TECH ADVISOR

MateBook X Pro:

Why Huawei's awesome ultraportable is the laptop of the year

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OneDrive and Outlook get ransomware cover

The OneDrive protection is available now, while Microsoft will beef up Outlook.com over the coming weeks, writes MARK HACHMAN

I f your PC is infected with ransomware, it will spread from file to file, encrypting them until you pay the bad guys for the digital key. But ransomware can also spread to your files stored in the cloud, and that's what Microsoft's new OneDrive protections are designed to address.

The firm has announced the ability to 'roll back' the files stored in OneDrive to versions stored up to a month ago, to help you return to a point before you were infected by malware. The company also said it will use its automated threat-detection systems to figure out when the ransomware began infecting those files and alert you via your phone that an infection has taken place.

Microsoft announced additional protections for sharing and reading files stored on OneDrive and emailed via Outlook.com, the web-based version of Outlook, including encrypted email. The catch? You'll have to subscribe to Office 365, Microsoft's subscription service that also includes access to PowerPoint, Excel, Word, and the other Office apps. The Outlook protections aren't yet available to the Office 365 version of Outlook.

"With the growing presence and sophistication of online threats like viruses, ransomware, and phishing scams, it's increasingly important to have the right protection and tools to help protect your devices, personal information, and files from being compromised," Kirk Koenigsbauer, the corporate vice president for Office, wrote in a blog post.
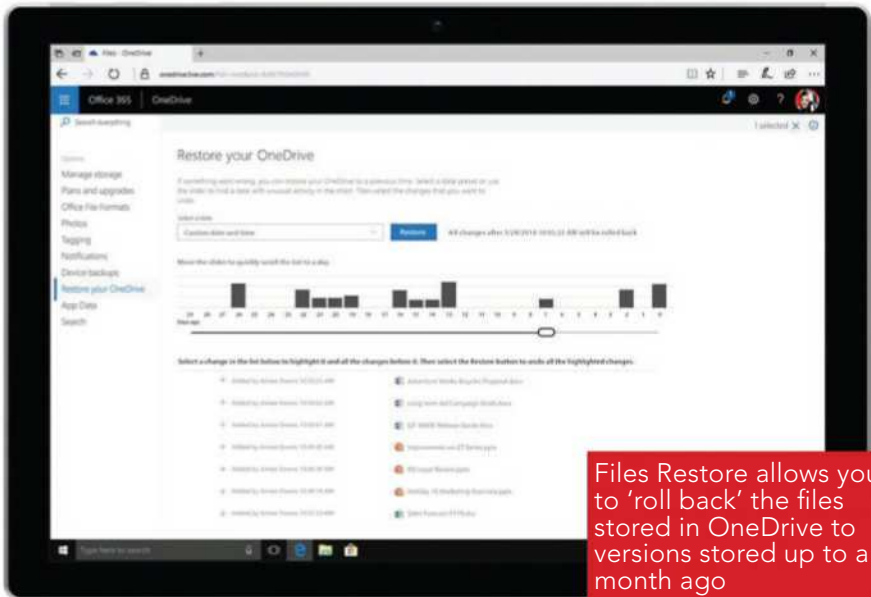
Appealing solution

Though smart surfing and other good Internet practices are your first defence against malware, including ransomware, it does happen. And if ransomware infects your PC, it tries to infect other computers on your network, including persistent connections to cloud storage. Erasing all your files and refreshing your PC

would be an appealing solution – if it didn't mean losing all of your files. Microsoft is pitching OneDrive as a solution: upload all your critical files before your PC is infected. Even if the OneDrive stash becomes infected, you'll be able to access an older, uninfected version.

Cloud protections in place

What's new is that Microsoft has adapted its Files Restore capability – previously only for OneDrive for Business – and brought it into Office 365 subscriptions for home users. Not only will Microsoft detect an attack, but you'll be notified by any channels that the firm would normally use to send you messages: email, a popup notification, and more. Then, you'll be able to enter OneDrive and essentially 'roll back' to an earlier

Files Restore allows you to 'roll back' the files stored in OneDrive to versions stored up to a month ago

day. You'll want to pick a day before Microsoft alerted you about the attack, naturally.

Microsoft has also taken security within Outlook a step further: Now you can password-protect links to folders or files. That's handy as previously, there was really no real way to protect links to files or folders from being shared to anyone. Both the ransomware detection and link protections are available now, it said.

If you are concerned about those links being forwarded, Microsoft has begun to address that, too. In Outlook.com, you now have the option of encrypting a file or preventing it from being forwarded, or both simultaneously.

It's not clear how well Microsoft has secured files in Outlook versus, say, PGP, but the firm said you'll be able to encrypt a file sent via Outlook.com, then read it within Outlook for iOS/Android or the Windows Mail app. (Microsoft doesn't maintain the encryption if you respond to that email, though, or author another one from those other apps.) If you turn on the prevent-forwarding option, Microsoft will also encrypt the email, as well as any Office documents you've attached.

Password-protected sharing links, email encryption, and forwarding prevention will start rolling out in the coming weeks, Microsoft said.

It added that, later this year, the company will automatically begin checking links within Word, Excel, or PowerPoint. If that link links to a suspicious site, you'll be flagged. Outlook.com already sniffs your links for potential malware.

Qualcomm-powered PCs to get 64-bit apps

Microsoft plans to announce an ARM64 developer kit preview at its Build conference in May, reveals MARK HACHMAN

Windows PCs that use the battery-sipping Qualcomm Snapdragon ARM processor are just beginning to roll out, but they include some major caveats. One of them, the inability to run 64-bit apps, doesn't appear to be going away anytime soon.

According to a Microsoft representative, the company will "share more details" on a preview of its ARM64 software development kit (SDK) at its Build developer conference at the beginning of May. It's unclear when the preview version of the SDK will be

released, when a final version will debut, or when apps based upon it will roll out to end users.

A roadblock for users

PCs such as the Asus NovaGo currently include a 64-bit version of the Windows operating system, but will only run 32-bit apps. (Virtually all of today's PCs include a 64-bit version of Windows, and 64-bit apps.) The real difference between 32- and 64-bit apps concerns the amount of memory they can address; 32-bit apps are limited to 4GB of memory, meaning that some high-performance creative apps and games might not be able to run.

On one hand, that might not be a significant problem for PCs like the NovaGo, which have been marketed as an always-connected, all-day computer rather than a performance powerhouse. But Windows also blocks 64-bit apps from being installed from the Store or elsewhere. That roadblock will go away once 64-bit apps are supported on ARM.

The other sacrifice that owners of a Qualcomm Snapdragon PC have to make is to tolerate that apps written for the Intel Core chips have to be emulated, or interpreted – a translation feature that slows down the app somewhat. The good news, Microsoft representatives added, is that as more developers check in code compiled for the ARM processor – either using the 32-bit SDK or, eventually, the 64-bit version – the Microsoft Store app will automatically download the updated apps to users. So while buying a Qualcomm-powered Always Connected PC currently carries with it several caveats, things should improve over time.

Huawei MateBook X Pro

€1,499 (around £1,300) ★★★★⯨

H uawei's new MateBook X Pro builds on its predecessor – which was the firm's first-ever laptop – with upgrades galore including a touchscreen, better performance and a lower price.

It's called the X Pro rather than the X2 because the firm is pitching it against MacBook Pro and hoping that the lower price (and Windows) will tempt buyers away from Apple's offering.

Price

At the time of writing Huawei hasn't yet announced when it will go on sale, or any UK pricing. The official

line is that it will be launched in Q2, which means it should be out by the end of May.

Suffice to say that there are three main models: two with a Core i5 and one with a Core i7. They're also better specified than the equivalent MacBook Pro:

€1,499: i5/8GB/256GB
€1,699: i5/8GB/512GB
€1,899: i7/16GB/512GB

Design

This is undeniably a great-looking laptop. It also feels reassuringly well built and is light to carry around, possibly diminutive enough to fit into the tablet pocket of your backpack too.

Comparisons with the MacBook Pro are inevitable as Huawei has taken much inspiration from Apple in the MateBook X Pro's design. Flip it over and you'd be hard pushed to tell which is which: even the screws are in the same positions.

If you're familiar with the old MateBook X – a laptop that wasn't widely available to buy in the UK – you probably will notice the screen has grown and the bezels shrunk.

In a chassis that's basically the same size, Huawei has managed to fit a 13.9in panel and increased the resolution to 3,000x2,000 pixels. It has also added a touch layer so you can use all 10 digits on it simultaneously. A sheet of Gorilla Glass covers the entire display, running right to the edges of the lid.

However, the hinge design hasn't changed so the screen stops at around 130 degrees – it doesn't fold flat

against the desk or even underneath the keyboard for a tablet mode. That's not really a problem as such as this isn't meant to be a convertible or hybrid.

Build quality is top-notch and there's the same all-metal unibody design with diamond-cut edges and a sandblasted satin finish. Huawei's flower logo is now on the lid alongside the company's name and it certainly looks good even if it'll be unfamiliar to many who see it. You can open the screen with one finger and the base remains on the desk: the hinge's stiffness is perfect.

In a bid to trump the MacBook Pro, the new MateBook is fractionally thinner (by 0.3mm) and lighter (by 400g) than its rival.

The trackpad is bigger than before and the backlit keyboard is now spill-proof. As there's no room for a webcam above the screen, Huawei has cleverly hidden it in the keyboard. Just press it and up it pops, ready for action (see opposite). When you don't need it, it's hidden out of sight: handy for security, too.

Its position is far from ideal, though. As with other laptops that place the webcam below the screen, the viewing angle is less than flattering. In the MateBook X Pro's case, the camera points at your chest rather than your face if you sit in a normal working position. So you'll have to move back further than normal if you want your face to be in the shot on video calls.

Four mics are present and allow far-field use. That means you can stand the other side of the room and talk to your audience, or ask Cortana for assistance.

As with its predecessor, the power button has a built-in fingerprint sensor, which is compatible with Windows Hello.

From a cold boot, it'll take just 7.8 seconds until you see Windows 10's login screen and it's marginally quicker if the laptop's already in hibernation mode. The fast start-ups aren't exaggerated: we've measured similar times in our own tests.

On the sides, ports are swapped around a little. Instead of a USB-C port on either side, you'll now find a traditional rectangular USB port on the right. That's useful because no-one wants to have to carry an adaptor just to plug in a flash drive.

There are two USB-C ports, but they're now on the left. One can be used for data and charging, and the other supports Thunderbolt 3, which means you can hook up an external graphics card.

We're unconvinced many people will want to spend a lot of money on a graphics card and a special external PCIe enclosure to play games on a 14in laptop, but it's possible nonetheless.

The X Pro's webcam is located in the keyboard, meaning it's hidden out of sight when you don't need it

It's good to see a standard headphone socket, but disappointing not to find any kind of card reader.

The top-spec model, which we are reviewing here, has a Core i7 processor, the 8th-gen 8550U. It also has 16GB of RAM, a 512GB NVMe SSD and an Nvidia MX150 graphics chip. The latter means you can have reasonable gaming performance without stumping up for an external GPU.

In the lower-spec version is an i5-8250U, 8GB of RAM and no separate GPU. That means you get essentially the same graphics power as the original MateBook X which also used the Intel chip's built-in graphics. And it isn't much cop for gaming.

Oddly, the hard drive on our review model is partitioned into 80GB for Windows 10 and 380GB for your files. This is far from ideal, since Windows updates and apps (which you'll install on the C: drive by default) will quickly fill it up.

Another upgrade is the audio system. There are now four separate speakers, with tweeters added alongside the stereo woofers. There's Dolby Atmos branding again. Sound is very good for a laptop this thin. The speakers offer a good stereo soundstage, and even good surround effects. They're reasonably loud, but sound does get a little muddy at very high volumes when there's a lot going on in the soundtrack. But at normal listening levels, it's great.

LPTS display

Returning to the screen for a moment, Huawei has used the same LTPS technology it uses in some of its phones. It's an LCD panel, which uses a different

type of silicon to regular LCD displays. Put simply, this allows higher resolutions and lower temperatures, and also happens to be cheaper to manufacture. A win-win situation, really.

In use, the screen is excellent with great detail, colours, contrast and viewing angles. The downside to a glass screen is that it's highly reflective so you might have struggle to see what you're doing if there's bright light hitting it.

If you didn't know better, you'd assume it was an IPS screen, and with those thin bezels, it looks wonderful.

Keyboard and touchpad

The touchpad is large, like the MacBook's, and with Windows 10 you can use all sorts of gestures to navigate: two fingers to scroll up and down, three fingers to switch between apps and pinch-to-zoom.

The keyboard has a US layout

The keyboard is spill-proof and backlit and the keys have just the right amount of travel and resistance. The only niggle is that – like the MacBook Pro – the keyboard has a US layout that places the @ symbol on the 2 key instead of a UK keyboard, which has it on the ' key.

Performance

Performance is as good as you'd expect from an Intel Core i7/Nvidia MX150 combo. Windows 10 Home is very responsive, largely thanks to the NVMe SSD which far exceeds the read and write speeds you get with a standard SATA-connected SSD – over 3GB/s for reading and around 1.3GB/s for writing.

However, the MateBook X Pro does get warm. Even browsing certain websites can cause it to heat up, and the fan kicks in more regularly that you might like. It's not an obtrusive sound, but still noticeable in a quiet room or office.

For such a thin and light laptop, the 15X is pretty powerful

Running especially intensive apps causes internal temperatures to rise even more, with the fan running at full speed during benchmarks. That isn't particularly surprising, but something worth bearing in mind if you're planning to do a lot of video editing or gaming.

The MX150 graphics chip is a lot more powerful than the Intel UHD 620. In the 3DMark Fire Strike test, it scored 2574. That's more than double the score from the Intel GPU which managed only 1083. However, the MX150 isn't as quick as a GTX 1050. Oddly, though, Dell no longer sells an XPS 13 with one of those and sticks exclusively with the UHD 620 for the 2018 range.

The bottom line here is that the Nvidia chip offers enough power for playing games at medium resolutions and graphical quality settings. And that's pretty amazing in a laptop this thin and light.

Battery life

Huawei quotes a run-time of 12 hours for playing back HD video. It also says that using the bundled USB-C charger for 30 minutes will provide around six hours of use.

The original MateBook X lasted around 10 hours in our tests, which is good but not outstanding. And it's the same story with the X Pro. Running a video on loop with brightness set to 120cd/m² saw the battery last a hair over 10 hours.

In the real world , we saw roughly eight hours of use which isn't wonderful, but when you consider the power on tap, it's not terrible. Plus, the power supply is small and light so you can take it with you.

Huawei has installed a power profile which it reckons makes the laptop around 15 percent more power efficient than the original, but the aggressive screen time outs (just 15 seconds of inactivity) quickly become annoying so you'll probably want to change it to a couple of minutes at least.

The same power profile could also be responsible for the dim maximum brightness that's set by default. When you disable auto-brightness you can turn it up to much more acceptable levels.

Verdict

At the time of writing, we're still waiting for UK and US pricing. Huawei has promised it will be "disruptive" and going by the Euro prices, it certainly offers better specifications than the MacBook Pro for the same or less money. Whether it undercuts the entry-level

The display has a touch layer that you can use 10 digits on simultaneously

Dell XPS 13 remains to be seen, but neither of these rivals have the option of an Nvidia MX150 GPU, so the MateBook outperforms them when it comes to graphics power. Whichever way you look at it, though, the MateBook X Pro is a contender for this year's best laptop. It's much the same as its predecessor: a premium ultraportable that's well designed and has plenty of power on tap. Jim Martin

Specifications
- 13.9in (3,000x2,000, 260ppi) LTPS touchscreen
- Windows 10 Home
- 8th Generation Intel Core i5-8250U/Core i7-8500U CPU
- 8/16GB LPDDR3 RAM
- 256/512GB NVMe PCIe SSD
- Wi-Fi 802.11a/b/g/n/ac, 2.4/5GHz 2x2 MIMO
- Bluetooth 4.1
- 1x USB-C
- 1x Thunderbolt 3
- 1x USB-A
- Pop-up webcam
- Front-facing 1Mp camera
- 3.5mm headset jack
- 57.4Wh lithium-polymer battery
- 304x217x14.6mm
- 1.33kg

Gigabyte Aero 15X v8

£2,399 inc VAT from **fave.co/2HlXIWo** ★★★★½

The Gigabyte Aero 15X is the most powerful gaming laptop we've tested. Sure, this is only because it's the first to use one of Intel's new 8th-generation Core i7 laptop processors, but it is reason for excitement nevertheless. It also fits incredible gaming performance into a frame slim and light enough to carry around.

The 15X doesn't have the style of a Dell XPS 15 or MacBook Pro 15, or the keyboard customization of a Razer. But the screen is fantastic, the hardware powerful and gaming performance terrific for the weight.

Price

As one of the first gaming laptops with an 8th-generation Intel CPU, it's tricky to gauge the Gigabyte Aero 15X's price in context. However, we do know it's not cheap, with the entry-level model costing £1,999.

We reviewed the top-end version of the laptop, with a 4K/UHD screen and GeForce GTX 1070 Maxi-Q graphics card, which costs £2,399. Drop down to 1080p display resolution and you pay £2,199.

With the 1080p, GTX 1060 CPU at £1,999, we expect it to be somewhat less expensive than the comparable laptops from top brands like Alienware. However, as with any performance machine like this, you have to swallow the idea you could build a much more powerful desktop for the same money.

Design

This is not the first Aero 15X we've tested. Last year Gigabyte released a version with a similar graphics card, but an older processor and less impressive screen. The insides have changed, he casing not so much.

It's an angular 15in laptop that's significantly thinner and lighter than most high-end gaming systems. It weighs 2kg and is 20mm thick. These aren't the sort of dimensions we look for in a computer to carry around, but it's impressive considering the gaming power inside. It's only around 200g heavier than a 15in MacBook Pro, and around 5mm thicker. It's radically more portable than an Alienware 15, for example, which weighs 3.5kg and is 25mm thick.

If you're just looking for a laptop to use at home, we wouldn't necessarily suggest you look at the Gigabyte

15X first. There are trade-offs to gaming laptops this slim, but if you want to take it out and about with you, this is a great choice.

The 15X is also less of a conspicuous gamer's machine than much of the competition. Its keyboard lettering does look like it's been inspired by *The Matrix*, but there are no colourful slashes on the lid, no LEDs across its sides and no giant aggressive-looking heat outlets. It's only the keyboard font and the carbon fibre finish on part of the lid that add a little gamer flair.

We like this more subdued style, although we're in the area of pure personal preference. And we do also like the smoother style of the Razer Blade a little more.

There are a lot of severe angles in the 15X. The edge of the keyboard is relatively sharp, the sides of the laptop are almost corrugated for a slight industrial look, and perhaps better strength.

The build is very good – the lid, the keyboard surround and the lower panel are all aluminium although it doesn't feel overtly so. A lot of top-end gaming laptops use plastic for all surfaces but the lid. Here you get closer to the feel of a premium non-gamer model where parts flex significantly less under finger pressure: always a good sign.

Connectivity and audio

Most laptops in the 'thin and light' class are shifting over to using USB-C connectors. The 15X, thankfully, has not. It has a wide array of connectors. There are three full-size USBs and one USB-C with Thunderbolt 3. For video there's a DisplayPort and full-size HDMI. You also get a full-size Ethernet RJ-45 and an SD slot.

The 15X has a wide array of connectors

That we used the term 'full-size' three times there tells you how little Gigabyte has compromised to make the 15X slimmer. This connection array is exactly what we want in a portable gaming laptop. You don't need a set of adaptors, nor do you need a dock.

Other things to note include the way the slim display bezels push the webcam underneath by the hinge, making its angle somewhat awkward.

The speakers are not particularly good either. Top volume is conservative, there's no bass and treble is tame. They don't sound ugly, but you wouldn't want to use them regularly for gaming.

Keyboard and trackpad

The 15X has one of the smoothest trackpads of any laptop. It feels similar to those of Dell's excellent XPS models. Its surface is textured glass, and the smoothness comes from using a much finer texture. This is a good pad for general productivity work, although we're not huge fans of its button zoning. For a while

you'll probably accidentally right-click when you mean to use the left button. It's not as good for gaming as it is for general jobs, as separate buttons work better.

However, as with any serious laptop built for games, you will almost certainly plug in a mouse for longer sessions. There are currently a few issues with the pad driver too, as it has a habit of freezing momentarily every now and then.

The keyboard is very good, with meatier key resistance and longer travel than most of this size. It's a welcome upgrade from the shallow and light feel of the average ultraportable laptop. It may take a few days to get used to the way the keyboard is shifted slightly left of centre to fit in the numberpad, which is one reason the 15in MacBook Pro doesn't have one. However, if you're a serious gamer you'll want a numberpad.

As you can see, the 15X's keyboard is backlit, and able to display 16.8 million colours: just about any tone

The backlit keyboards colours all look 'true'

you like. All colours look 'true', where some multicolour backlight LEDs tend to struggle to make whites actually appear white. Unfortunately, Gigabyte's keyboard customization software is not the best. While there's per-key lighting, you can't set it per key, or even use zones. You have a large choice of animated presets, some of which will give you a headache, or a single colour across the keyboard. This didn't put us off as we like a one-colour backlight, but it may disappoint those who like to go to town with the lighting.

Display

The Gigabyte Aero 15X we reviewed last year had a very solid display with good colour and contrast. This 2018 model makes significant upgrades bringing it much closer to a pro-level screen.

It's 15.6 inches across and uses an LCD panel, which is standard stuff, but its colour and contrast are excellent. It covers 99.8 percent of sRGB, 96.5 percent of Adobe RGB and 86.4 percent of DCI P3.

When we also include the tones rendered outside of these gamuts, those figures rise to 143.3 percent (sRGB), 98.8 percent (Adobe RGB) and 101.6 percent (DCI P3). These are exceptional scores. The 15X's colour depth is far better than the vast majority of laptops at any price. Colour accuracy is also much higher than average among ultra-premium laptops.

We're glad that Gigabyte has also reined this in, though. Windows 10 running at this full colour depth can look sickly. As standard, the 15X uses a Pantone colour mode that has the warm look you get with a professionally calibrated display, and properly

controlled colour. Contrast is excellent too at 1524:1. You won't find much better than this in a laptop with an LCD screen.

Maximum brightness is 387cd/m², which is great and far more than you'll need indoors. As the laptop has a matte screen, it'll even hold up well outside. The screen's surfaces diffuses reflections.

The area around the screen is worth noting, too. Like Dell's XPS 15, there's barely any screen border, apart from below it. It's not a touchscreen, but that's not expected for a gaming laptop.

As we mentioned at the start of this review, we're reviewing the top-end 4K version of the 15X, so you likely won't get this standard-setting performance from the 1080p version. It is also worth remembering that while this is a very powerful laptop, it doesn't have

The 2019 15X's display is a huge improvement over last year's model

enough power to play the most demanding games at 4K resolution.

As for criticisms, the only annoyance we've noticed is that the 15X switches briefly, and awkwardly, between its native colour mode and the calibrated Pantone one on boot-up. Much like the keyboard, it's the Gigabyte software that lets the 15X down, if only in a small way.

Performance

This is the first gaming laptop we've reviewed to have one of Intel's Core i7-8750H CPUs. This is part of the Coffee Lake-generation of processors. It has six cores, where until now most top-end gaming laptops used the last-generation quad-core Intel Core i7-7700HQ CPU.

Is there a huge difference? Here's where it gets a bit complicated. Since we reviewed the 2017 15X there has been a hit to laptop processors caused by updates designed to combat the Spectre and Meltdown insecurities. That said, we've not seen a huge change in the benchmarks results of our reviews.

The new 15X scores 16,976 points (4814 single-core) in Geekbench 4, compared to the 14,502 (4353) of last year's Aero. That's a healthy upgrade, if not a 50 percent improvement.

In PCMark 10, the laptop scores 4,274 points, which is actually lower than we saw in last year's version. However, that laptop's score was a somewhat anomalous result. More recently we reviewed the Asus RoG Strix GL703VM (with Core i7-7700HQ) laptop, which scores a closer 4,390 points.

We don't see the kind of radical gains of Intel's U-series processors in this latest generational upgrade.

Those chips are designed for slim and light laptops. However, Geekbench 4 suggests there is a real upgrade in raw performance.

There is no big change in gaming performance, however, as the 15X uses the Nvidia Max-Q GTX 1070 we've seen before.

This is a version of the GTX 1070 card designed for slimmer laptops that don't have room to fit in large, advanced cooling systems. Unlike the 'full' laptop version of the GTX 1070, the Max-Q version doesn't get that close to the performance of the desktop 1070, but it is still terrific for such a compact machine.

Deux Ex: Mankind Divided runs at an average 53.4fps at 1080p, Ultra settings, and 109fps at 720p, low settings. You can't max everything out in a high-end game like this and still get rock-solid 60fps, but you can get close. At 4K resolution, Ultra settings, the 19.7fps average is far too slow for our liking. You could fiddle around at resolutions between 1080p and 4K, though.

Some games do run fine at 4K. Alien: Isolation, for example, averages a very good 56fps at this resolution. At 1080p, it averages 175fps and a ridiculous 213fps at 720p, low settings.

The 15X is a great gaming laptop, although we did see very similar results from last year's model, which had the same GPU.

Even with the Max-Q GPU, quite a lot of heat is created when gaming. To get rid of this the 15X uses a combo of wider and narrow diameter fans. You can hear this duo tone as they rev up, the smaller fans creating a higher-pitch noise. You can let the laptop judge the fan speed itself, or max it out using a keyboard

shortcut, which might work well if you wear a headset or headphones. When gaming the 15X is reasonably loud, but does not have the annoying whine of some thinner laptops that use smaller fans.

Heat bleeding into the keyboard is the issue you can't get rid of completely. However, the parts you touch never get hot, just warm. And we've seen some keyboard heat up in all the Max-Q laptops we've tried.

The fans run no matter what you're doing, even writing a document. However, they're very quiet when running low and we didn't notice any annoying coil whine noise.

Battery life

A sticker on the Gigabyte Aero 15X claims it has an "all-day battery", and we hoped this would prove true. The previous model trucked on for an excellent nine hours, 55 minutes.

The 15X's battery life was significantly lower than that of its predecessor

This model doesn't last anywhere near as long. Playing a looped video at 120cd/m^2 brightness, the Gigabyte Aero 15X only lasts three hours, 55 minutes. That's six hours less than the old model.

It makes us wonder whether our review model doesn't have the 94Wh battery Gigabyte advertises for this new range. Even the GTX 1070 and a bump to 4K screen resolution shouldn't drain the battery this much.

Verdict

The Gigabyte Aero 15X is a tremendous gaming laptop for those who want something they can carry around the house easily or take around to use as a day-to-day laptop. Its 4K screen is fantastic, while the build quality is good as it has perfect performance for 1080p gaming. It'll even handle some titles at 4K resolution. Our one significant disappointment is that

The Aero 15X offers fantastic gaming performance

its battery life is nowhere near as long as last year's model according to our tests. Andrew Williams

Specifications
- 15.6in (3,840x2,160, 282ppi) 4K IPS LCD matte display
- Windows 10 Home 64-bit
- 2.2GHz Intel Core i7-8750H (3.9GHz boost) 6 cores, 12 threads
- Nvidia GTX 1070 Maxi-Q GPU with 8GB RAM
- 16GB 2,400MHz DDR4 RAM
- 500GB storage
- 802.11b/g/n/ac single-band 2x2 MIMO
- Bluetooth 4.1
- 1x USB-C 3.1
- 3x USB 3.0
- Ethernet
- Mini-DisplayPort
- HDMI
- Kensington Security Slot
- SDXC card slot
- Stereo speakers
- HD webcam
- Single mic
- 3.5mm headset jack
- UK tiled keyboard with numberpad
- Two-button trackpad
- 94Wh lithium-ion battery, non-removable
- 356.4x250x19.9mm
- 2,071g
- 2-year on-site warranty

Macworld

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Apple 9.7in iPad

Price: £319 inc VAT from **fave.co/2GyRup4** ★★★★⯪

Pull it off the shelf at the Apple Store, and you'd be hard-pressed by sight alone to distinguish the new 6th-generation 9.7in iPad from last year's model. And under the hood, it's not much different, where there's simply a speedier A10 processor. The new iPad is, well, an iPad.

What's truly new is support for Apple Pencil, the sleek stylus that formerly only worked with the iPad Pro. But never doubt that the Pencil support marks a bold move on Apple's part. Combined with the new

chip, the formerly capable iPad is transformed into something that's now a serviceable substitute for an iPad Pro – for a mere £319.

Some will find Apple Pencil support a transformative experience, and if you've been looking to upgrade from an iPad that predates the iPad Air 2, this is a device that will make you glad you waited.

The more things change

In light of Apple's marketing of the new iPad to schools, the design feels like an exhortation not to judge a book (or a tablet) by its cover. It reminds us that some things can change for the better despite outward appearances. In some regards, much of what we said about last year's iPad applies here as well, whether it's the way the buttons ranging from the volume controls

Can you tell which is this year's model and which is last year's?

to Touch ID sit in the same spots, or the way it offers much the same Wi-Fi and LTE connectivity.

The new iPad weighs about the same as its predecessor, and the same protective cases will fit. It still only has two speakers, compared to the four you get on the iPad Pro. It even sports the same serviceable 8Mp 1080p rear camera and the puny 1.2Mp 720p front camera, the latter of which seemingly exists only for occasional Skype and FaceTime chats. Were the new iPad judged solely on specifications, it'd hardly warrant much attention over 2017's model at all.

Pencil pusher

But you shouldn't judge the new iPad based on its specifications. Tim Cook and friends decided to let this scrappy device support the Apple Pencil, although you'll have to buy it separately. (That also means an extra £89 to the total cost, bringing the 2018's iPad's 'true' price up to £408.) It may seem like a simple thing, but the magic of the Apple Pencil is that it lets you share much the same experience of using a pricey iPad Pro, but on a lower-priced tablet.

Never mind for a moment that the new iPad doesn't have some of the best technical goodies found on the iPad Pro, whether it's the TrueTone technology that adjusts the display to match the light in the room or the iPad Pro's 4GB of memory. (The 2018 iPad makes do with 2GB.) It even lacks the iPad Pro's ProMotion tech, which boosts the display refresh rate up from the roughly 60Hz found on a device like this to an impressive 120Hz. That's important, as it means the newer iPad Pros can better catch the

slightest movements of your hands, which makes them more ideal for professional artists.

However, you're likely not going to notice the difference in everyday use. I've been using an Apple Pencil as a writing tool since 2016 on my 1st-generation 12.9in iPad Pro (which also lacked ProMotion), and I almost never felt the Pencil was doing anything but laying down precisely the lines I wanted to see. Thanks to the pressure sensitivity, the way it interprets tilts and angles, and, yes, the overall low latency, the Apple Pencil is the closest you get on a tablet to mimicking the experience of writing with a pencil or pen on a spiral notebook, which is part of the reason Apple wants to see it catch on in schools.

The only real drawback to the new 9.7in iPad is that it doesn't have a laminated display like the iPad


The Apple Pencil has been around for a few years now, so there are many Pencil-compatible note-taking apps on the App Store

Pro, and so you'll see a visible gap between the display and the glass above it. I found, though, that it barely affects the 'feel' of writing, although the extra space makes the sound of the Pencil hitting the glass a bit louder than what you'll hear on a Pro.

I love the Pencil for the way it lets me scribble out ideas in apps like Notability or MyScript Nebo without having to waste a forests' worth of paper, and it's incredible for marking up PDFs with highlights and marginal notes.

It's also fantastic for students in that they can use Split View multitasking to open a PDF or other document on one side of the screen and scribble out notes in an app on the right. And, naturally, the Pencil remains a stellar tool for artists, who can use it with fully featured apps like Procreate.
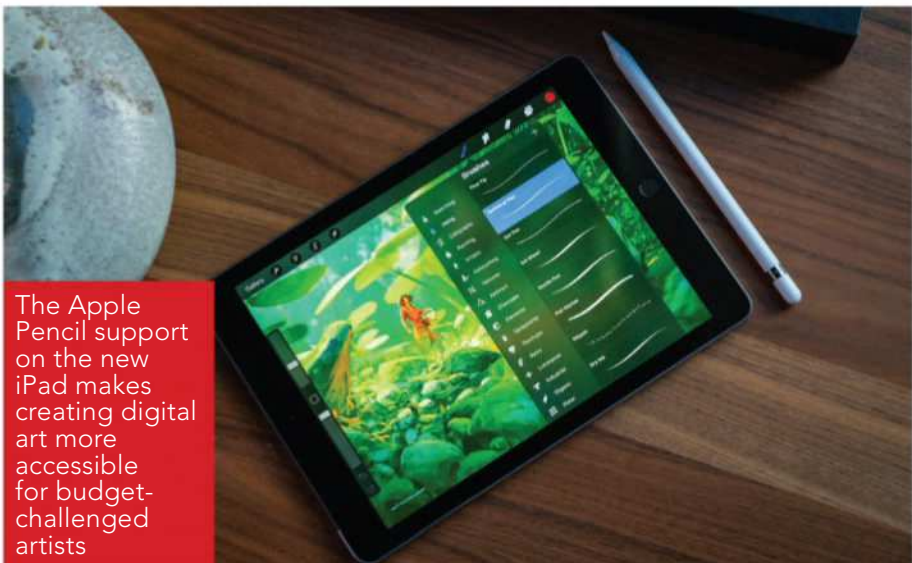
The Apple Pencil support on the new iPad makes creating digital art more accessible for budget-challenged artists

Earlier this year, you'd have to shell out £619 for an iPad Pro at the minimum to get that kind of experience. With the new iPad, though, you get that kind of power for about half the price. For a lot of people, that's enough to make it a better buy than the Pro. Even I've found myself leaving my 12.9in iPad Pro behind in favour of this device, and I'm tempted to switch over to it entirely.

Performance

The new iPad is still a good buy even if you're not into the whole 'writing with pencils in 2018' bit. That's because the new iPad is also fast.

Last year's iPad had an impressive A9 chip packed in its casing, but the new version has the A10 Fusion chip we've previously seen in the iPhone 7 and 7 Plus. The improvements show up in Geekbench results, with the new iPad scoring 3463 on the single-core CPU test and 5845 on the multi-core test. (That's about the same score you'll get with an iPhone 7 Plus.) Last year's 9.7in iPad, however, scored only 2384 on single-core and 4372 on multi-core. That's not too shabby, especially considering that the new 10.5in iPad Pro scores 3908 on single-core and 9305 on multi-core.

In the most casual cases you'll find this only means that apps open ever-so-slightly faster, but I find it sometimes greatly affects game performance. (Let's admit it: a lot of children in classrooms are going to be playing games on these things rather than listening to teachers.)

On the new iPad, the popular battle royale shooter Fortnite ran beautifully, complete with the shadows

Fortnite on the 2017 9.7in iPad (left) and the 2018 iPad. Notice the greater pixellation on the older device

and richly-detailed textures you'd find while playing on a Mac. Playing on last year's iPad, though, I found the characters and buildings look pixellated and rough, and the shadows and other details were gone. The differences aren't so jarring on PUBG Mobile, but it's worth noting that the popular game recommends the 'high' settings on the new iPad and only the 'medium' on last year's. If you're looking for performance, in other words, you'll want to pick up the new one.

From there on out, it's basically the same device as last year's iPad. The screen once again has no anti-glare coating, which means you can basically use your iPad as a mirror when you're in sunlight. The battery life easily meets the 10 hours Apple claims it reaches, even after I played graphically intensive games and watched a whole movie with the brightness cranked up.

What about the children?

Apple sees this iPad as its champion in the fight against Chromebooks in classrooms, and there's no doubt that

it's an impressive device for the price. I don't think it's much of an exaggeration to claim that it's the only tablet that truly matters in the low-end price range, regardless of whether we're talking about classrooms or playing Candy Crush Saga on the bus.

Sure, on its own, the iPad manages well, and I was even impressed by the display keyboard in landscape mode. But the fact remains that getting the most out of an iPad in the classroom requiring making certain potentially expensive adjustments. Want a physical keyboard? You'll have to shell out extra for a keyboard case, and then you'll have to pair it through Bluetooth since the new iPad doesn't have a Smart Connector for connecting Apple's Smart Keyboard.

Apple's approach with its Classroom and Schoolwork apps, though, requires a full commitment to the

Jot it down

Apple ecosystem. We've already said that we're optimistic about seeing it in classrooms on account of its emphasis on privacy and quality, but everyday schools might find iPads a tough sell when looking solely at immediate pricing. All the same, keep in mind that iPads will likely hold up better than cheaper Chromebooks over time, which could save school districts a lot of money in the long run.

Verdict

In our review of last year's 9.7in iPad, we said it was a "better choice than the iPad Pro for a lot of users", and the addition of Apple Pencil support and a faster processor makes that especially true for this year's model. For £319, you're getting a stellar tablet that feels as though it's very capable, although without some quality-of-life features. For a general-purpose tablet for school, business, or pleasure, it currently doesn't get any better than this. **Leif Johnson**

Specifications

- 9.7in (2,048x1,536) LED backlit display
- iOS 11.3
- A10 Fusion chip
- 32/128GB storage,
- 8Mp rear-facing camera
- 1.2Mp front-facing camera
- 802.11ac Wi-Fi
- Bluetooth 4.2
- 32.4Wh lithium-polymer battery
- 240x169.5x7.5mm
- 469g

Huawei P20 Pro

£799 inc VAT from **fave.co/2GDEIWx** ★★★★⯪

R ather than call it the P11, Huawei has decided to follow up the P10 with the P20. There are three phones in the range, a Lite version with a 5.8in screen, a 'standard' option (£599 from **fave. co/2GuhL87**), and a Pro model which is a little larger with a 6.1in display. It's the latter we're looking at here.

Design

The P20 is, just like the Mate 10, a redesign rather than an iteration of the P10. Perhaps that's one reason why it's the P20 and not the P11.

In any case, it has rounder edges than its predecessor but, more noticeably, a glass back. It looks much better than the sandblasted aluminium of the P10 and comes in a range of colours including Twilight, which is a gradient from dark blue to a pinkish hue.

Photos don't do the finish justice, but in the flesh it's another eye-catching design that will make people ask "What phone have you got?". If you prefer, there's a black version, Pink Gold or Midnight Blue.

The other obvious feature that will get people talking is the third lens. It's the first phone to sport a trio of rear cameras, but it's slightly odd that one sits separate to the other two. Amazingly, one has a 40Mp sensor, another has a 3x optical zoom lens and a black-and-white camera completes the triplet.

Around the front, there's a 6.1in screen that has a similar design to the iPhone X as there's a camera and speaker in a notch at the top. It's a smaller intrusion than Apple's notch and you can choose in the display options to 'hide' it by putting a black strip across the top. The clock, battery level and notification icons remain in place, though, which maximizes screen space and is a good compromise.

Surprisingly, Huawei decided not to make the bottom edge bezel-less, but instead cram a long, thin home button/fingerprint sensor there. It's great news for those who despise rear-mounted fingerprint sensors.

Display

With a resolution of 2244x1080, the 6.1in display is even wider than the Mate 10 Pro, with an aspect ratio of 18.7:9. Unlike the regular P20, the Pro gets an

AMOLED screen. This offers more vibrant colours and a little more brightness. It isn't the brightest screen around, but is certainly bright enough.

There are more options than on the Mate 10 Pro. Like that phone you can enable the always-on option, so the clock is displayed when the phone is asleep. But with the P20 Pro you can turn on a 'Natural tone' setting which changes the colour temperature according to the ambient light – exactly like the True Tone display on an iPhone or iPad.

You can also choose vivid or natural colours, and even adjust the screen's colour temperature manually if you want to.

There's the expected blue-light reduction for night-time use, but you can't schedule this according to sunset and sunrise times, which would have been nice.
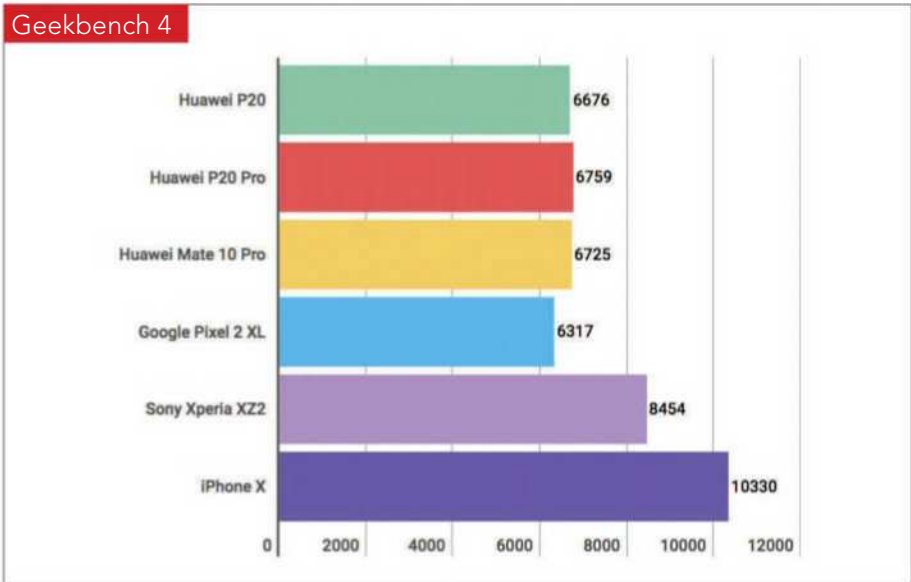
Overall, this is a fabulous screen with excellent contrast, great colours and perfectly good pixel density. And unlike other OLED displays (think Pixel 2 XL) it doesn't suffer a noticeable blue tint when viewed off-axis. There is a slight tint as you tilt the phone, but that's true of every OLED screen, including the iPhone X.
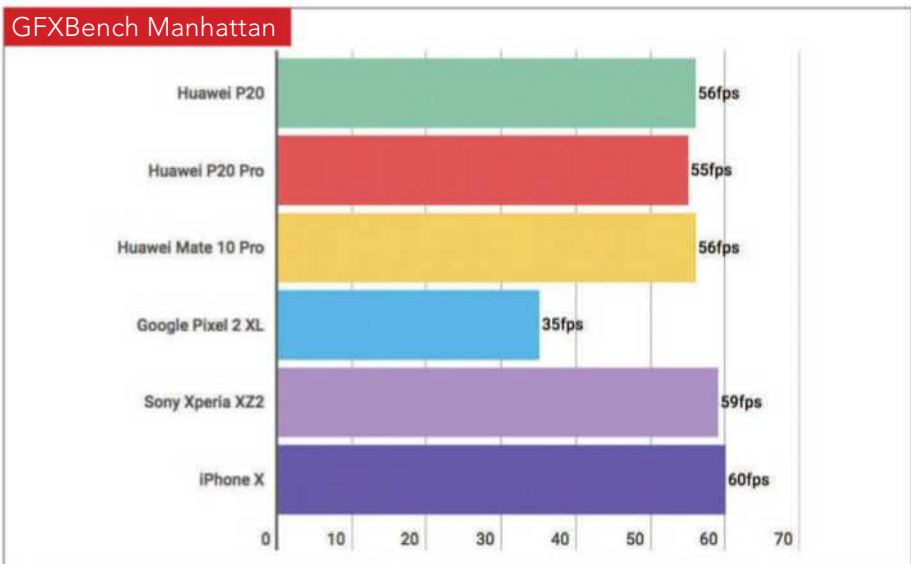
Performance

The P20 borrows the Kirin 970 processor from the Mate 10, but that's not really an issue since it's a very fast chip. On the P20 Pro, it's backed by 6GB of RAM and 128GB of on-board storage.

No surprise, then, that performance is essentially the same as the Mate 10 – and P20 – which use the same CPU. And all are very quick indeed.

Geekbench 4

Huawei P20	6676
Huawei P20 Pro	6759
Huawei Mate 10 Pro	6725
Google Pixel 2 XL	6317
Sony Xperia XZ2	8454
iPhone X	10330

GFXBench Manhattan

Huawei P20	56fps
Huawei P20 Pro	55fps
Huawei Mate 10 Pro	56fps
Google Pixel 2 XL	35fps
Sony Xperia XZ2	59fps
iPhone X	60fps

TECH ADVISOR

GFXBench T-Rex

Device	fps
Huawei P20	60fps
Huawei P20 Pro	60fps
Huawei Mate 10 Pro	60fps
Google Pixel 2 XL	60fps
Sony Xperia XZ2	60fps
iPhone X	60fps

Scale: 0 10 20 30 40 50 60 70

JetStream

Device	Score
Huawei P20	54.2
Huawei P20 Pro	46
Google Pixel 2 XL	63.3
Sony Xperia XZ2	89.6
iPhone X	224

Scale: 0 20 40 60 80 100 120 140 160 180 200 220 240

One thing you won't find is a slot for adding extra storage via a microSD card. With 128GB already on board, you could argue that this isn't really an issue, but it's still a cross in a box that's ticked by the Galaxy S9+.

Connectivity and audio

As you'd expect, there's 802.11ac Wi-Fi with MIMO, but the older version of Bluetooth (4.2 not 5.0). This is a dual-SIM phone and supports Cat 18 LTE for up to 1.2Gb/s download speeds, when they're available from your mobile operator that is.

You get stereo speakers by virtue of the use of the earpiece at the top of the screen as well as another speaker in the bottom edge. Unfortunately, as with the Mate 10 Pro, the effect isn't brilliant: the bottom speaker is much louder and has a much larger frequency range. This means you don't get a nice even sound when watching videos. If that's a priority, then consider the Pixel 2 XL or another phone with dual front-firing speakers.

Cameras

Cameras are of course the P20's main attraction. They are so important that the whole rear of the phone has been designed around the cameras, with the Huawei logo running parallel to the line of cameras, so it's readable when you're taking a picture – or video – in landscape mode.

The left-most camera in this orientation is the 20Mp mono camera that Huawei has used for quite a few of its recent phones, including the P10. In the middle is a 40Mp colour camera and, on the right,

The P20 Pro's biggest selling point is its three cameras

an 8Mp camera. The latter two work together to produce a 3x optical zoom. Those are some serious numbers, and you'll probably recall Nokia putting a 41Mp sensor in its 2012 PureView 808 phone (and later using it in the Lumia 1020).

Huawei says the only the 8Mp camera benefits from optical stabilization, but iFixit's teardown of the P20 Pro reveals that all three have the hardware in place.

While you can shoot photos at 40Mp, the P20 Pro defaults to 10Mp. This is to enable a 5x Hybrid Zoom mode which combines the three cameras and some clever processing to deliver some credible-looking telephoto shots at 10Mp.

Opposite is how that looks in the real world. The images have been resized in Photoshop, but we have included 100 percent crops of the 3x and 5x photos below so you can see the full level of detail captured.

3x zoom

100 percent crop
of the 3x photo

5x zoom

100 percent crop
of the 5x photo

It's certainly impressive, with the hybrid mode delivering sharper results than you might expect, and better than simply interpolating a 3x photo in Photoshop to make it larger.

Camera features don't stop there. There's a nifty six-second long exposure mode which uses AIS (Artificial Intelligence Stabilization) and ISO right up to 51,200 to deliver sharp night shots without a tripod. The Kirin 970's NPU (Neural Processing Unit) is used along with all the camera hardware to eliminate blurring caused by shaky hands.

And while it sounds too good to be true, it actually works. We tried it in an almost pitch-black room with a cityscape projected in the background and, although we could only review the images on the phone's screen, they certainly looked sharp enough.

We even compared this mode to an equivalent six-second long exposure in the Pro camera mode where we saw the expected blurry mess, so that AIS is clearly doing a lot.

You can't select anything above ISO 6400 manually though: the highest 102,400 ISO is only used when needed in the Night Shot mode.

In our usual low-light comparison, the long-exposure shot has more saturated colours and is clearly sharper than the standard auto mode. (You can see our test shots at the top of the next page.)

On top of this, the Ultra Snapshot (where you double-press the volume down button to take a photo even if the phone is asleep) now takes just 0.3 seconds, so you can pick up your P20 Pro and capture whatever's going on at that instant.

AI smarts

Continuing with the AI theme, the P20 Pro uses '4D predictive focus'. It analyses movement in the frame and predicts where the object will go next, so hopefully it's in sharp focus no matter when you hit the shutter button. We tried this out on a couple of fencers and the phone picked one person and followed his movements. And for the most part, it accurately predicted the direction he would move next. Although the foils were blurry due to the fast movement, the fencer was in sharp focus.

AI is also used, as it is on the Mate 10, for scene recognition. The P20 Pro can identify 19 different scenarios (six more than the Mate 10) from food to pets to portraits and landscapes.

This isn't some gimmick: it makes the camera app a joy to use because all the settings are automatically adjusted in an instant, so you get the best possible photo. And it works really well, quickly and accurately detecting scenes such as cats, food, flowers, foliage, people, and more.

Its only failure is that it boosts greenery to ridiculously lurid levels in the name of making it 'lush', the result being grass appears radioactive. Hopefully, Huawei can tone this down in a software update.

There are wins, though. If you point the camera at just one person with their head and shoulders in the frame, it will automatically switch to portrait mode and blur the background.

Here's the difference between a standard photo and one taken with portrait mode. It doesn't perfectly mask out the background, but still does a nice job.

100 percent crop
of the 40Mp photo
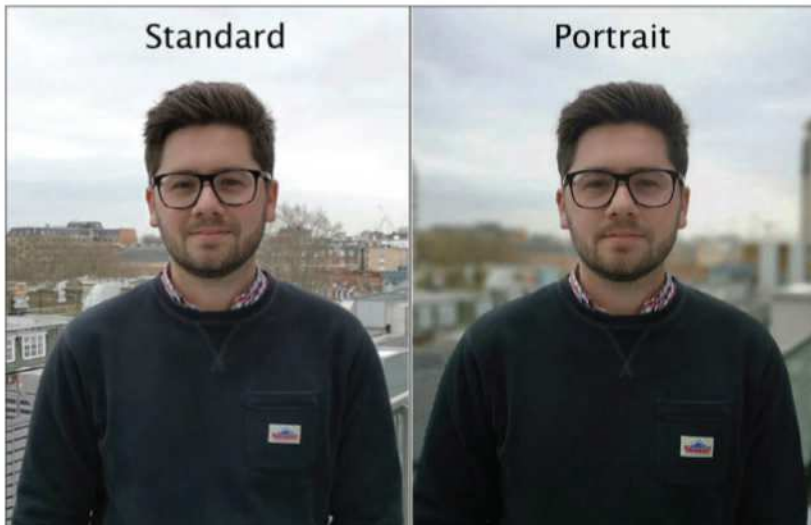
Opposite is a comparison of the 40- and 10Mp modes. You can see that there's very little processing done in the former, but in the latter there's plenty of sharpening and also HDR. Yet all we did between taking the two photos was change the resolution.

Around the front you'll find a 24Mp selfie camera. That's not a typo either: the P20 pulls no punches with its sensor resolutions. In our limited testing, it proved to be very impressive indeed, delivering the kind of sharp detail usually reserved for rear cameras. Huawei says this will step down in resolution as light deteriorates in order to maintain sharpness and reduce noise.

Video

Photography is well covered, then, but video appears to be a second-class citizen (just as with the P10 and Mate 10). Don't get us wrong: the P20 Pro shoots

decent quality video. However, if you want to stray from the default setting of 1080p at 30 frames per second you lose stabilization. That means no stabilization is offered at all at 1080p60 or at 4K.

With no support for recording HDR video either, the P20 Pro isn't the best choice for those who like to use their phone to make home videos.

One slight redeeming feature is that Huawei has added a Super Slow Motion mode, which – like the Galaxy S9 – shoots a second or so of 960fps video at 720p. The implementation isn't quite as intelligent: you have to press the button at the instant the action happens. So as with the Xperia XZ1, it's a bit of a case of luck if you manage to capture the motion you wanted. It processes the video for a few seconds afterwards, so you can't immediately shoot another clip, but the resulting video starts at normal speed, smoothly transitions to super-slow motion and then back to normal speed at the end.

Battery

Despite the thickness of 7.8mm, there's a 4,000mAh battery in Huawei's phone. As with the long-lasting Mate 10 Pro, the P20 Pro will easily cope with a day of heavy use. And if you're not too demanding, you'll probably find it will last two days before needing a recharge. At worst, Huawei bundles a SuperCharge charger in the box, which will restore 60 percent in just 30 minutes, 80 percent in 45 minutes and a full charge in just under 90 minutes. And given that 60 percent will get you through a full day with the P20 Pro, that's remarkable.
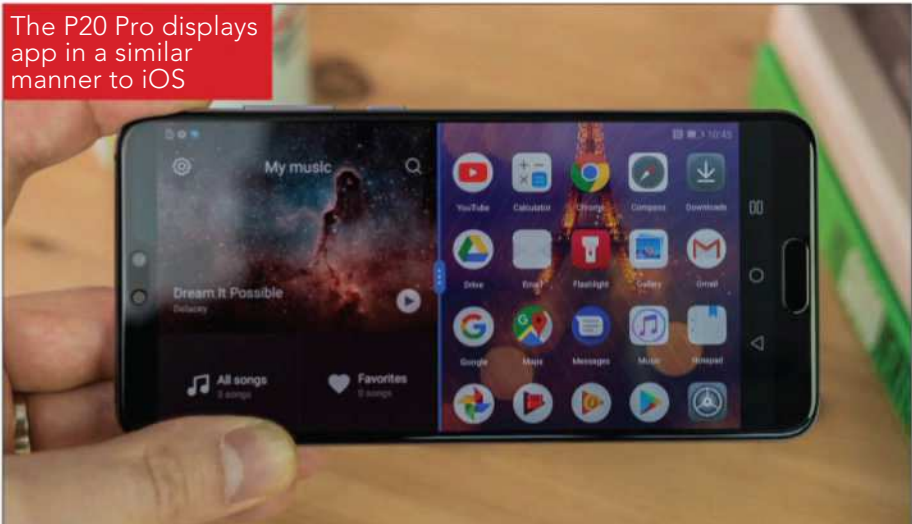
Software

In the box, the P20 Pro ships with Android Oreo 8.1 and Huawei's EMUI 8.1 software.

If you already know Huawei phones and EMUI, you'll know exactly what to expect: little has changed compared to the Mate 10 or P10. It defaults to an app grid like iOS, but you can enable the app drawer if you prefer not to have all your apps plastered across multiple home screens.

There are a couple of improvements. One is that AI is used to tag photos for better searching. It can put photos into one of roughly 100 categories. It will also use algorithms to 'score' photos for aesthetic beauty so you can easily see the 'best' photos you've taken. AI can also straighten wonky horizons.

If the notch bugs you, just choose the 'Hide notch' option in the settings and it disappears.

The P20 Pro displays app in a similar manner to iOS

Huawei gives you the option to hide the notch
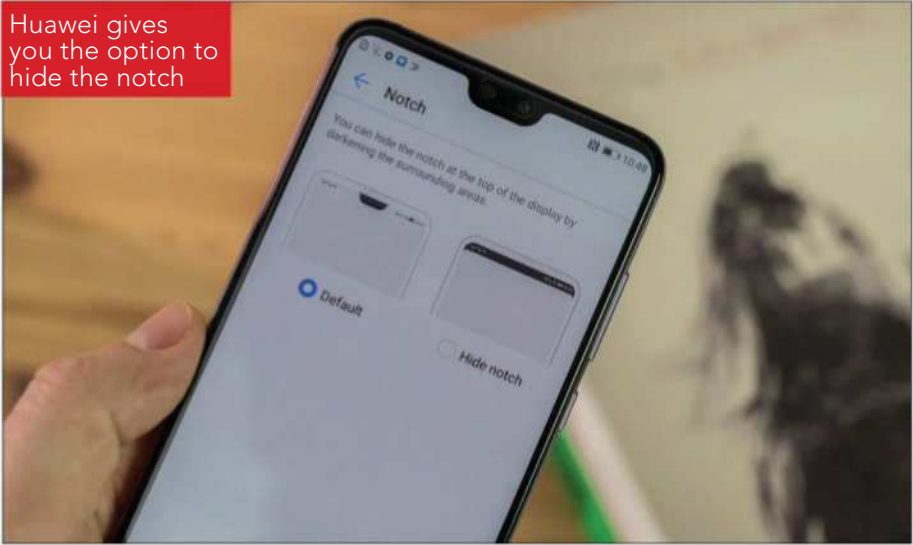
EMUI 8.1 brings wireless file transfers to a PC or Mac with no special software required. We couldn't test this out, though, and Huawei didn't go into detail about exactly how this works.

Similarly, the Huawei Clone app runs faster and can transfer data from your old phone up to 5x faster: 32GB of data can be 'cloned' in 19 minutes according to the firm. The wide screen lends itself to multiple apps and sure enough, you can run certain apps side by side (or one above the other).

Verdict

In the P20 Pro Huawei has delivered a stunning phone that should be on your shortlist along with the Galaxy S9 and iPhone X. Sure, there are some niggles such as the lack of stabilization for 4K video, no headphone

jack and no wireless charging, but if your priority is photography, then the P20 Pro does not disappoint.

Add in the long battery life, dual SIM slots and great screen and you've got the complete package: this is one of the best phones of 2018.

It's a fair amount more than the regular model, so save yourself £200 on the regular P20 if you don't mind 'only' dual rear cameras, no waterproofing and an LCD screen versus OLED. **Jim Martin**

Specifications

- 6.1in (2,244x1,080, 408ppi) AMOLED capacitive touchscreen display
- Android 8.1 Oreo
- HiSilicon Kirin 970 processor
- Octa-core 4x 2.4GHz Cortex-A73 and 4x 1.8GHz Cortex-A53 CPU
- Mali-G72 MP12 GPU
- 6GB RAM
- 128GB storage
- Fingerprint scanner
- Three rear-facing cameras: 40Mp (f/1.8, 1/1.7in, OIS), 20Mp (f/1.6) and 8Mp (f/2.4), Leica optics, 3x optical zoom, phase detection and laser autofocus, dual-LED dual-tone flash
- 24Mp front-facing camera: autofocus f/2.0, 1080p
- 802.11ac Wi-Fi
- Bluetooth 4.2
- A-GPS, GLONASS
- USB 3.0 Type-C
- 155x73.9x7.8mm
- 180g

Sony Xperia XZ2

£699 inc VAT from **fave.co/2Hg3E6q** ★★★★☆

S ony's Xperia XZ2 range is the Japanese giant's first phone to boast the now-ubiquitous 18:9 aspect ratio on its screen. Read on for our thoughts.

Design

After years of similar-looking phones, Sony fans (just as much as us) have been crying out for a design revamp for the Xperia line. With the XZ2, they finally have it – sort of.

It brings with it a new design language for Sony – dubbed 'Ambient Flow' – and is the firm's first

smartphone to have an 18:9 display. Finally, gone are the giant bezels that sat above and below the display of the XZ1, replaced by slightly less giant bezels above and below the new 5.7in display. Opinions at *Tech Advisor* are split as to whether its an improvement, but this is certainly not the sort of all-screen device Sony's biggest rivals are able to offer. It reminds many of us of some old Nokia Lumia phones, which is perhaps not the best thing.

Ambient Flow is about more than the screen, though. It's also about breaking up the straight lines that have dominated recent Sony devices. Instead, the XZ2 has 3D curved glass on both the front and back of the phone – a subtle curvature at the edges of front, a more noticeable bulge on the back.

There are pros and cons to the design, but mostly the former. The curved glass looks stunning when it catches the light, though unsurprisingly it's a fingerprint magnet. It's also one of the most slippery phones we've tested and getting out of a pocket without dropping it feels like an almighty task.

The use of Gorilla Glass 5 should reassure buyers that it's tough enough, but even so glass rears are always an extra risk when it comes to drops and scratches.

The rounded design feels good in the hand, though it is comparatively thick and heavy. Figures of 11.1mm and 198g do not sound right for a brand-new 2018 flagship. It might only be thick in the middle, but the rounded back means that the phone is basically impossible to use while resting on a flat surface. It rocks side-to-side like a baby's crib. We wouldn't mind

so much if the size and weight meant a huge battery, but that's not the case here.

Beyond that, Sony has moved both the camera and fingerprint sensor to the centre of the phone's rear – and the fingerprint sensor is now always on, so is quicker to use than before. Previously, it was mounted in the power button on the side. Although it's faster, we prefer the old method. The natural way to hold the XZ2 means your finger rests on the camera lens, not the scanner. It's far too low down the phone, as is the power button on the side.

You'll get the IP65/68 waterproofing we've all come to expect from Sony. However the firm has sadly, and shockingly, finally given in and joined the most of the industry in dropping the 3.5mm headphone jack, so it's USB-C or Bluetooth only when it comes to audio.

The XZ2 will launch in a selection of four colours (with the usual colour-coded UI to match): Liquid Black, Liquid Silver, Petrol Blue, and Ash Pink.

Display

As mentioned, the XZ2 is Sony's first phone with an 18:9 display. The firm is playing catch-up here and the change means the display has jumped from 5.2- to 5 7in, a more average size for a 2018 flagship. If you want a smaller phone, then Sony has the XZ2 Compact and we're glad that it is still making 'mini' versions for those that still want one.

The new 5.7in screen comes at the cost of chunky dimensions though, as the XZ2 has a screen-to-body ratio of 76 percent, a fair amount short of the Galaxy S9's 83 percent. Those bezels are still holding the

Sony XZ2 (left) and XZ2 Compact (right)

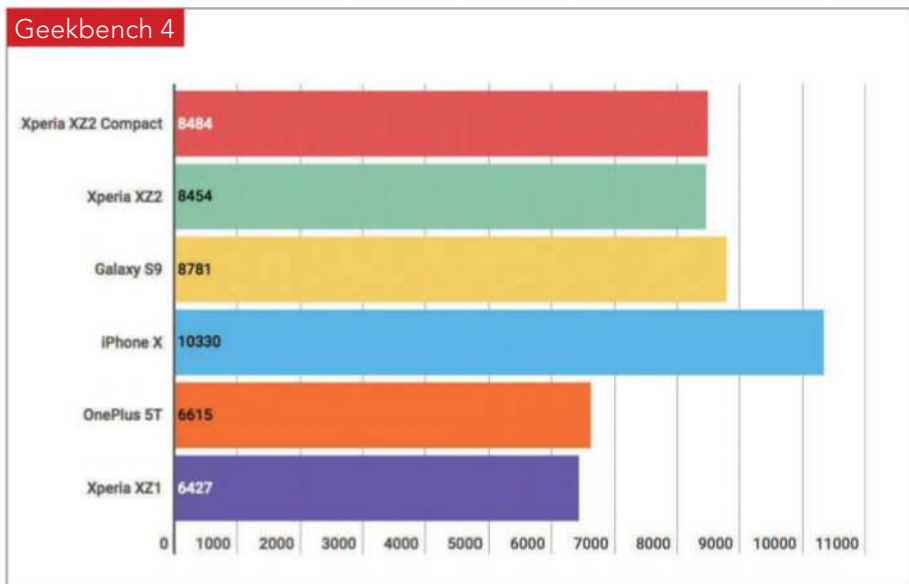design back. We are glad Sony hasn't gone down the iPhone X route and introduced a notch, though.

The screen's Full HD+ resolution of 2160x1080 isn't the highest we've seen, but it's more than enough for a sharp-looking image at 424ppi. It's also very bright with a maximum of 535cd/m^2.

There are improvements as Sony has borrowed HDR upscaling tech from its Bravia TVs, so that the XZ2 can take any video content – either local to the device or streamed – and upgrade it to HDR as you're watching it, with results that are impressive.
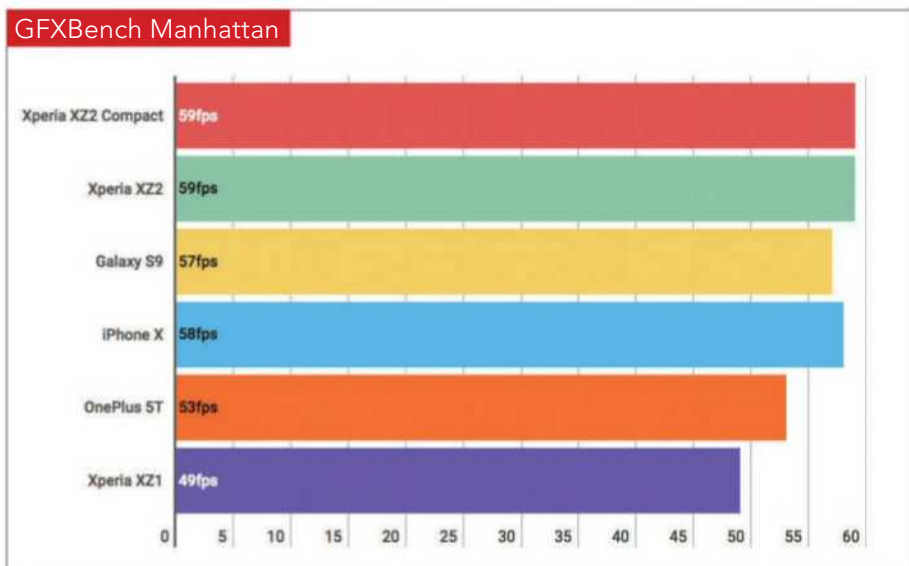
Performance

Unsurprisingly, the XZ2 is powered by Qualcomm's new Snapdragon 845, which we're likely to see in most major Android flagships this year. Here it's paired with 4GB of RAM and a typical 64GB of on-board storage.
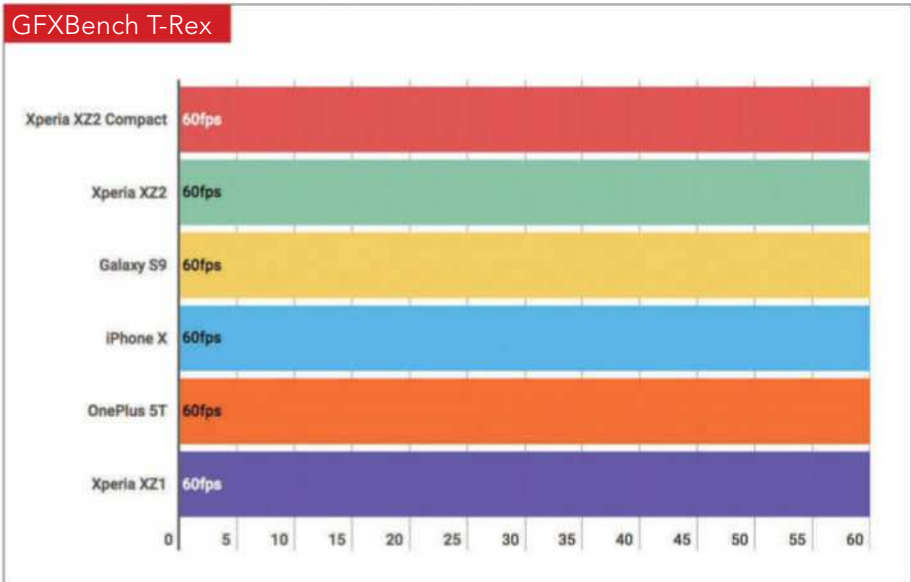
Geekbench 4

Device	Score
Xperia XZ2 Compact	8484
Xperia XZ2	8454
Galaxy S9	8781
iPhone X	10330
OnePlus 5T	6615
Xperia XZ1	6427

Axis: 0, 1000, 2000, 3000, 4000, 5000, 6000, 7000, 8000, 9000, 10000, 11000

GFXBench Manhattan

Device	Score
Xperia XZ2 Compact	59fps
Xperia XZ2	59fps
Galaxy S9	57fps
iPhone X	58fps
OnePlus 5T	53fps
Xperia XZ1	49fps

Axis: 0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60

GFXBench T-Rex

Device	fps
Xperia XZ2 Compact	60fps
Xperia XZ2	60fps
Galaxy S9	60fps
iPhone X	60fps
OnePlus 5T	60fps
Xperia XZ1	60fps

Scale: 0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60

JetStream

Device	Score
Xperia XZ2 Compact	89.1
Xperia XZ2	89.6
Galaxy S9	68.8
iPhone X	224
OnePlus 5T	63
Xperia XZ1	60

Scale: 0, 20, 40, 60, 80, 100, 120, 140, 160, 180, 200, 220, 240

Although some rivals have more memory and storage, this should still be enough for most users. The inclusion of a microSD card slot for adding up to 400GB more helps and the feature is becoming more rare.

Performance isn't something to worry about with a flagship phone, and hasn't been for some time. As our test results show, the XZ2 keeps pace with the Galaxy S9 across the board and we've not had any issues. You should really base your decision on other elements.

It's worth noting that the XZ2 Compact offers the same core specifications at a lower price if you don't mind the smaller screen.

Audio

The front-facing stereo speakers are now 20 percent louder, with a slightly improved frequency range to match – and there's still support for High Resolution audio. They are decent, but we're hugely disappointed to see Sony, a company that prides itself on audio, ditch the headphone jack – especially when the phone is easily thick enough to house one. A USB-C to 3.5mm jack adaptor is included in the box, but this is a small consolation. You'll need it for the supplied headphones as they are not USB-C.

Instead of a useful port, you get a new 'Dynamic Vibration System', borrowed from the PS4's DualShock 4 controllers. In essence, it's force feedback that uses the vibration motor inside the phone. You select different levels of power by tapping a volume button and using the slider.

The system analyses audio from music, video, or games and vibrates the phone to match the audio.

It's a bit of a gimmick, doesn't work with every app and you need to be holding the phone but works reasonably well – especially for film trailers.

Cameras

Thanks to an exclusive image processor developed together with Qualcomm, Sony promises that the camera in the XZ2 has reduced noise, better colour reproduction, and improved contrast when compared to the XZ1.

Despite rivals having two or even three rear cameras, such as the Huawei P20 Pro reviewed on , the XZ2 has a lone 19Mp camera and there's no optical image stabilization. Also, the camera can't take images in portrait mode.

The blurred background bokeh effect is one of the big selling points of dual-lens cameras for most, and

The XZ2's can't take pictures in portrait mode

the XZ2 doesn't offer an alternative – there's not even a software portrait effect built into the main camera app, despite Google proving it can be done to great effect in the Pixel 2.

Features such as predictive capture – which automatically detects motion or smiles – and autofocus burst are handy. We also like that Sony still offers a dedicated two-stage button on the side for photography. The combined phase detection and laser autofocus is speedy, too.

Overall, the camera is decent enough but can't stand up to rivals at similar or even lower prices. You can see samples below and opposite that show the XZ2 is good in low light despite the f/2.0 aperture being a way off rivals, but often the images look better on the phone than on a PC monitor. For example, in the macro shot we thought we'd got the buds on the plant nicely

Landscape mode
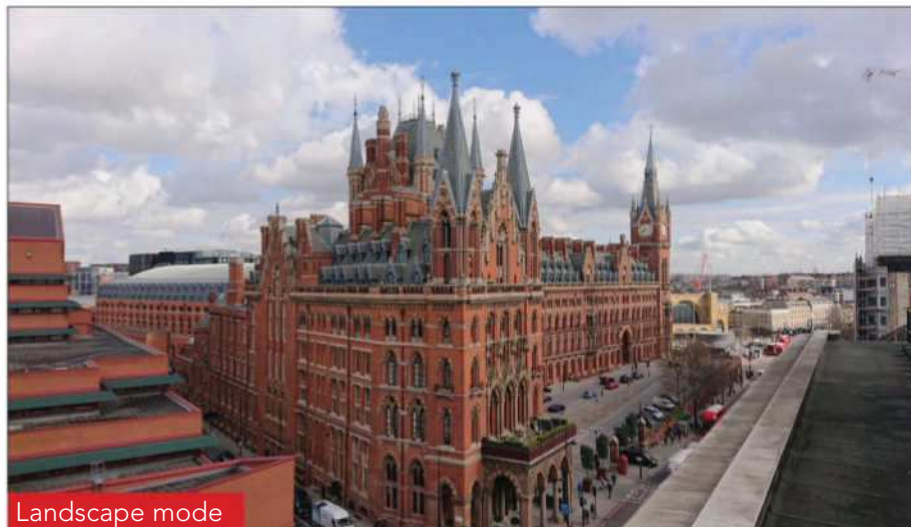
in focus and sharp, but later inspection revealed that it's a little off. It's a bit disappointing from Sony, which supplies cameras for rival phones.

If you're just after general snaps for social media, then the XZ2 is easily good enough. If, however, you're serious about phone photography, then rivals such as Samsung's Galaxy S9 and Apple's iPhone X are better.

Perhaps more importantly, this is also the first smartphone from any manufacturer capable of recording 4K HDR video footage, while the 960fps super slow motion that Sony pioneered will now be available up to 1080p, compared to the previous cap of 720p. Those are some nice video upgrades, which might swing it for those serious about shooting films.

However, the super slow motion in Full HD means a shorter burst of the high frame rate, even if you can fit more in the frame. It's also still difficult to hit the

Macro shot

button at the right time for things that aren't happening continuously, Samsung's new motion detect feature is much better.

Sony's 3D scanning tech has been added to the selfie camera, so you don't even need a friend to help you use it any more.

Battery life

As mentioned earlier, the XZ2 doesn't have a huge battery, despite its weight and size. It's 3,190mAh, which is only marginally bigger than the Galaxy S9. The Huawei P20 measures just 7.7mm and has a 3,400mAh.

Previously, Sony claimed a two-day battery life for its phones, but that seems to be a thing of the past, despite newer and more efficient processors. The company now just claims all-day battery and that's about right unless you're a heavy user.

In our battery test, the XZ2 managed six hours, 46 minutes. That's only slightly more than the Galaxy S9's six hours, 38 minutes. Sony's own lower tier XA2 phones managed eight- to 10 hours in the same benchmark.

On the plus side, the XZ2 benefits from Quick Charge 3.0 and Qi wireless charging.

Software

As you'd expect the phone ships with Android 8.0 Oreo – after all, the XZ1 was the first non-Google phone to pack that version of the operating system – and comes with Sony's usual tweaks and additions.

Not much has changed since the XZ1, so existing Sony users will feel right at home. This sadly means there still too many preloaded apps such Kobo, AVG

Sony's Xperia Assist software helps users make the most of the phone's features
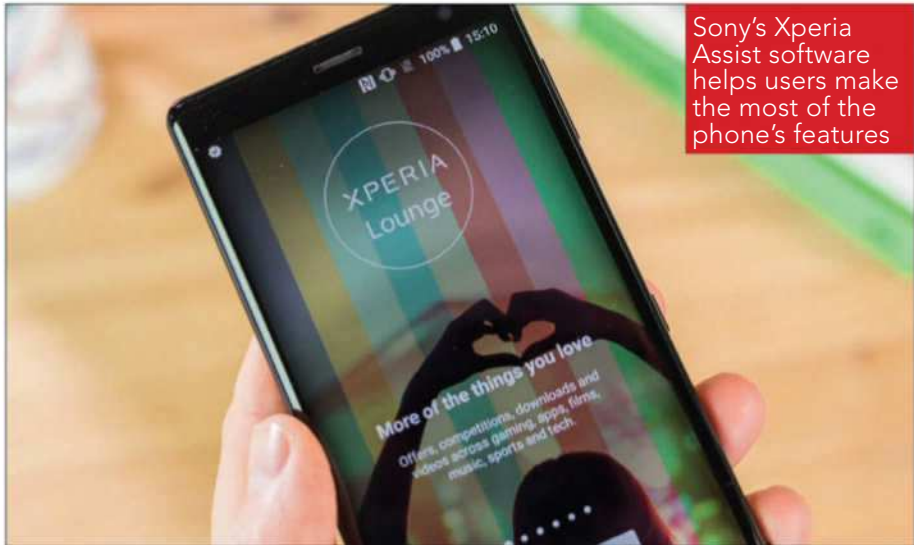
and various others from Amazon, and while these can be disabled they can't be uninstalled.

Thankfully, Sony makes up for this by providing some of the best own-brand apps on the market, including its own Music player and PlayStation for things such as PS4 Remote Play.

The phone also comes with Xperia Assist software, which is designed to help users make the most of the phone's various features. Whenever an app is opened for the first time, the software uses a chatbot interface to explain the app's new features.

Verdict

We waited a long time for Sony to bring a new design and although the firm has switched to an 18:9 screen, we're miffed by the chunky and heavy design that has

a fingerprint scanner and power button in awkward places. And dropped the headphone jack. The core specs of the XZ2 are perfectly good but that's no longer a differentiator in the smartphone market. Consumers look for amazing photography and other nifty features, which are lacking here. The Xperia XZ2 Compact makes for a decent choice with the same core specifications in a smaller phone at a lower price, but otherwise flagships such as the Samsung Galaxy S9, Apple's iPhone X and Huawei P20 are better. Chris Martin

Specifications

- 5.6in (2,160x1,080, 424ppi) IPS LCD capacitive display
- Android 8.0 Oreo
- Qualcomm MSM8998 Snapdragon 845 processor
- Octa-core 4x 2.7GHz Kryo 385 Gold and 4x 1.7GHz Kryo 385 Silver CPU
- Adreno 630 GPU
- 6GB RAM
- 64GB storage, microSD up to 400GB
- Fingerprint scanner
- 19Mp rear-facing camera: f/2.0, 25mm, 1/2.3in, 1.22µm, gyro EIS, predictive phase detection and laser autofocus, LED flash
- 5Mp front-facing camera: f/2.2, 1/5in, gyro EIS, 1080p
- 802.11ac Wi-Fi
- Bluetooth 5.0
- A-GPS, GLONASS, BDS, GALILEO
- Micro-USB 3.1 Type-C
- Non-removable lithium-ion 3,180mAh battery
- 153x72x11.1mm
- 198g

Windows 10 Spring Creators Update

Many of the update's new features are promising but remain works in progress, writes MARK HACHMAN

Microsoft's next Windows 10 upgrade – informally known as the Spring Creators Update and set to be available in the coming weeks – improves Windows in numerous ways. But the firm has also added innumerable under-the-hood adjustments. That's why we've put together this preview to underscore smaller additions you might miss, or explain subtle changes in how Windows 10 works.

Unlike previous lists we've compiled, though, some of these hidden features seem tentative, with more work clearly needed. Fortunately, Microsoft seems inclined to keep developing Windows 10, with no major replacement on the radar. (We'll highlight the very best features as part of our review.)
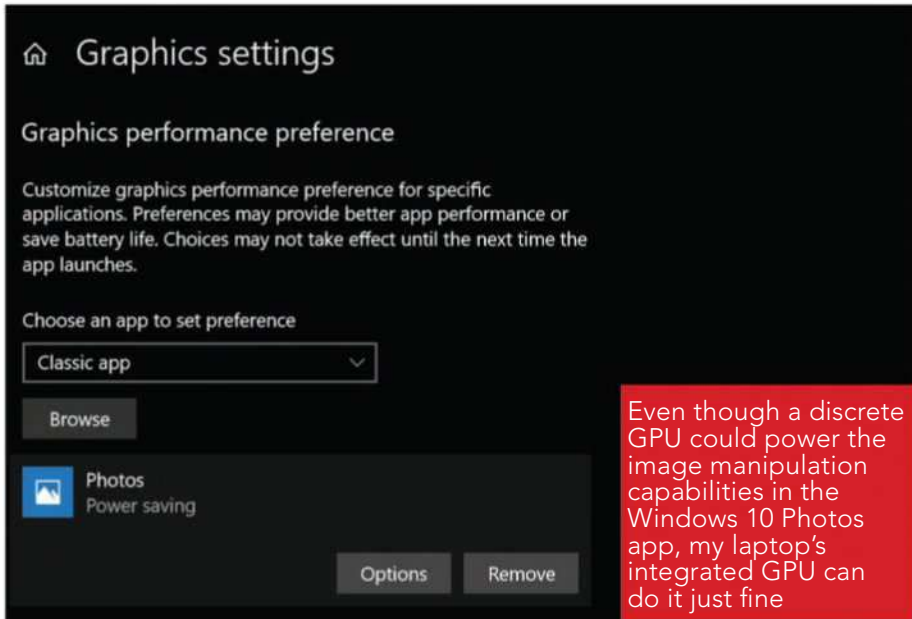
One-click data deletion

One of the continued complaints about using Windows 10 is Microsoft's use of telemetry – collecting information about you as you use the OS. In addition to the privacy controls already built into Windows, there's now a Delete button (Settings > Privacy > Diagnostics & Feedback) which removes all the diagnostic data that Microsoft has collected on your device.

App-by-app GPU management

If you own a desktop PC with a graphics card, you'll know that both AMD and Nvidia supply utilities whose functions include selecting which GPU apps you should use: either the economical integrated graphics chip inside your CPU, or the power-hungry discrete GPU. Now Windows takes control over that decision by default. (Go to Settings > Display, then click the Graphics settings link at the very bottom of the page.)

Don't worry, this isn't another case of Windows intruding into your life. With most apps, letting Windows make the decision is perfectly reasonable (apps have the final say). But in the rare case where you'd prefer your integrated GPU to run a simpler game like Asphalt 8 to preserve your laptop's battery life, this new control allows you to do that.

Even though a discrete GPU could power the image manipulation capabilities in the Windows 10 Photos app, my laptop's integrated GPU can do it just fine
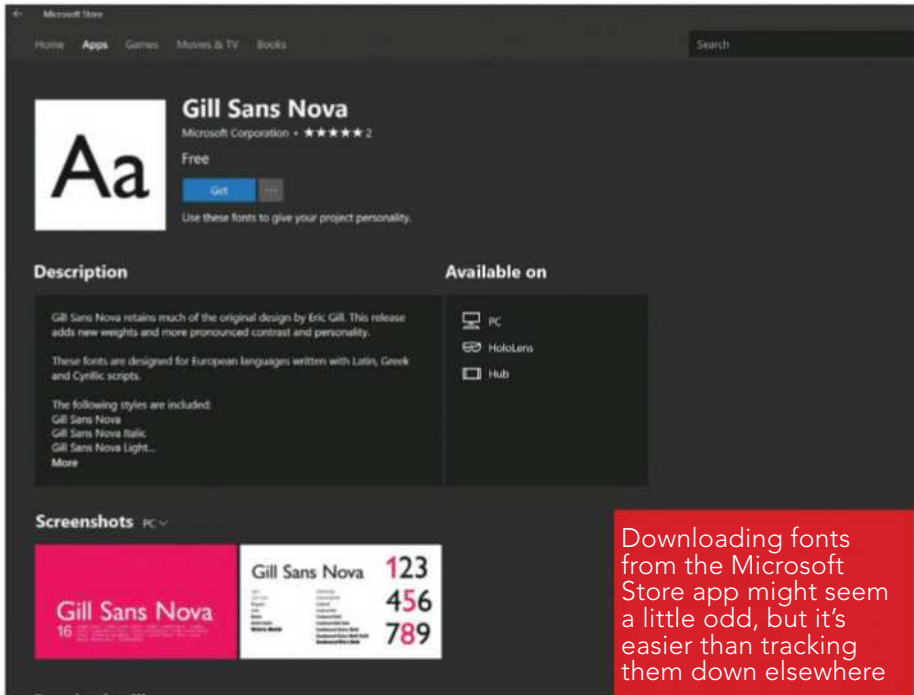
A better Game Bar

Microsoft wants you to stream PC games via Mixer, and to help you do that, it's revamped the Game Bar. Now you'll find a clock as well as toggles to turn your mic and camera on and off. You can edit your Mixer stream title. The Game Bar is still a bit obtrusive at times, and could become more so, the more toggles and switches Microsoft is tempted to add here. But the new additions are useful.

Fonts in the Microsoft Store

Many of us have a few favoured fonts, and that's it. But for those who prefer a more varied typeface, Microsoft now allows you to download new fonts from

Downloading fonts from the Microsoft Store app might seem a little odd, but it's easier than tracking them down elsewhere

the Microsoft Store. There are only nine or so at the time of writing, but Microsoft seems to be planning to add more, just as the company has added dozens of Themes to personalize your PC.

These fonts can be managed from your Settings menu, specifically Settings > Personalization > Fonts. While the settings allow you to preview a font in its various derivatives (regular, black, bold, italic and bold italic for the Arial font, for example) it also allows you to adjust new, variable fonts like Bahnschrift. Clicking Variable font properties down at the bottom of the page allows you to adjust its weight and width.

Swift Pair: On-demand Bluetooth pairing

Normally, Bluetooth pairing on a PC goes something like this: via Settings > Devices > Bluetooth, you click the '+' icon to begin the pairing process, then initiate pairing on the device as well.

The Spring Creators Update partially eliminates Windows from the equation. When you trigger a pairing request from a device, Windows pops up a notification asking you whether you'd like to go through with the request. Microsoft calls this Swift Pair.

Within your own home, Swift Pair sounds great. But in a crowded airport lounge or a community workspace, Swift Pair seems rife for mischievous or outright malevolent exploitation. Regardless, you won't be seeing much of it, as it's enabled only for the Microsoft Surface Precision Mouse, at least for now.

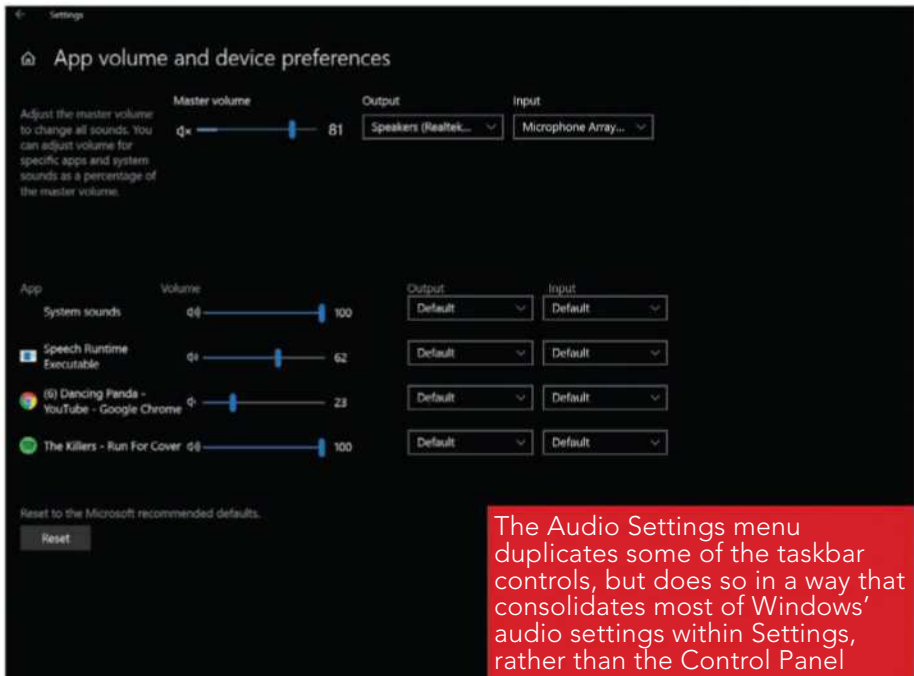## Go password-less within Windows 10 S

If you use a Windows 10 S machine, you'll now have the option of completely eliminating passwords in favour of the Authenticator app for Android or iOS. Essentially, Microsoft's sneaking a more secure two-factor authentication method into your PC.

I haven't tested this personally, as I previously migrated our in-house Surface Laptop onto Windows 10 Pro. But I've used the Authenticator app frequently. The app either offers you the option of entering a time-limited code into your PC, or, more conveniently, allows you to approve an authentication request with a single click. Given that Windows 10 S is reportedly becoming the public face of Windows 10, you may see this option more, and more.

Somewhat better
Settings for your PC's audio

Placing granular audio controls inside your taskbar was a nice feature of the Fall Creators Update. But Microsoft's perpetual problem is that too many controls are scattered about, divvied up between the taskbar, Settings, and Control Panel. The firm has attempted to phase out the Control Panel's audio settings by putting more granular controls inside the Settings menu. (It's still a work in progress.)

While the new Settings menu adds individual UWP app controls within the Audio settings, it conveniently leaves them in place on the taskbar, too. What's

The Audio Settings menu duplicates some of the taskbar controls, but does so in a way that consolidates most of Windows' audio settings within Settings, rather than the Control Panel

new are handy audio and mic level indicators that provide real-time feedback.

It's extremely frustrating, though, that Windows still doesn't offer a basic graphics equalizer – even though Microsoft added one to its Groove Music app, then killed off the Groove service that powered it, then routed users to Spotify. Does the Spotify app have a graphics equalizer yet? Of course not.

Autocorrect/autosuggest for hardware keyboard

Within this release, Windows 10's Spring Creators Update tries to provide the same smartphone-like autocorrect and autosuggest functions for the hardware keyboard that it does for the software keyboard that pops up on Windows tablets. Neither, unfortunately, really delivers.

Within Settings > Devices > Typing, you have the option to toggle on auto-correct capabilities as well as auto-suggested words – but, oddly, auto-suggested words were enabled only if you toggle on auto-correction. As you type in apps such as WordPad or Word, Windows pops up a list of three suggested words.

Unfortunately, the predictions are consistently poor; typing 'dipt' yielded guesses like 'football'. And the way in which you actually select your word choice – clicking the up-arrow, then clicking the left- and right-arrow to navigate to your choice – quickly makes auto-suggestions a chore.

Every smartphone's keyboard already knows how to properly suggest words. When will Windows learn?

Improved eye-tracking controls with Eye Control

For some people, eye tracker peripherals such as those made by Tobii remain their primary way of interacting with Windows. (Windows won't track your eyes with your laptop's built-in webcam.) For those who routinely use them, Microsoft has fine-tuned the shortcut menu in which users can interact with Eye Control, including a way to pause Eye Control to passively watch a video.

Better support for HDR displays

Chances are that you don't own a state-of-the-art HDR display. But Microsoft is looking forward to a day when both professional artists and everyday users enjoy a panel with higher graphic fidelity. Within the Fall Creators Update, Settings > Apps > Video Playback allowed you to toggle HDR support and apply processing power to improve the visual quality.

Within the Spring Creators Update, you gain a few new options, including calibrating your display (click Change calibration settings for HDR video) that allows you to tweak the brightness of the display. (The video' you're asked to adjust looks a lot like the static image opposite.)

You also have more options when choosing to play back video. Within the FCU, you had the option to emphasize better battery life or better video when playing back video, including applying processing power. The latter option reduced battery life as it brightened the screen. Now, you have the option of leaving the screen brightness dialled down, while still applying more processing power to clean up the video.

Microsoft's HDR calibration page allows you to favour details in darker or lighter scenes via a slider bar

Although I could see noticeable changes to the demonstration video on Microsoft's page as I adjusted the settings, I wouldn't say there was any measurable improvement. Part of that might have been because Windows mistakenly identified my test Surface Laptop as a device capable of rendering HDR video. The graphics properties of my adaptor indicated that both the Laptop's display, as well as an external HDR-capable monitor, were still being rendered in SDR mode. If HDR does take off, Windows will need to indicate more clearly to users what their visual options are.

## A larger number of MyPeople users
Microsoft debuted MyPeople within the Windows 10 Fall Creators Update, allowing you to include icons of

up to three of your closest friends within the taskbar, and giving them the ability to send pop-up notifications that included emoji. Microsoft originally limited the number of MyPeople friends to three; ten is now the limit. You can now drag and drop the icons to rearrange them, too. Previously, Microsoft hid any overflow within a separate, default icon. Now the friends who don't rate being included on your taskbar hide underneath the MyPeople icon itself.

Cortana changes, and not for the better

The appointment of Javier Soltero (responsible for the excellent Outlook mobile app) as Cortana's new boss will hopefully fast-track Cortana's development, which has stagnated. For now, the only real addition to Cortana is updated Lists, as well as better natural-language recognition, à la the Harman-Kardon Invoke.

Cortana was supposed to have added a sort of meta list, called Collections, with recommendations for recipes, websites, and more. But the only suggestions

This is Cortana's Lists. Graphics aside, this is a pretty sorry to-do app
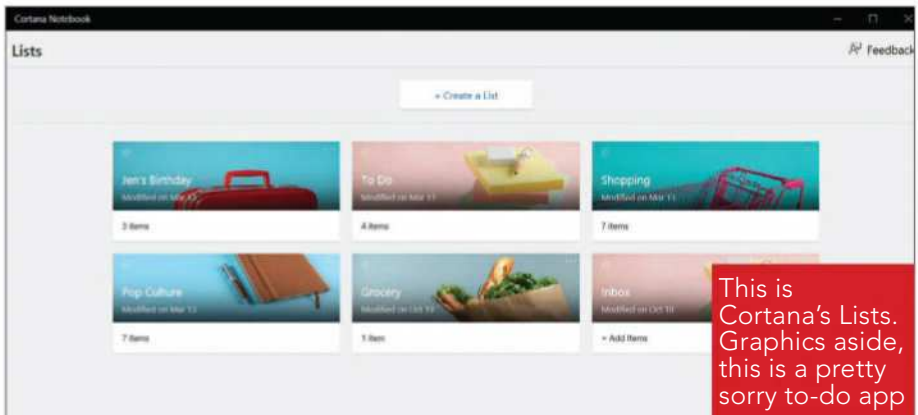
Cortana provided were on my to-do list, such as 'homework' and 'water plants'. Not good.

Meanwhile, one important aspect of Cortana, the 'I've got more for you' box, has been demoted. This feature used to display a list of relevant news stories, stock prices, sports results, and more within the Fall Creators Update. Microsoft supposedly planned to migrate it into the Notifications Centre in the lower right-hand corner. If so, it never made it to my Insider builds. It announced a preview app called Cortana Show Me in a late Insider build. Though it hasn't yet downloaded to my machine, it sounds useful: like the 'out of the box experience' that uses the friendly Cortana persona to help set up a new PC, Show Me walks you through a series of guides of common Windows tasks.

Windows for Workstations Ultimate Performance

This is a true hidden feature, if only because few of you will run Windows for Workstations, the prerequisite for this feature. Microsoft describes this as going one step beyond the current 'high performance' setting, eliminating micro-latencies associated with fine-grained power management techniques. (It consumes a bit more power as a result.)

Most gamers would love to see this option migrate down to Windows 10 Pro – or even a hypothetical Gaming Edition – but it hasn't happened yet.

As with any Microsoft feature release, there are many more upgrades and changes than we've provided here. We'll look at these once the update has been released.

Razer Game Store

The Steam alternative that gives you free games and PC hardware.
BRAD CHACOS reports

R azer creates virtually every type of PC peripheral you can think of, from headsets to mice to keyboards, but it's now taken on a new challenge: Steam. Yes, Razer has launched a gaming store of its own. Aptly called the Razer Game Store, the new marketplace taps into the zVault rewards system that Razer debuted last year to give loyal customers free games and gear.

The Razer Game Store (**fave.co/2uM0dPS**) behaves similarly to the Humble Store. When you buy a game, you'll receive a key to activate it on a platform like Steam or Uplay. The company says you'll see titles from

Ubisoft, Bethesda, Bandai Namco, Sega, and Rockstar, as well as other publishers. It won't be B-tier dregs either; Dragon Ball FighterZ, Assassin's Creed: Origins, Grand Theft Auto V, Ghost Recon Wildlands, Cuphead, Kingdom Come: Deliverance, and Dishonored: Death of the Outsider are some of the games being sold, with Pillars of Eternity II: Deadfire and The Crew 2 in the wings. Only officially authorized keys will be available.

Razer kicked things off with discounts of up to 75 percent on Ubisoft games, and by giving away 10,000 Steam keys for Furi on a first-come, first-serve basis. The company also plans to offer steeper discounts and bigger rewards on four 'Razer exclusives' per week. Assassin's Creed: Origins, Wolfenstein II, Ni no Kuni II: Revenant Kingdom, and Far Cry 5 are up first. They're listed at between 10- to 60 percent off and come with a Game Store voucher up to £10, double zSilver rewards, and a £10 voucher for Razer hardware.

Razer Game Store rewards

The rewards are the prime reason for using the Razer Game Store. Whenever you buy a game, you'll unlock some sort of perk, such as the vouchers mentioned above. You'll also receive zSilver, the zVault loyalty credit that can be traded in for games and Razer gear. Every purchase gives you zSilver, but using zGold – Razer's homegrown virtual currency, which can also be used for transactions on GamersGate, Indiegala, Smite, and War Thunder, among others – to buy your games awards a much higher zSilver payout.

The zSilver rewards catalogue reveals what sort of prizes you can unlock over time. Indie game keys range

from 15,000 to 50,000 zSilver depending on the title, while hardware varies greatly. The Razer Ergonomic Keyboard Rest, for example, costs 37,0000 zSilver, whereas Razer Cynosa Chroma Pro keyboard will set you back 146,500 zSilver.

Grabbing big-ticket Razer gear from gaming bounties will take a while, in other words, and doubly so if you aren't buying games with zGold. Because the Razer Game Store gives you Steam and Uplay keys, though, there's probably no harm in using it for the games you want. Given enough time, your zSilver piggy bank might just pay for a great peripheral upgrade.

The Razer Game Store is available now in the UK, US, Germany, and France, with localized content and pricing information. The rest of Europe has access to an English-language version of the Game Store with prices in Euros, while other countries can buy from a global storefront that accepts US dollars.

Some of the items on the Store's rewards page
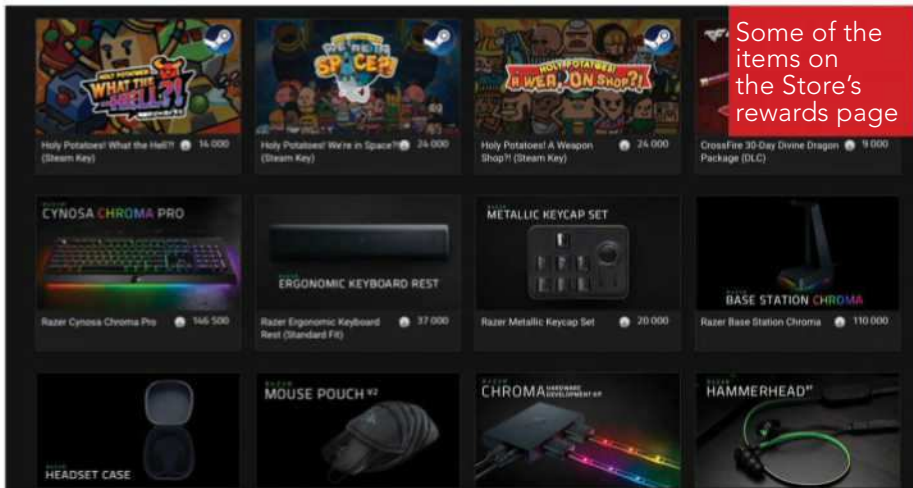
Best budget PC speakers

MICHAEL ANSALDO's audio upgrades won't break the bank

Your laptop's built-in speakers aren't doing any favours for the gigabytes and gigabytes of music and movies on your hard drive. Even the best ones can leave your audio sounding thin and lifeless. External speakers – along with a good set of headphones – are a must for getting the best fidelity from your media files.

A trip online or to your favourite electronics store will reveal a head-spinning variety of options in this

category, with some systems costing as much or more than you paid for your laptop. You don't need to take out a personal loan to upgrade your audio, though. Quality speakers can be found even with a budget of around £50. And while there is a certain degree of 'you get what you pay for' at this price level, you'll be rewarded with satisfying sound if you're willing to make a few compromises.

We've given you a head start by testing some of the most commonly available budget models. All cost around £50, sometimes significantly less. We set up each in a typical environment – on a desk in a home office – and play a variety of audio tracks to push their sound capabilities. We also provide some buying advice below to help you choose the right model for your needs.

What to look for

2.0 speakers vs. 2.1 speakers

Sure, a 5.1 (five speakers, one subwoofer) multichannel speaker system sounds pretty sexy. But even if you were to unearth one for £50 or £60, the quality would almost certainly be just as cheap. That money can buy a much better quality two-speaker system. These basic 2.0 stereo setups, which are comprised of just a left and right speaker with a single driver (the actual loudspeaker) in each, abound in this price range. Occasionally you can also find a decent 2.1 system – a pair of speakers to handle the higher frequencies and separate subwoofer for the bass. These take up more space but often produce more balanced sound. More on that next.

Creative Pebble

Sound quality: Ask your ears, not the spec sheet

Try not to be seduced by manufacturer's specifications on sound quality. Even if you can parse frequency response numbers, they are frequently exaggerated. Let your ears be your guide instead. Listen for a good balance between the high (treble), mid, and low (bass) frequencies. Often, speakers will exaggerate one – usually the treble or the bass – at the expense of the others. Good speakers will produce full, detailed audio that sounds as the creator intended it.

Be aware, though, that finding strong bass response in this price range can be challenging. Without a subwoofer, 2.0 systems have trouble reproducing low frequencies. The manufacturers often use technological

tweaks to beef up the bass notes, but these can sound boomy, and muddy the overall mix. If a deep, controlled bottom end is a priority, a 2.1 system might be a better investment.

AC power vs. USB: The trade-offs

Both these options are prevalent in the sub-£60 price range. USB-powered speakers reduce cord clutter, as they don't need a separate power cable. However, they can't supply as much juice as the AC variety, so they tend to produce lower volume and less bass.

Creative Inspire T12

Price: £51 from **fave.co/2qo0MLk**

Creative Labs has been synonymous with great-sounding PC speakers for years, so I expect excellent audio even from the company's lower-end products. The Inspire T12 speaker system did not disappoint, delivering warm stereo sound at a great price compared to other budget PC speakers we've tested.

Produced in matte-black plastic with a glossy black front panel, the speakers are aesthetically kissing cousins to Creative's higher-end T20 series. Each 180x71x98mm speaker has a tweeter on the front and a woofer that takes up the entire backside. In lieu of a subwoofer, the T12 uses Creative's BassFlex technology to extend the low frequency.

Setting the T12 up is easy. The left speaker has an attached cable that plugs into the right speaker to tie them together. Also on the back of the right speaker is the power port, and an audio input jack you connect

to your PC's headphone port using a supplied 3.5mm cord. On the front is a volume knob that doubles as the power switch, a headphone jack for private listening, and an auxiliary-in jack for lining in your smartphone or other MP3 player.

The T12 have impressive sound for desktop speakers at this price. The high end was crisp without ever getting tinny, and the BassFlex tech gives the bottom end a pleasing punch. The speakers also pack a volume wallop that belies their small size. Cranked all the way, they easily fill a modest-sized room with sound, though the audio tends to muddy at that level, too. I found the halfway point on the volume knob to be the sweet spot for desk-bound listening, delivering satisfying sound whether I was listening to classical, rock, jazz, or hip-hop.

The T12s are also a great audio enhancer for music and movies on your phone or tablet, but having to physically tether your mobile device to speakers seems fairly archaic in 2018. For its part, Creative offers a wireless version of the Inspire T12 that's virtually identical, save for a Bluetooth pairing button where the aux input is on the wired version.

Bottom line

If you want to upgrade the audio quality of streamed music and videos on your PC and are working with a modest budget, the Inspire T12 fit the bill. They won't dazzle you with design like the GOGroove BassPULSE, and they don't integrate the wireless capability like most newer systems do. But if those aren't deal-breakers, they will provide balanced sound with enough bass that brings out the best from most styles of music.

GOGroove BassPULSE

Price: £44 from **fave.co/2EDmW0b**

If the phrase 'PC speakers' still conjures images of a pair of beige boxes, GOGroove's BassPULSE may be a bit of culture shock. This 2.1 speaker system promises to turn any music listening session into an instant party with a boost to the bottom end and coloured lights that pulse to the beat (choose among the blue we tested, or green or red, on Amazon).

The BassPULSE system consists of a 279x235x114mm, 10-watt side firing subwoofer and two 209x88x76mm satellite speakers, each with 5 watts of power. The sub is sturdily built and weighs just over 3kg, while the satellites are slim sheets of sculpted acrylic, each with a Neodymium Full-Range driver embedded at the top and angled to target your earholes when you're sitting at a desk. All three pieces have built-in LEDs that glow blue, red, or green depending on which model you buy.

The two speakers share a single cord that plugs into the output jack in the back of the subwoofer. An

included 3.5mm cord plugs into the adjacent input jack. The other end plugging into the auxiliary output or headphone jack on your PC or mobile device, or you may connect the system via Bluetooth if you prefer to be untethered. The power cord is attached to the back of the subwoofer, so you don't need to worry about misplacing it.

Once the sub is plugged into an AC outlet, all you have to do is flip on the power switch. Everything is controlled from a panel on the front of the sub. A pair of knobs control the volume and bass level, respectively. Beneath these is a 'pulse' button that activates the LEDs. These glow steadily until you crank the bass past 80 percent of maximum, then they'll pulse with the music.

Given the big subwoofer – and the name of the system itself – it wasn't surprising that the bass stole the show in my testing. However, it tended to bleed into other frequencies. Dialling down the bass knob

added a little more clarity, but the bass had more or less the same boom quality whether I was playing rock, jazz, or EDM. The mids and highs were more distinct, and the sound never distorted even with all knobs cranked to the limit.

The pulsing lights, however, were a major disappointment. Maybe I was expecting too much, thinking they would operate more like a dance floor strobe, but even with the bass cranked they produced nothing more than a blink-and-you'll-miss-it flicker. Frankly, they work better as a light by which to navigate the speaker controls in a darkened room than an ambience-enhancer.

Bottom line

The BassPULSE may over-promise on its light show capabilities, but it's a good speaker system for the price. Most users will notice a definite sonic improvement over their PC's built-in speakers, with enough power to fill a small room whether you're listening to music, gaming, or watching a movie.

Logitech Z150 Stereo Speakers

Price: £22 from **fave.co/2GUneSg**

Logitech's Z150 stereo speakers cater to those with simple needs. No flamboyant designs or crazy amounts of connectivity options for these users. It's enough to find a pair that brings a little extra volume and clarity to our computer audio and fits on our desk. Even within our budget PC speaker round-up, this pair is notably inexpensive and unassuming.

As you'd expect with entry-level speakers, the Z150 set is small, lightweight, and slim on features. The enclosures measure 151.5x84.5xmm, and each are constructed with matte-black plastic, weighing 550g. The 2in speaker drivers are uncovered on the front panel, and the control unit has a power/volume knob, a headphone jack, and input for other devices like your phone or tablet. A cutaway at the bottom of each speaker seems to be for aesthetic purposes rather than any sound enhancement.

The speakers require minimal setup. They're hardwired together, so you just need to plug the detachable power cord into an outlet and the 3.5mm cable attached to the back of the control unit into your PC. With 6 watts of peak power, these speakers can get plenty loud. I kept the volume knob at the halfway point (my PC volume was set to max) during desk-bound listening.

The sound quality is better than you'd expect at this price point: The stereo separation is excellent and the mids and highs are clear and full. However, with no subwoofer or other bottom-end support, the bass is clear but has no depth and could easily get overpowered by the rest of the track. At higher

volumes, the highs started to suffer a little, too, with cymbals getting harsh and some sibilance creeping into the vocals.

One quirk of the Z150 is that although it includes a jack for headphones, it offers no amplification for them. If you plug in for some private listening, you'll quickly notice that the speaker's volume knob has no effect. Instead, you have to adjust the volume in your system settings. This is a common complaint about the speakers in online user reviews.

Bottom line

The Z150 will bring clear sound and nice volume boost to music and movies played on your PC or mobile device. If your expectations – and your budget – are modest, and the lack of bass response isn't a deal-breaker, they are a decent upgrade for the cost. But If you can squeeze another £5 or £10 out of your bank account, slightly more expensive models in our buying guide that will give you much more bass for the buck.

Runner-up:
Edifier R19U Multimedia Speaker
Price: £37 from fave.co/2qo2Hj0

Typically, the lower you go under the £50 threshold for budget PC speakers, the more the returns diminish. Edifier's RU19 2.0 system is a rare exception. These speakers sound great, look great, and at just £37 they leave your bank balance largely unscathed. It's one of the better buys here, which is saying a lot when they are all so affordable.

The R19U will bring a little style to your desktop. Each 105x85x175mm speaker has a matte-silver base with a black faux-wood enclosure that gives it a warm vintage vibe. Its 2.75in driver and porthole is covered with black mesh grill. They are controlled by a large black power/volume knob on the left channel, which also has a 3.5mm headphone port. On the back is a 3.5mm AUX socket, where you can connect your mobile device or other audio player with the supplied cord.

To set up the R19U, you first plug the RCA connector extending from the left speaker into the jack on the right one. Next, plug the USB cable into your computer. As the speakers draw the audio as well as the power from this USB connection, you'll then need to access your operating system's audio settings and change the output to the R19U.

The speakers deliver excellent, balanced sound, with rich mids and crisp highs. Even without a subwoofer,

they have a good controlled bass response. It won't rattle your windows, but it has a satisfying punch.

As is common with USB speakers, the volume output is a little low. Even with the source volume maxed, I had to push the speakers' volume knob past the halfway point to get to a listenable level when I was sitting in front of them. When I wanted to listen to music while moving about the room, I'd have to turn them up all the way. The good news is that they didn't distort even at the highest volume.

Bottom line

Put the Edifier RU19 on the shortlist of sub-£50 speakers worth buying. I found they generally brought the best out of any given audio, whether it was an album, a film, or a YouTube video. And the subtle design nod to the wood floor standing speakers of home audio's golden age was kind of endearing. If you can live with the bass and volume limitations inherent in USB-powered speakers, you won't be disappointed.

Best overall budget speakers:
Creative Pebble

Price: £40 from **fave.co/2qntVWR**

Creative says its Pebble speaker set was inspired by a Zen Japanese rock garden. This USB-powered 2.0 system has a simple, sparse design with a subtle aesthetic appeal. Still, I wondered how much audio enhancement they could bring to a PC for a measly £40. It turns out, quite a bit, even compared to pricier budget PC speakers we've tested.

Available in black or white (the price for white may differ slightly on Amazon, each speaker measures 114x13x116mm – about the size of a grapefruit. The space-saving size makes it easy to find room for them on even the smallest or most cluttered desk. The rubber ring on the flattened bottom of each enclosure keeps it from slipping on your desktop.

Pebble's 2in far-field drivers – which combine for an RMS of 4.4 watts – are angled at 45 degrees. This design is optimal for directing the audio at your ears when you're sitting in front of your computer. Built-in passive radiators extend the low-frequency response for beefier bass. A power/volume knob on the front panel of the right speaker works in conjunction with your PC's audio controls to manage Pebble's volume.

With Bluetooth speakers becoming more the norm, contending with cables can feel like a hassle. Fortunately, Pebble keeps the wires few and tidy. The two speakers are hardwired together, so all you need to do is plug the USB cord into one of your PC ports, and the 3.5mm input into your headphone jack. Each of these cables is attached to the back of the right speaker, so you don't need to worry about losing them.

Pebble delivers surprisingly rich, immersive audio. USB-powered 2.0 speakers tend to suffer in sound

quality compared to their AC-powered counterparts, but that wasn't the case here. Highs were crisp and clear, and the bass had plenty of presence. Overall, the audio had depth and detail no matter what type of music I ran through the speakers. The tipping point for speakers this size is usually at higher volumes, where distortion becomes an issue. But even when playing bottom-heavy genres like dub or dance music, Pebble retained crystal clarity at high volume.

Bottom line

Decent sound in £40 stereo speakers is as rare as gold. Pebble sets a new bar with its well-above-average audio. It's not audiophile quality – nothing at this price point is – but it's fuller and more balanced than you find in PC speakers that cost twice as much. Pebble offers an inexpensive audio upgrade that's tough to resist.

How To: Set up a VPN in Windows

MARK SHEA and IAN PAUL look at when and how to use the VPN client built into Windows

VPN (virtual private network) technology lets a computer using a public internet connection join a private network by way of a secure 'tunnel' between that machine and the network. This protects the data from being seen or tampered with.

The two most common use cases are consumer VPN services that allow individuals to surf privately from home or a public setting, and business-oriented solutions that allow employees to securely connect to a corporate network remotely.

For the most part, VPN connections are handled by custom software, or by third-party generic software such as the OpenVPN client or Cisco AnyConnect.

Another option that's generally supported by most virtual private networks is to use Microsoft's built-in VPN client. This is useful when some VPNs don't provide their own client or if you want to use a VPN protocol not supported by your VPN's client such as IKEv2.

The downside to using the built-in client is that you have to select a specific server to use as opposed to jumping between different locations the way you can with a commercial VPN service. On the other hand, most employer-supplied VPNs will offer a limited number of servers you can connect to, which makes using this client ideal.

Set up a VPN in Windows 10

Step 1: Click on the Cortana search bar or button on the taskbar and type **vpn**.

Step 2: The top choice should be Change virtual private networks (VPN). Alternatively, open the Settings app and go to Network & Internet > VPN.

Step 3: At the top of the VPN screen in the Settings app, click Add a VPN connection.
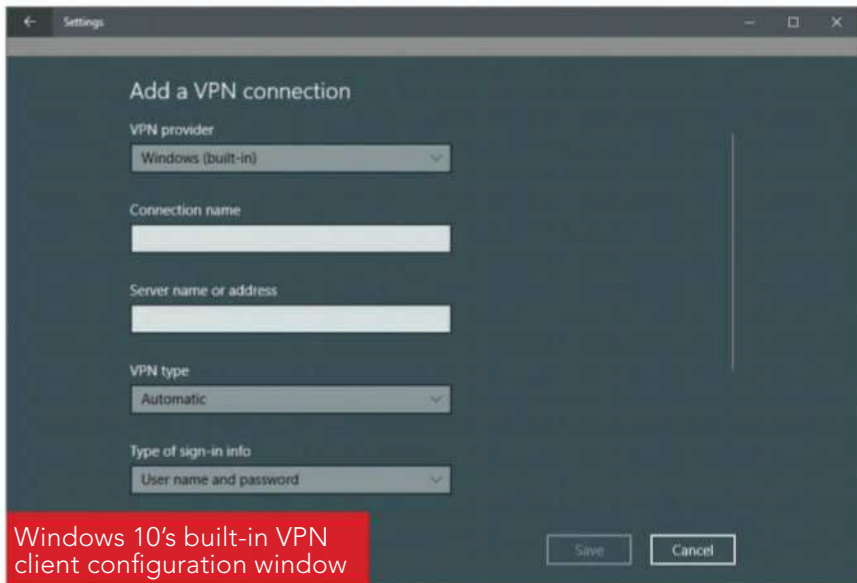
Step 4: In the screen that appears, enter the details for your VPN connection. Under 'VPN provider' click on the drop-down menu, and select Windows (built-in). This will also change 'VPN type' to Automatic, and 'Type of sign-in info' to User name and password.

Step 5: Next, fill out the 'Connection name' and 'Server name or address'. These vary based on your VPN provider – whether a third-party service or an employer. For this example, we're using Acevpn (**fave. co/2qpPrdC**), a clientless VPN service that supports various connection types such as IKEv2, L2TP, and PPTP.

Step 6: Scroll down this screen and you'll see a spot to enter your username and password for the VPN

– again provided by your VPN service. Once the information is entered, click Save, and close the Settings app.

Step 7: Click the Wi-Fi icon in the system tray on your taskbar, and select your newly created VPN connection, which should be right at the top of the list. It should automatically start to connect, and if all goes well the connection process should happen relatively quickly.

An IKEv2 VPN connection ready to go in Win 10

The above process works for the easier VPN connection types such as PPTP and L2TP, but if you want to use IKEv2 that requires installing a root certificate from your VPN provider. Keep in mind that not every service supports IKEv2, so using this method depends greatly on your VPN service provider or employer.

Regardless, here's how it works on Windows 10. First, download your VPN provider's IKEv2 certificate to your desktop or somewhere else that's convenient. Next, double-click on the certificate file and a security warning pops-up. Click Open.

On the next window that opens click Install certificate. Now we've arrived at the Certificate Import Wizard. Select the Local Machine radio button and click Next. On the following screen make sure to select the

radio button labelled Place all certificates in the following store, and click Browse.

A smaller window opens with a folder tree. Select Trusted Root Certification Authorities and then click OK. Now we're back at the Certificate Import Wizard window. From here click Next.

Windows 10's Certificate Import Wizard

The hard part is over. On the next screen click Finish and then OK in the smaller window.

Now that the certificate is installed we can set up the IKEv2 VPN using the same step-by-step instructions above. Just make sure that you select IKEv2 under 'VPN type', and then use the server name, address, and username and password provided by your service provider.

Once you've connected to the VPN, check to see that your VPN is working by visiting **IPleak.net**. You should see an IP address, and DNS servers that are different from your non-VPN state.

If you don't, there are a number of potential causes that we can't go into here. Your best bet is to check with your company's IP department or the support service of your VPN.

However, one easy and common fix for IKEv2 problems is to right-click on your Wi-Fi or ethernet

icon in the system tray, and select Open Network and Sharing Centre from the context menu. When the Control Panel opens click Change adaptor settings on the left side, then right-click the name of your VPN connection and go to Properties > Internet Protocol Version 4 (TCP/IPv4) > Properties > Advanced... > IP Settings. Check 'Use default gateway on remote network' and click OK. Close up all the windows and try IP Leak again.

Set up a VPN in Windows 7

Step 1: Click the Start button. In the search bar, type **vpn** and then select Set up a virtual private network (VPN) connection.

Step 2: Enter the IP address or domain name of the server to which you want to connect. If you're connecting to a work network, your IT administrator can provide the best address.

Step 3: If you want to set up the connection, but not connect, select Don't connect now; otherwise, leave it blank and click Next.

Step 4: On this next screen, you can either put in your username and password, or leave it blank. You'll be prompted for it again on the actual connection. Click Connect.

Step 5: To connect, click on the Windows network logo on the lower-right part of your screen; then select Connect under 'VPN Connection'.

Step 6: In the 'Connect VPN Connection' box, enter the appropriate domain and your login credentials; then click Connect.

Step 7: If you can't connect, the problem could be due to the server configuration. (There are different types of VPNs.) Check with your network administrator to see what kind is in use – such as PPTP – then, on the 'Connect VPN Connection' screen, select Properties.

Step 8: Navigate to the Security tab and select the specific 'Type of VPN' from the drop-down list. You may also have to unselect Include Windows logon domain under the Options tab. Then click OK and Connect.

It takes a little work, but setting up a VPN using the Windows built-in client is relatively quick, and as a user it's a helpful skill to have.

How To: Dual boot Windows

If you want to run different versions of Windows on the same PC, MARTYN CASSERLY shows you how to dual boot the OS

For most people, running one operating system on their PC or laptop is enough, but in some instances it can come in handy to have two separate versions on a PC. This may be due to specific software that only works with an older release of Windows, or maybe you want to compare the differences between Windows 7 and 10 before

committing to an upgrade. Thankfully, the OS is designed with dual booting in mind.

You can create a dual-boot system from pretty much any version of Windows, but here we will add Windows 10 to a PC running Windows 7.

System requirements

You'll need a copy of Windows to install, and this should be burned onto a CD or written to a USB stick. Microsoft provides a downloadable version of Windows 10 on its site, although you'll still need a product key to activate it if you intend to use the operating system long term. Fortunately, the days of dealing with an 'ISO' file are over: when you download Windows 10 using Microsoft's Media Creation Tool, the process is automatic. That means you'll end up with a USB stick that your computer can boot from.

As you're installing an operating system we recommend you do a full backup of your data, as there's no guarantee something won't go wrong and you wouldn't want to lose precious files. Here are the basic steps before we get to the details:

Step 1: Install a new hard drive, or create a new partition on the existing one using the Windows Disk Management Utility.

Step 2: Plug in the USB stick containing the new version of Windows, then reboot the PC.

Step 3: Install Windows 10, being sure to select the Custom option.

Step 4: Select the newly created partition or the other hard disk as the destination for Windows 10. Then click Next to install the operating system.

Install a second copy of Windows

If you have a new hard drive (or SSD) or a spare one, you can use this to install the second copy of Windows. If you don't have one, or you can't install a second because you have a laptops, you'll need to use your existing hard drive and partition it.

Create a new partition

If you need to install a second version of Windows on the same hard drive as the first, make space on it. This can be tricky if you're running low on storage, as Windows 10 ideally requires around 20- to 25GB – we recommend at least 50GB.

Here's how to find and delete large files taking up space. Once you've backed up any files that are important you'll need to go to the Windows Disk Management utility. To do so hold down the Windows key and press R. This opens a box, into which you type **diskmgmt.msc** and press enter.

You'll now see a list of the partitions on your hard drive. Select the primary partition, usually called (C:), and then right-click and select Shrink Volume.

Now you'll see another window that shows you the size of the partition, and asks you to Enter the amount of space to shrink in MB. To create a 25GB partition you'll need to enter 25000, then click Shrink. This will modify the partition, allowing you the space you need to install Windows 10.
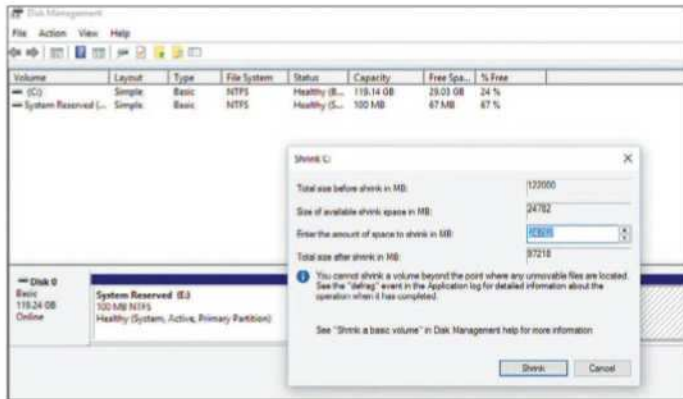
Install Windows 10

Place the previously created CD or USB version of Windows 10 into your PC and reboot the machine. You should be taken straight to the installation process, but if your machine goes back to your normal operating system straight away you'll need to adjust the boot sequence in your BIOS.

When the install sequence starts you'll need to select the Custom option. This opens up a panel that asks you Where do you want to install Windows? From the presented options select the one entitled Unallocated Space, which should be 25GB. Click Apply and once Windows has created the partition click Next.

Now the installation process should go through as normal, and when you reboot your machine you will have the option to choose between the two operating systems. The bonus is that as different versions of Windows still use the same file system, you'll be able to access your files from either OS.

IDG