Arguably the best key switch for a truly tactile touch is the Cherry MX Blue, which produces a distinctive high-click sound when pressed. But a fast typist in full flow can sound like a demented sewing machine, so quieter alternatives have been developed.

As well as the Blue, there is the non-click – or linear – Cherry MX Black. This has a smooth, uninterrupted journey from rest to actuation, and will prove a little quieter. The Cherry MX Red is almost the same, but with less resistance (around 45 centinewton rather than 60 centinewton).

Sought after by gamers, these linear switches are not so popular for simple text typing as they don't give any bite feedback. So, a quieter yet tactile switch was developed: the MX Brown. This may be the best compromise for quietude in a professional typing pool.

Other switches are available, but less common. There are Alps Electric types in the classic Apple Extended Keyboard and in Matias' Tactile Pro. Programmers and PC veterans may also remember the buckling-spring mechanical switches of the IBM Model M keyboard.

Further upmarket, giving the requisite tactility, but not strictly mechanical, are the capacitive electrostatic spring switches found in Topre keyboards. Expect to pay closer to £200 for a Topre Realforce keyboard. These are tuned in such a way that depressing the outlying keys requires less finger pressure.

Key layout

Also consider the key layout. Most computer keyboards seen today are a variation on the IBM PC layout of the early 1980s, modified by Microsoft with the addition of a proprietary super key in the 1990s: the Windows key was first seen in Windows 95.

In contrast to the huge choice for Microsoft-fueled computers, other platforms often suffer with that platform's hand-me-downs. But Unix and Linux users sometimes prefer their crucial Control (Ctrl) key closer to home, in place of the Caps Lock. Mac users expect to find their super key – the Command (Cmd) marked with the ⌘ Bowen knot or older Apple logo – immediately to the left of the Spacebar. Some keyboards allow you limited hardwire customisation through DIP switches, or you can manually uproot keys and change their mappings in software on your chosen computer.

Extras

High-grade construction is important. Also look out for potentially useful additions, such as backlighting, USB hubs and detachable USB cables. The latter lets you use a cable length that suits your setup, rather than spool up the multimetre cable built into most keyboards.

Build	★★★☆☆
Features	★★★☆☆
Value	★★★★☆
Overall	★★★★⯨

PC ADVISOR
BEST BUY

CHERRY G80-3000

£60 inc VAT • cherrycorp.com • tinyurl.com/cjk5ocb

No group test of mechanical keyboards would be complete without a Cherry. Thanks to the mechanical switches that underlie a great many keyboards from respected brands, the name has become synonymous with high-quality Qwerty PC keyboards.

The G80-3000 is a classic model that Cherry has been producing for more than 24 years. It's a full-size extended Windows keyboard with a number keypad. The design is simple and utilitarian, suitable for general office duties or use by professional developers.

Our sample was constructed from dark charcoal-grey ('Black') lightweight matt-finish plastic; you can also find the G80-3000 in a beige colour that the company calls 'Light Grey'.

The keys are a slightly slippery-feeling plastic, textured, and with shallow-dished recesses. Despite the unusual waxy sandpaper finish to the plastic, we found the good tactile feel inspired fast typing. The lettering is laser-etched for longevity.

The keyboard chassis is deep at 191mm, but it has a low profile at 38mm high. That's 48mm with the rubber under-risers lowered. These proved effective in preventing board drift across the desk.

A fixed USB cable snakes out from the right rear corner of the keyboard, with 1.7m of wire to play with.

The external construction is below that of the premium-priced keyboards. While it's far from flimsy, the Cherry G80-3000 does feel somewhat cheap and insubstantial.

This board also lacks the bumps on the F and J keys, useful for touch-typing; instead, these keys are slightly deeper dished.

UK models of the G80-3000 come with Cherry MX Blue switches. The noisy, but superbly tactile option means this is the most affordable keyboard we've found with these switches – they're more typically found inside £100-plus peripherals.

Aside from the long-lasting keys (specified at more than 50 million presses per key), this keyboard also boasts Unix Code Set 3 support for some legacy installations, when using the PS/2 adaptor.

VERDICT: The Cherry G80-3000 is like a Timex watch running a Rolex movement inside. The case is serviceable, but designed to a meet a low price; the bits that make it tick are really special. If you can get past the flexible chassis, relative to most other mechanical designs the G80-3000 offers high-end timely typing on the cheap.

Build	★★★☆☆
Features	★★★⯨☆
Value	★★⯨☆☆
Overall	★★★☆☆

CHERRY G84-4100

£50 inc VAT • cherrycorp.com • tinyurl.com/cjb5uz8

The Cherry G84-4100 warrants inclusion in this round-up by virtue of its mechanical keys. It has a special low-profile ML mechanical switch, which allows it to be the smallest external keyboard we've ever used.

Small keyboards became familiar during the netbook fad of a few years ago; the use of a 10in or smaller screen meant there was simply no space for a full-width Qwerty keyboard. The justification for downsizing this keyboard may not be immediately apparent, but cramped server rooms and the like will find it a home.

The lightweight design weighs less than 400g and is small enough to slip into a large coat pocket. It comes in either old-school light grey or black. Construction quality could politely be described as adequate; die-casting sprue artefacts can be seen on the rear of every low-profile key, and the key action is a little jarring – at least when compared to keyboards using the usually silky MX switchgear.

The pressure to actuate each switch feels slightly greater than usual, and the key travel is strangely frictional across most keys. Some keys are stickier than others, and it feels as though it may benefit from plenty of use, allowing each key to 'bed in'.

Before the G84-4100 can become your input weapon of choice, you'll first need to master the layout. An awful lot of keys have been crammed into the limited 315x190mm plan of this baby keyboard. This makes fast typing a matter of practice.

Along the bottom row, for example, we find Ctrl, Fn, Windows, Alt and backslash/pipe keys, all to the left of the Spacebar alone; Alt Gr, Windows, List, Ins, Del and the cursor keys sit to the right. That's a lot of keys, and to squeeze them in Cherry has shrunk the Spacebar to just 55mm wide (regular versions are around 110mm).

More difficult to work around were the condensed Backspace and Return keys, as well as the overall key shrink that meant our hands were more furled and hamster-like over the keyboard.

If your computer has no need for a super key there is an option to lose the Windows key on a related model.

VERDICT: For those times when you demand a small-form-factor keyboard that still sports all the main keys you'd need on an IBM PC, the Cherry G84-4100 will neatly fill the space. It's rated well for industrial longevity, at up to 20 million key strokes; just don't expect top-notch build quality or the usual Cherry precision-feel keys.

PC ADVISOR TEST CENTRE

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

PC ADVISOR
RECOMMENDED

DAS KEYBOARD MODEL S PRO FOR MAC

£122 inc VAT • daskeyboard.com • tinyurl.com/caj3yz8

Finding a great keyboard for a Windows PC is never a problem, but some of the best mechanical brands simply don't cater to anything other than the Microsoft/IBM key layout. Das Keyboard's range is limited, but it covers most bases: there's the standard Model S Professional keyboard for Windows, an Ultimate edition with totally blank keys for proud touch typists, and this Model S for Mac. All three use MX Blue switches for the best clicky feel with positive feedback.

The Das Keyboard Model's piano black top and angular top-right corner detail is distinctive. The lower section is more conventional matt black plastic, with substantial rubber plates in each corner to deter slippage. However, lifted by its fold-down rear feet, very little rubber makes contact with the desk.

A long USB cable is attached at centre-back, with a substantial rubber grommet to reduce strain. At the cable's end are two USB 2.0 plugs; one is required for usual operation, and the other provides additional current to the keyboard's two-port USB 2.0 hub.

Only one version of the Das Keyboard Model S Pro For Mac is available, with US key layout. Used with a UK Mac, you'll still find the £ sign with Shift, 3, for example, but British Mac typists will lose access to the   and ± symbols.

With its full complement of Cherry MX Blue switches, we found typing on the Das Keyboard divine. The chassis is well-damped, so the casework won't amplify the sounds of the switches.

The Blue switch has a marked and positive click point near the top of its travel, with some gentle resistance as your fingers follow through to the bottom. We found typing could be incredibly swift.

The key caps have a traditional shape, with shallow concave sculpting to guide fingertips into place. Keys are a satin-matt black, with white character legends laser-etched in a vertically compressed, rather square and angular upper-case font that isn't so easy to read.

Apple display brightness controls and some basic media-transport keys are provided. You also get a Sleep button, but there are no OS X-specific keys such as Mission Control and Launchpad shortcuts.

VERDICT: If you work on a Mac and like Cherry MX Blue, this Das Keyboard Model S Professional for Mac is your only choice. Good job it's a good one, then. This keyboard is solidly built, with modern-retro black lacquer styling.

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

PC ADVISOR
GOLD

DIATEC FILCO MAJESTOUCH 2

£120 inc VAT • diatec.co.jp/en • tinyurl.com/d3fogp7

Filco is a revered brand for keyboards, produced by the Diatec Corporation in Japan since the early 1980s. The company's core range is the Majestouch line, which was introduced in 2004 and is now available in many variants; all are based on the form now known as the Filco Majestouch 2.

As soon as you pick up a Majestouch 2, you know you're holding an example of high-quality engineering. The main chassis is heavy-gauge plastic on the outside, but weighty, suggesting there is a quantity of metal inside. Mark 2 appeared in 2011, with much the same external looks as the original Majestouch, but revealing a revision to the internal PCB. This version used a stronger material to withstand the stress of long-term use.

You can choose from the full range of Cherry MX switches: Blue, Black, Brown or Red. We tried the Majestouch 2 with Cherry MX Blue switches in a UK 105-key layout. Other European language layouts are available; all are Windows versions, although you can buy replacement super keys to swap your Windows (⊞) key, with Tux, Ubuntu or blank-top buttons.

As well as black the keyboard is sold with bold yellow keys, or a green camouflage pattern/metallic blue chassis with black keys.

Three LEDs are embedded above the number keypad, and the USB cable is fixed at the centre of the Majestouch 2's rear. The usual flip-down feet work very well here: rubber pads fixed to the chassis' front and the feet all make good contact with the desk to keep the keyboard rooted in place.

The typing experience offered by the Filco Majestouch is simply superb, and extremely comfortable. MX Blue switches give the essential tactile and audible feedback to facilitate very fast and accurate typing, and the keyboard body didn't resonate during heavy use. The keys feature a traditional concave-topped design, with a matt/satin finish for good contact with the fingertips.

VERDICT: The Filco Majestouch 2 is a very plain and boring keyboard in its standard black guise, but it's also the best-constructed and refined keyboard we've tested. We would have appreciated wider platform support and perhaps a detachable USB cable but, in every other respect, the Majestouch fulfils the key requirements of the mechanical keyboard and is now our benchmark reference point.

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

DIATEC FILCO MAJESTOUCH NINJA

£120 inc VAT • diatec.co.jp/en • tinyurl.com/d5rLb8z

Joining the standard-issue Diatec Filco Majestouch are two principal variants, of which this is one. Instead of a full-length keyboard with a number keypad to the right, Diatec offers a short-form version without the extra numbers, known as the Tenkeyless Keyboard.

It's not entirely bereft of extra keys, though, since you still get the handy Ins, Del, Home, End, Pg Up and Pg Dn keys in their island to the right of the Return key. You also have full-size cursor arrow keys in the usual inverted-T pattern.

And if you do ever need a dedicated numerical keypad, Filco makes a separate unit that can complement this keyboard for £48.

Tenkeyless is not unique in the world of specialist keyboards, but what is remarkable is the quality that gives this particular version its elite assassin moniker of Ninja. The keys tops are plain black, with the legends in a more covert position on the front sides of the keys.

Stare down directly from above, and you have a vista of unmarked keys, as once issued at typing schools and still available from Das Keyboard and the cult-followed Happy Hacking Keyboard (HHKB).

One suggested advantage, aside from confusing non-touch-typists who sit at your PC and can't lean back far enough to read the edge markings, is to obviate any chance of wear to the lettering through prolonged use. Of course, we'd hope that this is now a thing of the past, since high-grade brands routinely boast of laser-etched key tops that allegedly don't wear off.

The same great build quality can be found in the Ninja Tenkeyless as the Majestouch: the supremely heavyweight build and rigid frame supports a resilient underboard for the keys, and inspires easy typing.

Our sample was fitted with Cherry MX Red switches, the easy-travel take on the linear Black switch. These have the same 4mm stroke as the Black, with their bite point halfway down, and are quieter than the Blue. We did find our typing accuracy suffered a little, however. UK distributor The Keyboard Company can also supply the Filco keyboard with Cherry MX Brown or Blue switches.

VERDICT: If you have no need for a numberpad, Diatec's Tenkeyless design saves some useful desk space. And if you want your keytops to remain as fresh as the day you started using your faithful keyboard, the side-marked Ninja layout will be a most appealing take on the trusted Filco Majestouch keyboard.

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

PC ADVISOR RECOMMENDED

DUCKY DK9008 SHINE 2

£150 inc VAT • duckychannel.com.tw • tinyurl.com/cnyLzc6

Like many serious keyboards the Ducky Shine 2 uses high-grade mechanical switches, and includes many touches to endear it to Windows gamers. The standout feature is its backlit keys, and there is a useful range of options controlling how they light up.

The keys are gently scalloped for the fingertip pads, with all letter and character shapes embedded in semi-opaque white plastic, allowing light from the individual LEDs below to glow through.

Our sample had Cherry MX Red switches, giving a light, relatively quiet smooth linear action. The bite point is set high, with only a small press required to print each character. However, fast typing was prevented by frequent mis-hits of adjacent keys. The Ducky is also available with Black, Blue or Brown switches to suit taste.

The Ducky's frame is made from very robust matt black plastic. A full-width design, there's a 10-digit number keypad to the right, and Function keys running across the top.

There's no USB hub, but you do get a Micro-USB 2.0 port, and a 1.5m black cable is supplied. This neat touch means you can exchange a shorter cable to reduce desk spaghetti.

The fun starts when you tap Fn and F10. We tested a blue-light model; also available are green, white, pink, orange and red options. The first press lights up just the Qwertys, punctuation and number line; the second lights up every key; and the third enters the keyboard into pulse mode. The fourth mode is Reactive, which works best in a darkened room. The individual keys light up only when pressed, meaning fast typing makes dancing patterns beneath your fingers.

For *Knight Rider* fans, the final mode sets the Function keys into a side-to-side chaser light sequence. Pointless, yet strangely cool.

You can customise the keyboard to light up only a selection of keys. For gamers, the obvious choices are W, A, S and D. In fact, presets already toggle between the latter and lit-up arrow keys.

Four DIP switches allow further customisation. Unix typists can exchange the Ctrl and Caps Lock buttons; the Windows key can be set to lock; and for Mac users Windows and Alt can trade places.

VERDICT: The Ducky Shine 2 packs in more than we've seen before – and it does so with great class, using high-grade materials and excellent construction quality. Professional typists may have less need for glowy keys, but gamers and PC pros will love it.

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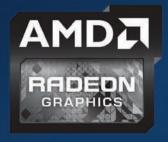
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Build	★★★☆☆
Features	★★★★☆
Value	★★★☆☆
Overall	★★★☆☆

MATIAS TACTILE PRO 3 KEYBOARD

£119 inc VAT • matias.ca • tinyurl.com/bLtxnkv

The Matias Tactile Pro is a hefty full-size keyboard, styled in white plastic and redolent of the transparent-body, white-key Apple Mac keyboards of the early 2000s.

Like the Quiet Pro, the Tactile Pro has a chunky design. It weighs around 1.2kg and stands 54mm high with its feet folded down. The Matias features a centrally fixed USB cable at the back, and three extra USB 2.0 ports for attaching desktop accessories.

The body is transparent plastic that's been painted white on the inside to create a shiny look, while the keys themselves are matt brilliant white and laser-etched. We're not convinced they'll stay white when faced with direct sunlight or dirty fingertips. Each key is neatly concaved to allow better contact with the fingertips.

The Mac has the best typography tools baked into the OS, and a wide range of symbols is found using Alt or Shift, Alt with the usual alpha-numeric keys. With the Matias Tactile Pro, you don't have to rely on memory or the floating keyboard palette to find them; each character is printed in the top-right corner of each key. The result is a very busy and technical-looking keyboard.

Across the top of the keyboard are function keys F1 to F15, although these serve almost exclusively as traditional function keys and not as shortcuts to Apple-specific features such as Launchpad. The exception are F14 and F15, which will control screen brightness on an Apple MacBook or connected Apple Cinema Display.

Matias has fitted the Tactile Pro with mechanical keys from Alps Electric. These give a very positive, audible click when tapped, but the Tactile Pro is noisier than these mechanical keys alone would warrant. The entire keyboard reverberates and amplifies their action with a hollow plasticky tone.

The key action is rather like that of Cherry MX Blue switches, with a little less initial resistance at the actuation point near the top of their travel. Their sound is more a lower-pitched clunk than the Blue's high click. We found it possible to build up a good head of speed typing on this keyboard, at the expense of increased noise.

VERDICT: This beefy keyboard is the noisiest we've heard, although we were more concerned about the chassis-amplified quality of noise than its quantity. The action of its Alps Electric switches is superb. Ideal for anyone looking for a traditional typing experience.

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

MATIAS QUIET PRO KEYBOARD

£119 inc VAT • matias.ca • tinyurl.com/bbqn9sv

The Matias Quiet Pro is a premium keyboard designed to be more acoustically acceptable in quiet workplaces and homes, while still offering some of the 'feel' of a clicky keyboard. Instead of Cherry MX switches, Matias installs its own switch, inspired by an Alps design. Its feel is something like that of the MX Brown – the 'low-noise' Cherry – but with a slightly more positive action. The bite point is near the top of travel, while the followthrough has gentle resistance.

The experience of typing is very good – perhaps not as engaging as some noisier types, but with better precision than Cherry MX Black or Red, which can lack tactile feedback. You should be able to build up to a fast typing speed,.

The noise level is far lower than the lauded Cherry Blue, yet it's far from silent. The keys make about as much noise as a common membrane-switch keyboard, which is to say not much.

The construction is reassuringly heavy, and the Matias weighs a chunky 1.2kg. The body appears to be ABS plastic, all black and high gloss, while the keys are matt-textured with shallow finger dips.

There are no company logos or other markings on the top of the keyboard. Topping each key are white laser-etched legends that shouldn't fade with use.

The sample we tested was designed for Windows use, and features one Windows super key between Ctrl and Alt, to the left of the Spacebar. The layout was set to US, but pressing Shift, 3 will still print a £ symbol when using a UK OS.

Supplied by The Keyboard Company, there is also a US-only Mac version, which comes in pretend-metal silver plastic.

As a full-size keyboard, there's a numberpad to the right. Less conventionally it omits the Num Lock or Clear key above number 7, and replaces it with a Tab key to assist spreadsheeters.

A simple USB 2.0 hub has three regular Type A ports: one left, one right and one rear right. A pair of feet hinge out from below to raise the Quiet Pro's profile by 16mm at the back. We found the keyboard most comfortable to use in this configuration.

VERDICT: The Quiet Pro is not entirely quiet, but it make a lot less racket than most other switched keyboards we've tried. If you need a mechanical keyboard built to a high standard and with reasonable noise levels, the Matias Quiet Pro will serve you admirably.

PC ADVISOR TEST CENTRE

Conclusion

When space is limited and you don't need full-size keys, you might find room for the Cherry G84-4100. Despite its small size it includes all the legacy IBM PC functions you'll need, but it offers far from the satisfying mechanical action prized by typists. The two Matias keyboards in our round-up do offer some of that rewarding feel, although we were less impressed by their clunky, resonating chassis. For Mac users, the Tactile Pro also indicates every non-alphanumeric character, but makes for a rather busy-looking board.

Das Keyboard also caters to Mac users. Its Cherry Blue switches earn it our recommendation on that platform, although we'd prefer to see a UK layout version of this model.

Ducky keyboards such as the Shine 2, aimed at gamers, seem to cram in just about every useful feature, along with technicolour backlighting. They come at a price, but are deserving of a warm recommendation if you have the budget.

Still expensive but slightly more in reach is the Filco line, which features incredibly solid construction and a practical design. You can choose between full-width and tenkeyless options, with the key legends edge-printed or on top.

Cherry's G80-3000 has a disappointingly plasticky build quality, but it makes available at a more affordable price the addictive feel of a mechanical keyboard with Cherry MX switches.

	Model name	Part number	Key switches	Key layout	Connection	Extras	Dimensions Weight
CHERRY £60 inc VAT · PC ADVISOR BEST BUY · ★★★★½	G80-3000	G80-3000LSCGB-2	Cherry MX Blue	UK IBM/Microsoft	USB 2.0 plug (includes PS/2 adaptor), 1.7m cable	None	470x195x44mm 935g
CHERRY £50 inc VAT · ★★★☆☆	G84-4100	G84-4100LCMGB-0	Cherry ML	UK IBM/Microsoft	USB 2.0 plug (includes PS/2 adaptor), 1.7m cable	None	465x194x36mm 409g
DAS KEYBOARD £122 inc VAT · PC ADVISOR RECOMMENDED · ★★★★☆	Model S Pro For Mac	DASK3PROMS1MACCLI	Cherry MX Blue	US Macintosh	2x USB 2.0 plugs, 2m cable	Two-port USB 2.0 hub	454x165x25mm 1,004g
DIATEC FILCO £120 inc VAT · PC ADVISOR GOLD · ★★★★½	Majestouch 2	FKBN105MC/UKB2	Cherry MX Blue (Brown/Red options)	UK IBM/Microsoft	USB 2.0 plug (includes PS/2 adaptor), clear dust cover	None	438x135x29mm 1,214g
DIATEC FILCO £120 inc VAT · ★★★★☆	Majestouch Ninja	FKBN88MRL/UKFB2	Cherry MX Red (Blue/Brown options)	UK IBM/Microsoft	USB 2.0 plug (includes PS/2 adaptor), clear dust cover	None	355x135x29mm 1,003g
DUCKY £150 inc VAT · PC ADVISOR RECOMMENDED · ★★★★½	DK9008 Shine 2	Ducky KB 9008S2-R	Cherry MX Red (Blue/Black/Brown options)	UK IBM/Microsoft	Micro-USB 2.0 plug, removable clear dust cover, 1.5m cable	Backlit keys, DIP switches	Not specified 1,168g
MATIAS £119 inc VAT · ★★★½☆	Tactile Pro 3 Keyboard	FK302-UK	Alps Electronic	UK Macintosh	USB 2.0 plug, 1.83m cable	Three-port USB 2.0 hub	460x163x54mm 1,249g
MATIAS £119 inc VAT · ★★★½☆	Quiet Pro Keyboard	FK302QPC	Matias	UK IBM/Microsoft	USB 2.0 plug, 1.83m cable	Three-port USB 2.0 hub	460x165x35mm 1,278g

Soundbars

Photography by Dominik Tomaszewski

Sick of putting up with sound that's as thin as your TV? Chris Martin reviews six soundbars that offer better quality with minimum hassle

Soundbars are the latest craze in home entertainment. These long units are designed to sit below, in front of or above your TV. They contain two or more speakers, and may operate in tandem with a separate subwoofer that produces the lower-frequency sounds.

Many people are unhappy with the sound quality delivered by their flatscreen TV, but fears of a difficult setup routine and a mess of unsightly wires mean they are unwilling to install a surround-sound system. Perhaps they simply don't have a big enough room.

Not all soundbars replicate surround sound, but they do offer a convenient, relatively compact solution for getting better quality audio in your living room.

Key features

Consider how the soundbar will connect to your TV. The most common method is to use an optical cable, also known as Toslink. Most modern TVs support this, but be sure to check before choosing your soundbar.

Some soundbars have HDMI inputs, which can be convenient, but do the same job as Toslink. You should also check that this output will route all incoming audio from connected devices such as Blu-ray players, PVRs and games consoles, as well as the internal TV tuner. This way, to hear audio from all your devices you need to have only one cable going to your soundbar.

Most soundbars have other inputs, including a 3.5mm minijack and/or stereo phono jacks. These take analogue feeds and allow you to play audio from just about every device, including phones and tablets.

However, if you'd prefer the convenience of wirelessly playing music from a mobile device, look for built-in Bluetooth. Unless your mobile device and soundbar both support aptX, the default codec within the A2DP standard, sound quality won't be as good.

Subwoofers

A standalone soundbar will be unable to offer full-range sound, so many come with a separate subwoofer. This produces the deep bass required by movie special effects such as explosions. You can get away without a subwoofer if you'll mostly be watching dialogue-heavy programmes.

Subwoofers are either active or passively powered. Passive models don't have a built-in amp, so do not require mains power. These rely on an extra amp in the soundbar.

Active subwoofers have their own amp, so require an external power source. They can wirelessly receive audio, though, so you can place them away from the soundbar without trailing wires. Watch out for soundbars such as the Samsung HW-E551, which puts all the inputs on the sub. This is an advantage if your TV and soundbar are to be wall-mounted and the cables would otherwise have to run to the soundbar.

Audio

Don't pay much attention to manufacturers' amplifier power figures. Even when they're accurately described, watts don't directly translate to volume, since the speaker sensitivity also affects things. Some brands rightly avoid printing power figures.

The number of speakers isn't particularly important. If you're after a convincing surround-sound effect, be sure to read reviews rather than rely on makers' claims. Also, don't confuse terms such as '3D sound' or 'spatial sound' with surround sound. Some soundbars use Dolby Virtual Speaker technology, while others have their own names for pseudo-surround.

Configuration

Most soundbars are limited in where they can be mounted. If you plan to wall-mount, check this is an option. Some soundbars can be positioned at different angles; others will even convert into separate stereo speakers, should you want to chop and change.

BOSE SOLO

£349 inc VAT • bose.co.uk • tinyurl.com/cwdLwst

Unlike traditional soundbars, the Bose Solo is housed in a deep flat box and designed to sit below rather than in front of your TV.

The plain-looking box is about 7cm tall, so it won't push your TV much higher than it currently sits. Bose says you can fit a TV up to 42in and 18kg on top of the Solo, or you could fit this 52cm-wide box on its own shelf below.

In common with most soundbars, the main connection is an optical input. Once plugged into your TV's output, the Solo will provide the sound for anything you use, from games consoles to Blu-ray players. There are no HDMI inputs for direct hook-ups.

In fact, inputs on the whole are kept to the bare minimum. There's also a coaxial digital input and stereo phono jacks, while the USB and 3.5mm ports are for service use only. Cables are provided, but without Bluetooth connectivity there's no easy way of connecting mobile devices and playing the music stored on them.

Bose provides a credit-card-size remote control with

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

the Solo, which is about as basic as you can get. It has just four buttons, offering power, volume up/down and mute. The soundbar is compatible with universal remotes, though.

Inside the Solo are four drivers and two bass ports. We heard better sound quality from the Bose than our Philips TV. However, in a number of areas the Solo is a let-down.

The speaker setup of the Solo is such that the soundscape is dominated by the mid-range and bass. Bass is punchy and the mid-range is mostly rich, but a lack of tweeters means the top-end is largely drowned out.

This wouldn't be so bad if you could adjust the levels using an equalizer. When listening to music there's no way of toning down the bass, which is often overpowering.

The Bose sounds good when watching terrestrial TV, but the vocals are a little hard. It's like having a decent centre speaker as part of a surround-sound system: there's little stereo separation and the sound seems to come from the same place. The situation improved when we watched a Blu-ray movie, but without a virtual surround feature the Solo isn't best suited to film enthusiasts.

VERDICT: The Bose Solo should provide better sound quality than your flatscreen TV, but a lack of inputs means it can do little else. Add in the non-adjustable sound and a reasonably high price and this soundbar is average at best.

ORBITSOUND M12 SOUNDBAR

£399 inc VAT • orbitsound.com • tinyurl.com/a5o24us

Orbitsound's M12 certainly looks the part with its glossy piano-black finish. The MDF-constructed unit is acoustically sealed, with a magnetically attached mesh front panel. It sits nicely in front of a TV, but is also small enough to fit on a shelf.

The M12 has swapped the iPhone dock of its predecessor for a control panel. There are buttons for power, volume, Bluetooth and input source, plus notification LEDs.

Bluetooth is a handy feature for a soundbar, letting you wirelessly play music from a smartphone or tablet. When you press the Bluetooth button the M12 can cleverly grab a previously paired device and resume playback.

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

A cunning feature is the M12's ability to automatically turn down the volume if it was cranked up the last time it was used.

The M12's downward-firing subwoofer has a 6.5in driver. Since it doesn't connect to the soundbar with a wire, you can place it anywhere in the room. It operates on a 2.4GHz frequency, although it's easy to change the channel to avoid interference.

The soundbar itself has four forward-facing mid-range drivers and two tweeters. The latter are grouped in the centre, but the sound is well-rounded. We heard excellent clarity in the mid-range, and the subwoofer delivers decent bass. We found the top-end slightly lacking and not very bright, though.

Two side-mounted drivers provide spatial sound. Rather than simply pumping out stereo, the front-facing drivers are a mono array. The side speakers play an out-of-phase stereo signal, which aims to eliminate the traditional stereo 'sweet spot'.

The result is very pleasing, and the M12 fills the room with a large and immersive soundscape. There's a real sense of space even when sitting to the side of the soundbar.

The default settings sound good, but you can adjust playback to taste; a dial on the sub's rear lets you tweak the level up or down by 8dB. The supplied remote offers comprehensive control.

VERDICT: There's a lot to like about the Orbitsound M12. It's a good-looking piece of kit, with a range of features that includes built-in Bluetooth and a wireless subwoofer. Sound quality is decent, and the Orbitsound does a good job filling the room. All this comes at a price, however.

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SAMSUNG HW-E551

£280 inc VAT • samsung.com/uk • tinyurl.com/cjaof4j

Samsung's stylish HW-E551 soundbar slots together a pair of wall-mountable speakers, which are able to work independently if you prefer. There's also a large rear-firing wireless active subwoofer.

Plenty of connections are found on this subwoofer, which means you'll need to place it close to the TV. You get optical, two HDMI in, one HDMI out, a 3.5mm jack and a USB port for playing audio from an external device, although USB playback support is limited to just MP3 or WMA files. We were pleased to find built-in Bluetooth for playing music from smartphones and tablets, too.

The LED display is a nice feature, and aids in navigating the different modes and volume levels. This can't be switched off, though, and even dimmed it can be distracting at night.

The sound quality is smooth and well-rounded. With the subwoofer offering tight bass and the speakers producing a clear mid-range and bright top-end, the HW-E551 is suited to TV, music and film. We'd have liked to have greater control over the sound, though: it's possible to adjust only the level of the subwoofer.

With 80W per speaker and 150W for the subwoofer, the Samsung has no trouble filling the average living room. It also has a 3D Sound virtual surround mode, which can be set to 'Light' or 'High'. It makes for a wider soundstage, but is no substitute for rear speakers.

A selection of sound modes are preset. You'll find music, game, news, sports, cinema and drama; we found the latter two the most useful. A Smart Volume feature aims to adjust the HW-E551's output level to suit the input, but it was too erratic for our liking.

There are three dynamic range compression settings, and any audio and lip-sync problems you encounter can be tackled with 25ms adjustments from 0- to 200ms.

A remote offers plenty of control over the system and its many features. It can also double as a remote for Samsung TVs.

VERDICT: The Samsung HW-E551 is a stylish soundbar with a versatile design. It has plenty of features, although not all are useful. Powerful and well-rounded sound quality combined with a mid-range price make this a good choice of soundbar.

PC ADVISOR RECOMMENDED

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

SONOS PLAYBAR

£599 inc VAT • sonos.com • tinyurl.com/d7jpukL

The Sonos Playbar is the firm's first effort to get into the home-cinema market. It's big and expensive, but it has a lot to offer.

Despite spanning the entire width of our 40in TV, the Sonos is lovely to look at. Its two-tone design mixes silver aluminium with black speaker fabric. It's well built and reassuringly heavy.

Setup isn't difficult, but it is more involved than with the other soundbars in our group. Having plugged in the power and optical cables you need to download the Sonos software to your PC or Mac (or install the mobile app on your smartphone or tablet), then follow a step-by-step process so simple a child could complete it.

The Playbar must also be connected to your home network via ethernet or the £40 Sonos Bridge.

If you already use some Sonos components, adding the Playbar allows you to set up a multiroom hi-fi system. You can play different audio in every room, or fill the entire house with a single track.

It has only a couple of physical ports, but the Playbar can play content from a number of sources. For example, music can be streamed over your home network from PCs, iPhones and iPads, and there's access to internet radio stations and Spotify.

Sonos doesn't supply a dedicated remote control, but mobile apps that let you use any device for this purpose are free to download. It's also possible to configure your TV remote to adjust the volume.

With nine drivers (six mid-range and three tweeters), each powered by its own amplifier, the Playbar produces high-quality sound. Angled tweeters provide an enormous soundstage, with a truly immersive stereo field. We were thoroughly impressed when watching Freeview TV and Blu-ray movies, and streaming music.

Movie lovers can add two Play:3 speakers or a Sonos Sub, but one isn't necessarily required: the Playbar packs a surprisingly large punch in the bass department.

The sound can easily be tweaked to suit your taste using the equalization, vocal-enhancement and other settings within the Sonos software. A night mode usefully ensures that at lower volume levels the quiet content is boosted and louder content is subdued.

PC ADVISOR BEST BUY

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

VERDICT: A superb soundbar. The Sonos Playbar is sleek and well-built, and offers unparalleled sound quality and plenty of features. If you can afford its high price, it's the best soundbar in this group.

SONY HT-CT60

£149 inc VAT • sony.co.uk • tinyurl.com/cpzow3L

Sony's HT-CT60 is a long soundbar, wider even than our 40in TV. You can place it in front of the TV or mount it to a wall. The hexagonal shape might not be to your taste, but when the soundbar is placed on the floor it allows sound to be directed upward.

The low price is reflected in the lightweight plastic build, but the grey speaker fabric and metal-effect ends look stylish enough.

Optical S/PDIF lets you play through the soundbar anything shown on your TV's screen, but with only coaxial digital and stereo phono inputs to hand you're limited in terms of what other devices can be added. Playing music stored on a phone or tablet requires a physical connection to the soundbar, for example. We'd prefer to see built-in Bluetooth, which is included in the cheaper Toshiba.

The HT-CT60 has a good stereo field and offers impressive sound reproduction across the low, mid and high frequencies. A subwoofer must be wired to the soundbar, but it doesn't require a power source.

Specified as 15W per speaker and 30W for the subwoofer, the HT-CT60 is no powerhouse. And in practice, even full volume isn't loud enough when listening to music from a phone.

A set of orange LEDs indicate which input is selected and whether the virtual surround mode is switched on. This mode enables you to do without rear speakers, but it isn't a like-for-like substitute.

As with the Sonos you can enable a Night mode, which makes sound effects and dialogue easier to hear at lower volume levels. However, this technology is compatible with only Dolby-encoded TV programmes, DVDs and Blu-rays.

Sony supplies a small remote control that has buttons for power, volume, input, surround plus bass and treble adjustments. The LEDs on the soundbar flash to indicate when you've reached any upper or lower limits. The remote can also be used to control power and volume, and switch channels on a Sony TV set.

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

VERDICT: The Sony HT-CT60 is a basic 2.1 soundbar system with looks that might not suit your tastes. It's lacking in standout features and physical inputs. However, the combination of an affordable £149 price tag and surprisingly good sound quality make it a decent choice if your budget is limited.

TOSHIBA MINI 3D (SBM1W)

£124 inc VAT • toshiba.co.uk • tinyurl.com/c8tq4uq

At first glance, the compact Toshiba Mini 3D soundbar looks like an iPhone dock or wireless speaker. It's small enough to sit out the way on a shelf below your TV, while the supplied passive subwoofer doesn't require an additional power source.

The simple black box features silver power, volume, input and Bluetooth buttons on top; the latter must be held down a few seconds to make the device discoverable. Green and red LEDs signify power on and off, while blue is for Bluetooth.

We'd prefer these LEDs to indicate which of the range of inputs you're using: there's also optical and coaxial digital, a 3.5mm jack and stereo phono inputs. As it is, you simply cycle through the options until you find the right one.

In its regular mode the Mini 3D sounds very much like a basic centre speaker; it's as though the audio is trapped inside a cage within the unit. However, press the 3D button on the remote and the sound is let loose, easily capable of filling the room.

In 3D mode your ears are tricked into thinking stereo speakers sit either side of the TV. You won't want to revert to the normal mode, which sounds awful by comparison.

Although the 3D mode conjures a big sound from a small box, it's not to be mistaken for a wraparound virtual surround feature. The audio only ever sounds as though it's coming straight at you.

For such a tiny system sound quality is pretty impressive, but it's not perfect. With four mid-range drivers and an accompanying subwoofer, the Mini 3D is predictably heavy on mid-range and bass. The small amount of top-end gets lost in the mix. Frequency response is listed as 95- to 19kHz.

The £124 Toshiba Mini 3D is clearly a budget model in comparison to some of the contenders in our soundbar group test, but this didn't counter our disappointment in the cheap plastic remote with annoying membrane buttons, nor the fact very little audio adjustment is possible. Using the remote control you can select one of three audio presets – movie, music and game – but we struggled to hear a difference between them.

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

VERDICT: The Mini 3D soundbar has an impressive amount of volume for its tiny size and sounds good in its 3D mode. There's also a good range of inputs and Bluetooth is a welcome extra. However, its sound is unbalanced and, with no adjustment beyond the basic presets, the Mini 3D can't compete with more expensive soundbars.

ENTER OUR PHOTO COMPETITION TO WIN A COPY OF PHOTO & GRAPHIC DESIGNER 2013!
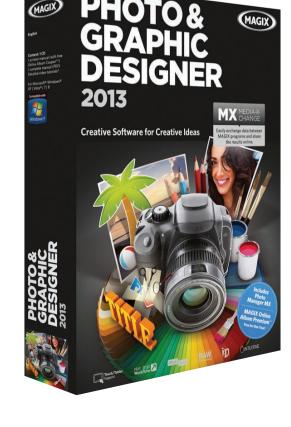
PC Advisor has teamed up with MAGIX to offer eight lucky readers the chance to win a copy of Xara Photo & Graphic Designer 2013, worth £69 each!

Photo & Graphic Designer 2013 is a complete solution for photo editing and graphic design. Take advantage of a high-performance program with a huge selection of photo and graphics tools. You'll be amazed at just how fast and effective this program is.

For a chance to win, simply send us a copy of your favourite photo, whether it's of a beautiful sunset, waves crashing on the beach, kids playing in the snow, or your dog snoring – whatever you like. Enter as many times as you want; all we ask is that you own the copyright to the photo.

To enter, simply tag PC Advisor in a photo on Facebook, or email letters@pcadvisor.co.uk.

facebook.com/pcadvisor

Competition ends 1 May 2013

How we test

We test all our soundbars in a typical living-room environment. We install them in the same position, connected to the same audio sources, and use the same cables. Each is connected to a 40in Philips LCD TV, with its built-in speakers muted.

To thoroughly test the features and sound quality of each soundbar we use various audio sources and types of content. For example, we watch a variety of standard Freeview television programmes, and connect an Android smartphone over Bluetooth (or a cable where this isn't possible) to listen to a range of musical genres from classical to drum and bass.

A 20-minute clip from Blu-ray movie *Battle: Los Angeles* is also used to assess effect reproduction, dialogue and virtual surround.

We listen to the output of each soundbar from various points in the room, both standing and sitting. We also judge the sound quality at low, regular and loud volume levels, and try out the Night mode where one is available.

	BOSE £349 inc VAT ★★★☆☆	ORBITSOUND £399 inc VAT ★★★★☆	SAMSUNG £280 inc VAT ★★★★☆ PC ADVISOR RECOMMENDED	
Model	Solo	M12 Soundbar	HW-E551	

PORTS & CONNECTIONS

Optical S/PDIF	✓	✓	✓	
Coaxial S/PDIF	✓	✗	✗	
HDMI	✗	✗	✓ (2 in, 1 out)	
3.5mm minijack	✗	✓	✓	
Stereo phono	✓	✓	✗	
Bluetooth	✗	✓	✓	
Other	✗	✗	USB	

GENERAL

Power output (RMS)	Not specified	300W total	310W (2x 80W + 150W)	
Subwoofer (active/passive, wired/wireless)	N/A	Active, wireless	Active, wireless	
Remote control	✓	✓	✓	
Mobile app	✗	✗	✗	
Wall-mountable	✗	✗	✓	
Virtual surround-sound mode	✗	✓	✓	
Night mode	✗	✗	✗	
Soundbar dimensions	525x70x309mm	600x90x100mm	1038x55x55mm	
Subwoofer dimensions	N/A	220x220x340mm	290x370x90mm	
Warranty	Two years	Two years	One year	

Conclusion

Despite being the most expensive soundbar here, the Sonos Playbar wins our recommendation. It combines outstanding build quality with gorgeous design, and offers both the best features and sound quality here. We could hardly find fault with the Playbar.

Of course, not everyone has £599 to splash out on a soundbar. Taking price into account, Samsung's HW-E551 may be a better proposition. For £280 it offers a versatile, attractive design, plenty of features and excellent sound quality.

The Orbitsound M12 impressed us, majoring on a room-filling spatial sound, but it's too expensive at £399.

Toshiba's Mini 3D is cheap, but a pain to use. It doesn't offer enough of a boost to sound quality to warrant its purchase.

For an extra £25 the Sony offers much better sound, but is overly wide and lacking in features – notably Bluetooth.

Finally, the Bose Solo offers an awkward combination of a high price and a lack of inputs. We wouldn't recommend it. ⊠

SONOS £599 inc VAT ★★★★½ PC ADVISOR BEST BUY	SONY £149 inc VAT ★★★½☆	TOSHIBA £124 inc VAT ★★★☆☆
Playbar	HT-CT60	Mini 3D (SBM1W)
✓	✓	✓
✗	✓	✓
✗	✗	✗
✗	✗	✓
✗	✓	✓
✗	✗	✓
Ethernet in/out, wireless via Sonos Bridge	✗	✗
Not specified	60W (2x 15W + 30W)	60W (4x 10W + 20W)
N/A	Passive, wired	Passive, wired
✗	✓	✓
✓	✗	✗
✓	✓	✗
✗	✓	✓
✓	✓	✗
900x85x140mm	940x83x70mm	290x72x100mm
N/A	170x245x300mm	220x246x220mm
One year	One year	Two years

Microsoft Office 2013 Productivity Suite

Designed for touchscreens as well as traditional PCs, Office 2013 is accessible on the latest-generation mobile devices. Simon Williams takes an in-depth look at the 2013 instalment of Microsoft's productivity suite

Microsoft Office is found on more PCs worldwide than any other productivity suite, so a new version – something that surfaces roughly every three years – is a major event. Office 2013 sees a couple of strategic developments for the company, as well as the usual spate of feature improvements.

This is the first version of Office to support the use of touchscreens, a method of interacting with a computer that was still something of a novelty just three years ago. The huge expansion of the tablet and hybrid PC market, which includes Microsoft's own Surface machines, has brought on a rapid advancement of the technology. Any company who ignores the requirement to operate its software with fingertips is not just missing a trick, but may well lose sales, too.

Microsoft also hopes to move the market away from the outright purchase of its software to a leasing paradigm, whereby customers pay an annual subscription. This approach has already proved viable in the internet security market, in which it's standard practice to sell a one-, two- or three-year rather than a perpetual licence.
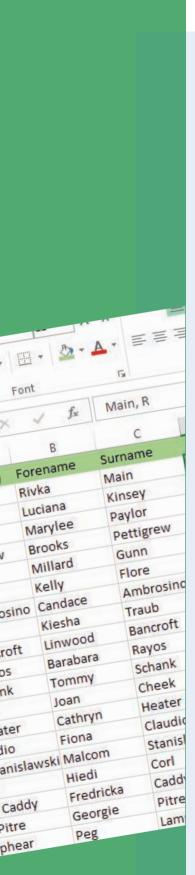
To this end it has introduced Office 365, a heavily cloud-based distribution system for Office. Although the productivity suite runs locally on your PC or tablet, free SkyDrive storage space is offered to encourage the storage of documents online. There are distinct advantages to using cloud storage – not least that you can access your files anywhere, on any machine on which Office software is installed.
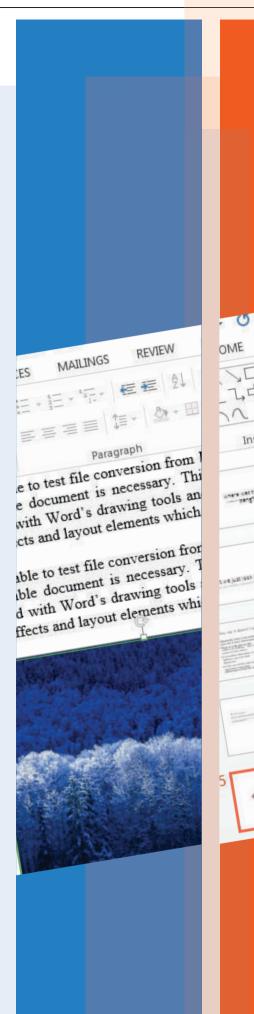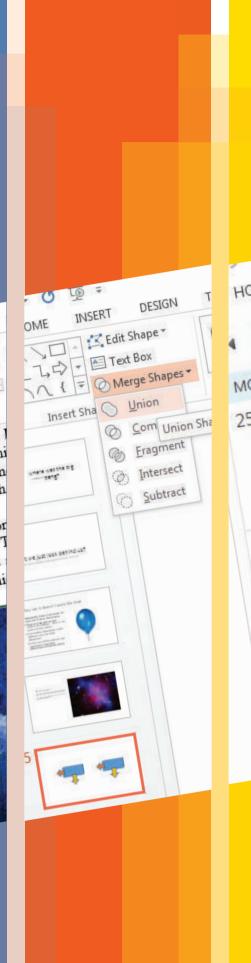
It's probably no coincidence that the deal on Office 365 Home Premium is more tempting than that for Office Professional 2013. Although the £80-per-year Home Premium product is restricted to non-commercial use, you can install the suite on up to five machines, PC or Mac. With Office Professional 2013, you pay £390 for a single-user perpetual licence.
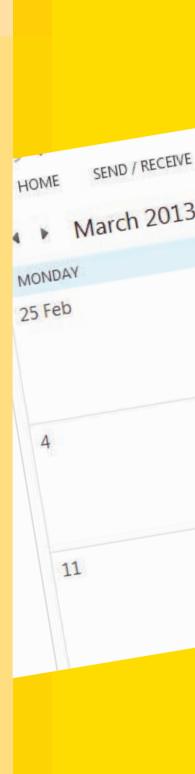
Over the following pages we'll take an in-depth look at Microsoft's Word, Excel, PowerPoint, Outlook, OneNote, Publisher and Access software, plus 365 and SkyDrive.

Usability	★★★★☆
Features	★★★★★
Value	★★★★☆
Overall	★★★★☆

Font

fx | Main, R

B	C
Forename	Surname
Rivka	Main
Luciana	Kinsey
Marylee	Paylor
Brooks	Pettigrew
Millard	Gunn
Kelly	Flore
Candace	Ambrosino
Kiesha	Traub
Linwood	Bancroft
Barabara	Rayos
Tommy	Schank
Joan	Cheek
Cathryn	Heater
Fiona	Claudi
Malcom	Stanis
Hiedi	Corl
Fredricka	Cadd
Georgie	Pitre
Peg	Lam

MAILINGS   REVIEW

Paragraph

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OME   INSERT   DESIGN

Edit Shape
Text Box
Merge Shapes
Union
Com Union Sha
Fragment
Intersect
Subtract

Insert Sha

HOME   SEND / RECEIVE

March 2013

MONDAY

25 Feb

4

11

Word

Microsoft Word continues to be the most popular word processor, but the new version looks different to that seen in Office 2010. Its most obvious update, which applies to all Office 2013 applications, is a new 'flattened' look. Rather than raising and colouring the ribbon toolbar, its minimalist presence is separated from the page with a simple horizontal rule. Tab headings are capitalised, which prevents them getting lost on the page.

This change is useful on smaller screens, on which you can also hide from view the ribbon to enlarge the available screen space. If you're using a touchscreen, a Read Mode places more space between ribbon icons so you're less likely to miss-tap. It also lets you swipe through an open document.

Backstage view has also seen some redesign, with a cleaner, less fussy menu down the left side. The Open page now includes SkyDrive as one of the sources from which you can load documents, or you can add your own storage locations. Unlike Office 2010 it doesn't automatically open the file browser, although this option is available when required.

PDF conversion and editing is now integrated into Word. You can select a PDF within the browser, which is then converted to a Word document and opened for editing; you make your changes as you would with any other Word document, then re-save it as a PDF. This round-trip compatibility with PDF requires the document in question to be editable, of course.

Green guidelines aid **ALIGNMENT** as you move objects around the page

Collaboration has always been an important feature, and version 2013 sees the addition of Simple Markup view. In this view alterations are not highlighted, but discreetly marked up in the left margin; comments appear in the right margin as speech bubbles.

You can easily switch to full Markup mode, in which the usual highlights appear along with details of the person who made them in the margin. These details will include a photo, if available, and a direct connection to their social-media profile, enabling you to instantly get in touch and discuss their changes. It's even possible to hold this discussion within the margin of your document.

On a touchscreen device you can also 'ink' (draw) over a document to mark up changes.
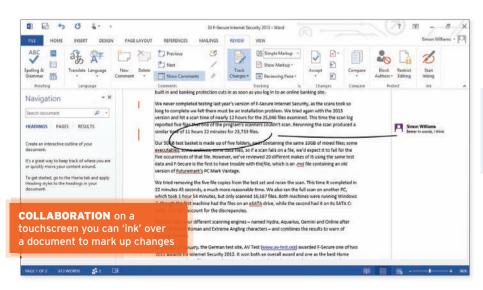
It's debatable whether it's an advantage to discuss document changes within a word processor but, if Microsoft Office is the house standard throughout an organisation, it may prove convenient.

At the page-design level, Microsoft has incorporated alignment aids similar to those seen in Publisher 2010. Green guidelines surrounding margins, paragraphs and the like pop up to aid alignment as you drag objects around the page. This makes it much quicker to set up the main elements of a page.

Live Layout helps here, too, showing in real time the effect on text wrap as a graphic or frame is adjusted or moved – copy reflows as the frame size changes. A pop-up button attached to these elements offers quick access to the text-wrap function, too.

Styles continue to be a headache, sometimes working and other times not. There are esoteric rules that decide when they work, but many people who have better things to do than learning them will simply avoid using Styles. This is a shame, as it was once a worthwhile productivity tool.

COLLABORATION on a touchscreen you can 'ink' over a document to mark up changes

Excel

As Word is to word processing, Excel is to spreadsheets; it's the best-known, most widely used application of its type. Whereas Word has competition from WordPerfect, LibreOffice Writer and Google Docs, the equivalent spreadsheet programs pose no threat to Excel.
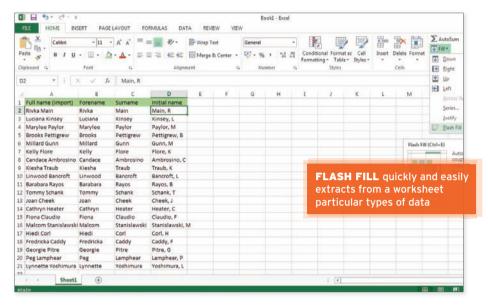
More fundamental than those found in Word, the new features in Excel 2013 include things such as Flash Fill and Quick Analysis. Some features also now appear as pop-up icons, rather than being buried in the ribbon.

Flash Fill makes it much easier to separate types of data. For example, if you have a column of full names – forenames and surnames – that you have imported from another source, perhaps the internet, you can extract all the surnames by typing the first surname as an example and clicking Flash Fill. Excel picks out the corresponding data from the following fields.

In the same way, you could extract the months from a list of dates, or the pounds from a financial list. You can draw on specific text, too, just by giving an initial example. Flash Fill is a one-off treatment in the vein of Excel's ability to fill a series of cells with the days of the week or months of the year; it doesn't put formulae into the destination cells, so the extracted data will not change with the source data.

Quick Analysis offers a way to preview and quickly add to a spreadsheet charts or spark lines. An icon appears at the bottom right when you highlight cells in a column of data. This pulls up a small pane for formatting, charts, totals, tables and spark lines, and hovering the mouse cursor over any of the icon options previews how the data will look with that option applied.

You can perform quick totals, averages and other statistics, and draw bar-, line- and dot charts without committing them to your spreadsheet. A single click will fix them to the worksheet when you find what you want.

FLASH FILL quickly and easily extracts from a worksheet particular types of data

Excel can now recommend ways to view your data by suggesting the best choice of pivot for your pivot table. Pivot tables are not for the fainthearted, but can help reveal the underlying trends in sets of data. Knowing how to translate the data in a worksheet to give the most useful view is something that comes only with experience, so software assistance may be valuable.

Say you have a worksheet listing customers' details and what they've bought in the past year. It might be worth checking whether there's any correlation between their gender or where they live, and the amount they've spent. Excel can suggest how best to construct the relevant pivot table.

Excel 2013 takes on the flattened look that runs the entire Office suite; apart from the cosmetic changes, it makes little difference to the way the application works.

Collaboration is facilitated by saving to and sharing from SkyDrive, but these files can be simultaneously accessed only via the web version of Excel. You can use the full Word and PowerPoint apps when sharing their documents in the same way.
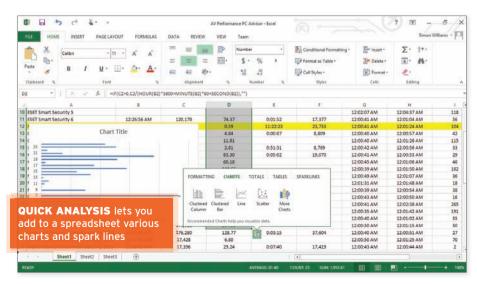
New features in Excel are mostly aimed at the less experienced, and focused on alerting more people to the powerful analysis tools found within the application. There's less here for the power user to learn, although Flash Fill and Quick Analysis are very useful productivity snippets.

QUICK ANALYSIS lets you add to a spreadsheet various charts and spark lines

PowerPoint
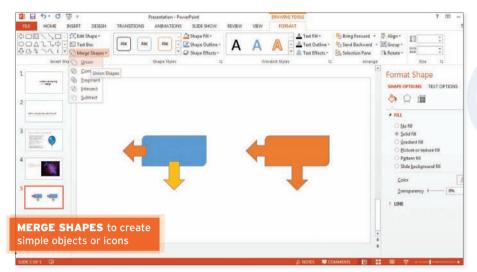
Like its siblings, Word and Excel, PowerPoint is the de facto tool for computer-based presentations. Microsoft made a few claims for new features in PowerPoint 2013, some of which were slightly exaggerated.

Microsoft implies that Presenter View is a new feature for 2013. When using multiple screens, it allows the presenter to see the upcoming slide and any notes. This functionality was present in PowerPoint 2010, although it has had a revamp.

Presenter View is now displayed with a black background, and the presenter's screen shows both current and subsequent slide, along with any notes. There is a new laser pointer, and you can zoom in to draw attention to a particular area of a slide.

MERGE SHAPES to create simple objects or icons

You can also swap displays, although it's difficult to think of a reason you might want the audience to see what's on your screen. PowerPoint automatically sets up Presenter View when it detects that a second screen is connected to the machine running the presentation.

Collaboration is another marketing buzzword for PowerPoint 2013. New is the ability to share a presentation with friends or colleagues, then accept comments on the individual elements within each slide. This feature was also available in PowerPoint 2010, in which you could upload your presentation to SkyDrive for simultaneous review by two or more people.

SkyDrive is the default storage location when you're online and logged into your Microsoft account. It's easy to set up sharing, simply by sending a link to the colleagues you want to take part. There's a new comment pane for each slide, in which you can see the comment threads on any edits.

There are several new design features to help build slides. Alignment guides, as introduced in Word 2013 and Publisher 2010, are also available in PowerPoint 2013. As well as being able to align elements, it's possible to set up a master slide that offers alignment guides on every slide in a presentation. This is genuinely useful, making a consistent layout much easier to achieve.

The range of shape tools has been expanded by the introduction of the Merge Shapes function. This lets you merge two or more shapes in a variety of ways, using union, combine, fragment, intersect and subtract mathematics. Given the wide range of shapes already available, the ability to

create your own by merging two or more gives considerable extra graphical scope.

When you select an object, a new Format Object task pane opens to the right, putting in one place all the formatting settings. This is unusual for this version of Office, but harks back to the panes that Word 2007 used for paragraph styles and other formatting.

The eyedropper tool enables you to capture and transfer to other elements (such as backgrounds) specific colours. It's difficult to believe this tool hasn't previously been available in PowerPoint. Other improvements include support for MP4 and WMV video, plus the ability to play a soundtrack across multiple slides.

While there may not be as many new features in PowerPoint 2013 as Microsoft would have you believe, a number of notable improvements make it easier to construct and run presentations. Opening up several

areas of its function to the cloud, allowing you to grab content and collaborate on presentation creation, is a sensible and natural progression for the application.

Outlook
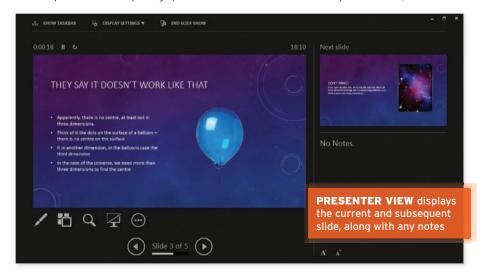
Many people think of Outlook as the Office email client. It's very good at handling one or more email accounts and working with backends such as Exchange, but there's a lot more to the application. Outlook integrates email, contacts, schedules and to-do lists; in version 2013 it simply does so more smoothly.
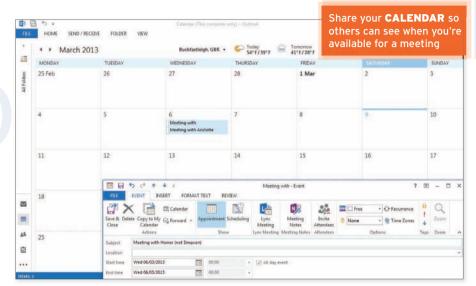
Outlook 2013 looks even more minimalist than the other Office 2013 applications: partly because the ribbon is hidden by default; partly because colour is used sparingly. Click any of the tabs at the top of the screen and the ribbon appears for drilling down to the various settings and functions.

Four icons on the left edge of the screen call up Outlook's other primary functions. You can hover the mouse over these to get a quick peek without leaving the current view.

Outlook has adapted to touchscreen use, but it's not easy to operate on a small-screen tablet. That's despite the extra space found in the ribbon toolbar and the improved message organisation. For example, filtering contacts by their first initial is tricky without a stylus.

There are several new email features that make group working easier. The program has been able to manage multiple mail accounts for many years, but you can now simultaneously access multiple accounts. You can also share your calendar, so others

PRESENTER VIEW displays the current and subsequent slide, along with any notes

Share your **CALENDAR** so others can see when you're available for a meeting

can see when you are available for meetings or other activities.

Perhaps the biggest single change is the inline reply, which is used for commenting on points in an email. You can respond to queries or raise questions directly within the received message, without hitting reply.

Outlook 2013 is a streamlining job but, once you've got used to the new design, these small savings combine to offer a useful upgrade to Outlook 2010.

OneNote

OneNote is the newest member of the Office clan and was designed with mobile devices in mind. It has always been able to accept finger or stylus input, and includes an audio recorder and built-in handwriting recognition.

The application uses the analogy of a series of notebooks, each of which can be sub-divided into sections and pages. On these pages you can type text, draw directly onscreen, and paste in elements such as tables from web pages. All these things can be arranged as required, then exported to Word, Excel, PowerPoint or other Office apps.

The facilities that enable you to navigate tables and add headers have been improved. You can also now create and embed Excel worksheets (and Visio drawings) within a OneNote page. Click in a cell and the worksheet opens in a separate Excel window. Whether you created the spreadsheet in OneNote or imported it from Excel, changes made in Excel are also updated in OneNote.

You can now link a OneNote page to a scheduled event in Outlook; the linked notes are called up when the event occurs, which may be useful when attending meetings, lectures or presentations. At the event you can also record what's said or take new notes, then link them to the existing notes within OneNote. This can provide a useful recap.

It's not all good, though. It's still none too easy to draw with a finger, even though OneNote was designed as a tool for use on mobile devices. Fingers are just too big to cope with anything detailed. Handwriting also has to be pretty large, which makes it difficult for the built-in handwriting recognition to do its job. OneNote highlights the importance of a stylus for serious note-taking on a tablet.

Publisher

Often seen as the poor relation in the Office suite, Publisher is a page-design application that can punch well above its weight when putting together attractive publications. Publisher had a revamp in the 2010 version, and there's much less to get excited about here: the changes are mostly tweaks.
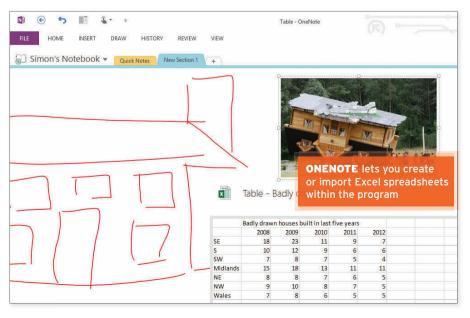
One such tweak is picture background, which sets an image as the background to a document. Microsoft also claims Picture swap, which swaps the contents or format of two picture frames, as a new feature but, yet again, it was present in Office 2010.
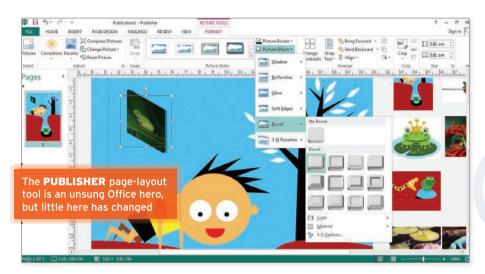
As with PowerPoint 2013, you can now import images direct from the cloud, without saving them first. This speeds up page layout, although you should be aware of copyright concerns when snaffling material in this way.

There's an improved range of effects to apply to frames and shapes, including more shadows, glows, bevels and 3D rotations. All are available from the Picture Tools tab in the ribbon menu; you'll find some useful presets here, too.

A new output option, called Photo Printing, should make it easier to get entire documents printed via online services. The 'Export, Pack & Go' list now includes a facility that can save each page of a document as a Jpeg or Tiff image file, too.

Microsoft has missed a trick by not also bringing to Publisher the new ability in Word to import PDF files. A page-layout

ONENOTE lets you create or import Excel spreadsheets within the program

Badly drawn houses built in last five years					
	2008	2009	2010	2011	2012
SE	18	23	11	9	7
S	10	12	9	6	6
SW	7	8	7	5	4
Midlands	15	18	13	11	11
NE	8	8	7	6	5
NW	9	10	8	7	5
Wales	7	8	6	5	5

program is, in many ways, a more appropriate tool for importing and editing PDFs than a word processor. Although even Publisher 2010 could export a PUB file to PDF, this functionality restricts you to creating the file in Publisher.

In common with the other Office 2013 programs, Publisher offers SkyDrive as the default storage location. You can grant others access to your documents simply by sending them a link. They will need Office installed.

Publisher is still something of an unsung hero in Office, and it's unfortunate that this incarnation does little to increase its heroism.

Access

Access is Office's database tool, and a substantial application in its own right. It has recently moved its focus from a database to a database-application-creation tool. Many people use Access for running predefined databases, and Microsoft supplies a number of standard templates for apps such as contact management and asset tracking.

In common with the entire suite of applications in Office 2013, Access has moved toward the cloud. It can now produce Web Apps, which can be accessed through a browser. There's plenty of guidance in creating these, and you don't need to start from scratch. As long as the Web App you want to create can be based on one of the database templates provided, navigation and different views are pre-constructed.

The trouble is, Web Apps either have to be accessed through SharePoint, Microsoft's

Web application platform, or from an Office 365 account with Access Services. A lot of setup is involved to get all this running but, once established, it should be possible to use Access as the back-end of a database, using nothing more than a browser for access.

If you're forever ploughing through property sheets when building a database, Access' new callouts, which group particular properties next to an associated section or control, should speed things up.

Access 2013 has also taken on the full backstage view that other Office applications use. It's easy to see what's available in the way of online database templates when you select New.

Cloud compatibility works in the same way as with the other Office 2013 applications, so you can save to and load from SkyDrive on any machine capable of running the suite. If you really must put

together an SQL query while waiting for a train on the way home from work, you can download the necessary data as you need it.
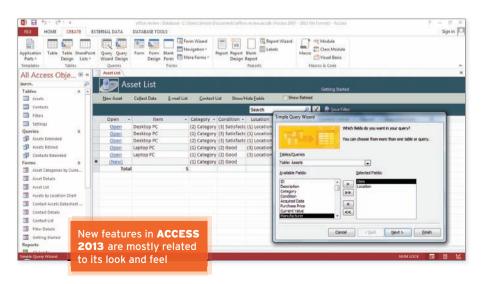
The ability to construct Access Web Apps is the main new feature of Access 2013. Even with the help provided, though, they require a commitment to the program and database-construction techniques. Otherwise, most of the new features in Access 2013 are related to its look and feel.

Office 365

Microsoft's increased emphasis on the cloud for document storage, updates and troubleshooting assumes you have a fast, reliable broadband connection. This is fine if you live and work in a city, but a decent web connection is not always a given in rural areas. Some of our testing was conducted in a rural setting using a satellite link; although this is rated at 18Gbps, it can be much slower – we witnessed noticeable pauses when moving documents to and from SkyDrive.

Microsoft is encouraging its customers to move to its subscription-based Office 365 suite by offering more flexible licence terms. You can have up to five installations of Office 365, on any combination of desktop and portable PCs or Macs. You can also move around these installations, deactivating Office 365 on one machine and activating it on another.

Until recently, a perpetual licence for a standalone version of Office could be installed on only one PC and couldn't be transferred. So, if you replaced your PC

OFFICE 365 is Microsoft's subscription-based productivity suite

Office 365
Home Premium

One Office. Five Devices.

Microsoft

or upgraded certain parts you wouldn't be able to continue using your paid-for Office installation.

At the time of writing, Microsoft had just changed its terms in response to customer complaints. A copy of Office is now transferable once every 90 days. It's still a bit mean-spirited – if your PC is stolen you'll have to wait three months before you can legitimately install your software on a replacement machine – but it's an improvement on the previous situation.

There's also a financial incentive to subscribing to Office 365, assuming you have a use for all five installations. Office Professional 2013 and Office 365 Small Business Premium contain the same seven core Office applications, and both can be used for commercial purposes (Office 365 Home Premium cannot).

The Professional product costs £390 for a perpetual single-user licence, so you'd need five to compare on cost. Assuming a three-year cycle between Office versions, the Office 365 Small Business Premium route will cost £1,575 (£105 per person, per year), while the Professional Plus one will cost £1,950. At the end of that time, of course, you'll still have five Office 2013 Professional licences, whereas the Office 365 installations will have expired (unless you pay again to renew them). Also note that you can pay less

for perpetual licences through Microsoft's Professional Plus volume-licensing scheme.

Aside from the arguments over licensing and cost, the new version of Office reveals a number of useful improvements in its core components, and minor tweaks throughout. Word's round-trip PDF editing, Excel's Quick Analysis and Flash Fill, and improvements to Presenter View in PowerPoint immediately come to mind. Improved integration with SkyDrive and the ability to use the Office apps anywhere, with documents downloaded from the cloud, is clearly the way forward when working out of the office.

These days, Office's major competition comes from free suites such as LibreOffice, OpenOffice.org and Google Docs, not commercial rivals such as WordPerfect. Although these offerings are able to offer much of the same functionality, and will cater to most people's needs, if you need to collaborate with business colleagues or clients, there's no real substitute for having Office on your machine.

Office remains the most comprehensive productivity suite available, and there are still things that each of its applications can do that the opposition can't. If you're working with Office documents, there's nothing more compatible than Office. ⊠

	Perpetual licences			Office 365 subscriptions	
	Home & Student	Home & Business	Professional	Home Premium	Small Business Premium
Availability	Retail, OEM	Retail	Retail	Software as a service	Software as a service
Maximum users	1	1	1	All users in one household	10
Devices per user	1	1	1	5 shared between users	5
Commercial use	✗	✓	✓	✗	✓
Word	✓	✓	✓	✓	✓
Excel	✓	✓	✓	✓	✓
PowerPoint	✓	✓	✓	✓	✓
OneNote	✓	✓	✓	✓	✓
Outlook	✗	✓	✓	✓	✓
Publisher	✗	✗	✓	✓	✓
Access	✗	✗	✓	✓	✓
InfoPath	✗	✗	✗	✗	✓
Lync	✗	✗	✗	✗	✓
Price	£110	£220	£390	£80	£105 typical

3D printing

Imagine being able to 'print' physical objects in your own home. Mike Bedford discovers that you don't have to: home 3D printing is already a reality

I t's been some time since we've seen any substantial improvements in home printing technology, but a new type of printer is on its way. Although the tech remains accessible to only the wealthiest customers, home 3D printers are set to prevail over the coming years.

With the recent explosion in sales of 3DTVs and, to a lesser extent, 3D displays for our PCs, we might expect to see printers that can reproduce on the page what appears to be a three-dimensional scene. In fact, such printers produce 3D objects that you can pick up and

hold. It may surprise you to learn that the technology has been around for a while, too.

Today's 3D printers are expensive, costing many times the price of even the best A4 inkjets. Even so, services are available that will turn your design into a 3D object, without breaking the bank.

Here, we look at what's possible with 3D printing, and investigate some of the lower-cost models you can buy. We also provide practical advice on how to get your 3D objects printed, and present a glimpse at what's to come. That Star Trek replicator might be closer than you think.

How it works

The single parts used to build larger objects are usually machined or moulded in manufacture. This is known as subtractive manufacturing, since you begin with a single block or sheet of material and cut away the unwanted parts. 3D printing, by comparison, is a type of additive manufacturing, whereby you start with nothing and add material to create the finished object.

The operation of a 3D printer has a lot in common with that of an inkjet or laser printer. Desktop printers will build up an image by printing lines of dots, whereas 3D printers build up solid objects one layer at a time.

Imagine cutting out of a sheet of cardboard lots of circles, then gluing them one on top of another. You'd end up with a cone. 3D printers follow the same principle to create solid objects by producing each layer at a time.

Another analogy can be used to highlight the importance of the 3D printer's vertical resolution, which is the thickness of each layer. Had you used sheets of paper rather than cardboard, you'd have needed to use many more layers but the end product would have been smoother and formed a better representation of a cone. Thus the vertical resolution affects the smoothness of the output, and how close your finished object will come to the original design.

Light polymerisation

One of the first technologies used for 3D printing is stereo-lithography or light polymerisation. Using this method a thin layer of liquid chemicals is introduced to a tank, and a laser beam then scans its surface. The UV light causes the liquid to form a solid plastic through polymerisation, and as the laser beam is turned on and off it is able to

selectively solidify the parts of the liquid that correspond to a layer of the object. Additional liquid is then added to create the second layer, which adheres to the first. The process is repeated until each layer is complete.

A disadvantage of this method is that any solid parts that appear above empty parts in a separate layer will not be supported and drop to the bottom of the tank. This can be overcome by adding and later removing physical supports.

Fused deposition modelling

A second method is fused deposition modelling or fused filament fabrication. In this process a thin plastic filament is heated and extruded through a nozzle, which moves around to build up each layer. In common with the light polymerisation process, parts of an object that are not supported by lower layers can cause problems, although the plastic solidifies sufficiently quickly that small overhangs can be tolerated. When using a printer with multiple nozzles, it is also possible to use one nozzle to create supports out of a different material, such as PVA, which is water-soluble and can be washed away when no longer required.

Selective laser sintering

The final method, which is most commonly used by 3D printing services, is selective laser sintering. This works in a similar fashion to light polymerisation, but uses powder rather than liquid. When the powder is heated by the laser it fuses (sinters) to form a solid. Various types of material can be used, and the growing list includes common materials such as plastic, metal and ceramic. Because the

un-sintered powder in each layer can support solidified material in the layer above, there are no problems with unsupported portions of the object.

With these technologies, 3D printing's potential is limited only by your imagination. It's already possible to print personalised mobile phone cases, and libraries of designs let you make household objects such as cups and saucers. If you have the know-how, you can even design your own objects using 3D CAD software. You could, for example, print small plastic parts to repair damaged equipment – let's hope appliance companies are quick to get onboard and allow you to purchase 3D files for replacement parts.

Because you can print using ceramics and metals as well as plastics, your replacement parts needn't be cheap copies either.

There are limitations to what can be produced. Size is a notable restriction. Although you won't be printing a full-size Jaguar XKR any time soon, improvements are coming thick and fast: desktop printers can now produce objects as large as a loaf of bread, and 3D printing services have the means to go bigger still.

Another limitation is the ease with which you can create intricate mechanical objects, especially if they have separate moving parts. It's possible to print and manually assemble the individual parts, but it'll be some time before we're able to print a pocket watch as a single object. Then again, only a couple of years ago we were restricted to printing objects in a single colour.

3D printers

None of the best 3D printers on the market are what you might call cheap. These are used by 3D printing services, as well as the likes of Formula One teams, who are able to print car parts at the side of the track.

Chances are, you won't be able to stretch to the tens of thousands of pounds required

to buy one of these machines, so we'll instead concentrate on the 'budget' 3D printers that are increasingly becoming available. The pricing still has a long way to fall before one is found in every home, however.

Most of the following manufacturers are US-based and do not have UK offices, nor resellers. If you decide to import a 3D printer, bear in mind that you'll be liable to pay a hefty shipping charge, plus 20 percent VAT.

Formlabs' Form 1 offers a respectable resolution of 25 microns (0.025mm), but a modest print size of 125x125x165mm. Unlike most 'budget' 3D printers, which are based on the fused filament fabrication method, the Form 1 is a light polymerisation printer. Formlabs is accepting orders at the discounted price of $3,299 (about £2,000) for delivery in May. However, whether or not Formlabs succeeds in its aim to bring 3D printing to the masses will largely depend on the outcome of a patent infringement lawsuit that has been brought against the company.

Makerbot's Replicator 2 replaces the Thing-O-Matic, a DIY 3D printer that was bought in kit-form. The preassembled Replicator 2 can be yours for around £1,799. It uses fused filament technology to create 3D models, and offers a vertical resolution of 100 microns (0.1mm). The Replicator 2 has a surprisingly large build volume of 284x152x155mm. For around £2,290, the Replicator 2X has two extruders and can create slightly smaller objects that feature two different colours.

Bits from Bytes' RepRap is a home-assembled 3D printer that is significantly cheaper than its rivals. Two variants of this fused filament printer exist: Huxley is ideal for small objects; Prusa Mendel is used for larger designs. The project is open-source, meaning the assembly instructions are freely available to download.

Interestingly, the designs for many of the RepRap's parts can also be downloaded, meaning you can buy one 3D printer and then print another. How much it costs depends on whether you buy a complete kit or separately track down the individual components, but there are reports of units being built for less than £300, and in as little as 20 hours. Note that it will likely take the uninitiated considerably longer, but the ability for 3D machines to self-replicate is intriguing.

Bits from Bytes' RapMan is a kit based on the original RepRap, which contains different electronics and doesn't have to be connected to a computer. Instead, the RapMan allows models to be printed directly from a USB

memory stick. In its single-printhead form, it has a large 270x205x210mm build volume and a vertical resolution of 0.125mm. RapMan is available in various configurations costing from £954 to £1,486 – note that these prices differ from those shown on the website because we've added VAT at 20 percent.
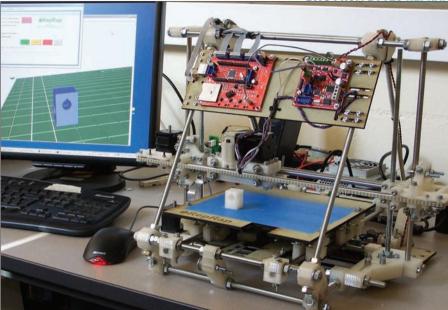
Cubify Cube For a lower-cost solution that you don't have to build yourself, you could try the Cube. Cubify's 3D printer costs $1,532 (around £965). Another fused filament printer, the Cube has a modest resolution

BITS FROM BYTES REPRAP

CUBIFY CUBE

of 0.2mm and can produce objects up to 140x140x140mm in size.

As a sign of what's to come, Cubify has produced a printer that wouldn't look out of place on the desk next to your PC. Built-in Wi-Fi means there will be no unsightly cables cluttering the desk either. The manufacturer claims the Cube is the only 3D printer certified safe for home use.

A slightly more up-market printer from Cubify is the CubeX, which has up to three printheads. This allows you to use up to three different colours. It also has a higher 0.125mm resolution, and a larger 275x275x275mm build volume. The CubeX

costs $2,662 (£1,687), $3,227 (£2,045) or $4,276 (£2,709), depending on whether you want one, two or three printheads.

Bits from Bytes' 3DTouch is yet another fused filament 3D printer from Bits from Bytes. The 3DTouch is available in various configurations, with one, two or three printheads; prices start at £2,394 for the single-printhead version.

The 3DTouch in many ways sounds very similar to the RapMan kit, but it is delivered fully assembled.

3D printing services

In the world of 3D printing, the term 'budget' is judged in relative terms – even the cheapest models have a price tag significantly higher than what most home users will be prepared to pay. The price will undoubtedly drop over the coming years, but you don't need to wait until then to take your first steps in 3D printing.

Just as photo-processing companies were able to provide a printing service before photo-quality home inkjet printers became affordable, the same is true of 3D printing.

The web is now awash with 3D printing services specifically aimed at home users. Not only is it cheaper to use such a service than to buy your own printer, the equipment they have to hand is professional-quality. In other words, it's someone else's time and effort, and the results are better.

You can expect to be offered a wider choice of print materials, and the output size will be less of a problem.

At its simplest, the process is similar to ordering photographic prints online.

You upload a file that defines the 3D object, and a check is carried out to ensure that the model is printable. You then specify the object size and options such as material and colour, hand over your payment details and wait for the object to be delivered. Typically, this takes only a few days.

Sculpteo

One of the first 3D printing companies to target consumers is France-based Sculpteo (sculpteo.com). The basic service offered is much as we describe above, although there's a bewildering array of materials to choose from, including plastics and resins in various colours. Before you place an order you're able to manipulate a virtual model of your creation, allowing you to view it from all angles and fine-tune the output size.

In addition to printing your own designs, Sculpteo also offers various semi-customised designs with which you can, for example, print geometrical shapes or your own iPhone case. Read about how we created a unique iPhone 5 case at tinyurl.com/bqq65tx.

The Sculpteo website includes a huge library of objects designed by others that you can print in the material of your choice. Included here is everything from practical items such as lampshades and tableware, through chess sets and dice, to decorative objects and jewellery.

The maximum size depends on which machine is used and your choice of material, but objects can be as large as 677x368x565mm. The price is dependent on the size, amount of material used (a hollow object will cost less than a solid one), and the material. As an example, our iPhone 5 case cost around £20.

If you would prefer to work with a company that's a little closer to home, a Google service for '3D printing service UK' will return no shortage of options.

Few can offer the same range of materials as Sculpteo, and many are primarily aimed at business users. This means the process may not be as user-friendly.

Replicator Warehouse

One UK-based company that deserves special mention is Replicator Warehouse (replicatorwarehouse.com). Its pricing is competitive, with small prints starting from £2.95, and you can choose from a couple of types of plastic and a wide range of colours, including fluorescent blue.

A key reason to choose this company, provided that you live close enough to visit London's Elephant & Castle shopping centre, is Replicator Warehouse's walk-in shop. The benefit of using a retail store in preference to a web-based service is the ability to chat face-to-face with a specialist about your requirements before placing your order. When it comes to technology for which the majority of us are newbies, this shouldn't be underestimated.

The Replicator Warehouse shop also sells parts for the RepRap printer, and offers courses on building it. In the near future it will also sell prebuilt RepRap printers.

Resources

Whether you buy a preassembled or kit-form printer, or use the services of a 3D printing company, you will first need a 3D software model. There are various ways to get hold of 3D models for all levels of expertise.

While the easiest option is to focus on those resources specifically intended for 3D printing, this isn't your only option. Just as you can find photos of pretty much anything online, the same is true for 3D models. Designed to be used by people wanting to manipulate 3D images onscreen, such libraries are also suitable for 3D printing.

Sculpteo maintains a large library of 3D models, but this is just the tip of the iceberg. Perhaps the biggest online resource is Thingiverse (thingiverse.com), which is owned by Makerbot. Described as "a place for you to share your digital designs with the world", the Thingiverse is also a place for the world to share its digital designs with you.

According to Makerbot, the Thingiverse holds 3D designs for 36,000 'things', and its catalogue is rapidly growing. To help you find your way around this huge collection of 3D models, objects are grouped into nine categories: Art; Fashion; Gadgets; Hobby; Household; Learning; Models; Tools; and Toys & Games.

An alternative that requires minimal work, yet allows you to create something of your own, is to use the online utilities provided by some 3D printing services. Sculpteo is well ahead of the game in providing utilities for printing customised iPhone cases, geometrical models, 3D text and much more.

Similarly, Makerbot's Thingiverse Customizer lets you customise 3D designs in your browser. As an example suggested by Makerbot, you can take a snowflake from Thingiverse, open it in the MakerBot Customizer, determine how many points and stars it has, then print that custom, one-of-a-kind item.

If you want to create something from scratch, you'll need a 3D CAD package. This isn't for the faint-hearted, but persevere and there's every chance you'll succeed in making your own 3D models that you can view and manipulate onscreen, and ultimately turn into real-world object.

One option here is to try your hand at SketchUp (sketchup.com), a free CAD program for beginners. Read our introduction at tinyurl.com/cjLsn7p to get up to speed.

An alternative, if you want to print a real-world object, you can take lots of photographs of it from different angles, then use software that automatically stitches together the shots to create a 3D image. We offer step-by-step instructions on how to do this at tinyurl.com/bmguvru.

One thing to be aware of in choosing or creating your own 3D models is file formats. Just as there are several file formats for photographs, of which Jpeg is the most common, 3D models are available in several formats. Choose a format that is compatible with your printer or printing service.

If you find something that you like, but it's saved in the wrong format, you'll probably be able to convert it using the free MeshLab utility (see meshlab.sourceforge.net). This software can import and export files in most 3D formats.

It's worth bearing in mind that although even the cheapest 3D printers are suitable for producing decorative items and curiosities of various types, you might be disappointed if you need something with structural strength.
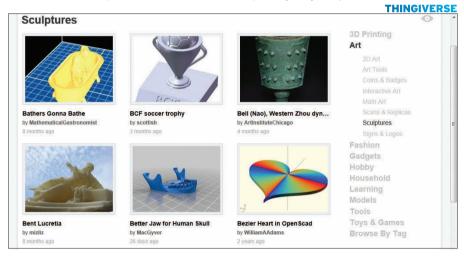
3D printers have been used to create durable objects for use in engineering projects, but this can't be guaranteed for selective laser sintering printers working with plastics.

This was recently demonstrated by The Verge, which tried to print custom cases for the Lumia 820 using Nokia's 3D designs. The cases were printed by two 3D printing services, which both expressed their doubts over printing a design intended for conventional plastic manufacturing techniques such as injection moulding. In particular, they were worried parts of the case were not thick enough for selective laser sintering. This view was confirmed as weak spots failed when attempting to remove either case from the phone.

of stronger parts. These could be used, for example, to repair a car or bicycle.

Perhaps one of the most innovative possibilities is printable electronics. Scientists at Warwick University have already printed a game controller.

A major limitation of budget 3D printers is that they can print only small items. Printing services tend to have larger, more capable machines. The size of the output doesn't have to be limited by the size of the printer, though, and scientists have developed 3D printers that can move around like industrial robots, creating objects larger than the printers themselves. Aircraft manufacturer EADS is developing a method of printing wings for jet airliners, while Dutch

THINGIVERSE

The future

With 3D printing in its infancy, we can expect to see many developments in the near future. Although some of the larger consumer-oriented 3D printing services claim they can print your object in a huge number of different materials, in reality most of these are simply various types and colours of plastic. But a much broader range of materials is under development, which we can expect will soon be available to us all.

If little plastic ornaments don't really hit the spot, you'll soon be able to print in classier materials such as pewter, glass, wood (actually a plastic wood mixture that looks like real wood), fabrics and even precious metals. Printing in chocolate is a reality, too, so expect to see more customised confectionary on shop shelves.

On a more serious note, we're also going to see the greater availability of steel and tungsten alloys that will enable the printing

architect Janjaap Ruijssenaars of Universe Architecture has recently revealed plans for an entire house, built as a never-ending Möbius Strip that will be created in concrete using a huge 3D printer.

According to experts, a potentially groundbreaking development could be every bit as revolutionary as the invention of the internet. Earlier this year, the growth in internet downloads caused HMV to enter receivership. If the ability to download digital files rather than purchase physical CDs from a high-street store can have such a profound effect on the music industry, just imagine the impact of being able to download anything you want and printing it out at home.

It will sound ridiculous now, but imagine that Apple has just launched the iPhone 17. Rather than queuing outside an electronics store to be the first to own this 9G handset with holographic display and 1,024-core processor, you simply download it from Apple's site and print it out at home. Now that's what we call convenience. ⊠

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PC ADVISOR AWARDS 2013

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PC ADVISOR AWARDS NOMINEES

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The votes are still coming in and the arguments raging, but the nominees for the *PC Advisor* Awards have been decided for another year. As with last year's awards, there are nearly two-dozen prizes. Many of our award categories have been wrangled over by our team of reviewers and writers, while the rest will be decided by *PC Advisor* readers before the winners are announced in early 2013.

The purpose of the *PC Advisor* Awards is to showcase excellence across the diaspora of products and services we cover online, in our apps, and right here in the *PC Advisor* print and digital magazines. Nominees and winners have been chosen from a year's worth of reviews, so each represents the best of the best in its particular category.

For the hardware awards, we've split up the categories along similar lines to the Top 5 charts we update every month, while we've divided the software section by program type.

In each case, products in contention had to have been reviewed by *PC Advisor* editors during 2012. Those reviews could have been online or in print – or, most often, both.

In addition, there are five *PC Advisor* Reader Awards. We will be running an online survey, inviting UK consumers to have their say on the best laptop and desktop PC brands, the best online retailers, and the gadget of the year. From the votes we receive we'll be able to deduce valuable feedback about the brands you favour and how well they live up to expectations. So don't forget to have your say! Head to pcadvisor.co.uk/awards.

HARDWARE AWARDS

PC ADVISOR AWARDS 2013 WINNER

Best Windows Desktop PC Brand
- Chillblast
- CyberPower
- Lenovo
- PC Specialist
- QuietPC

Best Budget Laptop
- Acer Aspire V3-571
- Asus K55VD
- Dell Inspiron 15R 5520
- HP Envy Ultrabook 6-1010ea
- Lenovo IdeaPad U410

Best Windows Laptop
- Alienware M14x
- Lenovo IdeaPad Z580
- Samsung 900X4C
- Samsung Series 7 Chronos
- Toshiba Satellite Z930 Ultrabook

Best 7in Tablet
- Apple iPad mini
- Google Nexus 7
- Amazon Kindle Fire HD
- Barnes & Noble Nook HD
- BlackBerry PlayBook 2.0

Best 10in Tablet
- Apple iPad with Retina Display
- Google Nexus 10
- Samsung Galaxy Note 10.1
- Toshiba AT300
- Asus Transformer Pad Infinity TF700

Best Smartphone
- Apple iPhone 5
- Google Nexus 4
- HTC One S
- Motorola Razr i
- Samsung Galaxy S III

Best Monitor
- AOC i2352Vh
- BenQ G2750HM
- Dell S2440L
- ViewSonic VX2336s-LED
- Philips Brilliance 241P4QPYES

Best Printer
- Canon Pixma MX895
- Epson Stylus Photo PX730WD
- HP Photosmart 7520 e-All-in-One
- Lomond EvoJet 2 Office
- Pantum P2050

Best Wireless Networking Product
- Apple AirPort Express
- D-Link DIR-857
- DrayTek Vigor 2850Vn
- TP-Link TL-MR3020
- Netgear WN3000RP

Best Network Storage Device
- Netgear NAS Duo V2
- Qnap TS-659 Pro II
- Synology DS-412+
- WD My Book Live Duo
- Zyxel NSA325

Best Storage Device
- Corsair Performance Pro 256GB
- G-Technology G-Raid with Thunderbolt
- Hitachi Deskstar 5K4000 4TB
- Samsung 830 Series 256GB
- WD Red 3TB

Best Portable Storage Device
- Buffalo MiniStation Extreme 1TB
- Elgato Thunderbolt SSD
- Freecom Mobile Drive Sq 500GB
- iStorage diskAshur 500GB
- WD My Passport Edge for Mac 500GB

Best Graphics Card
- Asus GTX 660 Ti
- MSI GeForce GTX 670
- Sapphire HD 7770 OC
- XFX 7970 3GB GDDR5
- Zotac GeForce GTX 680

Best Camera
- Canon EOS 650D
- Nikon D800
- Panasonic Lumix DMC-TZ30
- Samsung NX20
- Sony NEX-C5R

Best Audio Product
- Apple GarageBand for iOS
- Bitcount ClearTune
- Cambridge Audio Sonata NP30
- Chord Electronics Index
- Ferguson Hill FH009

Best Digital Home Device
- Belkin @TV Plus
- BT YouView Humax DTR-T1000
- EnergyEgg Solo
- HD Anywhere Multiroom+
- Sony BDP-S790

Best TV
- Panasonic Viera TX-L47WT50
- Philips 46PFL7007
- Samsung UE46ES6800
- Sony Bravia KDL-46HX853
- Toshiba 46TL963

SOFTWARE AWARDS

PC ADVISOR AWARDS 2013 WINNER

Best Security Software
- Bitdefender Internet Security
- G Data InternetSecurity
- Kaspersky Internet Security
- Norton Internet Security
- Trend Micro Titanium Internet Security

Best Photo/Video Software
- Adobe Photoshop CS6

- Adobe Premiere Elements 11
- CyberLink PhotoDirector Ultra 4
- InPaint
- Magix Movie Edit Pro 2013

Best Game
- Far Cry 3
- Guild Wars 2
- Mass Effect 3: Extended Cut

- Torchlight II
- World of Tanks

Best Mobile Game
- Bad Piggies
- Draw Something
- Football Manager Handheld 2012
- New Star Soccer
- Walking Dead for iOS

BUSINESS AWARDS

PC ADVISOR AWARDS 2013 WINNER

Best Business Laptop
- Acer TravelMate P6
- Dell Latitude E6420 ATG
- HP ProBook 4530S
- Lenovo ThinkPad X121E 3045
- Toshiba Portégé Z930-108

Best Business Printer
- Dell C3765dnf
- Epson WorkForce Pro WP-4595 DNF
- HP LaserJet Pro 400 M401dw
- Kyocera Ecosys FS-4300DN
- Samsung ML-2955DW

Best Business Software
- Acronis True Image Home 2013
- Crunch
- Dragon NaturallySpeaking 12 Premium
- Nuance PDF Converter Professional 8
- Paragon Drive Copy 12 Professional
- Xero

READER AWARDS

PC ADVISOR AWARDS 2013 WINNER

- Best Specialist Online IT Retailer

- Best Laptop Brand
- Best Desktop PC Brand

- Best Online Retailer

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Expert advice
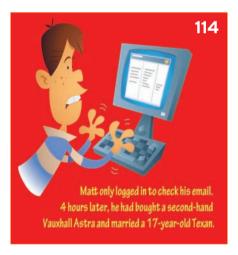
You may think your computer is safe from malware, but no security suite can guarantee to keep all nasties at bay. And system files can be corrupted by unexpected power cuts, too. Whatever the cause of your PC's misbehaviour, a recovery disc may be able to help. In *Troubleshooter* (page 100) we show you how to create a bootable CD or USB drive that can get your PC started, scan the hard drive for problems, and get Windows running again.

With 72 hours of video uploaded to YouTube every single minute, and the demand for an active internet connection to enjoy even a second of it, you can never hope to watch it all. Follow our guide to downloading YouTube videos to an Android or iOS device, though, and you'll at least be able to watch your favourites offline. See page 111.

Finding, buying and sending greeting cards can be a chore, but online services such as Moonpig (page 114) promise to do all the hard work. You can create personalised cards that exactly match your needs, then have them sent directly to the recipient in plenty of time.

No longer happy to trundle along in Facebook's shadow, Myspace has relaunched as a music-streaming service with an eye on Spotify. Explore the new Myspace on page 116.

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Matt only logged in to check his email. 4 hours later, he had bought a second-hand Vauxhall Astra and married a 17-year-old Texan.

116

QUICK TIP: SHUT DOWN WINDOWS 8 WITH THE POWER BUTTON

Microsoft has buried the option to shut down Windows 8 in the Charms bar. You can make your life easier by adding a Shut down shortcut to the Start screen, or configure Windows so that pressing the PC's power button shuts down the computer.

Start typing 'control panel' with the Start screen in view, then select that option from the search results.

Type 'power' into the Control Panel's search box. Under Power Options, click 'Change what the power buttons do'.

By default, 'When I press the power button:' is set to Sleep. Change this to Shut Down. If you have a laptop, you can choose separate behaviour depending on whether it's running on battery power or connected to the mains.

Rather than using your mouse to shut down the PC, quickly pressing the power button will achieve the same thing. ⊠

Repair Windows with a recovery disc

If your PC is infected with malware or won't boot, **Roland Waddilove** shows how a rescue disc can help

T hanks to widespread viruses, Trojans, spyware and other types of malware, security software is essential for any Windows PC that is connected to a network or the internet. We reviewed the 2013 security suites in our previous issue (see tinyurl.com/bdz3ffs). But remember that no security software offers a cast-iron guarantee: there remains a small risk that your computer could become infected.

Malware can cause a variety of problems, sometimes even preventing Windows from booting. This behaviour makes it more difficult to remove the infection – partly because when malware is running in memory it can foil any attempt to remove it by restoring deleted files and settings.

There are other reasons your PC could refuse to start up, too, from the installation of new hardware or software to which it's taken a dislike, to corrupted system files.

One possible solution, provided that the problem is software-based, is a rescue CD. This is a special disc from which your computer can boot, meaning it doesn't rely on your Windows installation. Because the rescue CD has its own operating system, which is usually based on Linux, the malware will not be running, making it much easier to clean a stubborn infection.

What rescue discs do

Rescue CDs are most often used to clean malware infections when antivirus software has been unsuccessful. However, some offer extra functionality, and you may also find a file manager and a file-recovery utility. Using these tools you can access the contents of the hard drive without starting Windows, then transfer documents, music, videos and photos to a safe place. You may even be able to recover lost and deleted files, too.

What rescue discs don't do

There are certain faults that rescue CDs cannot fix. They will not repair damaged Windows files that prevent a PC from booting. However, some contain a browser with which you can download the missing or damaged files from the web. If you suspect system files may be corrupt, the best solution is to boot from your Windows disc and choose the Repair option when prompted. If you don't have such a disc, see tinyurl.com/93L72bs for more information on creating one.

When to use a rescue disc

A rescue disc should be used when you have tried and failed using the usual clean-up tools such as antivirus and antispyware software, or you can't boot the PC. Malware can embed itself deep within Windows and disable security software. It can change file associations, which prevents you from running clean-up tools, and block websites that provide software for removing malware infections. Booting from a rescue CD gets around all these problems because it doesn't require Windows to be running.
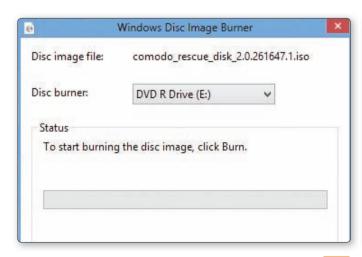
How to make a rescue disc

Don't wait until your computer has a problem: burn a rescue disc today. The software is usually provided as an .iso file, which you must burn to disc. In Windows 7 or 8, right-clicking an .iso file displays a menu with an option to burn it to disc. Insert a CD-R, cancel Autorun, right-click the file and choose Burn.

Computers running Windows XP or Vista may need to use a utility such as CDBurnerXP (free from cdburnerxp.se) to complete this task.

Alternatively, some rescue systems can be written to a USB flash drive, which then becomes a bootable device. This is particularly useful for netbooks and ultraportable laptops that don't have an optical drive.

To boot from your rescue CD you may need to alter the boot order in the Bios. PCs are often set by default to boot from disc, turning to the hard disk second. But rarely will they by default boot from a USB drive.

Download the Comodo Rescue Disk .iso file, then right-click it and select 'Burn disc image' **1**

Click Tools, 'Check for updates' to download the latest virus definitions **2**

Tech
Help

If your PC ignores your rescue disc or USB device, reboot and press F1, F2, F12, Del or whichever key launches the Bios setup utility. Look for the boot device or boot order in the settings and select the CD/DVD-ROM drive (or USB device) first and the hard drive second.

Rescue CDs download the latest virus definitions and updates, so an active internet connection is required. Not all PCs and laptops will allow you to use a Wi-Fi connection for this. If in doubt, use an ethernet cable to connect the PC's network socket to your router, even if it means temporarily moving the machine.

Comodo Rescue Disk

Comodo's Rescue Disk (tinyurl.com/bj6t49d) is a 50MB download that boots your PC into a version of Linux. Comodo Cleaning Essentials automatically starts and, if an internet connection is available, it updates the virus definitions. If Wi-Fi doesn't work, download to a second PC the definitions database (tinyurl.com/7o9sgcc), then copy it to a USB flash drive.

Loading this database won't be obvious to non-Linux users. Go to Tools, 'Import Signature Database', then head to Computer/mnt to see the drives attached to the PC. Having updated the definitions you can begin a Smart-, Full- or Custom- scan.

PCMan File Manager enables you to access the PC's hard disk to be accessed, letting you then copy files to another drive. There is also a web browser, which is useful for looking up information on the internet.

AVG Rescue CD

AVG's free antivirus software is very popular, and its Rescue CD (tinyurl.com/b945un9) uses the same scanning engine. It's an 85MB download that reveals a text-based menu that must be navigated using the cursor, Tab and Enter keys. Program updates can be loaded from a USB drive (grab them from tinyurl.com/28xmms2), or will be automatically downloaded if an internet connection is available.

AVG helpfully lists the disks attached to the PC, making your files easy to find. There's a useful option to create a bootable USB flash drive, too.

The Scan menu option scans the computer and repairs faults and malware infections. The Utilities menu has a file manager for exploring the hard disk, a Registry editor for fixing Registry entries, Fix MBR for repairing a drive's boot sector when Windows won't start, and PhotoRec and TestDisk for recovering lost and deleted files. There's even a copy of TrueCrypt, which enables you to mount drives encrypted with the popular TrueCrypt utility.

Kaspersky Rescue Disk 10

Kaspersky has built a comprehensive Linux-based rescue system that it calls Rescue Disk 10 (support.kaspersky.com/4162). This 263MB download doesn't do anything in addition to the other programs here, but it's very easy to use and has a Windows-like interface. You get the equivalent of a taskbar, which shows running applications, and a start button that pops up a menu. Multiple windows can be opened on the desktop. You will immediately feel at home.

Kaspersky's product contains the Rescue Disk software itself, a Registry editor, a web browser and a file manager. A few customisation options can be accessed through the gear icon in the top right corner. For example, you can choose what to scan and how deeply to scan.

Alternative software

• F-Secure Rescue CD
  (tinyurl.com/98evvvt)

• Bitdefender Rescue CD
  (tinyurl.com/9c7hjtk)

• Trend Micro Rescue Disk
  (tinyurl.com/crmfasL)

• Avira Antivir Rescue CD
  (tinyurl.com/89v9npy)

Click Options and you can select from a variety of scanning options **3**

Choose the type of scan you want to run and click it to begin the PC clean-up task **4**

PAUL
MONCKTON

YOUR QUESTIONS ANSWERED

Expert computing advice

We tackle readers' hardware and software conundrums

LONG FILENAMES
IN THE CLOUD

LONG FILENAMES IN THE CLOUD

Q I came across your guide to cloud storage (tinyurl.com/a9wwndk) because I need to back up and share large quantities of files for project work. I have used various backup programs and storage facilities in the past, but none has been able to back up documents with long filenames. Often there has been no indication that such files have not been backed up either. Can you point me in the direction of a service that supports long filenames?

Long filenames aren't a problem for cloud storage services such as Dropbox. You're more likely to be running into the maximum pathname length. A pathname consists of the filename, plus all its containing folder names, right up to the initial drive letter.

To avoid problems in Windows, the pathname shouldn't exceed 260 characters.

One way around this could be to compress into a single ZIP or RAR file any large folder structures before you back them up to the web.

Alternatively, consider shortening some of the folder names if possible.

DO I NEED A ROUTER UPGRADE?

Q My Sky broadband connection can at times be rather slow, particularly when more than one person is using it. I think I may need to replace my eight-year-old router to speed up things. Is it true that I must buy a new router directly from Sky for it to be compatible with the company's broadband network?

It's often the case that very old routers are not compatible with the latest high-speed broadband services. This means users with older equipment may be unable to take advantage of any speed upgrades that are automatically rolled out by ISPs.

Without knowing the specifics of your broadband package and the model of your router, it's not possible to determine whether this is what's happening. However, it would be worth contacting Sky with this information and asking for its advice. In some cases the ISP will offer a router upgrade free or at reduced cost.

Although many ISPs allow the use of third-party routers and modems – often with the caveat that no technical support will be provided – Sky Broadband does not. It's sometimes possible to get around this restriction, but it's not recommended unless you know what you're doing and are prepared to deal with the consequences of violating Sky's terms and conditions.

COLOURS DON'T MATCH
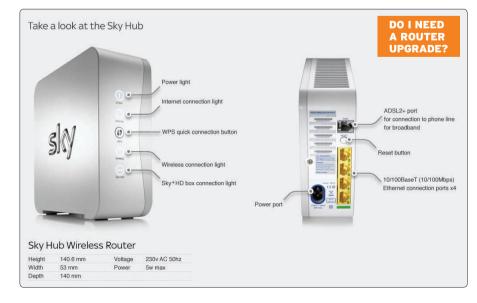
Q I'm using Adobe Photoshop CS4 on my Windows XP PC with an LG monitor. When I print photos on my Canon Pixma MP5350, the colour is very different to that shown onscreen. It's very frustrating to spend hours

tweaking a photo and then not getting the results for which I had hoped. How can I tweak my monitor and printer so they are both reading from the same page, so to speak?

This is a very common problem that can be mitigated by employing some level of colour management. Colour management is a complex topic, and it can be time-consuming and expensive to achieve professional-level results. Nevertheless, it is possible for home users such as yourself to improve on a completely unmanaged colour setup.

The first step is to ensure your monitor, printer, Photoshop and Windows all adhere to the same colour profile, such as sRGB. This is a lowest-common-denominator approach, which probably won't make the most of your printer's capabilities, but it will ensure that all devices are working in the same colour format and minimise unexpected variations.

If you wish to accurately calibrate your system, you can purchase a tool such as the

DO I NEED
A ROUTER
UPGRADE?

Tech Help

COLOURS DON'T MATCH

Datacolor Spyder 4. It measures your screen colours and creates a colour profile to match. A similar device is available to calibrate printers; using the two together you should be able to achieve accurate colour reproduction.

You don't say how old your monitor is, but all flat-panels will degrade with age. LCD displays generally become dimmer and colours get increasingly yellow, for example. If your display is very old, you will either need to calibrate it using a hardware calibrator or, preferably, buy a new screen.

Even if you calibrate an old monitor to improve its accuracy, there will be many colours that no amount of tweaking will enable it to display. The further the monitor has shifted from its original colour setup, the worse this problem will become; any built-in colour settings, such as sRGB, will no longer be accurate.

It's important to bear in mind that monitors and printers aren't capable of displaying the exact same colour range. When creating a print from a photograph you should look to achieve the best

translation from onscreen image to print. Ultimately, some further tweaking may be required to get the most pleasing prints.

DOWNGRADE TO WINDOWS 7

Q I have bought a Dell Inspiron 14z Ultrabook. Its specification lists an Intel Core i5 processor, a 500GB hard drive, an SSD and Windows 8. I'd prefer it to run Windows 7. I have tried using a shell to emulate the older OS, but it feels unwieldy. How difficult would it be to install Windows 7 on the SSD so I can continue to enjoy the fast boot times? I have not installed any software that would require backing up. I also need to know whether an OS downgrade would invalidate my warranty, and where I can buy a genuine copy of Windows 7.

Downgrading your operating system should not invalidate your hardware warranty. You can run any operating system you wish.

Whether or not you can easily downgrade to Windows 7, though, will depend on whether your Windows 8 PC was purchased with downgrade rights. With downgrade rights, you can install a previous version of Windows without needing to purchase an additional key for the software. Windows 8 Pro often provides downgrade rights to Windows 7 Professional, for example.

SEARCH THE WINDOWS STORE FOR A SPECIFIC APP

We're often asked how to search the Windows Store for specific apps or keywords. The virtual shop front offers plenty of categories for browsing, but no clues on how to find a specific app. Thankfully, there is a search facility – and a number of ways in which you can access it.

From within the Store start typing to bring up the Search bar. Alternatively, swipe in from the right or place the cursor in the top-right corner to bring up the Charms bar, then select Search. The Store is by default selected as your search location.

You don't need to be viewing the Windows Store to search for a particular app either. From any app you can bring up the Charms bar, enter into the Search box a keyword, then select the Store as the search location.

A quicker way to achieve the same thing is to press Windows key, Q to bring up the Search box. Entering your search term will

bring up a few search results and a recommended result. Clicking on the Store icon below returns the full set of search results.

You can filter these results using the drop-down menus provided, sorting by category, price or relevance.

Be aware that even though you'll be using an SSD, Windows 7 won't boot up as fast as Windows 8. Also watch out for any possible incompatibilities: some of the most recent laptops sold running Windows 8 will not have been tested with Windows 7. There is no guarantee that Windows 7 drivers will have been made available either.

STAY AWAKE SCREEN

Q I have a Samsung Galaxy S III that I keep plugged in and on charge next to my laptop. How can I stop the screen from automatically turning off when the phone is on charge, but then resume normal timeout behaviour when unplugged?

The Galaxy S III has an option for this, but it's not located where you might expect to find it in the Display settings. Instead, you must go to Settings, Developer Options and tick the box next to Stay Awake.

This option won't be available on all Android smartphones, and some operators may even remove it from the Galaxy S III. If this is the case with your handset, look for a Car Mode option. Alternatively, you can try downloading the AnyScreenTimeout app from Google Play, which allows you to set any screen-timeout value from 0 secs to 99 mins 55 secs or never.

STORAGE SPACE MODES

Q I've recently upgraded to Windows 8 and I want to make use of some old hard drives by creating a Storage Space. I'm confused about which mode I should use. Alternatively, should I forget about Storage Spaces and use the Intel Raid on my motherboard?

Setting up Storage Spaces can be a good way to combine multiple disks so they appear as a single logical drive. It can also give you some mirroring and parity options to protect yourself from drive failure. Storage Spaces are relatively easy to set up in Windows 8, and you can add to or replace the drives in your setup later on.

Storage Spaces do have disadvantages, however. Firstly, you'll need to be running Windows 8 to access the drive. If you ever run another OS, such as Windows 7 or

DOWNGRADE TO WINDOWS 7

Linux, your data will be inaccessible. The feature can also cause problems during troubleshooting if your system becomes unable to boot and you need to access the data on the Storage Space.

You may be tempted to use the parity mode option within Storage Spaces to maximise capacity while retaining the ability to survive disk failure. However, this results in a large and very noticeable decrease in performance, especially when writing files. This may not matter too much if you're

STAY AWAKE SCREEN

using the Storage Space to hold media files (it will be fast enough for playback), but if you ever need to copy large volumes of data you should prepare for a long wait.

The mirroring modes can also protect your data should one of the disks fail, and offer faster performance, but they provide less usable disk space.

The Intel Raid on your motherboard doesn't require the same level of support from the OS because it uses the board's firmware to create the disk array. However, it doesn't offer the same options as Storage Spaces, and is instead based on traditional Raid setups. You can't add drives to expand the size of your array while it is in use either.

Another possible problem could arise should you need to move your Windows installation to a new motherboard, since it will need to support the same Raid options. So, should your motherboard fail, you stand to lose data if you can't move over your disks to the new system.

In general, for home users who want to protect their data personal backup is a better option than a redundant disk setup that won't protect you from accidentally deleting or overwriting files. In any case, it's important to back up data in a format that remains accessible if your PC fails.

USB POWER CUT

Q I am trying to transfer photos and files from my PC to a USB flash drive before I get rid of the computer. However, when I plug in the USB flash drive the computer switches off. Do you have any idea what's going on?

This sounds like a hardware problem. When connectors in a USB port accidentally touch and short out, it can turn off your PC's power supply. The problem could be caused by the USB connector on your PC or by the connector on your USB flash drive.

If you have another USB port on your PC, try using it to see whether the same problem occurs. Also try the flash drive on your new PC to check it is working correctly.

If your PC has no other USB ports, you could buy a plug-in USB card. However, since you'll be disposing of the PC it's not really worth spending money on fixing it.

A worthwhile alternative may be to remove the hard drive from the old PC and buy a USB caddy or drive enclosure so you can connect it to your new PC and copy over the files from there. You can then keep the drive as a backup device.

You may find it useful to organise all the files you want to copy into an easily accessible folder – perhaps called something like 'C:\MY OLD FILES' – before you remove the drive from your old PC.

DYNAMIC DISK PROBLEM

Q I have an HP Pavilion laptop that's fitted with 4GB of RAM and a 500GB hard drive. I've recently bought a Windows 8 installation DVD with the intention of dual-booting the new OS with the copy of Windows 7 preinstalled on the laptop.

After shrinking by 100GB the Windows 7 partition to create a new partition, the installer presented me with two options: install to the already used partition or make a clean install on the newly created partition. I tried the latter and received the response: 'Windows cannot be installed to this hard disk space. The partition contains one or more dynamic volumes that are not supported for installation'.

The sticking point seems to be the dynamic disk. What may be needed is a means to convert the 'dynamic' to plain or basic. How can I do this?

USB POWER CUT

TECH JARGON BUSTER

GOOGLE NOW: A feature introduced in the Jelly Bean release of Google's Android operating system. Google Now is designed to offer up pertinent information without you actively searching for it. It can make use of many personalised information vectors, such as location and distance to frequently visited locations, web searches and the contents of your Gmail inbox. Information is presented as a series of 'cards', which appear when required. For example, a list of bus times might appear when you are standing next to a bus stop.

GOOGLE NOW

TIZEN: An open-source Linux-based OS designed to run on devices such as phones, tablets and in-car infotainment systems. The board of Tizen Association includes industry heavyweights such as Intel, NEC and Samsung, and has support from multiple operators.
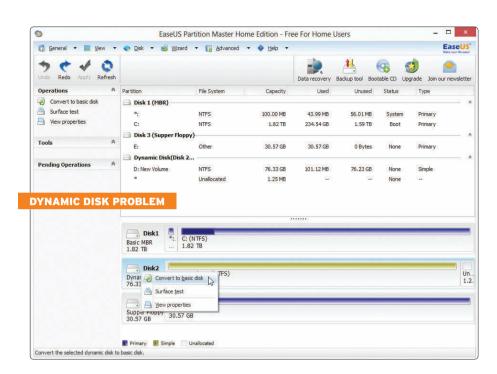
HYPERTHREADING: A feature of some Intel CPUs that allows the chip to make more efficient use of its underlying internal architecture by presenting more processor cores to the OS than physically exist. The processor can allocate multiple processing threads to a single core, which will efficiently manage its resources by using execution units that would otherwise have remained idle.

KEY ROLLOVER: Although most often used one key at a time, keyboards are multitouch devices that can also interpret key combinations such as Ctrl, Alt, Del.

Gaming keyboards often offer multikey rollover, which allows many simultaneous key presses to be registered during frantic gameplay.

ROOTING: The process of gaining full administrative access to the core functions of a device that are usually locked away from the user. With iOS devices this is known as jailbreaking. Although rooting will usually invalidate your warranty, you may find the ability to run unauthorised apps and tweak the processor speed to boost performance or increase battery life a worthy trade. For more on jailbreaking an iOS device see tinyurl.com/bcr67fd; for rooting an Android device see tinyurl.com/ardhhcr.

MIRACAST: A standard for wirelessly transmitting real-time images, audio and video between devices. These are most often phones, tablets TVs and projector.

DYNAMIC DISK PROBLEM

It's certainly true that Windows 7 can't boot from a dynamic disk that contains more than one volume. It's not clear why you have a dynamic disk configured, but it is possible to convert it to a basic disk so that you may proceed with the installation.

The most straightforward method is to back up all your data, reformat the drive as a basic disk, then restore you programs and data. You can perform the formatting and partitioning operations using the built-in Windows Disk Management Tool. This may sound rather long-winded, but you should back up your data before performing any sort of low-level disk operations in any case.

An alternative would be to use a free disk-management utility such as the free version of Partition Wizard 4.2 or EaseUS Partition Master. Both these tools can convert a dynamic disk to a basic disk, while leaving the data in place.

Again, it is a very good idea to back up your data before undertaking any of these procedures. ⊠

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.

SEARCH THE *PC ADVISOR* FREE ONLINE HELPROOM

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.

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PC ADVISOR

Create a professional newsletter in Word

Using nothing more than Microsoft Word, Mike Bedford explains how to put together a professional-looking newsletter for mailing out to your readers

The days of typewritten newsletters being reproduced using a photocopier or wax stencils are thankfully behind us but, in many ways, some modern newsletters look equally amateurish.

Most people would argue that the content is more important than the design, but you'll need to create something people want to pick up and read in order to get that content in front of them.

Word processors, graphics packages and high-quality printers can help amateur publishers to compete with the professionals, but they will need to learn certain skills to make the most of the technology. Our aim within this workshop is to provide you with those skills.

It's important that you differentiate your newsletter's design from the thousands of others that pop into people's email inboxes, so we'll teach you the basic principles and leave the creative decisions for you to address.

That said, it's always a good idea to have a look at other newsletter designs and take inspiration from elements that you think work particularly well.

You don't need an expensive desktop publisher to get started creating your newsletter. Decent results can be achieved using the word processor that is most likely already installed on your PC. Here, we'll show you how to design a newsletter using only Microsoft Word.

Rarely is a newsletter entirely textual, of course, and you may also require a basic photo editor to manipulate images. Our generic instructions can be applied to whatever package you favour.
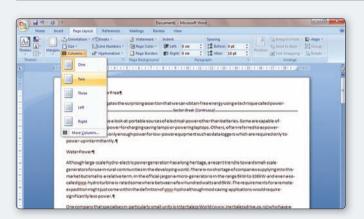
Having produced your newsletter in Word, what you do with it is up to you. It takes just seconds to convert that document to PDF for sending to club members or a printing service via email, or you could print (and then photocopy) the document for posting.

MAKE A NEWSLETTER IN WORD
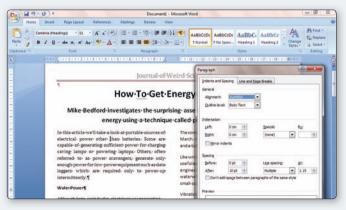
START Open Word and create a new document. Specify the page size (A4 or A5) using the Size button, and define the margins with the Margins button on the Page Layout ribbon. The margins should be wide enough to suit the printer you'll be using.
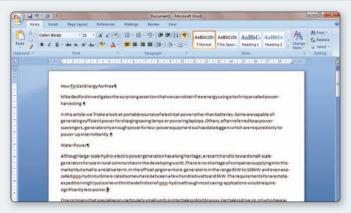
4 Without moving the cursor, click the Columns button on the Page Layout ribbon and specify the number of columns. We recommend using two or three, but if the paper on which you'll be printing the newsletter is wide enough you could use more.

7 Also experiment with various formatting options, such as line spacing, indents and justification, until you achieve a style you like. These options are accessible from the Paragraph icon on the Home ribbon.

Tech Help
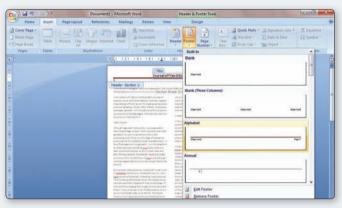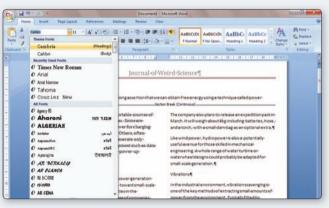
2 For now we'll create a single article. Start by typing in or importing the text. This will start with the title, perhaps followed by a standfirst (a subtitle that contains the author's name), and then the body text. Don't bother with any formatting just yet.
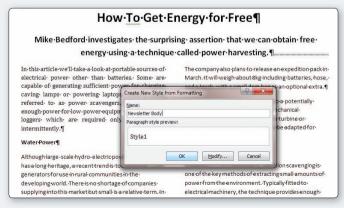
3 We'll use multiple columns for most of the article, but the title and standfirst should run the full width of the page. Place the cursor at the start of the body text, then select Continuous from the Breaks menu on the Page Layout ribbon.
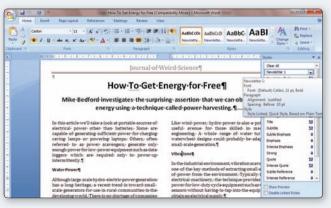
5 Headers and footers contain information that appears on every page, such as page numbers. Choose a header style from the Header menu on the Insert ribbon, then fill in the blank fields. Do the same for the footer, then double-click to return to the document.
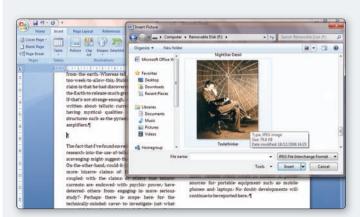
6 Now it's time to choose your fonts, but don't go overboard. Just two fonts (one for the headings, and another for everything else) can look classy, but anything more can look tacky. Experiment with various fonts and sizes on the Home ribbon.
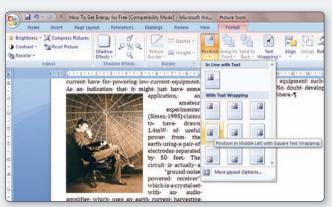
8 Rather than manually applying fonts and formatting, define styles for the title, standfirst, headings and body. Right-click a formatted paragraph, select Styles, then choose 'Save Selection as a New Quick Style' and enter a name for the style.
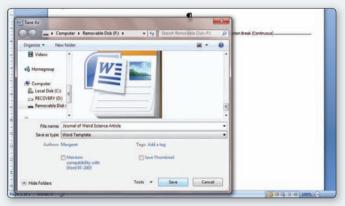
9 You can now apply styles to your document. If you defined a style called 'Newsletter 1' to the top-level headings, click on any paragraph that should appear as a heading and select 'Newsletter 1' from the Styles menu on the Home ribbon.

10 You can insert pictures using the Picture icon on the Insert ribbon. First, though, open the image in your photo editor and ensure it's no more than 400dpi at the size it will appear in print. This will ensure your newsletter's file size remains manageable.
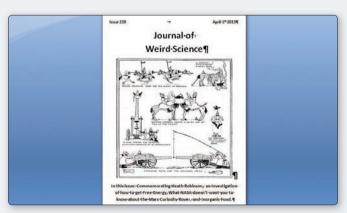
11 To make a picture span several columns, select the image and choose one of the 'With Text Wrapping' options from the Position menu on the Formatting ribbon. Resize and drag the image where you want it, but avoid doing so disproportionately.
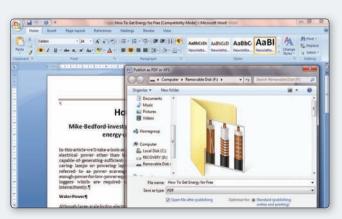
12 Once you've completed and saved the article, create a template for the next instalment. Delete all the text, save for the section break, then open the Office menu and select Save As, Word Template. Give your template a suitable name and click Save.

13 To later create a new article, open the Office menu and choose New, 'New from Existing', then select your template and click Create New. A document that contains all your predefined styles will appear.

14 The front cover and first page or two (the table of contents, for example) may use a different format to the following articles. Using the techniques we've already discussed, create and save template styles for these pages.

15 If you're using a commercial printer you'll probably need to supply your newsletter as a PDF. From the Save As menu choose 'PDF or XPS'. Ensure that 'Standard (publishing online and printing)' is selected next to Optimised for and click Publish. ☒

Download YouTube video for offline viewing

Tech Help

The web is full of videos for you to enjoy, but you don't always have an active internet connection on your smartphone or tablet. Marie Brewis and Jim Martin explain how to download videos from YouTube for offline viewing

Before we get into how to go about downloading your favourite YouTube videos for offline viewing on an Android or iOS device, let's tackle that thorny issue of whether such activity is legal.

Rather than charging you for the content you enjoy, Google offers YouTube as a free service and recoups its investment via advertising spend. Simply put, it provides free content for you to enjoy, and you return the favour in the form of a website 'hit'. The more visitors it records, the more it can charge advertisers.

Download a video to watch it offline and, although Google recorded a hit the first time you came to the video, you'll remove any money-making potential it has for your subsequent viewings.

Naturally, then, Google doesn't want you to side-step its advertising by downloading content. Neither do the creators of videos – including PCA – who also make money from the adverts.

But taking steps to avoid streaming-quality issues and overstepping your data-download limit are surely common sense, and avoiding advertising isn't illegal. After all, in-browser ad blockers are legal – if unfair to the publisher when accessing free, ad-supported media – and no-one will pull you in front of a judge for leaving the room to make a cup of tea during a TV ad break.

Consider the fact that lots of people who create YouTube videos rely on the money they make from adverts displayed on their clips. And downloading video from YouTube breaches Google's terms of service, too.

In short, these permit the viewing of YouTube video through Google's own website and apps only. Unsurprisingly, the downloader apps we discuss here are not found in Google's own

Play app store, and you must look elsewhere on the web to download them. While Apple may at times allow similar apps into its App Store, it doesn't own YouTube and, in any case, you'll find they don't stay in the App Store for long.

Such third-party apps will continue to pop up on the web, and people will continue to use them to watch their favourite YouTube videos. Google might not be aware that you're using them to download content from YouTube, and even if it did any threats of banning you from the service are all but impossible to uphold. You don't need to be signed in to access YouTube.

It's up to you to decide whether the practice of downloading video content from YouTube (for personal use) is morally correct.

DOWNLOAD YOUTUBE VIDEOS TO ANDROID DEVICES
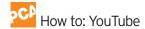
START Several free apps are available that let you download YouTube movies to your Android tablet or smartphone. We like TubeMate YouTube Downloader, but you won't find it at Google Play. Head to m.tubemate.net for a list of download sites.
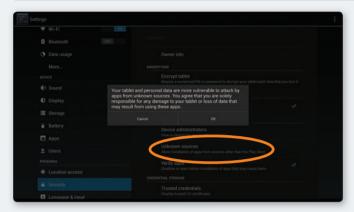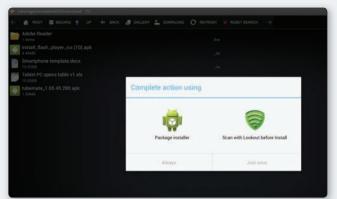
2 We chose to download TubeMate YouTube Downloader from Android Freeware. Head to the site and tap the Install app button, then select a save location and tap Ok. The app will be downloaded to your device.

…DOWNLOAD YOUTUBE VIDEOS TO ANDROID DEVICES

3 By default, Android won't let you install software from sources other than Google Play. Tap Settings, Security, then enable the option to allow installation from Unknown sources. Tap Ok to the warning. Remember to reverse this setting following installation.

4 Find the downloaded .apk file using a file browser, and tap to install it. If you have a security app such as Lookout installed, it's worth scanning the download for malware. TubeMate YouTube Downloader will be installed when the scan is complete.

5 Open the TubeMate app. You'll find a selection of videos on the home screen, and can use the Search option to browse more YouTube videos. Tap the grid option next to the magnifying glass to view your YouTube Favourites, Playlists, Subscriptions and more.

6 Having found a video that you want to download to your smartphone or tablet, simply tap the green down-arrow to begin the process. If the video is particularly long, you may want to download it via Wi-Fi rather than 3G.

7 TubeMate will display a list of download options, which includes various video resolutions and an option to save as MP3. Note that this doesn't convert the file to MP3, but saves it as an MP3 rather than video file; most Android apps will recognise it as audio.
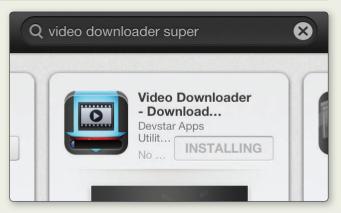
8 TubeMate YouTube Downloader will immediately download the file to your device. To later view the video offline, simply look in the Videos folder in Android's Gallery and tap the file to begin playback. ⊠
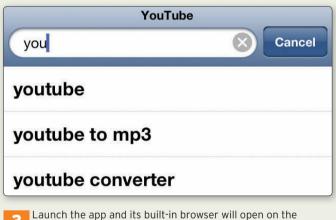
DOWNLOAD YOUTUBE VIDEOS TO iOS DEVICES

START Open the App Store and search for Video downloader - download manager. Be sure to include the hyphen for the app to appear first in the results list. Plenty of similar apps, such as Tube Downloader, are also available.
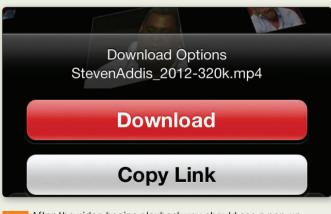
2 Install the free app on your iPhone or iPad. A paid-for Pro version is also available, and you will likely see nag screens prompting you to upgrade each time you launch the app. The free version does the job for the purposes of this guide.

3 Launch the app and its built-in browser will open on the Help page. If the address/search bar doesn't appear onscreen, simply swipe down to display it. Search for YouTube, then tap the site in the results list.

4 Tap the magnifying glass icon to search for a particular video on YouTube. When you find one you want to download for offline viewing, tap to play the video. It's a good idea to toggle on your Wi-Fi connection if it's a particularly long video.

5 After the video begins playback you should see a pop-up with the option to Download the video. If this is not the case, you'll be offered a Buffer to cache option. In essence this does the same thing, but saves the video in a different folder.

6 To play a saved video, tap the Files icon at the bottom of the app to bring up a list of downloaded files. Tap the video you want to watch to begin playback. Simply rotate your device to landscape to watch it in fullscreen mode. ⊠

Design custom greeting cards online

Martyn Casserly explains how to create and send greeting cards with a personal touch, without leaving the comfort of your own home

Matt only logged in to check his email. 4 hours later, he had bought a second-hand Vauxhall Astra and married a 17-year-old Texan.

There was once a time when those wanting to mark a special occasion with a greeting card would have to brave the psychedelic torture of a trip to Clinton Cards. But having navigated the piles of cuddly toys, retina-melting wrapping paper and mugs emblazoned with luminous names, rarely were they rewarded with the exact sentiment they had in mind. If only there was a better way.

Thankfully, help is at hand. Online services that offer personalised greetings cards have become increasingly popular over the past few years, with companies such as Moonpig, Hello Turtle and Funky Pigeon selling an impressive range of customisable missives.

Each service operates in a similar way, allowing you to select a template and alter the wording to suit the intended recipient. Some designs also allow you to insert one or more photographs. You specify such

things as the shape and size of the card, and the font, size and colour of the text printed inside. When you've finished your masterpiece, you simply provide an address and the company posts the card on your behalf – you don't even need to visit the Post Office.

Taking advantage of the digital format, Moonpig also allows the creation of video cards. These are simple, short messages created on your smartphone or computer, which are viewed by the recipient via Moonpig's free mobile app.

Most services also let you customise calendars, mugs and T-Shirts; if required, they can also send flowers, cuddly toys and a bottle of plonk along with your card.

Creating a personalised gift has never been easier or more convenient. In the following workshop we'll guide you through the process using Moonpig, so you'll never again have to suffer the tyranny of wrapping-paper merchants.

CREATE A PERSONAL GREETING CARD AT MOONPIG
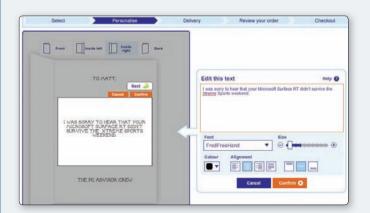
START Head to moonpig.com. Click the Login/Register option in the top menu bar to set up a free account. The process is very short and straightforward. You will not be required to enter your credit-card details until you purchase a card or gift.

4 Having found a design, select the card so it appears in the preview pane. At the top of the preview window are four tabs (Card, Front, Inside and Description), which allow you to access and customise the various elements of the card.

7 Click an individual text field in the preview pane to begin entering your message. A drop-down menu lets you alter the text font, while a slider lets you adjust its size. There are also options for altering its colour and alignment.
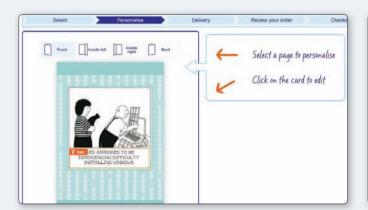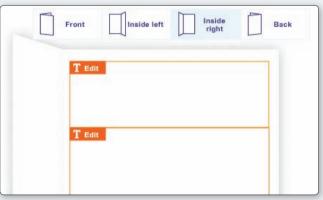
2 Available templates are sorted into handy sections for birthdays, weddings and the like, and you can drill down through the categories using the column on the left. If you have a specific idea in mind, enter a keyword into the search bar.

3 We searched for 'computer', and Moonpig returned 89 available designs. Templates are displayed in a grid, with the selected option previewed in the left pane. Browse through the list for a card that meets your needs.

5 Specify a card size using the drop-down menu in the preview pane, then click Next Step. (Note that the card's size will affect its price.) You can select individual pages to edit by clicking the relevant icon at the top of the preview pane.

6 Text that can be edited or fields in which you can add your own words are flagged when you hover the mouse over them. On the front page, for instance, you can change the name, and on the inside right you can add a personal message.

8 Once you're happy with your creation click the Order Now button. This will take you to a page that asks where you want the card to be delivered. You can have the card sent to your own address or directly to your recipient.

9 A convenient feature of Moonpig's service is the ability to decide when the card should be posted. This means you can design and order a greeting card in advance, rather than leaving it until a couple of days before the card needs to be delivered. ⊠

Music streaming with the new Myspace

No longer content with lurking in Facebook's shadow, Myspace has relaunched as a music-streaming service. Mary-Ann Russon is your guide

Before Facebook dominated the social-media space, Myspace was a popular social network. Users were able to upload photos, post short messages and send emails to their friends, but it was better known as a platform for new artists to champion their tracks, with the addition of personalised music players to user profiles.

As millions of its users followed their friends as they flocked to Facebook, Myspace couldn't compete. In 2009, even co-founder Tom Anderson packed his bags. But the musicians remained loyal: Myspace was the best place to advertise their brand, not just their music.

Facebook eventually got the hang of artist/company promotion with Pages, but Myspace continued to be the go-to social network for musicians hoping to make a name for themselves. Now under new management, it

comes as little surprise to see Myspace relaunch as a music-streaming service.
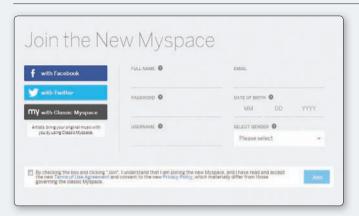
Christian Parkes, Myspace's marketing vice president, said: "The new Myspace is a completely different proposition from what has previously existed, built for musicians, artists and the creative communities that surround them."

Myspace lets you stream entire albums from popular artists, and replay the tracks as often as you want, all for free. It's also designed to work seamlessly on tablets, allowing Myspace to give even Spotify a run for its money.

For now, it's free to sign up to Myspace. Once you've set up your profile, you can search for music, add tracks to multiple playlists and even give public kudos to your favourite songs.

In the following workshop we show you how to navigate the new Myspace and start finding the music you like.

GET TO GRIPS WITH MYSPACE

START Head to new.myspace.com/signup. If you were a member of the old Myspace, you can either update your existing account, link a new account with your Facebook and/or Twitter profile, or start entirely from scratch.
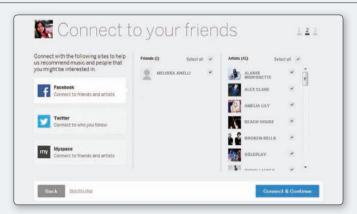
4 From the Home screen you can post a status update using the speech bubble on the right, search for and connect with friends on other social networks, and search for tracks. Click on a song and it will play on the built-in music player.
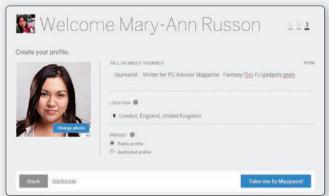
7 Say you want to find out more about Duran Duran. Clicking an album cover returns a full track listing, a list of other Duran Duran fans who have connected to this song on Myspace, and similar artists. Click the band's picture to visit their profile page.

Tech
Help
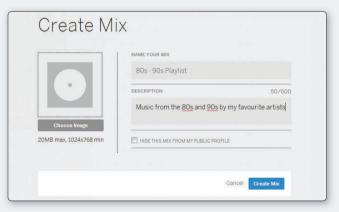
2 You'll be prompted to associate yourself with certain terms, such as 'Musician' or 'Fan'. On the next screen, you can connect with your Facebook and Twitter friends. Myspace will add any artists whose Pages you Like on Facebook to your new profile.

3 Next you need to create your profile. Any information from your old profile may have been deleted. You can choose a profile picture, enter a description of yourself, and decide whether you want your profile to be public or restricted.

5 Click on the linked circles symbol next to the track name and a menu will pop up that allows you to queue the track to play next, add it to a new playlist ('mix'), or share the track with people both within and outside your Myspace network.

6 To create a new playlist, choose 'Add to mix' from the menu. A Create Mix screen appears, within which you can give your playlist a name, write a description and even upload a picture to illustrate the list.

8 Band profile pages offer a comprehensive biography, complete with photos and a list of events. If a video is available for the currently playing track, this will appear in the righthand corner of the screen and remain there as you navigate the site.

9 If you'd like to know what else is going on in the world of music, you can catch up on the latest news, releases and exclusive performances by clicking Discover in the toolbar. Scroll sideways to read articles, listen to tracks and watch videos.

Draw illustrations on your PC or laptop

If you need to create a diagram to illustrate something, Diagram Designer could be what you need. Sandra Vogel explains how to use this free tool

It's probably not often that you need to produce a diagram, but the chances are you'll try to create it in Microsoft Word or your photo editor. Neither are particularly well suited to the task, however. You need a purpose-built tool, such as the free Diagram Designer we look at here.

You might need to create a simple chart or graph, a circuit or a wiring diagram, or even a rough family tree. Pretty much any process, thought pattern or sequence can be easier to understand when visually represented.
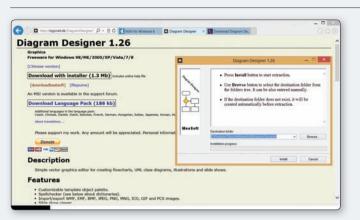
Using Diagram Designer you can draw different shapes and colours. Arrows can be used to show the direction of flow, while freehand and other lines can indicate connected information. You can add illustrations or photos to aid clarification, link to websites or additional documentation for further details, and insert comments and notes that are easy to read and digest. Diagram Designer even has a built-in spell checker.

Diagram Designer is a relatively basic freeware program for drawing diagrams, and you might find you quickly outgrow it. However, we like that it isn't bloated with features you'll never use. If your diagramming needs are basic, it could be all you require.
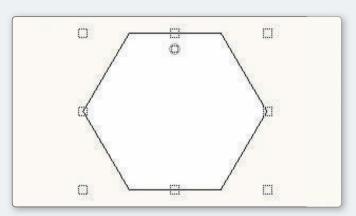
Drawing a basic diagram is a simple matter of dragging shapes from a palette and adding arrows and text. You can import graphics, create links to external data such as web pages, group items so they can be manipulated as a set, and export diagrams in a range of useful formats. In the following workshop we show you how to get started.

GET STARTED WITH DIAGRAM DESIGNER
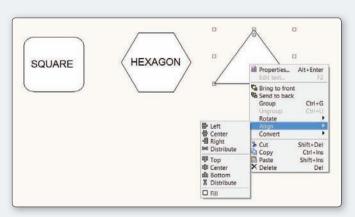
START Head to tinyurl.com/arxpt and download a copy of Diagram Designer. This open-source software is free to use, but if you like it and continue using it you may wish to consider returning to this page and making a donation to the author.
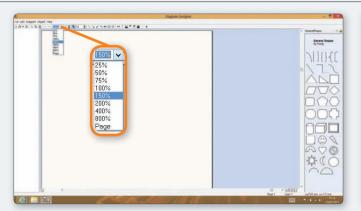
4 Select a template and drag it on to the workspace. You can resize the shape by clicking and dragging the square handles in each corner, and rotate it using the small circle near the top. There's a back button on the menu bar if you want to undo changes.
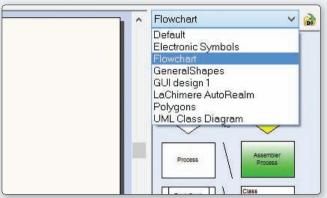
7 Right-click any symbol to access extra functionality. For example, you can align a shape to a particular part of the page, display it in front of or behind other elements, and even resize it to fill the entire page.

Tech Help
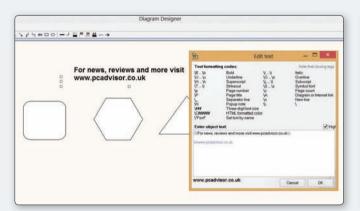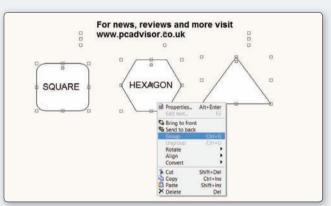
2 Launch the program and maximise the workspace to fill the screen. Using the zoom drop-down in the menu bar, fix the width of the drawing area so that it occupies all the space available in the main window, with no grey backing visible.
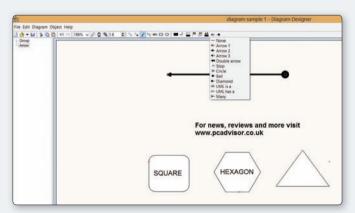
3 The vertical bar on the right holds the standard templates. You can download additional templates from the Diagram Designer website. We added GeneralShapes, for example. Save these templates in the application folder.
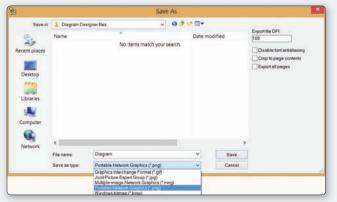
5 You can add text by clicking the abc icon in the menu bar, then clicking within the workspace where you want the text to appear. A pop-up window lets you apply basic formatting using special commands. You can also add live URLs.

6 Pass the mouse over several items at once to select them all, then right-click and choose Group. Any changes made to one shape will now be applied to them all, which is ideal if your diagram features recurring elements, for example.

8 Lines can be added to Diagram Designer and formatted via the menu bar. Choose whether you want to draw a line, arrow or a curve, then click the last two icons in the menu bar to specify the type of start and end points it should use.

9 You can insert objects such as pictures, specify text fonts, colour and size, choose a landscape or portrait paper orientation, and export diagrams in a range of popular image formats (but not PDF). ⊠

LETITIA AUSTIN

Xara Web Designer Silver Edition
FULL PROGRAM

Installation details

Go to My Computer. Right-click the disc icon and open the disc. Select Files 215\Xara Web Designer Silver and open the file

Online registration required: follow the links during installation before 1 May 2013

System requirements

Windows XP/Vista/7; 256MB RAM; 200MB drive space

Xara Web Designer Silver gives you complete design freedom over your website. It's a totally WYSIWYG solution and requires no HTML or coding skills. You can lay out your text, graphics, photos and widgets, and publish your pages, with no third-party software required. Designs can be created from scratch, or you can make use of the large selection of fully customisable templates supplied.

Features

• Genuine WYSIWYG web design

• No HTML skills required

• Complete design freedom

• Professional-quality website and web-graphic templates

• Includes flexible and intuitive drawing, photo-editing and page-layout tools

• Free web hosting with Magix Online World ⊠

Avira Internet Security 2013
FULL PROGRAM (THREE-MONTH LICENCE) AVAILABLE ONLY ON THE DISC+

Installation details
Go to My Computer. Right-click the disc icon and open the disc. Select Files 215\Avira Internet Security 2013 and open the file

Online registration required: head to tinyurl.com/c44xg2L and use the code FCRRR-RRRLC-2XRVS-HVLWP-TXBRD before 1 May 2013

System requirements
1GHz processor; Windows XP/Vista/7; 512MB RAM; 150MB drive space

Avira Internet Security is an award-winning threat-management solution. Full-featured yet light on resource consumption, Avira spans the gamut of security functionalities, from malware prevention to child protection.

Combining sophisticated technologies with an intuitive user interface, Avira empowers you to fully benefit from the opportunities afforded by a secure online environment, including shopping, banking and social networking.
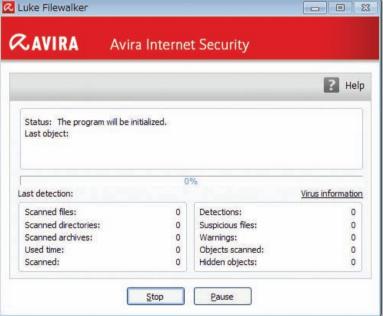
Avira is renowned for the excellence of its detection rates, both proactive and reactive. Its proprietary system scanner, lauded by independent testing institutes, protects your computer with push-button convenience from all types of malware.

Always on the road, always online? Whether from a coffee shop or an airport lounge, Avira's advanced Web Protection and powerful Firewall enable you to securely transfer funds, make online purchases and safely access the internet from public Wi-Fi hotspots.

Differentiating between legitimate messages, spam and email scams can be a tiresome, time-consuming, endeavour. Avira protects your mailbox, blocks spam and, with the assistance of advanced Antiphishing technology, safeguards your identity.

Avira Internet Security empowers parents to shield their children from harmful web content, to set limits on the amount of time spent online, and offers the option to notify parents if their kids are exposed to cyberbullying or profanities on social-media platforms.

Steganos Password Manager 2012
FULL PROGRAM AVAILABLE ONLY ON THE DISC+

ONLINE REGISTRATION REQUIRED

Installation details
Go to My Computer. Right-click the disc icon and open the disc. Select Files 215\Steganos Password Manager 2012 and open the file

Online registration required: head to tinyurl.com/cjfp7gt before 1 May 2013

System requirements
Windows XP/Vista/7/8; 1GB RAM; 100MB drive space

Do you use the same key for your house, car and office? Not likely. Yet many of us use the same password for several websites. If just one of your accounts is hacked, your entire online identity could be jeopardised. Strangers could write emails in your name, make online purchases or view your bank account, all of which could damage your reputation.

Your online identity depends on the quality and diversity of your passwords, but thinking of and remembering many different logins is impossible.

Steganos Password Manager 2012 solves this problem. It generates, remembers and enters into login fields extremely secure passwords. You need to remember only the master password.

Features
• AES 256bit encryption and a virtual keyboard renders keyloggers useless

• Steganos Pic-Pass lets you access Password Manager using a sequence of images

• Use the Password Manager to store your internet bookmarks ⊠

PCA OFFER SAVE £5 ON PRIVACY SUITE - NOW £44.95! TINYURL.COM/BZSVA8H

DISC INSTRUCTIONS

Place disc in drive. Open the file 'Click here to begin.pdf' for extra information.

The disc on the cover of *PC Advisor* is supplied as is, subject to the following terms. The disc is provided to readers of *PC Advisor* for their personal use and may not be resold or copied for distribution.

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Where telephone numbers or URLs are given for registration, these may be valid for a limited period and only to UK users. We cannot be held responsible for discontinued offers. This doesn't affect your statutory rights. All product descriptions given here are provided by original software developers.

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Ultraportable laptops	1 — Apple MacBook Air 13in **PC ADVISOR GOLD**	2 — Apple MacBook Pro 13in Retina **PC ADVISOR RECOMMENDED**	3 — Samsung 900X4C **PC ADVISOR RECOMMENDED**	4 — Apple MacBook Air 11in **PC ADVISOR BEST BUY**	5 — Acer Aspire S7-391
Price	£1200 inc VAT	£1,449 inc VAT	£950 inc VAT	£849 inc VAT	£1,200 inc VAT
Website	Apple.com/uk	Apple.com/uk	Samsung.com/uk	Apple.com/uk	Acer.co.uk
Build rating	★★★★½	★★★★★	★★★★☆	★★★★½	★★★★☆
Features rating	★★★★½	★★★★½	★★★★½	★★★★☆	★★★★½
Performance rating	★★★★½	★★★★☆	★★★★½	★★★★½	★★★★½
Value rating	★★★★☆	★★★☆☆	★★★★☆	★★★★☆	★★★½☆
Overall rating	★★★★½	★★★★½	★★★★☆	★★★★½	★★★★☆
Processor	1.8GHz Intel Core i5-3427U	2.6GHz Intel Core i5-3230M	1.7GHz Intel Core i5-3317U	1.7GHz Intel Core i5-3317U	1.7GHz Intel Core i5-3317U
RAM	4GB DDR3L	8GB DDR3L	8GB DDR3	4GB DDR3L	4GB DDR3
Storage	256GB SSD	256GB SSD	128GB SSD	64GB SSD	128GB SSD
Screen size	13.3in	13.3in	15in	11.6in	13.3in
Screen resolution	1440x900	2560x1600	1600x900	1366x768	1920x1080
Graphics	Intel HD Graphics 4000	Intel HD Graphics 4000	Intel HD Graphics 4000	Intel HD Graphics 4000	Intel HD Graphics 4000
Video memory	N/A	N/A	N/A	N/A	N/A
Wireless	802.11a/b/g/n	802.11a/b/g/n	802.11a/b/g/n	802.11a/b/g/n	802.11b/g/n
Ethernet	Via adaptor only	Gigabit with adaptor	Gigabit	Via adaptor only	✗
Bluetooth	✓	✓	✓	✓	✓
USB	2x USB 3.0	2x USB 3.0	2x USB 3.0, 1x USB 2.0	2x USB 3.0	2x USB 3.0
FireWire	✗	✗	✗	✗	✗
Thunderbolt	✓	✓ (2)	✗	✓	✗
DisplayPort	✓	✓	✗	✓	✗
HDMI	✗	✓	✓ (Micro HDMI)	✗	✓ (Micro 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	Webcam	HD webcam, multitouch trackpad, backlit keyboard	HD webcam
Operating system	Mac OS X 10.8 Mountain Lion	Mac OS X 10.8 Mountain Lion	Windows 7 Home Prem 64bit	Mac OS X 10.8 Mountain Lion	Windows 8 Pro 64bit
Bundled software	iLife 11	iLife 11	Samsung Recovery Solution	iLife 11	None
Fear (Max detail)	29fps	29fps	28	28fps	23fps
Battery	50Wh lithium-ion	74Wh lithium-ion	62Wh lithium-ion	35Wh lithium-ion	Not specified
Battery life	8 hrs 20 mins	8 hrs 44 mins	8 hrs 3 mins	6 hrs 10 mins	Not tested
WB 6/PC Mark 7 score	132/4,497	Not tested/4,596	125/not tested	129/not tested	Not tested/4,581
Dimensions	325x227x4-17.5mm	313x219x19mm	375x237x15mm	300x192x3-17mm	323x223x12.5mm
Weight	1.34kg	1.64kg	1.67kg	1.07kg	1.28kg
Warranty	1-year return-to-base	1-year return-to-base	1-year return-to-base	1-year return-to-base	1-year return-to-base
Verdict	• Now £50 cheaper • Decent turn of speed • Stunning battery life • Nice 256GB SSD • Ultra quiet	• Big price cut and slightly more speed • Strong performance • Fantastic battery life • Limited future expansion	• Sleek and stylish • Good matt screen • Comparatively fast • Great battery life • Lots of memory	• Reasonable price tag • Very light and compact • Strong performance for size • Good graphics • Great build quality	• Strong IPS touchscreen • Incredibly thin • Decent performance • Frustrating trackpad • Poor gaming speeds
FULL REVIEW	TINYURL.COM/8C7LYCO	TINYURL.COM/BQBSHQC	TINYURL.COM/6VZ5TOG	TINYURL.COM/CCPOANM	TINYURL.COM/DYAJ46E

>> 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 RECOMMENDED Toshiba Satellite L850D-12Q	2 PC ADVISOR BEST BUY Dell Inspiron 15R-5521	3 Acer Aspire V3-571	4 Lenovo G580	5 Asus X501A
Price	£340 inc VAT	£499 inc VAT	£450 inc VAT	£400 inc VAT	£340 inc VAT
Website	Toshiba.co.uk	Dell.co.uk	Acer.co.uk	Saveonlaptops.co.uk	Uk.asus.com
Build rating	★★★★☆	★★★★☆	★★★★☆	★★★½☆	★★★★☆
Features rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Performance rating	★★☆☆☆	★★★★☆	★★★★★	★★★★☆	★★☆☆☆
Value rating	★★★★☆	★★★★☆	★★★★½	★★★★☆	★★★★☆
Overall rating	★★★★☆	★★★★☆	★★★★½	★★★½☆	★★★½☆
Processor	1.7GHz AMD E2-1800	1.7GHz Intel Core i5-3317U	2.5GHz Intel Core i5-3210M	2.4GHz Intel Core i3-3110M	2.2GHz Intel Core i3-2328M
RAM	6GB DDR3	8GB DDR3	8GB DDR3	6GB DDR3	4GB DDR3
Storage	750GB HDD	1TB HDD	750GB hard drive	1TB HDD	320GB HDD
Screen size	15.6in	15.6in	15.6in	15.6in	15.6in
Screen resolution	1366x768	1366x768	1366x768	1366x768	1366x768
Graphics	AMD Radeon HD 7340	Intel HD Graphics 4000	Intel HD Graphics 3000	Intel HD Graphics 4000	Intel HD Graphics 3000
Video memory	N/A	N/A	N/A	N/A	N/A
Wireless	802.11b/g/n	802.11b/g/n	802.11a/b/g/n	802.11b/g/n	802.11b/g/n
Ethernet	10/100	Gigabit	Gigabit	10/100	Gigabit
Bluetooth	✓	✓	✓	✓	✗
USB	2x USB 3.0, 1x USB 2.0	2x USB 3.0, 2x USB 2.0	1x USB 3.0, 2x USB 2.0	2x 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	8x DVD±RW	8x DVD±RW	8x DVD±RW	8x DVD±RW	N/A
Extras	Webcam	Webcam	Webcam	Webcam	Webcam
Operating system	Windows 8 64bit	Windows 8 64bit	Windows 7 Home Prem 64bit	Windows 8 64bit	Windows 8 64bit
Bundled software	Nero 12 Essentials	N/A	Microsoft Office Starter	N/A	McAfee Security trial
Stalker (Low/High)	17/13fps	36/23fps	Not tested	37/24fps	10/17fps
Battery	48Wh lithium-ion	65Wh lithium-ion	48Wh lithium-ion	48Wh lithium-ion	47Wh lithium-ion
Battery life	3 hrs 45 mins	6 hrs 0 mins	5 hrs 18 mins	4 hrs 0 mins	4 hrs 35 mins
PCMark7 score	1,265	2,834	123 WorldBench 6 points	2,614	1,389
Dimensions	380x242x33.5mm	376x259x31mm	380x253x33mm	375x240x36mm	380x253x35mm
Weight	2.35kg	2.3kg	2.6kg	2.4kg	2.1kg
Warranty	1-year return-to-base	1-year in-home	1 year collect-and-return	1-year return-to-base	1-year return-to-base
Verdict	• Very low price • Bright and clear screen • Quality trackpad, keyboard • Lacks performance • A little heavy	• Good all-rounder • Ample battery life • Pleasant screen • Strong build quality • Can handle some games	• Strong general performance • Not much gaming potential • Excellent trackpad, keyboard • Reflective screen • Decent battery life	• Decent performance • Screen very glossy and has narrow viewing angles • Irritating touchpad • Rather weighty	• Low price • Decent build quality • Surprisingly good speakers • Very poor for gaming • No optical drive
FULL REVIEW	TINYURL.COM/AXNXBB4	TINYURL.COM/BEDJG3F	TINYURL.COM/CQKL4PD	TINYURL.COM/A786DEY	TINYURL.COM/B7YOHCJ

>> 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** Dell Inspiron 15R SE	**2** Lenovo IdeaPad Y580	**3** PC Specialist Optimus IV	**4** Acer Aspire V5-571P	**5** Toshiba Satellite P855-32J
Price	£659 inc VAT	£999 inc VAT	£957 inc VAT	£549 inc VAT	£999 inc VAT
Website	Dell.com/uk	Lenovo.com/uk	Pcspecialist.co.uk	Acer.co.uk	Toshiba.co.uk
Build rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Features rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★★
Performance rating	★★★★☆	★★★★½	★★★★☆	★★★★☆	★★★★☆
Value rating	★★★★☆	★★★★☆	★★★½☆	★★★★☆	★★★½☆
Overall rating	★★★★☆	★★★★☆	★★★★☆	★★★½☆	★★★½☆
Processor	3.2GHz Intel Core i7-3632QM	2.4GHz Intel Core i7-3630QM	2.4GHz Intel Core i7-3630QM	1.7GHz Intel Core i5-3317U	2.5GHz Intel Core i5-3210M
RAM	6GB DDR3	8GB DDR3	8GB DDR3	6GB DDR3	8GB DDR3
Storage	750GB hard drive	1TB HDD	1TB hard drive + 120GB SSD	500GB HDD	750GB hard drive
Screen size	15.6in	15.6in	17.3in	15.6in	15.6in
Screen resolution	1366x768 pixels	1920x1080	1920x1080 pixels	1366x768 pixels	1920x1080 pixels
Graphics	AMD Radeon HD 7730M	Intel HD Graphics 4000	GTX 660M, Intel HD 4000	Intel HD Graphics 4000	nVidia GeForce GT 640M
Video memory	2GB	N/A	2GB (660M)	N/A	2GB
Wireless	802.11b/g/n	802.11b/g/n	802.11b/g/n	802.11a/b/g/n	802.11b/g/n
Ethernet	Gigabit	Gigabit	Gigabit	Gigabit	Gigabit
Bluetooth	✓	✓	✓	✓	✓
USB	4x USB 3.0	2x USB 3.0, 2x USB 2.0	3x USB 3.0, 1x USB 2.0	1x USB 3.0, 2x USB 2.0	4x USB 3.0
FireWire	✗	✗	✗	✗	✗
Thunderbolt	✗	✗	✗	✗	✗
DisplayPort	✗	✗	✗	✗	✗
HDMI	✓	✓	✓	✓	✓
DVI	✗	✗	✗	✗	✗
VGA	✓	✓	✓	✓	✓
eSATA	✗	✗	✓	✗	✗
Media card slot	✓	✓	✓	✓	✓
Audio	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic	Speakers, mic
Optical drive	8x DVD±R	BD-ROM	4x BD-ROM	8x DVD±RW	6x BD-ROM
Extras	Webcam	Webcam	Webcam	Webcam	Webcam, glasses-free 3D
Operating system	Windows 8 Pro 64bit	Windows 8 64bit	Windows 8 Standard 64bit	Windows 8 64bit	Windows 8 Pro 64bit
Bundled software	None	None	None	None	Toshiba utilities
Fear (Max detail)	Not tested	Not tested	Not tested	Not tested	71fps
Battery	48Wh lithium-ion	72Wh lithium-ion	76.9Wh lithium-ion	37Wh lithium-ion	48Wh lithium-ion
Battery life	3 hrs 43 mins	2 hrs 30 mins	2 hrs 55 mins	3 hrs 20 mins	3 hrs 4 mins
PCMark 7 score	Not tested	2,938	4,572	2,544	2,716
Dimensions	378x252x34.1mm	385x255x35.7mm	405x270x50mm	382x253x24.5mm	385x253x33mm
Weight	2.8kg	2.8kg	3.3kg	2.45kg	2.94kg
Warranty	1-year onsite	1-year return-to-base	3-year RTB (1-year parts)	1-year return-to-base	1 year European carry-in
Verdict	• Dell sells only 8GB version • Great matt display • Decent speed • Short battery life • Rather large laptop	• Good multimedia system • Intel WiDi technology • Graphics aren't high-end • Not easy to find in this exact specification	• Excellent performance despite the price hike • Massive 17.3in screen • Blu-ray drive • Battery life not great	• Touchscreen • Decent performance • Poor battery life • Screen not the best quality • Roomy keyboard, trackpad	• Glasses-free 3D • BD-ROM drive • Not cheap • Short battery life
FULL REVIEW	TINYURL.COM/A9LRYC3	TINYURL.COM/BAYPR3E	TINYURL.COM/ABQB6QP	TINYURL.COM/C7LLU7P	TINYURL.COM/B4KSAFJ

>> 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 over 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 4GB 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 Apple MacBook Pro Retina	2 Alienware M14x	3 Alienware M17x	4 Chillblast Genesis 7970	5 Samsung Series 7 700G7C
	PC ADVISOR GOLD	**PC ADVISOR RECOMMENDED**			
Price	**£1,799 inc VAT**	**£1,330 inc VAT**	**£1,799 inc VAT**	**£1,199 inc VAT**	**£1,400 inc VAT**
Website	Apple.com/uk	Alienware.co.uk	Alienware.co.uk	Chillblast.com	Samsung.com/uk
Build rating	★★★★★	★★★★½	★★★★☆	★★★☆☆	★★★★☆
Features rating	★★★★½	★★★★☆	★★★★★	★★★★★	★★★★★
Performance rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★½
Value rating	★★★★☆	★★★★☆	★★★☆☆	★★★★☆	★★★★☆
Overall rating	★★★★½	★★★★½	★★★★☆	★★★★☆	★★★★☆
Processor	2.4GHz Intel Core i7-3630QM	2.7GHz Intel Core i7-3740QM	2.4GHz Intel Core i7-3630QM	2.7GHz Intel Core i7-3740QM	2.3GHz Intel Core i7-3610QM
RAM	8GB DDR3L	8GB DDR3	8GB DDR3	8GB DDR3	16GB DDR3
Storage	256GB SSD	500GB HDD + 32GB SSD	500GB HDD + 128GB SSD	750GB HDD/8GB SSD	1.5TB HDD
Screen size	15.4in	14.1in	17.3in	15.6in	17.3in
Screen resolution	2880x1800 pixels	1600x900 pixels	1920x1080	1920x1080	1920x1080 pixels
Graphics	nVidia 650M, Intel HD 4000	nVidia GeForce GT 650M	AMD Radeon HD 7970M	AMD Radeon HD 7970M	nVidia GeForce GTX 675M
Video memory	1GB	1GB	2GB	2GB	2GB
Wireless	802.11a/b/g/n	802.11b/g/n	802.11b/g/n	802.11b/g/n	802.11b/g/n
Ethernet	Via adaptor only	Gigabit	Gigabit	Gigabit	Gigabit
Bluetooth	✓	✓	✓	✓	✓
USB	2x USB 3.0	2x USB 3.0, 1x USB 2.0	4x USB 3.0	3x USB 3.0, 1x USB 2.0	2x USB 3.0, 2x USB 2.0
FireWire	✗	✗	✗	✗	✗
Thunderbolt	✓ (2)	✗	✗	✗	✗
DisplayPort	✓	✓	✓	✓	✓
HDMI	✓	✓	✓	✓	✓
DVI	✗	✗	✗	✓	✗
VGA	✗	✓	✓	✗	✓
eSATA	✗	✗	✓	✓	✗
Media card slot	✓	✓	✗	✓	✓
Audio	Headphone jack, Toslink out	Headphone jack, mic	Headphone jack, mic	headphone jack, mic	Headphone jack, mic
Optical drive	N/A	8x DVD±R, 2.4x DVD-RW, 4x DVD+RW, 8x DVD-ROM	8x DVD±RW	6x BD-ROM/DVD±RW	6x BD-ROM, 8x DVD±R, 2.4x DVD-RW, 4x DVD+RW
Extras	HD webcam, multitouch trackpad, backlit keyboard	Customisable backlit keyboard	Webcam	Webcam	HD webcam, Dolby Home Theater v4
Operating system	Mac OS X 10.7.4 Lion	Windows 7 Home Prem 64bit	Windows 7 Home Prem 64bit	Windows 7 Home Prem 64bit	Windows 7 Home Prem 64bit
Bundled software	iLife 11	None	None	None	Samsung Recovery
Fear (Max detail)	N/A	84fps	90Wh lithium-ion	76.9Wh lithium-ion	N/A
Battery	99Wh lithium-polymer	63Wh lithium-ion	2 hrs 30 mins	3 hrs	89Wh lithium-ion
Battery life	N/A	5 hrs 7 mins	N/A	N/A	3 hrs
WorldBench 6 score	N/A	168	4,924 (PCMark 7)	4,333 (PCMark 7)	123
Dimensions	359x247x18mm	337x258x38mm	410x304x44.5mm	376x256x43mm	410x285x50mm
Weight	2kg	2.9kg	4.26kg	3.3kg	3kg
Warranty	1-year return-to-base	1-year in-home support	1-year onsite	2-year collect-and-return	1-year international
Verdict	• Gorgeous super-resolution Retina display • Outstanding build quality • Wonderfully light and slim • Effortless to use	• Great gaming system • Stunning WorldBench score • SSD is now only 32GB • Glossy screen can be difficult to read	• Massive 17.3in screen • Stunning gaming performance • Weighty • Not cheap	• Chassis has cheap feel, average keyboard/touchpad • Strong games and Windows performance • Low price for the power	• Not the fastest laptop in general Windows use • Good graphics controller • Vast 17.3in screen • Blu-ray drive
FULL REVIEW	TINYURL.COM/7YGC3KJ	TINYURL.COM/CLGSCMV	TINYURL.COM/7N7R6T3	TINYURL.COM/9WTG6MP	TINYURL.COM/C93VN8N

>> 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.
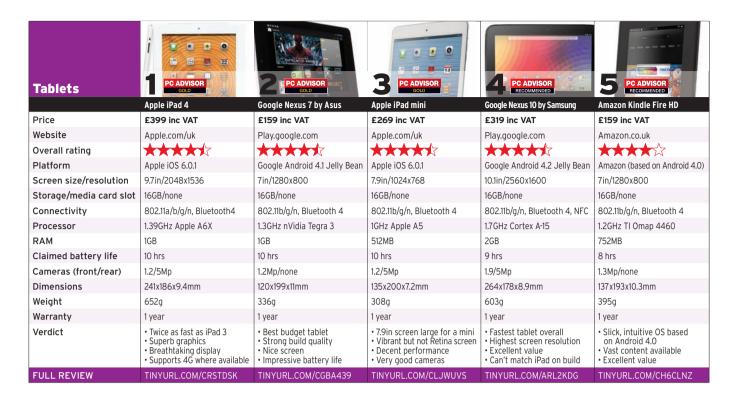
The best laptops should offer very good screens. Beware of glossy shiny panels that allow distracting reflections in certain lighting conditions.

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

	1 Apple iPad 4	2 Google Nexus 7 by Asus	3 Apple iPad mini	4 Google Nexus 10 by Samsung	5 Amazon Kindle Fire HD
	PC ADVISOR GOLD	PC ADVISOR GOLD	PC ADVISOR GOLD	PC ADVISOR RECOMMENDED	PC ADVISOR RECOMMENDED
Price	£399 inc VAT	£159 inc VAT	£269 inc VAT	£319 inc VAT	£159 inc VAT
Website	Apple.com/uk	Play.google.com	Apple.com/uk	Play.google.com	Amazon.co.uk
Overall rating	★★★★½	★★★★½	★★★★½	★★★★½	★★★★☆
Platform	Apple iOS 6.0.1	Google Android 4.1 Jelly Bean	Apple iOS 6.0.1	Google Android 4.2 Jelly Bean	Amazon (based on Android 4.0)
Screen size/resolution	9.7in/2048x1536	7in/1280x800	7.9in/1024x768	10.1in/2560x1600	7in/1280x800
Storage/media card slot	16GB/none	16GB/none	16GB/none	16GB/none	16GB/none
Connectivity	802.11a/b/g/n, Bluetooth4	802.11b/g/n, Bluetooth 4	802.11b/g/n, Bluetooth 4	802.11b/g/n, Bluetooth 4, NFC	802.11b/g/n, Bluetooth 4
Processor	1.39GHz Apple A6X	1.3GHz nVidia Tegra 3	1GHz Apple A5	1.7GHz Cortex A-15	1.2GHz TI Omap 4460
RAM	1GB	1GB	512MB	2GB	752MB
Claimed battery life	10 hrs	10 hrs	10 hrs	9 hrs	8 hrs
Cameras (front/rear)	1.2/5Mp	1.2Mp/none	1.2/5Mp	1.9/5Mp	1.3Mp/none
Dimensions	241x186x9.4mm	120x199x11mm	135x200x7.2mm	264x178x8.9mm	137x193x10.3mm
Weight	652g	336g	308g	603g	395g
Warranty	1 year	1 year	1 year	1 year	1 year
Verdict	• Twice as fast as iPad 3 • Superb graphics • Breathtaking display • Supports 4G where available	• Best budget tablet • Strong build quality • Nice screen • Impressive battery life	• 7.9in screen large for a mini • Vibrant but not Retina screen • Decent performance • Very good cameras	• Fastest tablet overall • Highest screen resolution • Excellent value • Can't match iPad on build	• Slick, intuitive OS based on Android 4.0 • Vast content available • Excellent value
FULL REVIEW	TINYURL.COM/CRSTDSK	TINYURL.COM/CGBA439	TINYURL.COM/CLJWUVS	TINYURL.COM/ARL2KDG	TINYURL.COM/CH6CLNZ

Smartphones

	1 Sony Xperia Z	2 Apple iPhone 5	3 HTC One	4 Google Nexus 4 8GB	5 Samsung Galaxy S III
	PC ADVISOR GOLD	PC ADVISOR GOLD	PC ADVISOR GOLD	PC ADVISOR GOLD	PC ADVISOR BEST BUY
Price	£515 inc VAT	£529 inc VAT	£519 inc VAT	£239 inc VAT	£372 inc VAT
Website	Sonymobile.com	Apple.com/uk	HTC.com/uk	Play.google.com	Samsung.com/uk
Overall rating	★★★★½	★★★★½	★★★★½	★★★★½	★★★★½
Platform	Android 4.1 Jelly Bean	Apple iOS 6.0	Android 4.1 Jelly Bean	Android 4.2 Jelly Bean	Android 4.0 ICS
Processor	1.5GHz Snapdragon S4 Pro	1GHz Apple A6	1.7GHz Snapdragon 600	1.5GHz Snapdragon S4 Pro	1.4GHz Exynos 4212 Quad
Storage/media card	16GB/none	16GB/none	32GB/microSDXC	8GB/none	16GB/microSDXC
Screen size/resolution	5in/1920x1080	4in/640x1136	4.7in/1920x1080	4.7in/768x1280	4.3in/800x480
Input method	Capacitive multitouch	Capacitive multitouch	Capacitive multitouch	IPS touchscreen	Capacitive touchscreen
Connectivity	4G, Bluetooth, Wi-Fi	HSPA+, Bluetooth, Wi-Fi	4G, Bluetooth, Wi-Fi	HSPA+, GSM, Bluetooth, Wi-Fi	HSPA+, GSM, Bluetooth, Wi-Fi
Battery life (talk/standby)	11 hrs/550 hrs	8 hrs/225 hrs	Not specified	Not specified	11 hrs/750 hrs
Camera	13Mp, 1080p video	8Mp, 1080p video	4Mp, 1080p video	8Mp, 1080p video	8Mp, 1080p video
GPS	GPS, Glonass	A-GPS, Glonass	GPS, Glonass	GPS	A-GPS, Glonass
Dimensions, Weight	71x7.9x139mm, 146g	59x124x8mm, 115g	68x9.3x137mm, 143g	69x134x9.1mm, 139g	70x137x9mm, 133g
Warranty	2 years	1 year	2 years	2 years	2 years
Verdict	• 443ppi full-HD screen • Fast performance • Dust- and waterproof • Very good 13Mp camera	• Very fast performance • Superb 4in screen • Beautifully balanced weight • Siri voice-recognition	• Fastest smartphone yet • 468ppi full-HD screen • UltraPixel camera • Great sound quality	• Stunning price tag • Exceptional build quality • Keyboard allows fast typing • Not great storage	• Premium Android phone • Superb 4.8in screen • Strong build • Difficult to use one-handed
FULL REVIEW	TINYURL.COM/CXDR829	TINYURL.COM/CTRJEJD	TINYURL.COM/CE76X3T	TINYURL.COM/D7HTPFJ	TINYURL.COM/CQ4FM7X

>> Buying advice

Tablets

Tablet PCs combine the mobility and connectivity of a smartphone with a larger screen and more powerful processor. Rather than struggle with Windows, they 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 tablets are available on subsidised tariffs, but it's usually cheaper to buy them outright. **READ MORE: TINYURL.COM/7YGVBQ6**

PC ADVISOR TEST CENTRE

Business PCs	1 Chillblast Fusion Sapphire	2 PC Specialist MPC-3470T	3 Quiet PC Serenity Value	4 Eclipse eBiz Precision i322H61	5 Arbico i5357 Pro
Price	£549 inc VAT	£479 inc VAT	£795 inc VAT	£569 inc VAT	£579 inc VAT
Website	Chillblast.com	Pcspecialist.co.uk	Quietpc.com	Eclipsecomputers.com	Arbico.co.uk
Build rating	★★★★☆	★★★★☆	★★★★★	★★★☆☆	★★★★☆
Features rating	★★★☆☆	★★★☆☆	★★★★☆	★★★★☆	★★★★☆
Performance rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Value rating	★★★★☆	★★★★☆	★★☆☆☆	★★★☆☆	★★★☆☆
Overall rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★☆☆
Processor	3.4GHz Intel Core i5-3570K	2.9GHz Intel Core i5-3470T	3.4GHz Intel Core i5-3570K	3.3GHz Intel Core i3-3220	3.4GHz Intel Core i5-3570K
RAM	8GB DDR3	8GB DDR3	8GB DDR3	16GB DDR3	8GB DDR3
Storage capacity	1TB HDD	1TB HDD	1TB HDD	1TB HDD + 120GB SSD	1TB HDD + 60GB SSD
Motherboard	Asus P8B75-M LX	Asus P8H61-I R2.0	Gigabyte GA-Z77-D3H	Asus P8H61-MX/USB3	Asus P8B75-M LX Plus
CPU cooler	Standard Intel cooler	Standard Intel cooler	Gelid Tranquillo	Standard Intel cooler	Xigmatek Apache
Power supply	EzCool 500W	Power Man 160W	Nexus NX-5000 R3 530W	Generic 500W	Ace 650W
Screen	23.6in Iiyama X2377HDS	N/A	N/A	23.6in Edge10 EF240A	N/A
Screen resolution	1920x1080 pixels	N/A	N/A	1920x1080	N/A
Graphics	Intel HD Graphics 4000	Intel HD Graphics 2500	Intel HD Graphics 4000	Intel HD Graphics 2500	Intel HD Graphics 4000
Video memory	N/A	N/A	N/A	N/A	N/A
USB	3x USB 3.0, 7x USB 2.0	2x USB 3.0, 7x USB 2.0	5x USB 3.0, 7x USB 2.0	3x USB 3.0, 5x USB 2.0	2x USB 3.0, 6x USB 2.0
Sound	Onboard	Onboard	Onboard	Onboard	N/A
Speakers	Built into monitor	N/A	N/A	Built into monitor	N/A
Case	CiT Fortress	In-Win BM643	Nexus Thrio 310	NA-705B	CiT Templar Micro ATX
Keyboard	Logitech MK260 (wireless combo)	Microsoft Comfort Curve 3000, Logitech USB mouse	Gigabyte GK-KM6150 (wired combo)	Microsoft Optical Desktop 400 (wired)	Logitech MK120 (wired combo)
Optical drive	24x DVD±RW	8x DVD±RW	24x DVD±RW	24x DVD±RW	24x DVD±RW
Operating system	Windows 8 Professional	Windows 8 Professional	Windows 8 Professional	Windows 8 Professional	Windows 8 Professional
Bundled software	Family software pack	PowerDVD, card reader	None	None	None
PCMark7 overall score	4,217	3,419	3,713	4,170	6,037
Power consumption	36W idle/84W load	27W idle/53W load	31W idle/105W load	43W idle/69W load	41W idle/108W load
Warranty	2-year collect-and-return	3-year labour, 1-year parts	2-year collect-and-return	1-year RTB	2-year RTB (1-year parts)
Verdict	• Competitive price • Strong performance • Excellent 23.6in IPS screen • Case could be more understated	• Small-form-factor • Conservative on power • Not as fast as the more powerful models here • Cramped internals make it difficult to upgrade	• Rather expensive • Very quiet operation • Good all-round performance • Lack of SSD affects performance in our benchmarks	• Modest processor • 16GB of RAM generous, but wasted • Screen of only average quality • Messy internals	• Not the cheapest • Price doesn't include a monitor • Powerful processor probably not necessary for office use • SSD could be of larger capacity
FULL REVIEW	TINYURL.COM/CX5T8X5	TINYURL.COM/ADM2BEJ	TINYURL.COM/9WP5SSS	TINYURL.COM/ABFZOA3	TINYURL.COM/COQEWFX

>> Buying advice

Business PCs

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Provided you have sufficient RAM (at least 2GB, but 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.

Family PCs	1 Chillblast Fusion Lynx	2 Wired2Fire Diablo Predator	3 CyberPower Ultra Scylla SE (MKII)	4 PC Specialist Vanquish HD-660	5 Eclipse Solar i5357N66Ti
Price	£799 inc VAT	£899 inc VAT	£699 inc VAT	£899 inc VAT	£929 inc VAT
Website	Chillblast.com	Wired2fire.co.uk	Cyberpowersystem.co.uk	Pcspecialist.co.uk	Eclipsecomputers.com
Build rating	★★★★½	★★★★☆	★★★½☆	★★★★☆	★★★★☆
Features rating	★★★★½	★★★★☆	★★★½☆	★★★★☆	★★★★½
Performance rating	★★★★☆	★★★★★	★★☆☆☆	★★★★★	★★★★½
Value rating	★★★★½	★★★★★	★★★★☆	★★★½☆	★★½☆☆
Overall rating	★★★★½	★★★★½	★★★★☆	★★★★☆	★★★★☆
Processor	3.4GHz Intel Core i5-3570K	3.4GHz Intel Core i5-3570K	4.2GHz AMD FX-4170	3.4GHz Intel Core i5-3570	3.4GHz Intel Core i5-3570
RAM	16GB DDR3	8GB DDR3	16GB DDR3	8GB DDR3	16GB DDR3
Storage capacity	120GB SSD + 1TB HDD	120GB SSD + 1TB HDD	2TB HDD	120GB SSD + 1TB HDD	64GB SSD + 2TB HDD
Motherboard	Asus P8B75-M LX	Asus P8Z77-V LX	Gigabyte GA-78LMT-USB3	Asus P8H77-M	Asus P8Z77-V LX
CPU cooler	Standard Intel cooler	Xigmatek Achilles CPU cooler	Standard AMD cooler	Standard Intel cooler	Standard Intel cooler
Power supply	700W Chillblast	600W Corsair CX600	500W Cooler Master	450W FSP Dual Rail	650W EZCool
Screen	23in Iiyama X2377	23in AOC i2352VH	24in Edge10 EF240A	23in AOC i2352VH	23.6in Acer G236HLBbd
Screen resolution	1920x1080 pixels	1920x1080	1980x1080	1920x1080	1920x1080
Graphics card	XFX AMD Radeon HD 7770	nVidia GeForce GTX 660	MSI AMD Radeon HD 7770	Palit nVidia GeForce GTX 660	nVidia GeForce GTX 660 Ti
Video memory	1GB	2GB	1GB	2GB	2GB
Wireless	802.11b/g/n	N/A	802.11b/g/n	802.11b/g/n	N/A
USB	1x USB 3.0, 1x USB 2.0	3x USB 3.0, 6x USB 2.0	2x USB 3.0, 6x USB 2.0	2x USB 3.0, 6x USB 2.0	3x USB 3.0, 6x USB 2.0
Media card slot	✗	✗	✗	✗	✗
Sound card	Onboard	Onboard	Onboard	Onboard	Onboard
Speakers	2x Logitech LS220	None	2x Logitech LS220	2x Logitech LS220	None
Case	Cooler Master Silencio 450	Xigmatek Asgard Pro	Cooler Master Elite 430	Cooler Master Elite 311	Cooler Master K350
Keyboard	Logitech MK260 wireless combo	Octigen JK-745, Logitech B110 wired keyboard and mouse	Logitech MK320 wireless combo	Logitech MK260 wireless combo	Microsoft Desktop 600 wired combo
Optical drive	Lite-On BD-ROM, Samsung 24x DVD±RW	LG BD-ROM/DVD±RW combo drive	Pioneer BD-ROM/DVD±RW combo drive	LG BD-ROM/DVD±RW combo drive	Lite-On BD-ROM/DVD±RW combo drive
Operating system	Windows 8 64bit	Windows 8 64bit	Windows 8 64bit	Windows 8 64bit	Windows 8 64bit
Bundled software	CyberLink PowerDVD 10	None	None	CyberLink PowerDVD 10	None
Sniper (Med/High)	41/9fps	Not tested	43/9fps	60/15fps	75/18fps
PCMark 7	5311	6376	2842	5768	5058
Warranty	2-year collect-and-return	2-year RTB	3-year RTB (1-year parts)	3-year 'Silver'	1-year RTB
Verdict	• Hefty 16GB of memory • Lightning-fast storage • Vibrant IPS screen • Noise-damping material in case	• Best overall performance • Strong gaming power • Quality AOC screen • Chillblast offers marginally better value for money	• Low price • AMD chip not as fast as the Intel equivalents • No solid-state storage • Well-made casing	• Impressive overall performance • Good gaming potential • Strong AOC screen • Not the cheapest	• Relatively expensive • Capacious and fast storage • GTX 600 Ti offers great gaming framerates • High noise levels
FULL REVIEW	TINYURL.COM/BX2QODV	TINYURL.COM/AECXMNQ	TINYURL.COM/BYTG8QG	TINYURL.COM/A2VE9NZ	TINYURL.COM/AB2ESOZ

>> Buying advice

Family PCs

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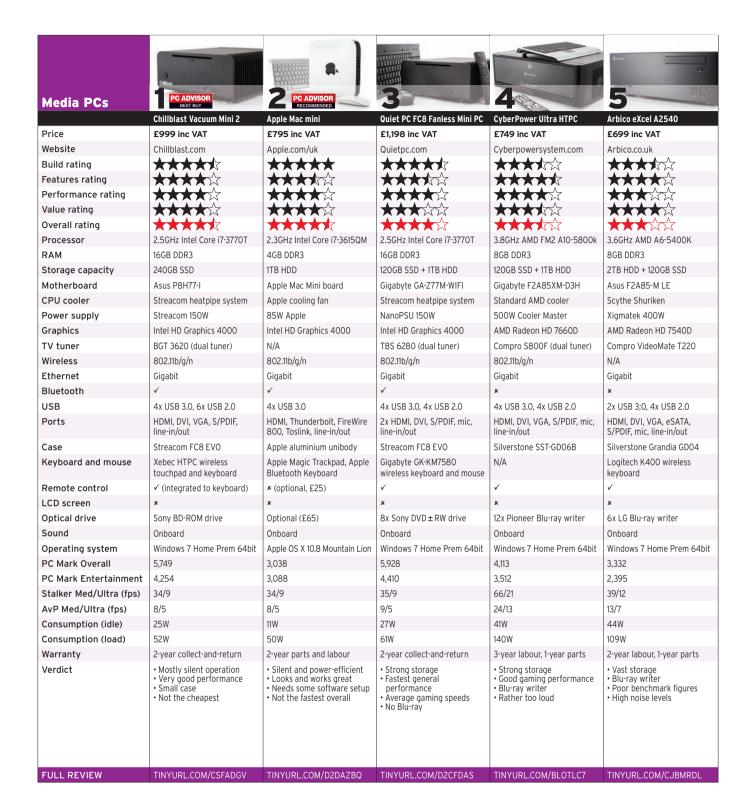
A family PC needs to offer decent performance in every area, able to cater for the needs of each individual – but there are some areas where you can cut costs.

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

Media PCs	**1** PC ADVISOR BEST BUY	**2** PC ADVISOR RECOMMENDED	**3**	**4**	**5**
	Chillblast Vacuum Mini 2	**Apple Mac mini**	**Quiet PC FC8 Fanless Mini PC**	**CyberPower Ultra HTPC**	**Arbico eXcel A2540**
Price	**£999 inc VAT**	**£795 inc VAT**	**£1,198 inc VAT**	**£749 inc VAT**	**£699 inc VAT**
Website	Chillblast.com	Apple.com/uk	Quietpc.com	Cyberpowersystem.com	Arbico.co.uk
Build rating	★★★★½	★★★★★	★★★★½	★★★★☆	★★★★½
Features rating	★★★★☆	★★★½☆	★★★★☆	★★★★☆	★★★★★
Performance rating	★★★★☆	★★★★☆	★★★★★	★★★★★	★★★☆☆
Value rating	★★★★☆	★★★★½	★★★☆☆	★★★★☆	★★★★☆
Overall rating	★★★★½	★★★★½	★★★★☆	★★★½☆	★★★☆☆
Processor	2.5GHz Intel Core i7-3770T	2.3GHz Intel Core i7-3615QM	2.5GHz Intel Core i7-3770T	3.8GHz AMD FM2 A10-5800k	3.6GHz AMD A6-5400K
RAM	16GB DDR3	4GB DDR3	16GB DDR3	8GB DDR3	8GB DDR3
Storage capacity	240GB SSD	1TB HDD	120GB SSD + 1TB HDD	120GB SSD + 1TB HDD	2TB HDD + 120GB SSD
Motherboard	Asus P8H77-I	Apple Mac Mini board	Gigabyte GA-Z77M-WIFI	Gigabyte F2A85XM-D3H	Asus F2A85-M LE
CPU cooler	Streacom heatpipe system	Apple cooling fan	Streacom heatpipe system	Standard AMD cooler	Scythe Shuriken
Power supply	Streacom 150W	85W Apple	NanoPSU 150W	500W Cooler Master	Xigmatek 400W
Graphics	Intel HD Graphics 4000	Intel HD Graphics 4000	Intel HD Graphics 4000	AMD Radeon HD 7660D	AMD Radeon HD 7540D
TV tuner	BGT 3620 (dual tuner)	N/A	TBS 6280 (dual tuner)	Compro S800F (dual tuner)	Compro VideoMate T220
Wireless	802.11b/g/n	802.11b/g/n	802.11b/g/n	802.11b/g/n	N/A
Ethernet	Gigabit	Gigabit	Gigabit	Gigabit	Gigabit
Bluetooth	✓	✓	✓	✗	✗
USB	4x USB 3.0, 6x USB 2.0	4x USB 3.0	4x USB 3.0, 4x USB 2.0	4x USB 3.0, 4x USB 2.0	2x USB 3;0, 4x USB 2.0
Ports	HDMI, DVI, VGA, S/PDIF, line-in/out	HDMI, Thunderbolt, FireWire 800, Toslink, line-in/out	2x HDMI, DVI, S/PDIF, mic, line-in/out	HDMI, DVI, VGA, S/PDIF, mic, line-in/out	HDMI, DVI, VGA, eSATA, S/PDIF, mic, line-in/out
Case	Streacom FC8 EVO	Apple aluminium unibody	Streacom FC8 EVO	Silverstone SST-GD06B	Silverstone Grandia GD04
Keyboard and mouse	Xebec HTPC wireless touchpad and keyboard	Apple Magic Trackpad, Apple Bluetooth Keyboard	Gigabyte GK-KM7580 wireless keyboard and mouse	N/A	Logitech K400 wireless keyboard
Remote control	✓ (integrated to keyboard)	✗ (optional, £25)	✓	✓	✓
LCD screen	✗	✗	✗	✗	✗
Optical drive	Sony BD-ROM drive	Optional (£65)	8x Sony DVD±RW drive	12x Pioneer Blu-ray writer	6x LG Blu-ray writer
Sound	Onboard	Onboard	Onboard	Onboard	Onboard
Operating system	Windows 7 Home Prem 64bit	Apple OS X 10.8 Mountain Lion	Windows 7 Home Prem 64bit	Windows 7 Home Prem 64bit	Windows 7 Home Prem 64bit
PC Mark Overall	5,749	3,038	5,928	4,113	3,332
PC Mark Entertainment	4,254	3,088	4,410	3,512	2,395
Stalker Med/Ultra (fps)	34/9	34/9	35/9	66/21	39/12
AvP Med/Ultra (fps)	8/5	8/5	9/5	24/13	13/7
Consumption (idle)	25W	11W	27W	41W	44W
Consumption (load)	52W	50W	61W	140W	109W
Warranty	2-year collect-and-return	2-year parts and labour	2-year collect-and-return	3-year labour, 1-year parts	2-year labour, 1-year parts
Verdict	• Mostly silent operation • Very good performance • Small case • Not the cheapest	• Silent and power-efficient • Looks and works great • Needs some software setup • Not the fastest overall	• Strong storage • Fastest general performance • Average gaming speeds • No Blu-ray	• Strong storage • Good gaming performance • Blu-ray writer • Rather too loud	• Vast storage • Blu-ray writer • Poor benchmark figures • High noise levels
FULL REVIEW	TINYURL.COM/CSFADGV	TINYURL.COM/D2DAZBQ	TINYURL.COM/D2CFDAS	TINYURL.COM/BLOTLC7	TINYURL.COM/CJBMRDL

>> Buying advice

Media PCs

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You can use any PC to create a media centre, but a quiet system is preferable. It's important to strike a balance between power consumption and performance – not only will the PC probably be left switched on for long periods, but a high-performance processor will generate large amounts of heat, and cooling that chip can involve noisy whirring fans.

Fanless systems can be built using large passive heat sinks or heat pipes, although you can find ultra-quiet tweakable fans if fitting one is unavoidable.

SSDs have no moving parts, making them silent in use. They're expensive, mind, so consider setting up a NAS elsewhere in your home for extra storage.

A TV tuner is desirable; you'll need a dual-tuner to watch and record shows simultaneously.

Also look for a Blu-ray drive and a wireless keyboard and mouse. **READ MORE: TINYURL.COM/CGFOD2K**

Gaming PCs	**1** Chillblast Fusion Firebird PC ADVISOR BEST BUY	**2** Scan 3XS Performance GTX PC ADVISOR RECOMMENDED	**3** Chillblast Fusion Stealth	**4** Overclockers Primo GTX 660 PC ADVISOR RECOMMENDED	**5** Dino PC Dark Claw GTX 670
Price	**£1,199 inc VAT**	**£1,849 inc VAT**	**£1,199 inc VAT**	**£643 inc VAT**	**£1,249 inc VAT**
Website	Chillblast.com	Scan.co.uk	Chillblast.com	Overclockers.co.uk	Dinopc.com
Build rating	★★★★☆	★★★★½	★★★★☆	★★★★☆	★★★★☆
Features rating	★★★½☆	★★★★½	★★★★½	★★☆☆☆	★★★★½
Performance rating	★★★★★	★★★★★	★★★★½	★★★☆☆	★★★★½
Value rating	★★★★★	★★★★☆	★★★★☆	★★★★½	★★★★★
Overall rating	★★★★½	★★★★½	★★★★½	★★★★☆	★★★★☆
Processor	3.5GHz (4.6GHz) Intel Core i7-3770K	3.4GHz (4.6GHz) Intel Core i5-3570K	3.4GHz Intel Core i5-3570K (4.3GHz)	3.1GHz Intel Core i5-3450	3.4GHz (4.5GHz) Intel Core i5-3570K
CPU cooler	Akasa Nero 3	Thermalright Macho	Gelid Tranquillo cooler	Standard Intel cooler	Xigmatek Knighthawk
Memory	16GB DDR3	8GB DDR3	16GB DDR3	8GB DDR3	8GB DDR3
Storage	120GB SSD + 2TB HDD	240GB SSD + 2TB HDD	120GB SSD + 2TB HDD	60GB SSD + 500GB HDD	120GB SSD + 1TB HDD
Power supply	600W Corsair	600W Corsair GS600	680W BeQuiet Straight Power	400W PC Power & Cooling	550W Xigmatek
Motherboard	Asus P8Z77-V	Gigabyte GA-Z77-D3H	Asus P8Z77-V	Gigabyte H61MA-D2V	Asus P8Z77-V LX
USB	4x USB 3.0, 4x USB 2.0	6x USB 3.0, 4x USB 2.0	6x USB 3.0, 4x USB 2.0	2x USB 3.0, 8x USB 2.0	2x USB 3.0, 4x USB 2.0
Screen	23.6in Iiyama X2377HDS (1920x1080)	27in Asus PB278Q (2560x1440)	Not supplied	Not supplied	23.6in Asus VS247H (1920x1080)
Graphics	Palit Jetstream nVidia GeForce GTX 680	EVGA nVidia GeForce GTX 680	Asus nVidia GeForce GTX 670 Direct CU II	Gigabyte nVidia GeForce GTX 660 Windforce 2X	Gigabyte nVidia GeForce GTX 670 OC
Graphics memory	2GB	2GB	2GB	2GB	2GB
Sound	Onboard	Asus Xonar DG 5.1	Onboard	Onboard	Onboard
Connectivity	Gigabit ethernet, 802.11b/g/n	Gigabit ethernet	802.11b/g/n	Gigabit ethernet	Gigabit ethernet
Ports	2x DVI, HDMI, DisplayPort	2x DVI, HDMI, DisplayPort	DVI, VGA	DVI, VGA	2x DVI, HDMI, DisplayPort
Case	Corsair Carbide 200R	Corsair Carbide 300R	Fractal Design Define R4	Xigmatek Asgard II	Corsair Carbide 200R
Keyboard & mouse	Logitech MK260	Corsair K60 keyboard, Corsair M60 mouse	Not supplied	Not supplied	Cyborg V7 keyboard, Cyborg rat3 mouse
Optical drive	BD-ROM/DVD±RW	DVD±RW	BD-ROM/DVD±RW	DVD±RW	DVD±RW
Operating system	Windows 8 64bit	Windows 8 64bit	Windows 8 64bit	Windows 8 64bit	Windows 8 64bit
Extras	Option Family Software package, card reader	Corsair Vengeance 1300 headset	None	None	BullGuard security, surge protector
PC Mark 7	6,498	6,485	6,422	5,507	6,412
Hard Reset	156, 138	149, 129	Not tested	108, 91	150, 131
Lost Planet 2	104, 81	93, 77	Not tested	71, 56	91, 74
Stalker CoP	273, 122	254, 121	Not tested	180, 84	255, 116
Alien vs Predator	113, 61	112, 60	Not tested	82, 43	107, 58
Sniper Elite V2	95, 24	94, 23	Not tested	62, 16	86, 22
Warranty	2-year collect-and-return	1-year collect-and-return, 2-year RTB (parts and labour)	2-year collect-and-return	2-year collect-and-return	3-year PromoCare

Verdict	• Excellent performance
	• Unmatched gaming power
	• High-calibre 23.6in Iiyama
	  IPS monitor
	• Case a little cramped
	• No specialist gaming
	  peripherals
		• Stunning performance
		• Very good 27in flat-panel
		• Minimalist good looks
		• Comes with lots of
		  gaming goodies
		• Rather expensive
			• Stunningly quiet
			• High price takes into
			  account noise reduction
			• Gaming performance
			  good, but not as strong
			  as some here
				• Incredibly cheap price
				• Respectable performance
				• Storage options not great
				• Small and basic case
				• Less versatile motherboard
					• Only a GTX 670, but
					  overclocked to the max
					• Not as fast overall
					  as the Chillblast
					• Nice 23.6in Asus display
					• Impressive input devices
					• No Blu-ray

FULL REVIEW	TINYURL.COM/CFDNSP9	TINYURL.COM/CSVFPTH	TINYURL.COM/BF8RMBD	TINYURL.COM/D288LKL	TINYURL.COM/D9TNXPQ

All gaming scores given at Medium and Ultra settings, measured in fps

>> Buying advice

Gaming PCs

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.

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.
READ MORE: TINYURL.COM/CZXH443

PC ADVISOR TEST CENTRE

Internet security suites

	F-Secure IS 2013	Norton IS 2013	Bitdefender IS 2013	Trend Micro Titanium IS 2013	Kaspersky IS 2013
	PC ADVISOR BEST BUY	PC ADVISOR RECOMMENDED		PC ADVISOR RECOMMENDED	
Annual price	£39 inc VAT	£49 inc VAT	£44 inc VAT	£59 inc VAT	£49 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	f-secure.com	uk.norton.com	bitdefender.co.uk	trendmicro.co.uk	kaspersky.co.uk
Overall rating	★★★★½	★★★★½	★★★★½	★★★★½	★★★★☆
Signature-based detection	99%	99.8%	98.8%	100%	98.1%
Malware blocking (full)	100%	100%	100%	100%	94.4%
Malware blocking (partial)	0%	0%	0%	0%	0%
Clean-up of malware	90%	60%	90%	80%	80%
On-demand scan speed	76 secs	79 secs	121 secs	110 secs	70 secs
On-access scan speed	230 secs	175 secs	341 secs	341 secs	368 secs
Interface design	Very good	Superior	Very good	Very good	Very good
Verdict	• Good value for money • Great scores in most tests • User-friendly interface • Fast scan speed	• Real-world attack scores bode well for its efficacy • Consumes few resources • Polished, simple interface	• Good value for money • Exceptional in some tests • Can slow startup • MyBitdefender a nice touch	• Brilliant performer • Scan times a little low • More guidance required • Expensive	• Excellent at cleaning up infections; not so hot on detection • Impacts system speed
FULL REVIEW	TINYURL.COM/CKKPBWF	TINYURL.COM/8U7W6OA	TINYURL.COM/CAFEHS7	TINYURL.COM/CRZZ73Z	TINYURL.COM/BRY3CTZ

GLOSSARY: • IS: Internet Security

Antivirus software

	Norton AntiVirus	Bitdefender Antivirus Pro	G Data AntiVirus	Kaspersky Anti-Virus	Trend Micro Titanium AV+
	PC ADVISOR BEST BUY	PC ADVISOR RECOMMENDED	PC ADVISOR RECOMMENDED	PC ADVISOR RECOMMENDED	
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 percent	97.5 percent	99.4 percent	95.7 percent	98.4 percent
Malware blocking (full)	96 percent	68 percent	84 percent	88 percent	88 percent
Malware blocking (partial)	0 percent	20 percent	4 percent	4 percent	8 percent
Clean-up of active malware	80 percent	80 percent	80 percent	80 percent	80 percent
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, as in life, you get what you pay for.
READ MORE: TINYURL.COM/7NR8FSM

Sub-£150 printers

	Samsung ML-2955DW	Oki C110	Pantum P2050	Canon MX895	HP Photosmart 7520
	1 PC ADVISOR GOLD	**2** PC ADVISOR BEST BUY	**3**	**4** PC ADVISOR RECOMMENDED	**5** PC ADVISOR RECOMMENDED
Price	£100 inc VAT	£126 inc VAT	£60 inc VAT	£140 inc VAT	£145 inc VAT
Website	Samsung.com/uk	Oki.co.uk	Pantum.com	Canon.co.uk	Hp.com/uk
Overall rating	★★★★½	★★★★☆	★★★½☆	★★★★☆	★★★★☆
Technology	Mono laser	Colour laser	Mono laser	Colour inkjet	Colour inkjet
Max print resolution	1200x1200dpi	1200x600dpi	1200x600dpi	9600x2400dpi	9600x2400dpi
Actual print speed	B=22.2ppm	B=15.8ppm/C=2.5ppm	B=15.8ppm	B=11.9ppm C=7.3ppm	B=17.6ppm C=7.9ppm
Scan/fax facilities	None	None	None	1200x2400 scans, fax	1200x2400 scans
Supported interfaces	USB 2.0, 802.11b/g/n, ethernet	USB 2.0	USB 2.0	USB 2.0, 802.11b/g/n, ethernet	USB 2.0, 802.11b/g/n, HP ePrint
Cost per page	B=2.7p	B=3.6p/C=5p	B=2.4p	B=2.9p/C=12.5p	B=2.4p/C=4.8p
Media card/auto duplex	✗✓	✗✗	✗✗	✓✓	✓✓
Input capacity	251 sheets	100 sheets	150 sheets + manual	150 sheets + 35 ADF	125 sheets + 20 tray + 25 ADF
Dimensions	348x338x197mm	396x380x275mm	380x260x236mm	491x448x218mm	454x551x220mm
Weight	7.2kg	14.4kg	6.1kg	11.7kg	8.6kg
Warranty	1 year	3 years	1 year	1 year	1 year
Verdict	• Speedy for the price • Slim but well-defined text • Reasonable running costs • Wi-Fi/wired network support	• Good value even at £140 • Performs better than an equivalent inkjet • No duplex mode	• Low price for a laser • Decent design • No fancy features • Solid running costs	• Excellent photo quality • Both Wi-Fi and Ethernet • Scans and faxes • Not the fastest printer	• Nice 4.3in touchscreen • Separate photo/ADF trays • Good speed for an inkjet • Competitive running costs
FULL REVIEW	TINYURL.COM/CCLSZDM	TINYURL.COM/YLNO5RV	TINYURL.COM/C764SZ2	TINYURL.COM/92YQ4SF	TINYURL.COM/98G9XTE

£151+ printers

	Kyocera Mita FS-1320D	Lomond EvoJet 2 Office	Xerox Phaser 3320	Kyocera FS-C5250DN	Canon i-Sensys MF4890dw
	1 PC ADVISOR BEST BUY	**2** PC ADVISOR RECOMMENDED	**3**	**4** PC ADVISOR BEST BUY	**5**
Price	£175 inc VAT	£50-£150 per month	£206 inc VAT	£390 inc VAT	£230 inc VAT
Website	Kyoceramita.co.uk	Lomond.com	Xerox.co.uk	Kyoceramita.co.uk	Canon.co.uk
Overall rating	★★★★½	★★★★½	★★★★☆	★★★★½	★★★★☆
Technology	Mono laser	Colour laser	Mono laser	Colour laser	Mono laser
Max print resolution	1200x1200dpi	1600x1600dpi	1200x1200dpi	600x600dpi	600x600dpi
Actual print speed	B=26.1ppm	B=41.4ppm/C=23.1ppm	B=33ppm	B=24.8ppm/C=18.3ppm	B=20ppm
Scan/fax facilities	None	None	None	None	600x600 scan, fax
Supported interfaces	USB 2.0	USB 2.0, ethernet	USB 2.0, ethernet, 802.11b/g	USB 2.0, ethernet	USB 2.0, ethernet, 802.11b/g/n
Cost per page	B=1.4p	Variable	B=1.6p	B=1.2p/C=5.2p	B=2.9p
Media card/auto duplex	✓✓	✗✗	✗✓	✗✓	✗✓
Input capacity	250 sheets	250 + 20 sheets	250 + 20 sheets	500 + 50 sheets	251 + 50 sheet ADF
Dimensions	375x393x250mm	542x455x265mm	366x368x257mm	390x523x397mm	390x445x360mm
Weight	12kg	12.8kg	10kg	30kg	13.4kg
Warranty	2 years	1 year	1 year	2 years	1 year
Verdict	• No frills business laser • Lacks Wi-Fi and ethernet • Modest running costs • Auto-duplex support	• Monthly payment plans rather than outright purchase • Stunning speed • No auto-duplex	• Strong turn of speed • Good print quality • Substantial paper capacity • Plenty of connectivity	• Blistering speed • Huge paper capacity • Colour printing isn't perfect • Hefty	• Strong fax/scan features • Duplex speed falls by only 25 percent • High running costs
FULL REVIEW	TINYURL.COM/6GG9UKV	TINYURL.COM/CLQAQ5V	TINYURL.COM/ARCLM4J	TINYURL.COM/7QMXVZA	TINYURL.COM/AC6AK2N

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/BUX9QM0

PC ADVISOR TEST CENTRE

Blu-ray drives

	LG BH10LS38	Lite-On iHBS212	LG BP40NS20	Lite-On IHES112-115	Buffalo BR3D-12U3
	1 PC ADVISOR RECOMMENDED	2 PC ADVISOR RECOMMENDED	3	4	5
Price	£65 inc VAT	£87 inc VAT	£90 inc VAT	£50 inc VAT	£199 inc VAT
Website	Uk.lge.com	Liteonit.eu	Uk.lge.com	Liteonit.eu	Buffalotech.com
Overall rating	★★★★½	★★★★☆	★★★★☆	★★★½☆	★★★★½
Blu-ray speeds	10x -R, 8x -R DL, 2x -RE, 10x -ROM	12x -R, 8x -R DL, 2x -RE, 8x -ROM	6x -R, 6x -R DL, 2x -RE, 6x -ROM	12x -ROM	12x -R, 12x -R DL, 2x -RE, 8x -ROM
DVD speeds	16x ±R, 8x ±R DL, 6x -RW, 8x +RW, 12x -RAM, 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	16x ±R, 8x ±R DL, 6x -RW, 8x +RW, 5x -RAM, 8x -ROM
Max storage	50GB	50GB	100GB	8.5GB	50GB
Interface type	SATA (internal)	SATA (internal)	USB 2.0 (external)	SATA (internal)	USB 3.0 (external)
Label technology	LightScribe	LightScribe	None	None	None
Software	(OEM – add £5 for software)	CyberLink Blu-ray Suite	PowerDVD, PowerProducer	None	PowerDVD, PowerProducer
Dimensions	146x170x41mm	146x170x41mm	160x153x22mm	158x145x22mm	160x220x50mm
Weight	749g	650g	380g	700g	1.1kg
Warranty	1 year	2 years	1 year	2 years	2 years
Verdict	• Look out for a new 16x version • Attractive front panel • Reliable performance • Very good value	• 12-speed internal writer • Issues during testing • Noisy during operation • Average with 4x media	• 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 • Low price	• 12-speed external writer • Power supply required • Bulky design • Expensive
FULL REVIEW	TINYURL.COM/8YTUJEF	TINYURL.COM/65PXHUJ	TINYURL.COM/BS8UAFF	TINYURL.COM/8SYECMW	TINYURL.COM/453BX7L

Wireless routers

	Apple AirPort Express	D-Link Cloud Router N600	Cisco Linksys EA6500	Asus RT-AC66U	AVM FritzBox Fon 7390
	1 PC ADVISOR RECOMMENDED	2	3 PC ADVISOR BEST BUY	4 PC ADVISOR RECOMMENDED	5 PC ADVISOR BEST BUY
Price	£79 inc VAT	£60 inc VAT	£170 inc VAT	£170 inc VAT	£200 inc VAT
Website	Apple.com/uk	Dlink.com	Linksysbycisco.com	Uk.asus.com	Fritzbox.eu
Overall rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★½
Standards supported	802.11a/b/g/n	802.11a/b/g/n	802.11b/g/n/ac	802.11b/g/n/ac	802.11a/b/g/n
Frequency modes	2.4GHz/5GHz (concurrent)	2.4GHz/5GHz (concurrent)	2.4GHz/5GHz	2.4GHz/5GHz	2.4GHz/5GHz (concurrent)
128/256bit WEP/WPA2	✓✗✓	✓✗✓	✓✗✓	✓✗✓	✓✗✓
ADSL Modem/Guest NW	✗✓	✗✓	✗✓	✗✓	✗✓
Parental cont./mobile app	✓✓	✓✓	✓✓	✓✓	✓✓
Firewall	NAT/SPI	NAT/SPI	NAT/SPI	NAT/SPI	NAT/SPI
Ports	10/100 WAN, 10/100 LAN, USB	Gig WAN, 4x gig LAN, USB	Gig WAN, 4x gig LAN, 2x USB	Gig WAN, 4x gig LAN, 2x USB	10/100 WAN, 4x gig LAN, 2x USB
Average power use	Not tested	Not tested	10.2W	9W	Not tested
Throughput (near, far, ac)	94Mbps, n/a, n/a	142Mbps, 115Mbps, n/a	266Mbps, 195Mbps, 471Mbps	270Mbps, 199Mbps, 457Mbps	92Mbps, 38Mbps, n/a
Dimensions, weight	98x98x23mm, 240g	111x93x145mm, 330g	256x184x40mm, 500g	207x149x36mm, 450kg	226x160x48mm, not specified
Warranty	1 year	1 year	2 years	2 years	5 years
Verdict	• Sleek, flat and square look • Concurrent 2.4/5GHz • Extremely easy setup • Digital audio output	• Cloud features • Parental controls • Excellent value • Interesting looks	• Stunning performance • Excellent interface • Strong QoS • 802.11ac isn't cheap	• Decent value • Versatile antennae • Great for file-hosting and media streaming	• Supports landline and internet telephony • Dual-band Wi-Fi • USB port
FULL REVIEW	TINYURL.COM/6LH6OOS	TINYURL.COM/9LGFF8Y	TINYURL.COM/AWYOPYX	TINYURL.COM/BU79W64	TINYURL.COM/3QUJZBX

>> 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 PC ADVISOR BEST BUY	2 PC ADVISOR RECOMMENDED	3 PC ADVISOR GOLD	4	5
	Seagate FreeAgent GoFlex	WD My Passport Edge for Mac	G-Tech G-Raid Thunderbolt	iStorage diskAshur 256bit	WD My Book Thunderbolt Duo
Price	£170 inc VAT	£60 inc VAT	£575 inc VAT	£172 inc VAT	£400 inc VAT
Website	Seagate.com	Wdc.com/en	G-technology.com	Istorage-uk.com	Wdc.com
Overall rating	★★★★☆	★★★★½	★★★★½	★★★★☆	★★★★☆
Capacity tested	3TB	500GB	8TB	500GB	4TB
Capacity range	1TB to 3TB	500GB	4TB to 8TB	250GB to 1.5TB	4TB to 6TB
Disk size	3.5in	2.5in	3.5in	2.5in	3.5in
Spin speed	7,200rpm	5,400rpm	7,200rpm	5,400rpm	7,200rpm
Transfer speed	94MBps (USB 3.0)	94Mbps (USB 3.0)	329MBps	94Mbps (USB 3.0)	223MBps
Encryption	192bit	Password protection	None	256bit	None
Other interfaces	Optional FireWire 800	None	None	None	None
Software	Memo Backup	WD utilities	None	None	WD Drive Utilities
Dimensions	158x124x44mm	112x83x11mm	235x130x85mm	19x85x120mm	165x157x99mm
Weight	1kg	164g	2.3kg	176g	2.2kg
Warranty	2 years	3 years	3 years	1 year	3 years
Verdict	• Great speed for USB 3.0 • Great value for capacity • Separate storage drive and USB 3.0 dock	• Not just for Macs • Password protection • Faultless build quality • Great value	• Fast Thunderbolt interface • Real-world speed can exceed 200MBps • Pricey, but huge capacity	• 256bit encryption • PINs, self-destruct passwords, anti-hacker tools • 2.5in disk stifles speed	• Thunderbolt interface • Not as fast as some Thunderbolt Raid drives • Quiet and cool operation
FULL REVIEW	TINYURL.COM/BN2Z92F	TINYURL.COM/BMG7SW9	TINYURL.COM/CXEF6MH	TINYURL.COM/CX3DNHY	TINYURL.COM/C6TADAH

NAS drives

	1 PC ADVISOR RECOMMENDED	2 PC ADVISOR BEST BUY	3 PC ADVISOR RECOMMENDED	4	5 PC ADVISOR RECOMMENDED
	Synology DS413	Synology DS412+	Zyxel NSA325	Iomega StorCenter ix2-200	Qnap TS-419P II
Price	£385 inc VAT (diskless)	£470 inc VAT (diskless)	£90 inc VAT (diskless)	£110 inc VAT (diskless)	£390 inc VAT (diskless)
Website	Synology.com	Synology.com	Zyxel.co.uk	Go.iomega.com	Qnap.com
Overall rating	★★★★☆	★★★★½	★★★★½	★★★½☆	★★★★☆
Drive bays	4	4	2	2	4
Processor	1,067MHz Freescale P1022 dc	2.13GHz Intel Atom D2700	1.6GHz processor	1.6GHz ARM Marvell 6282	2GHz Marvell 88F66282
Memory	1GB DDR3	1GB DDR3	512MB DDR2	256MB DDR3	512MB DDR3
Remote access	✓	✓	✓	✓	✓
eSATA	✓	✓	✗	✗	✓
USB port	2x USB 3.0, 1x USB 2.0	2x USB 3.0, 1x USB 2.0	2x USB 2.0	1x USB 2.0	4x USB 2.0
Raid options	0/1/5/5+s/6/10/JBOD	0/1/5/5+s/6/10/JBOD	0/1/JBOD	0/1/JBOD	0/1/5/6/10/JBOD
Software	DSM 4.1	DSM 4.1	zPilot	Iomega StorCenter Manager	TurboNAS 3.6.1
Dimensions	165x203x233mm	165x203x233mm	108x205x147mm	202x99x149mm	177x180x235mm
Weight	2kg	2kg	1.8kg	2.5kg	3kg
Warranty	2 years	2 years	1 year	3 years	2 years
Verdict	• Less powerful than DS412+ • CPU requires less cooling • Versatile, friendly interface • Cloud Station indispensable	• Superb read/write performance eclipses DS413 • Powerful options • Attractive and intuitive	• Cheapest drive here • Decent performance and features for the money • Complex interface	• Low price • Cloud/social media features • Relatively slow transfers • Unattractive admin panel	• Well priced • Robust cabinet construction • Solid performance • Old but effective interface
FULL REVIEW	TINYURL.COM/B562XW3	TINYURL.COM/6UUL4DE	TINYURL.COM/7B9EPW8	TINYURL.COM/BZ2DK38	TINYURL.COM/72N4GBN

>> 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

Projectors

	1 PC ADVISOR GOLD InFocus ScreenPlay SP8600	2 Epson EB-1945W	3 Vivitek Qumi Q2	4 Dell M110	5 ViewSonic Pro8300
Price	£670 inc VAT	£1,370 inc VAT	£395 inc VAT	£325 inc VAT	£850 inc VAT
Website	Infocus.com	Epson.co.uk	Vivitek.co.uk	Dell.co.uk	Viewsoniceurope.com/uk
Overall rating	★★★★½	★★★★½	★★★★☆	★★★★☆	★★★★☆
Projection technology	DLP	3LCD	DLP	DLP	DLP
Resolution (pixels)	1920x1080	1280x800	1280x800	1280x800	1920x1080
Brightness[1], Contrast	1,800, 5,000:1	4200, 3,000:1	300, 2,500:1	300, 10,000:1	3,000, 4,000:1
Image size	300in	280in	30-90in	80in	300in
Supported aspect ratios	16:10, 16:9, 4:3	16:10, 16:9, 4:3	16:10, 16:9, 4:3	16:10, 16:9, 4:3	16:9, 4:3
Noise levels (dB)	30 (26 eco)	37 (29 eco)	32 (28 eco)	36 (32 eco)	33 (29 eco)
Connections	VGA, HDMI, CM, CP, SV, USB	VGA, HDMI, DP, CM, USB, ET	VGA, HDMI, USB	VGA, HDMI, CM, CP, USB	VGA, HDMI, SV, USB
Lamp/lamp life	230W/4,000 hrs	Not supplied/2,500 hrs	LED/30,000 hrs	LED/10,000 hrs	230W/4,000 hrs
Dimensions	326x254x104mm	377x271x108mm	162x102x32mm	105x104x37mm	332x110x264mm
Weight	3.4kg	3.9kg	635g	360g	3.9kg
Warranty	5 years	5 years	3 years	2 years	3 years
Verdict	• Smooth video playback • Full-HD resolution • Great contrast levels • Bright, colourful image	• Incredibly easy to find optimum image quality • Strong spec and quality • Not particularly portable	• Now fantastic value • Lightest model here • DLP-Link enables 3D display • Exceptional lamp life rating	• Ultra-small and -light • Good colour • Long-life LED lamp • Remote control costs extra	• Good brightness levels • Flexible connectivity • Lacks colour depth, and cinematic content suffers
FULL REVIEW	TINYURL.COM/3HQANPV	TINYURL.COM/CP95P7G	TINYURL.COM/3TXMWPK	TINYURL.COM/77S8D6D	TINYURL.COM/9PU6XJS

[1]Ansi lumens GLOSSARY: • CM: component • CP: composite • ET: ethernet • SV: S-Video

Interchangeable-lens cameras

	1 PC ADVISOR RECOMMENDED Panasonic DMC-G3 (14-42mm)	2 Nikon D5200 (18-55mm)	3 PC ADVISOR BEST BUY Nikon D5100 (18-55mm)	4 Canon EOS 600D (18-55mm)	5 Pentax K-01 (18-55mm)
Price	£330 inc VAT	£650 inc VAT	£500 inc VAT	£500 inc VAT	£425 inc VAT
Website	Panasonic.co.uk	Nikon.co.uk	Nikon.co.uk	Canon.co.uk	Pentax.co.uk
Overall rating	★★★★½	★★★★☆	★★★★☆	★★★★☆	★★★½☆
Megapixel rating	16Mp	24.1Mp	16.2Mp	18Mp	16.28Mp
Maximum resolution	4592x3448 pixels	6000x4000 pixels	4923x3264 pixels	5184x3456 pixels	4928x3264 pixels
Optical zoom	3x	3x	3x	3x	N/A
Maximum aperture	f3.5-f5.6	N/A	f3.5-f5.6	f3.5-f5.6	N/A
LCD size	3in	3in	3in	3in	3in
Media card	SD/SDHC/SDXC	SD/SDHC/SDXC	SD/SDHC/SDXC	SD/SDHC/SDXC	SD/SDHC/SDXC
Battery/life	1x lithium-ion/270 shots	1x lithium-ion/660 shots	1x lithium-ion/660 shots	1x lithium-ion/440 shots	1x lithium-ion/540 shots
ISO range	100 to 6,400	100 to 6400	100 to 6,400	100 to 6,400	100 to 12,800
Dimensions	115x84x47mm	129x98x78mm	124x97x79mm	133x100x80mm	121x59x79mm
Weight	336g	555g	510g	570g	480g
Warranty	3 years	3 years	3 years	1 year	1 year
Verdict	• Great dSLR alternative • Rotating touchscreen • Strong video-capture mode • Very fast autofocus	• Easy to use • Excellent image quality • Strong build quality • Versatile 3in screen	• Cheaper, but offers less detail than the D5200 • Suitable for all levels • Good choice of lenses	• Now at an excellent price • Top-notch photo results • Fully auto/manual modes • Strong video capture	• K-mount lens • Impressive image quality • No optical viewfinder • Slower than digital SLRs
FULL REVIEW	TINYURL.COM/7JCXJCR	TINYURL.COM/AJE7VWA	TINYURL.COM/6UTE9KK	TINYURL.COM/72STE88	TINYURL.COM/BOAJTO8

>> Buying advice

Interchangeable-lens cameras

Compact system cameras (or interchangeable-lens cameras) bridge the gap between compacts and digital SLRs. They are ideal for those who want the versatility and quality of a digital SLR, with the ease of use of a compact.

A mirrorless design allows compact system cameras to be smaller than digital SLRs, while the lack of an optical viewfinder means an LCD is used for composition and review. Large sensors allow them to rival an SLR for image quality.

Compact system cameras are ready to shoot in seconds, and most offer burst modes that capture several frames per second.

Although the camera lens can be swapped, not all will be compatible with your chosen model. Panasonic and Olympus both use the Micro Four Thirds system, but Sony has its own E-mount system and Samsung uses NX-mount lenses.

Most compact system cameras record HD video, but the quality varies. If this is a priority, choose a model that can record 1080p video and also has a microphone input. READ MORE: TINYURL.COM/7DPM3SX

Sub-£150 graphics cards

	1 Sapphire HD 7770	2 MSI GeForce GTX 650	3 Sapphire Radeon HD 7750	4 MSI GeForce GTX 650 Ti OC	5 Gigabyte GeForce GT 640 OC
Price	£100 inc VAT	£85 inc VAT	£80 inc VAT	£120 inc VAT	£90 inc VAT
Website	Sapphiretech.com	Uk.msi.com	Sapphiretech.com	Uk.msi.com	Uk.gigabyte.com
Overall rating	★★★★½	★★★★☆	★★★½☆	★★★½☆	★★★☆☆
Graphics processor	AMD Radeon HD 7770	nVidia GeForce GTX 650	AMD Radeon HD 7750	nVidia GeForce GTX 650 Ti	nVidia GeForce GT 640
Installed RAM	1GB GDDR5	1GB GDDR5	1GB GDDR5	1GB GDDR5	2GB DDR3
Memory interface	128bit	128bit	128bit	128bit	128bit
Core/memory clock	1GHz/1,125MHz	1071MHz/1250MHz	800MHz/1,125MHz	954MHz/1,350MHz	1,050MHz/1,800MHz
Ramdac	400MHz	400MHz	400MHz	400MHz	400MHz
Stream processors	640	384	512	768	384
Power connectors	1x 6-pin	1x 6-pin	None	1x 6-pin	None
Interface	PCI Express	PCI Express	PCI Express	PCI Express	PCI Express
DirectX	11.1	11	11.0	11.0	11.0
Digital interface	DVI, HDMI, Mini-DisplayPort	2x DVI, Mini-HDMI	DVI, HDMI, DisplayPort	2x DVI, 1x Mini-HDMI	2x DVI, HDMI
Warranty	3 years	3 years	2 years	2 years	3 years
Verdict	• Faster than 650 and 7750 • Decent value for money • Plenty of stream processors • Low sound levels	• 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	• Plenty of performance • Good set of specifications • Hampered by 128bit memory interface	• Costs more than 7750 • Falls far behind 7770 • The best version of this card • Three digital connectors
FULL REVIEW	TINYURL.COM/BWJ7BL9	TINYURL.COM/AKT2XOM	TINYURL.COM/7ZB5OE3	TINYURL.COM/8Z5BDCZ	TINYURL.COM/9OSWMK2

£151+ graphics cards

	1 PC ADVISOR RECOMMENDED MSI GeForce GTX 670	2 Zotac GeForce GTX 680	3 Asus GTX 660 Ti	4 Asus HD 7870 DirectCU II	5 XFX 7970 3GB GDDR5
Price	£290 inc VAT	£380 inc VAT	£240 inc VAT	£200 inc VAT	£320 inc VAT
Website	Uk.msi.com	Zotac.com	Uk.asus.com	Uk.asus.com	Xfxforce.com
Overall rating	★★★★½	★★★★½	★★★★☆	★★★½☆	★★★½☆
Graphics processor	nVidia GeForce GTX 670	nVidia GeForce GTX 680	nVidia GeForce GTX 660 Ti	AMD Radeon HD 7870	AMD Radeon HD 7970
Installed RAM	2GB GDDR5	2GB GDDR5	2GB GDDR5	2GB GDDR5	3GB GDDR5
Memory interface	256bit	256bit	192bit	256bit	284bit
Core/memory clock	965MHz/1,502MHz	1,006MHz/1,502MHz	915MHz/6,008MHz	1GHz/1.2GHz	925MHz/1,375MHz
Ramdac	400MHz	400MHz	400MHz	400MHz	400MHz
Stream processors	1,344	1,536	1,344	1,280	2,048
Power connectors	2x 6-pin	2x 6-pin	2x 6-pin	2x 6-pin	1x 6-pin, 1x 8-pin
Interface	PCI Express	PCI Express	PCI Express	PCI Express	PCI Express
DirectX	11.0	11.0	11.0	11.1	11.1
Digital interface	2x DVI, HDMI, DisplayPort	2x DVI, HDMI, DisplayPort	2x DVI, HDMI, DisplayPort	DVI, HDMI, 2x Mini-DP	DVI, HDMI, 2x Mini-DisplayPort
Warranty	2 years	5 years	2 years	2 years	2 years
Verdict	• Almost on a par with 7970 • Low power consumption • Same memory bandwidth as GTX 680	• Fastest single-GPU card • Low power consumption • Price drop to 7970 weakens this card's value for money	• Faster than 7870 • Nicely priced • Can boost clock to 1,058MHz • Compares well to GTX 670	• GTX 660 Ti is better value • Cheaper than GTX 670, but behind on framerates • Modest power consumption	• Good performance • Not as powerful or as efficient as GTX 680 • Close to 7870 on value
FULL REVIEW	TINYURL.COM/CRDW78J	TINYURL.COM/C6C37QO	TINYURL.COM/D5BV2NG	TINYURL.COM/BUFMAFF	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 256bit interface lets through twice as much data as a 128bit 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

Sub-£200 flat-panels

	BenQ GW2750HM	ViewSonic VP2365-LED	AOC i2353Fh	ViewSonic VX2460H-LED	Hanns-G HL249DPB
	1 PC ADVISOR RECOMMENDED	**2**	**3** PC ADVISOR GOLD	**4**	**5** PC ADVISOR RECOMMENDED
Price	**£180 inc VAT**	**£180 inc VAT**	**£145 inc VAT**	**£157 inc VAT**	**£120 inc VAT**
Website	Benq.co.uk	Viewsoniceurope.com/uk	Aoc-europe.com	Viewsoniceurope.com	Hannsg.com
Overall rating	★★★★☆	★★★★☆	★★★★½	★★★☆☆	★★★★☆
Screen size	27in	23in	23in	23.6in	23.6in
Panel type	Vertical alignment	In-plane switching	In-plane switching 3D	Twisted nematic	Twisted nematic
Native resolution	1920x1080 pixels	1920x1080 pixels	1920x1080 pixels	1920x1080 pixels	1920x1080 pixels
Pixel pitch	0.31mm	0.27mm	0.27mm	0.27mm	0.27mm
Brightness	313cd/m²	238cd/m²	225cd/m²	250cd/m²	247cd/m²
Static contrast ratio	1,530:1	681:1	666:1	710:1	740:1
Response time	6ms	6ms	5ms	5ms	5ms
Ports	HDMI, DVI, VGA	DVI	2x HDMI, VGA	2x HDMI	DVI
Dimensions	654x489x191mm	548x433x250mm	550x388x188mm	581x447x194mm	563x211x403mm
Weight	5.6kg	5.4kg	5.6kg	3.5kg	3.8kg
Warranty	3 years	3 years	3 years	3 years	3 years
Verdict	• Massive 27in screen • VA panel is excellent • Superb contrast ratios • Colour accuracy not perfect	• Better value than ever • Great quality • Good viewing angles • DVI port only	• Wide viewing angles • Excellent colours • Attractive, slimline deign • No DVI connection	• Slim and stylish looks • Good range of inputs • One of the better examples of TN technology	• Low price • Pleasing image quality • Low power consumption • Only a TN panel
FULL REVIEW	TINYURL.COM/BQKT65S	TINYURL.COM/5WMJLR9	TINYURL.COM/7TWLB2A	TINYURL.COM/CSQ2H7P	TINYURL.COM/C95859A

£200+ flat-panels

	Dell S2440L	Asus PA248Q	AOC I2757Fm	ViewSonic VP2765-LED	Philips 248X3LFHSB
	1 PC ADVISOR RECOMMENDED	**2**	**3**	**4**	**5**
Price	**£201 inc VAT**	**£335 inc VAT**	**£230 inc VAT**	**£360 inc VAT**	**£210 inc VAT**
Website	Dell.co.uk	Asus.com/uk	Aoc.co.uk	Viewsoniceurope.com/uk	Philips.co.uk
Overall rating	★★★★☆	★★★★☆	★★★★☆	★★★½☆	★★★½☆
Screen size	24in	24in	27in	27in	23.6in
Panel type	Vertical Alignment	In-plane switching	In-plane switching	Advanced MVA	Twisted nematic
Native resolution	1920x1080 pixels	1920x1200 pixels	1920x1080 pixels	1920x1080 pixels	1920x1080 pixels
Pixel pitch	0.28mm	0.27mm	0.31mm	0.31mm	0.27mm
Brightness	239cd/m²	201cd/m²	237cd/m²	1,200cd/m²	326cd/m²
Static contrast ratio	1,200:1	630:1	660:1	378:1	800:1
Response time	6ms	6ms	5ms	25ms	2ms
Ports	HDMI, VGA	4x USB, HDMI, DVI, DP, VGA	2x HDMI, VGA	DVI, DisplayPort	2x HDMI
Dimensions	568x191x418mm	557x416x235mm	622x449x130mm	642x365x474-608mm	578x443x194mm
Weight	3.6kg	6.4kg	5.7kg	8.5kg	5.1kg
Warranty	3 years	3 years	3 years	3 years	3 years
Verdict	• Premium build quality • Very good VA panel • Excellent contrast ratio • Calibrate for best results	• For graphics professionals • Good control over image • Very accurate colour • 16:10 contrast ratio	• Nice 27in IPS panel • Versatile viewing angles • MHL Android hook-up • Base can be removed	• Large 27in display • Low resolution for size • Poor viewing angles • Slow response for games	• Graceful design • Illuminated Lightframe bezel reduces eye fatigue • Twisted nematic panel
FULL REVIEW	TINYURL.COM/CXWJJLM	TINYURL.COM/CPYX7MQ	TINYURL.COM/C53K8KP	TINYURL.COM/86T3PFM	TINYURL.COM/6MJA2NS

>> 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

JIM
MARTIN

Smart watches: coming soon to a wrist near you

Rumours of an iWatch are echoing around the internet, and we wouldn't be surprised to see one materialise this year. Wearable computers are about to become big business, and Apple needs another innovative product to capture punters' hearts – and wallets.

Tech watches have come and gone over the past few years, with the Pebble the talk of CES 2013. Smart watches are in essence companion products to smartphones, offering a convenient extra display for text messages, incoming call notifications and more.

But do we really need another device to add to our already burgeoning collection of PC, laptop, tablet and smartphone?

If you frequently miss important calls and texts because you've inadvertently left your phone in silent mode, or you're simply in a noisy environment, a smart watch could be useful. It may also appeal if you tend to be glued to your Twitter and Facebook feeds.

Plus, it's hard to argue with the wow factor. I've been wearing a Nike+ FuelBand for four months and, when lit, the simple LED display has never failed to elicit a stunned response from onlookers. The Pebble's E-Paper screen is probably more impressive, remaining sharp and readable even in bright sunlight – just like an e-book reader.

If Apple's fabled iWatch is a hit, just about every other consumer electronics manufacturer will be falling over themselves to produce one. Sony's £89 Smart Watch (pictured above) is already on sale, serving up notifications from Android devices from its 1.25in OLED display.

Whether people will be willing to stump up £200 for a wearable iOS device remains to be seen. But if Apple and other makers also integrate fitness functions – à la Fuelband and Fitbit – then smart watches could well be the next big tech gadget. ⊠

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TEST CENTRE **Touchscreen laptops on test**
You need a touchscreen to take advantage of Windows 8's Modern interface. We test touch-friendly laptops to see how they stack up.

TEST CENTRE **Small-form-factor PCs**
A tiny PC can sit unobtrusively in any room of the house, not seen and hopefully not heard. We test six of the latest models.

TEST CENTRE **Laptop speakers**
More and more catch-up TV is available through your laptop's browser, but its built-in speakers probably aren't up to the job. We review six speaker sets that can boost audio quality.

Windows 8 versus OS X Mountain Lion
We run head-to-head the latest desktop operating systems from Microsoft and Apple, assessing how they compare on everyday tasks and more.

Fitness tech
Struggling to maintain your New Year's get-fit resolutions? We investigate how technology can help, from wearable gadgets that track your movements to virtual fitness coaches for your Xbox.

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