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HP Spectre x360 15

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Everything Apple announced at WWDC

If you missed this year's WWDC keynote, then **JASON CROSS** has all of Apple's announcements



This year's WWDC was all about software. That meant no new Mac announcements, no low-cost HomePod, no iPhone SE... nothing but iOS, tvOS, watchOS, and macOS. There was still plenty to get excited about, though. Apple's upcoming operating systems are going to deliver a host of improvements and new features when they are released this autumn. Here's everything Apple announced at its keynote presentation.

iOS 12

This is the big one. Apple's most popular devices run iOS, and they are getting a lot of improvements.

Performance: Apple is paying special attention to performance, particularly on older devices. The company says that, on an iPhone 6s Plus, apps launch up to 40 percent faster, and twice as fast when there's lots of heavy multitasking going on. The camera launches 70 percent faster, the keyboard pops up 50 percent quicker, and the share menu is twice as fast, all on an iPhone 6S Plus.

FaceTime: Apple is adding group FaceTime with up to 32 people, the ability to add people in the middle of a FaceTime call, the option to use Animoji and Memoji in FaceTime calls, stickers in FaceTime calls, and even video filters.

Animoji: There are four new Animoji: T-Rex, Ghost, Koala, and Tiger. Plus, clips have been lengthened to 30 seconds. Animoji (and Memoji) recognize when you stick out your tongue or wink.

Memoji: iOS 12 introduces a new form of Animoji that is made to look like your face (or someone else's, if you want). Think of it as an animated 3D version of Bitmoji. You can customize how your face looks, adjust your hair, and accessorize.

Screen Time: Track how much time you or your children spends glued to their iPhone or iPad. You can set time



limits by app type and day, and they even sync between iPhone and iPad. Plus, create exceptions for apps you always want available, such as education apps.

Notifications: Finally, better iOS notifications. These will be grouped together by app, and you can instantly choose to have notifications for particular apps delivered silently. You can also mark certain alerts as critical so you get them even while in Do Not Disturb mode.

Do Not Disturb: Choose a bedtime, and your display will dim and silence notifications until you unlock your

phone the next day. You can also quickly set DND mode to end in an hour, at the end of the meeting you are in, or when you leave your current location. Perfect for school or the cinema.

ARKit 2: With ARKit 2, Apple extends its leadership in mobile augmented reality. There's improved face tracking, better rendering, a new cross-platform AR file format called USDZ, the ability to save persistent AR states, and the ability for multiple people to share in a single AR experience together. Apple is even including its own app named Measure that lets you quickly measure real-world objects.

Photos: Photos gets a bit of a facelift with a new For You tab, event search, sharing suggestions, and smarter search suggestions. It now supports RAW images, including the ability to edit them on an iPad Pro.

Camera: Portrait mode is improved, the QR code reader is better, and there's an API for developers to separate layers in a photo, so they can do their own portrait modes and other special effects.

Siri: It looks like Siri is getting a host of improvements in iOS 12. The big one is Siri Shortcuts, which lets you perform a set of actions all with a single command. This represents the first real integration of Workflow into iOS, too. Siri makes intelligent suggestions on the lock screen based on your past history. Plus, it can give you more facts about more things (including nutrition facts), and help you search for a password, too.

Privacy and Security: Safari can do more to prevent websites from tracking you. iOS can help you automatically generate strong passwords for websites and apps, and store them in Keychain. The passwords list will flag reused passwords, too. If you get one-time use passcodes via SMS, they'll be suggested for autofill so you don't have to pop back and forth or memorize them. Third-party password apps get an API to integrate into the keyboard, too.

Overhauled apps: iBooks (now just Books), Stocks, News, and Voice Memos have all been given a redesign and new features.

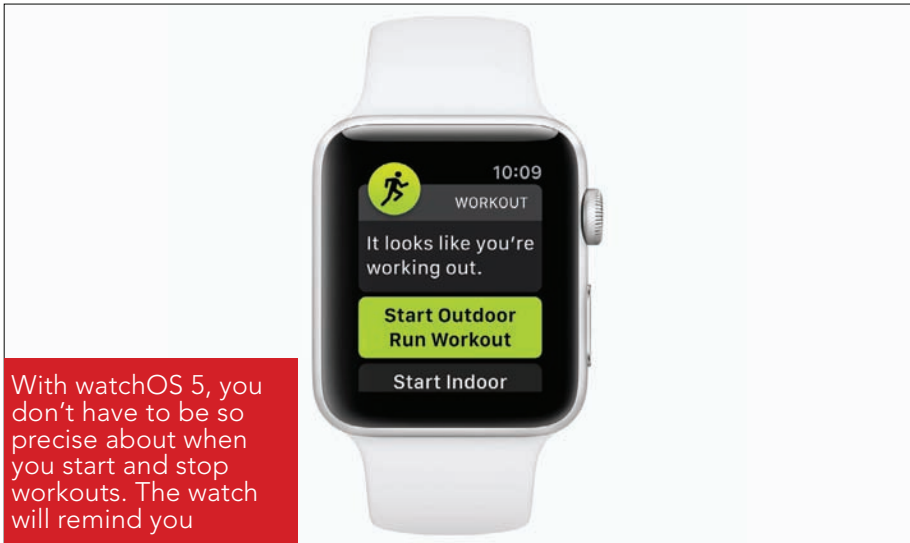
CarPlay navigation apps: At long last, third-party navigation apps will work in CarPlay. That means you can use Google Maps or Waze in your CarPlay-equipped car.

watchOS 5

We don't know what features the next Apple Watch will bring, but the next version of watchOS has plenty of new features. Unfortunately, Apple is cutting off support for the original Apple Watch (series 0), so if you want its new features, you'll need a Series 1, 2, or 3.

Activity Competitions: Challenge someone to a seven-day contest where you earn points based on the percentage of your rings you close.

Workout features: Apple Watch will automatically sense you are working out, prompt you to start a



workout, and give you credit for the workout you've already done. Then, it will remind you to end a workout. Apple has added new workout types such as Yoga. Great new features for runners include keeping track of pace, rolling miles, and cadence.

Podcasts: Yep, the podcasts app is coming to Apple Watch.

Walkie-Talkie: Probably the most fun new watchOS 5 feature, you can have a one-on-one push-to-talk conversation through your Apple Watch.

Siri watch face: The Siri watch face uses machine learning to get better at surfacing the right content for you at the right time.

No more “Hey Siri”: If you enable ‘raise to speak’, you can just lift your watch to your mouth and tell Siri what to do without saying “Hey Siri” first.

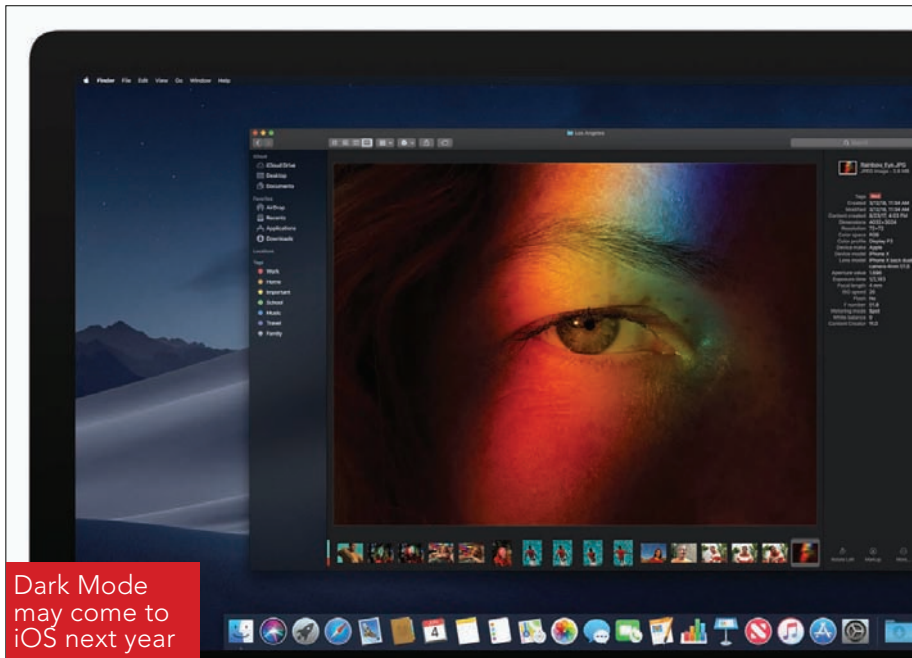
Better notifications: You get grouped notifications like you do on iPhone, better Do Not Disturb options, and more functions that can be done right from the notification itself.

Student ID cards: Some universities will integrate their student ID cards with Apple Wallet and Watch, so you can just tap your wrist to do everything you need your ID card for – building access, buying stuff, whatever. This feature is rolling out with six universities, with more coming over time.

macOS Mojave

Apple made one thing abundantly clear: it is not going to combine iOS and macOS. The next version of Apple’s computer OS, Mojave (10.14), has plenty of new desktop-exclusive features. Apple did confirm that it plans to bring some of the developer UI framework from iOS over to macOS, updated for Mac features such as pointers and hardware keyboards. It’s just an effort to make it easier for developers to make both macOS and iOS apps. Here’s what’s coming.

Dark Mode: It’s a shame this isn’t coming to iOS, but at least macOS is getting a Dark Mode. The Desktop, Finder, and supporting apps can all change their appearance to a more white-text-on-black-background appearance. Maybe iOS will get this next year?



Dynamic desktop: Special Desktop background images can update based on the time of day.

Stacks: Messy Desktops get icons and files grouped by type, and expand when you click them.

Finder features: The new Gallery view looks like the second coming of CoverFlow. It's a fast way to locate files by what they look like. Quick Actions let you perform common tasks (such as rotating an image) without opening an app, and you can see all of a file's metadata in the preview pane, without opening the Get Info window.

Quick Look: Mac users are used to checking out a file with the press of a space bar, but you can't do anything with it. With macOS Mojave, Quick Look lets you perform common actions like rotate images, mark up PDFs, trim video, or share files.

Screenshots: The screenshots function of macOS takes a cue from iOS, putting recent screenshots into a little floating thumbnail. Leave it there to save it, or click it to edit, markup, or share.

FaceTime: If iOS is getting FaceTime group calls, so is macOS.

New Apps: News, Stocks, Home, and Voice Memos are all finally coming to the Mac.

Mac App Store: Also taking a page out of iOS's playbook is the Mac App Store. It gets a new iOS-like design, including all the neat editorial content that the App Store added in iOS 11.

Privacy and Security: The same privacy and security enhancements introduced in iOS 12 are coming to macOS. That means helping prevent websites from tracking you if you don't want them to, generating strong passwords, and more password features in Safari.

Siri: Siri gets many of the same enhancements as it does on iOS, but with the addition of the Home app, Siri on the Mac can now control your HomeKit devices.



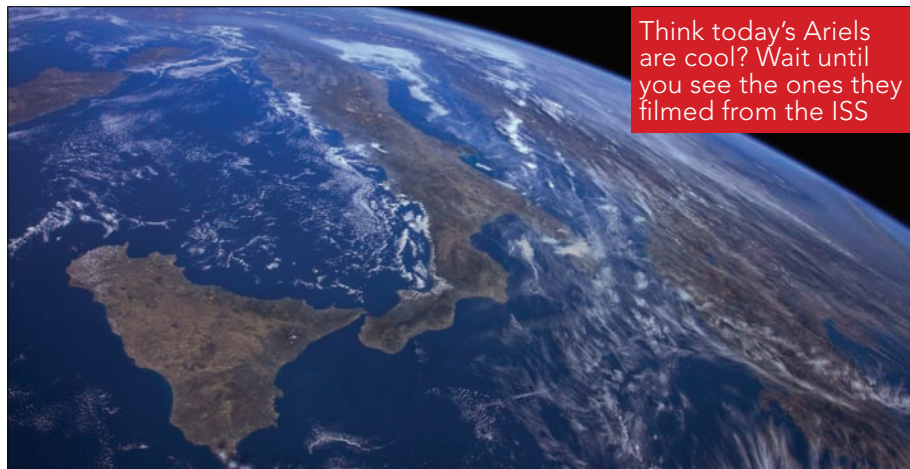
macOS is getting some of iOS's most important apps, like News and Home

tvOS 12

The customized operating system made for Apple's TV platform may not be getting the big-ticket features of iOS or macOS, but it's got a few new tricks up its sleeve.

Dolby Atmos: The final missing piece of the Apple TV 4K puzzle is support for Dolby's 3D object-based sound format. It's finally coming, along with lots of Atmos-enabled content in iTunes. Your existing content will be upgraded to Atmos, where applicable, at no charge.

Zero Sign-on: To make signing in less of a chore, the Apple TV will detect your broadband network and sign you in automatically to any apps that come as part



Think today's Aerials are cool? Wait until you see the ones they filmed from the ISS

of your subscription package. You'll also be able to securely AutoFill passwords using an iPhone and iPad.

Aerials: You can tap on the remote to see the location of an Aerial screen saver, and new Earth Aerials show you spectacular views of our planet as seen from the International Space Station.

Computex 2018

Computex gave us a glimpse of what to expect from PCs in the coming months. **BRAD CHACOS** reports



CES may be where technological dreams and inspirations spring forth, but Computex is where those ideas become reality. It's one of the biggest PC-centric shows year-in and year-out, where vendors reveal the tangible, physical hardware that will appear on store shelves in time for Christmas. This is where you'll find the pulse of the PC industry.

So what did we learn at Computex 2018? Gaming is on fire. The core chips at the heart of PCs are growing

stronger to satiate the hunger for more power, and for those who like to show off their pricey PCs, you can get RGB LEDs on pretty much everything. But that's just the tip of the iceberg. Read on for the coolest hardware we saw at Computex 2018.

Intel's massive hardware blitz

A massive, 28-core behemoth of a processor. A blisteringly fast Core i7-8086K chip that celebrates the 50th anniversary of Intel by breaking the 5GHz barrier out of the box for the first time in the company's history. A wild 'Tiger Rapids' concept that looks like a journal but is actually a powerful dual-screen PC. Bigger Optane SSDs. New Whiskey Lake and Amber Lake CPUs designed to hold the line until Intel works the kinks out of its 10nm fabrication process.

Threadripper 2

Not to be outdone, the very day after Intel's announcement, AMD pushed the Core Wars even further with the introduction of Threadripper 2, spearheaded by a monster 32-core, 64-thread flagship. Sheesh. A new 24-core CPU is coming as well, with these new chips built on the same underlying technology as 2nd-gen Ryzen. AMD also partnered with Cooler Master to create Wraith Ripper, a massive air cooler capable of taming the temps of 32 cores.

Dual-screen PCs

Dual-screen PCs that fold up like a book appeared at Computex, spurred by a multi-year concept creation from Intel.



Rioroto Project Morpheus

What size computer do you want? It's a key concern from the moment you decide to build a DIY rig, but with Rioroto's Project Morpheus case, you don't need to make the decision at all. As the world's first convertible PC chassis, Morpheus can shift from mini-ATX to full-tower size as your hardware loadout expands. The project also eschews current case fads by rejecting tempered glass and solid-metal panels, instead perforating nearly every surface with mesh ventilation to provide optimal airflow throughout your PC.

It's a clever idea. Rioroto isn't sure whether Project Morpheus will make it to market just yet, but fingers crossed that it does in some iteration.

Cooler Master's closed-loop thermoelectric cooler

Cooler Master's new hybrid cooler integrates a thermoelectric cooler into a traditional closed-loop cooling design. TEC coolers are typically found in those little six-pack mini-fridges that keep your beers cold.

So why did it do it? Simple. Traditional closed-loop coolers won't ever drop below ambient temperatures. The Peltier effect generated by a thermoelectric cooler breaks that barrier and plunges temperatures even lower. Previous implementations had some issues, so we're very intrigued to see how this turns out when it launches (hopefully) in the third quarter.

Asus ROG Phone

Razer kicked off the idea of an enthusiast-focused gaming phone, but the new Asus ROG Phone cranks things to 11 by swiping just as much inspiration from



fire-breathing PC builds. This handset packs ‘binned’ CPUs with overclocked performance, a massive 512GB of storage, vapour chamber cooling, a DCI-3 rated AMOLED panel with a 90Hz refresh rate and 1ms response time, and even customizable RGB lights.

The phone also offers nifty mobile-first features, such as ultrasonic shoulder buttons and a variety of docking options that transform the device into a switch-like gaming platform, an ad-hoc PC, and more.

The Asus ROG Phone sounds amazing on paper. One thing it doesn’t have, though? Release information. The street date and final price remain a mystery.

Nvidia BFGDs

One of the most notable things about Computex is what wasn’t announced. Nvidia CEO Jensen Huang told a gathering of reporters that the launch of new GeForce graphics cards is “a long time from now”.

But that doesn’t mean Nvidia showed up empty-handed. The company was showing off its massive, TV-sized G-Sync BFGD displays. The acronym ostensibly stands for “big format gaming displays”, but the name harkens back to Doom’s legendary BFG – the Big F***** Gun. Regardless, the idea of a 4K, 120Hz, 65in G-Sync HDR display has us excited.

During Computex, AMD also announced that its rival FreeSync technology is now available in living rooms via an update to twenty Samsung QLED TVs.

All-AMD Acer Helios 500

AMD technology showed up in more unexpected places at Computex. For example: a new variant of

Acer's Helios 500, a powerful gaming laptop that originally launched with Intel Inside alone. The all-AMD model includes a 6-core, 12-thread Ryzen 7 2700 desktop processor as well as Radeon Vega 56 graphics – the first time we've seen a laptop with a discrete Vega GPU. Acer made sure Vega puts its best foot forward by outfitting the notebook with a 144Hz FreeSync display.

Intel Low Power Display Technology

Nearly lost in the flood of Intel announcements at Computex was something a bit more fundamental. The company is working with display manufacturers Innolux and Sharp to create Low Power Display Technology, which tweaks every element of the panel – including the backlight and panel circuitry – to plunge its power draw all the way down to a single watt. They should still be bright enough, at around 350 nits of brightness,



These laptops, from HP and Dell, use the Low Power Display Technology co-developed with Sharp and Innolux

and last four to eight hours longer than comparable notebooks without LPDT. Intel says the technology will be optimized for the company's energy efficient U- and Y-series Core processors. At Computex, it showed off prototypes from HP and Dell. Look for the first systems with Low Power Display Technology to land on store shelves in time for the end of the year.

Lian Li Strimer

In a world gone mad for customizable lighting, the Lian Li Strimer takes RGB LEDs to a new frontier: your motherboard's power connector cable. What more do we have to say, really?

OLED displays on Asus ROG components

Asus took a different route with its new ROG Thor Platinum 1,200W power supply and ROG Ryuo and the ROG Ryujin closed-loop liquid-coolers. Sure, they're all packing RGB bling – but these pieces of kit pack interactive OLED displays, too. On the Thor PSU, it will show how many watts the system is drawing in real time. On the Ryuo and Ryujin, you can program the display to show off logos, animated GIFs, or anything else you want. It's simple, but surprisingly impressive in real life.

Cooler Master MK851 keyboard

Cooler Master's MK851 wants to kill your gamepad.

This innovative keyboard integrates Aimpad technology into the WASD and surrounding keys. Aimpad integrates an IR sensor into the key switch, which is able to track pressure up to 4mm deep.

That gives the keyboard analog gradations similar to a joystick, which in turn lets you drive a car or fly a plane in games with the precision of a joystick. Goodbye, Xbox One controllers?

MSI laptops (with cheater mode)

On the high-end, there's the Prestige PS42, a sleek ultraportable that isn't expressly for gaming, but MSI is still trying to cram Nvidia GTX 1050 graphics inside. That would be awfully impressive; we can't wait to see if they manage to achieve the feat. On the affordable end, there's the MSI GF63, a budget machine for gamers who can't afford to drop thousands on a laptop. At \$999 (£TBC), the price is certainly right, and with a 6-core 8th-gen Intel Core CPU and GTX 1050 inside,



MSI's Prestige PS42

it'll deliver enough power for a console-like 1080p gaming experience. Plus, you know, all the other benefits of being a portable PC.

MSI also showed off App Player, software that allows you to play virtualized Android apps on your computer. Why would you ever want to do that? To use a keyboard and mouse to massacre mobile gamers, of course.

Unique Asus laptops

Project Precog isn't the only innovative hardware that Asus brought to Computex. The company also revealed a new spin on the ZenBook Pro 15 that includes 'ScreenPad' technology, basically transforming the trackpad into a second screen for your PC on the fly. The new ROG Strix Scar II and Strix Hero II aren't quite as interesting, but the gaming laptops were designed to be optimized for shooters and MOBAs, respectively – a cool, niche concept.

Alienware accessories

Alienware doubled down on last year's accessory push with some fresh peripherals. Most notable: the premium AW988 wireless headset, Alienware's first cans in nine years. It's full of luxurious touches like a slot to house the USB dongle, but at £181, the AW988 is considerably more expensive than most modern gaming headsets. Hopefully, we can review a set to determine if they're worth the investment.

Alienware also revamped its Elite Gaming Mouse with a smoother, more ergonomic design and other changes prompted by customer feedback.

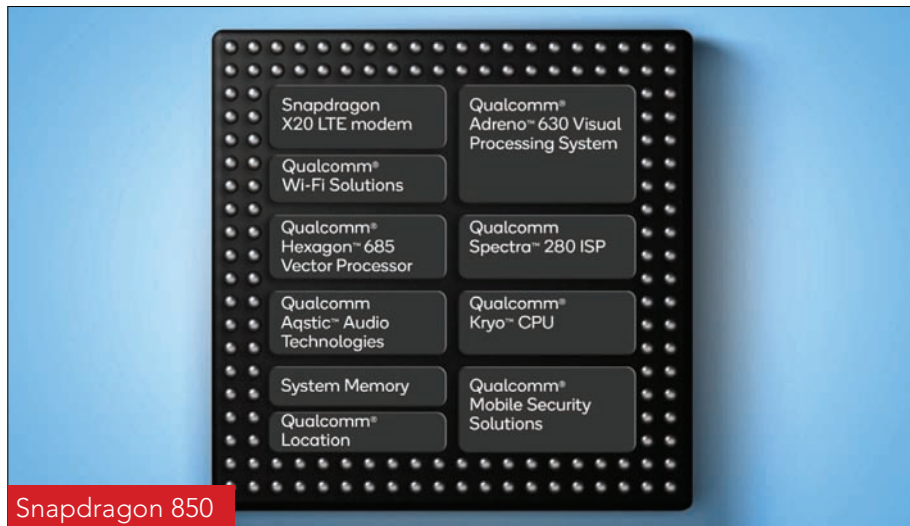
Aorus RGB Memory

Gigabyte made its DDR4 debut at Computex with Aorus RGB Memory.

It's a sleek piece of kit similar to existing RGB RAM options, but with an intriguing twist: the dual-channel memory kit includes two extra 'RGB-Infused Demo Modules' that are functionally useless, with no memory chips inside, but help extend the customizable RGB LED goodness to all four RAM slots so that you aren't left with gaps in your illumination. The 16GB kit is expected to cost \$229 (£TBC) when it launches by the end of the year, making it the most economical RGB memory option around for filling all your slots.

Qualcomm Snapdragon 850

Look, the first round of ARM-powered 'Always Connected PCs' didn't knock it out of the park, okay?



Laptops like the Asus NovaGo and HP Envy x2 deliver unprecedented battery life – up to 20 hours – but with serious performance concerns, since they have to rely on emulation to run standard Windows software. But Qualcomm is working to make things better.

The initial Always Connected PCs utilized Qualcomm's Snapdragon 835, a mobile chip found in phones. At Computex, the company announced the Snapdragon 850 – its first processor specifically created for Windows PCs. Qualcomm says the CPU delivers 30 percent more performance than the 835, and even better battery life. Get this: the Snapdragon 850 extends the already outstanding battery life of Always Connected PCs by another 20 percent, for what Qualcomm calls "multi-day" longevity. Will it be enough to push ARM-powered laptops over the hump? We'll have to wait and see.

HP Spectre x360 15-ch005na

Price: £1,599 inc VAT from fave.co/2l4OxcJ ★★★★★



HP's Spectre x360 15 changes everything. Specifically, the version that wields Intel's Kaby Lake-G CPU, fortified with Radeon RX Vega discrete graphics, upends the stereotype that 360-degree convertible laptops can't deliver top performance, as we prove in our test results on [page 30](#). Indeed, the Kaby Lake G version is as fast or faster than all comers.

The Spectre 15 x360 15's journey has been a long one. When we reviewed the first generation in 2016, it was basically designed to be a giant ultrabook with a big screen, rather than a pricey powerhouse.

Not to throw shade, but we've seen other vendors stuff much hotter CPUs and much hotter GPUs into 15in convertibles, and the results have been, well, less than stellar. That's definitely not the case with the Spectre x360, which gives you top-notch parts including:

- Intel Core i7-8705G
- 16GB of DDR4/2400 RAM
- 512GB NVMe PCIe SSD (Toshiba in our build)
- 15.6in 4K touch screen with active stylus support and 1,024 pressure levels

New look

Externally, the Spectre 15 x360 might look the same at first glance, but that's just the Dark Ash Silver colour. Look closer, and you can see HP has given the Spectre x360 the same sharply bevelled lines of the 13in version. The screen bezels have slimmed down on the sides. HP also integrates an IR-based Windows Hello-compatible camera and a fingerprint reader strip.

We measured our review unit at just over 359mm wide by 250mm deep. HP claims it's about 19.4mm thin (about three-quarters of an inch), which we confirmed. It's slightly thicker than the previous version, which was 17.9mm.

One complaint we definitely have is the weight. Our unit came in at 2.14kg. That's actually slightly heavier than the previous version. Some of that comes from the

hefty 4K touchscreen and its glass protective layer. One good side effect of the extra weight is the stiff chassis. Pick up the Spectre x360 15 one-handed, and you needn't fear that you'll bend it.

Display

HP has jumped into 4K with both feet on the Spectre x360 15. While most PC makers offer a 1080p version to lower cost and increase battery life (higher-resolution screens inherently use more power), HP offers only a single, 3,840x2,160 IPS-like panel option.

As more laptops offer 4K displays, it's important to know that this specification isn't a slam dunk when it comes to quality. Our unit's panel is reasonably bright at a measured maximum output of 319 nits, but other high-end models can hit 400 to 500 nits.

Keyboard and mouse

HP takes a new direction with the keyboard in this generation as well. The prior generation had speakers flanking the keyboard. In this new design, the speakers disappear and the backlit keyboard stretches edge to edge, allowing room for a 10-key numeric keypad. Yes, number crunchers, it's a properly designed 10-key, which Gigabyte and MSI still haven't learned how to implement.

While Apple and Dell have been acting like low-cost airlines, taking away creature comforts such as keyboard travel, HP gives you what feels like business-class service, with a plush 1.5mm for your weary fingers.

Our only quibble is the half-height cursor keys for moving up and down. An inverted 'T' is always



Unlike Apple and Dell, who are busy taking away key travel, the HP Spectre x360 15 features a full 1.5mm of travel on its keyboard

preferred. The trackpad is a glass-coated Synaptics ClickPad that's slightly offset to align with the keyboard. We've had palm-rejection issues with some of HP's extra-wide trackpads in the past, but this one we could not get to trigger. Good job.

Connectivity

The Spectre x360 doesn't skimp on connectivity. You get a pair of Thunderbolt 3 ports and a full-size HDMI on the right side. On the left there's an SD card reader, analog audio jack, standard barrel charger, and – wait for it – a USB Type A port.

The charger is a beefy 150-watt unit. The Thunderbolt 3 ports with USB PD will also charge the

laptop, but at a slower rate than you'll get with the traditional barrel charger.

Performance

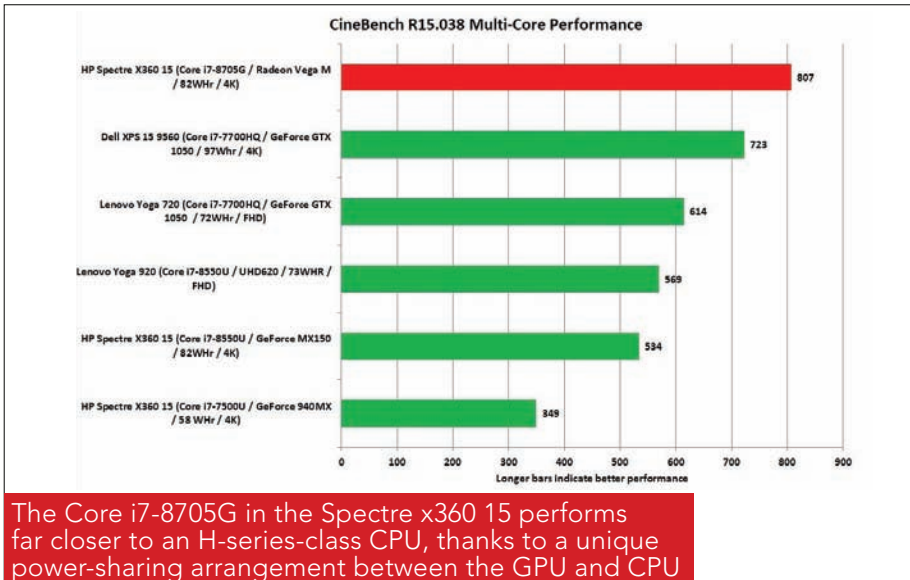
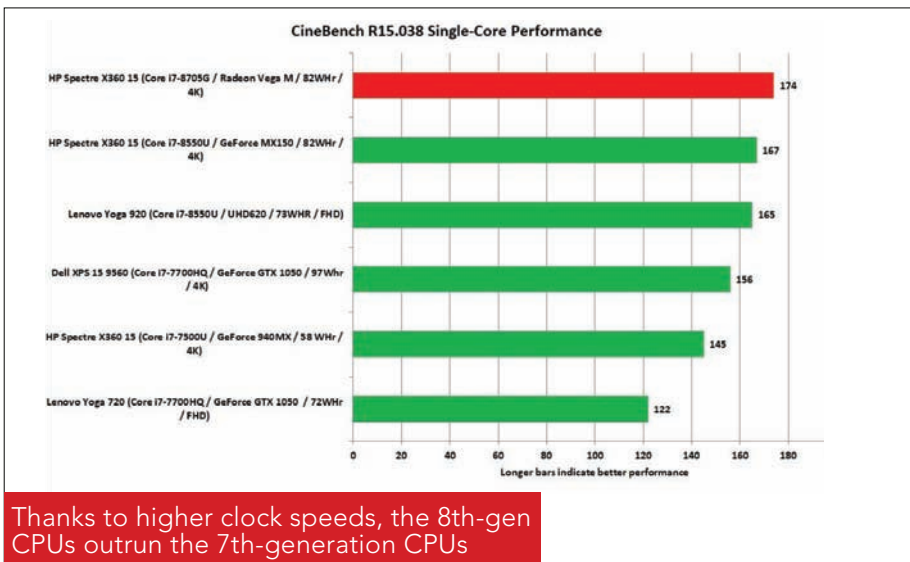
Much of the excitement around Intel's Kaby Lake-G CPUs stems from its once-unthinkable marriage of a custom Radeon RX Vega M with a quad-core 8th-generation Kaby Lake CPU. We expected strong graphics. The surprise for us came from the CPU side of things, though. As with previous generations of its laptop CPUs, Intel's 8th generation comes in two variants: low-power 'U' chips and high-power 'H' chips. The H processors usually rule the school, but Kaby Lake-G brings in some fresh, fast blood.

Intel has been pretty coy about exactly what's inside the 'G' series of CPUs. Sure, they're 8th generation, but are they low-power or high-power? Well, it turns out, they're high-power for the most part. Intel said it's using a new Dynamic Power Sharing feature that's possible only with the unique design of the Kaby Lake-G CPU. As you might guess from the name, performance between the CPU and the GPU is shared based on workload. If the GPU is at rest, power and thermals can be used to push the CPU to higher levels.

Our performance tests, therefore, are really a battle between the established Kaby Lake-H and the upstart G (while the low-power U watches from the sidelines). Which will prevail?

Cinebench R15

First up is Cinebench R15, which tests multi-core CPU performance when rendering a 3D scene. We included



results from the two other Spectre x360 15s in our performance chart: the Kaby Lake-R twin to our test unit, with the low-power quad-core Core i7-8550U, and the previous-generation low-power dual-core Core i7-7500U. The older unit comes in last, while the younger easily outpaces it.

As we expect given its Core i7-7700HQ H chip, the Dell XPS 15 clamshell outruns everyone... except the new Core i7-8705G. The Dell XPS 15 and the new HP Spectre x360 15 actually have the same basic CPU, but the 8th-generation Kaby Lake-G version in the Spectre x360 15 is more than 50 percent faster than the 8th-gen Kaby Lake-R version in the XPS 15.

One other result we want to point out above is from the Lenovo Yoga 720. It's another 15in convertible laptop with a high-power Core i7-7700HQ inside, plus GeForce GTX 1050 graphics. But it's a good example of the performance you give up when you try to stuff a 45-watt CPU inside a convertible laptop with a 75-watt graphics card. In this CPU test, the Spectre x360 15 is more than 30 percent faster.

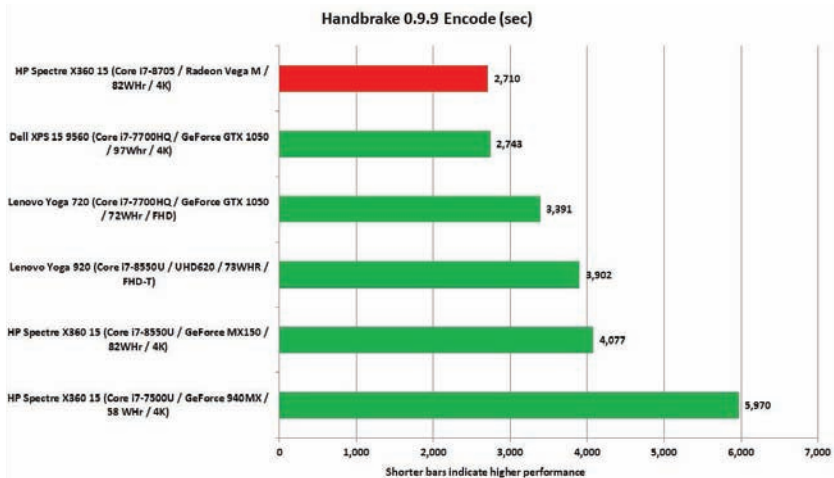
Single-core performance for the Spectre x360 15 also sings, as you can see from our results in Cinebench (below) using a single CPU thread. These numbers are more indicative of what you'll see in most real-world use, given that few applications will use all of the cores of a CPU.

Because all of the CPUs here use the same basic design, it comes down to how you can run the CPU. The newest 8th-generation chips take the lead, even over higher-power CPUs.

Handbrake performance

The Cinebench benchmark is very useful, but it usually takes just a couple of minutes to run on many laptops. That's not long enough to see how prolonged heat affects a system. That's why we run our Handbrake encoding test, which can push the CPU hard for more than 40 minutes on a quad-core. In theory, if a laptop isn't adequately cooled, or if it decides to sacrifice performance for fan noise, the effects will show up here.

The results again put the new Spectre x360 15 ahead of the competition, but it's really a tie. The good news for HP is that it's tied with Dell's XPS 15, which is a standard clamshell design with fewer thermal compromises. What the test really tells us is the new Kaby Lake G is every bit as fast as a 45-watt H-series CPU.



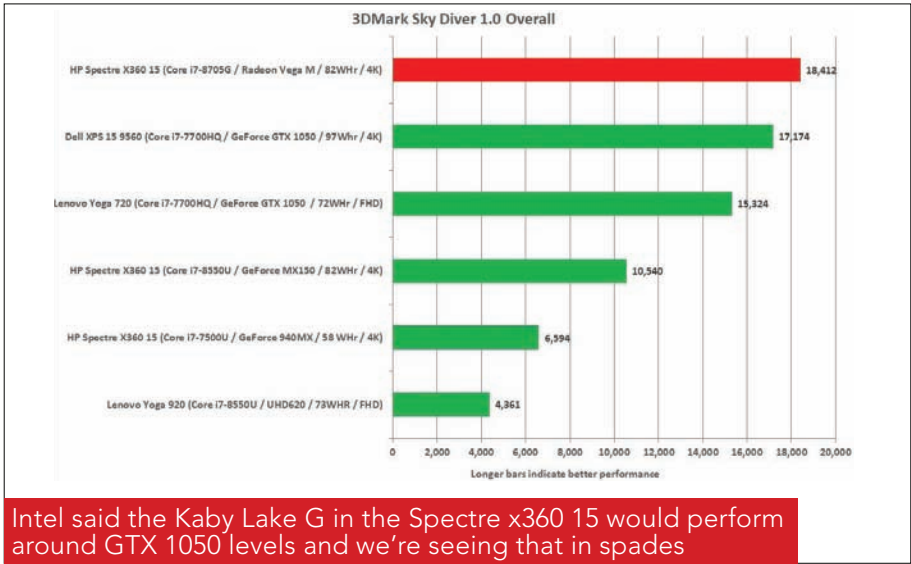
The Spectre x360 15 ties with Dell's XPS 15 but's a good thing

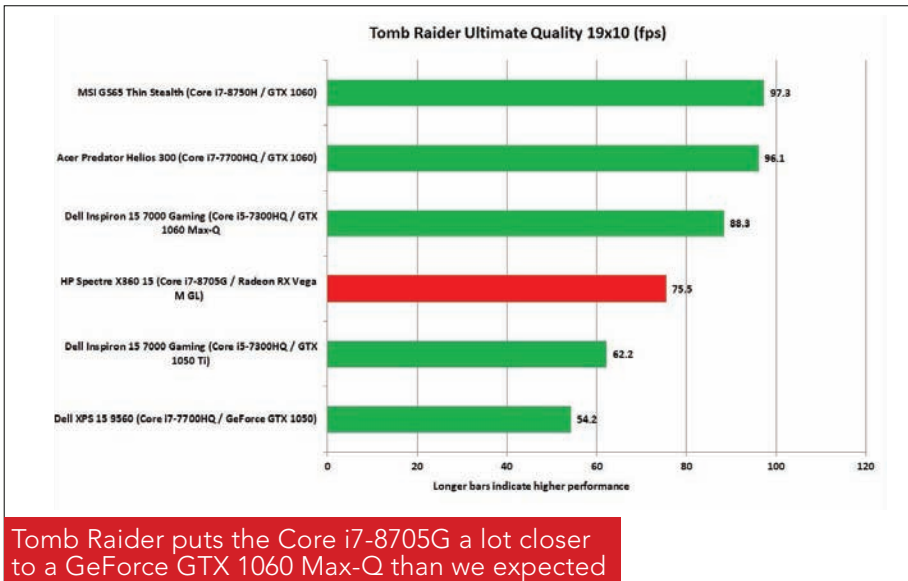
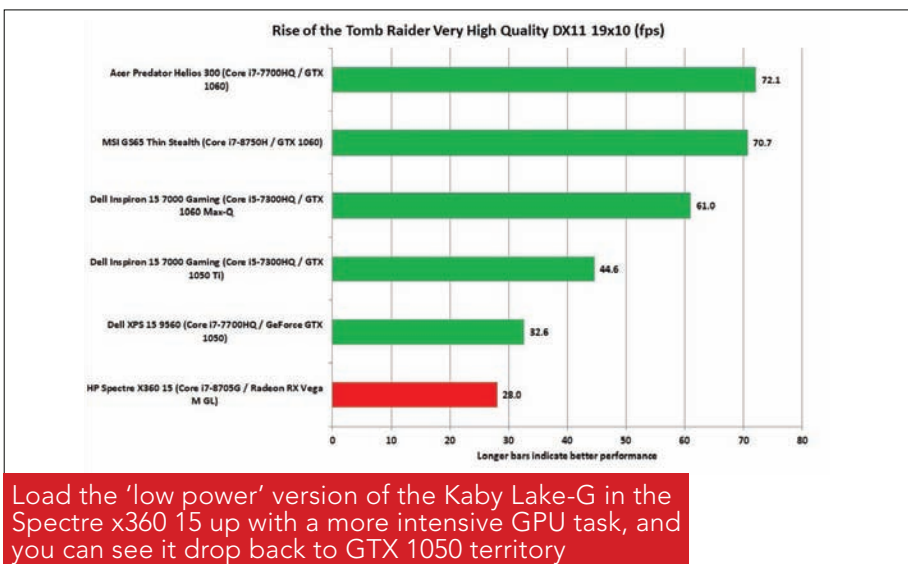
Gaming performance

We'd stop most mainstream laptop testing at this point, but with the Radeon RX Vega inside Kaby Lake-G, we also want to see how it performs in games.

The first result we give you is Futuremark's 3DMark Sky Diver. The results are right where Intel claimed they'd be: between GeForce GTX 1050 and GeForce GTX 1050 Ti. 3DMark is a synthetic test which may or may not apply to actual games. The first real game we tried was Tomb Raider on the Ultimate setting.

The test is a little sensitive to CPU performance, which propels the Spectre x360 15 a little higher than you'll see in a more graphics-intensive games. It's entirely likely that older games will see the graphics power of the Spectre x360 15 creep up a lot closer to GTX 1060 Max-Q.



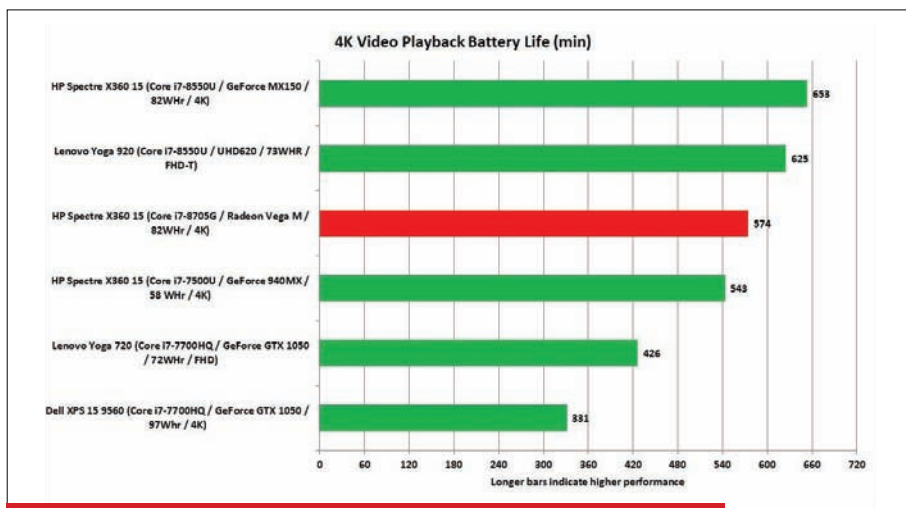


If you hoped the Spectre x360 15 would run with gaming laptops in all games, we return to reality in *Rise of the Tomb Raider*, where the Spectre x360 15 is slightly slower than a GeForce GTX 1050 laptop.

Battery performance

Our last test is likely the most important one for those who buy a laptop: battery life. We loop a 4K video at a relatively bright 250 to 260 nits, with the laptop set to airplane mode, and with earbuds connected.

The results for the Spectre x360 15 are fairly impressive, but not the winner. The winner is its near-twin, the Spectre x360 15 with a Core i7-8550U and GeForce MX150. Remember: both laptops have the exact same-size battery and the exact same screen. Still, for a laptop with this much CPU and GPU performance,



Considering where the Spectre x360 15 with Kaby Lake-G falls in the power curve, this is very impressive battery life

this is an impressive result. This still doesn't mean you can play a game on batteries for nine hours. It means you can probably watch movies on the SSD for that long. Browsing, gaming, and other CPU-intensive tasks will use far more battery.

Verdict

There are two conclusions to be made here. The first is the HP Spectre x360 15 itself. The high-end laptop has been around for two years now, but it took Intel's Kaby Lake-G to make it sing, delivering plenty of performance to go with the looks.

The slender profile hides our biggest disappointment, though: the weight. Blame the 4K panel, or look on the bright side and appreciate the sturdiness, but bottom line, this is a heavier laptop than we would like.

The second conclusion is that Intel's Kaby Lake-G Core i7-8705G is a pretty impressive package (A lengthier write-up is coming on the CPU itself.) It's not enough to threaten Nvidia's dominance at the high-end of gaming laptops, but the truth is, the lion's share of gaming laptops sales are actually in the GeForce GTX 1050 range. The Spectre x360 15 can hold its own in this crowd, further blurring the line between mainstream and gaming machines. **Gordon Mah Ung**

Specifications

- 15.6in (3,840x2,160) 4K IPS micro-edge BrightView WLED-backlit touchscreen display
- Windows 10 Home 64-bit
- 3.1GHz Intel Core 8705G (4.1GHz boost) 4 cores

- RX Vega M Graphics
- 8GB DDR4-2400 SDRAM (2x 4GB) RAM
- 512GB SSD
- 802.11b/g/n/ac single-band 2x2 MIMO
- Bluetooth 4.2
- 1x USB 3.1 Gen 1
- 2x Thunderbolt 3
- 1x HDMI
- 1x SD card reader
- 1x headphone/mic combo
- Bang & Olufsen quad speakers
- HD webcam
- 84Wh lithium-ion battery
- 359x250x19.4mm
- 2.14kg
- 1-year limited warranty

Samsung Galaxy A8

Price: £449 inc VAT from fave.co/2xzyuDC ★★★★★☆



The Galaxy A range of devices has come a long way in a relatively short space of time and now effectively offers a cheaper and slightly lower spec version of the flagship S range, while keeping some of the key features and design traits. Here we look at the A8.

Design

Samsung ditched plastic in favour for a combination of glass and metal on the A range back in 2016 and that

hasn't changed here. The Galaxy A8 is really not far off the S8 in terms of look and feel. In fact, it's easy to confuse the A8 with its premium brother, though there are a few small differences. The display, for example, doesn't have the curved dual edge, but does have small bezels, so most of the front is taken up by the screen. It has a 75 percent screen-to-body ration compared to the S8's 83 percent.

This means that, like the S8, the home button has been removed and the fingerprint scanner is now located on the rear of the phone – it's situated underneath the camera.

A small difference compared to the S8/S9 is that there's no dedicated Bixby button on the side. We're not particularly fussed about this, though.

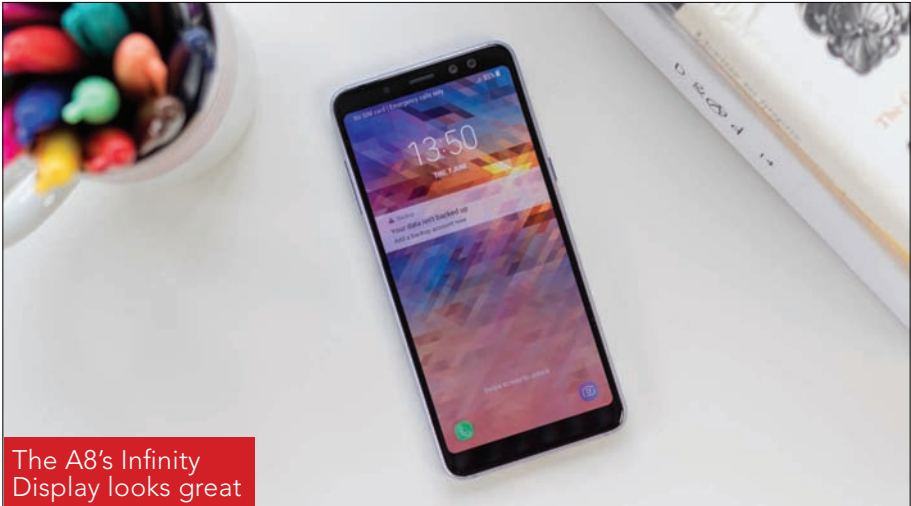
It is a little thicker than both the S8 and last year's A7 at 8.4mm, though it doesn't feel chunky at all. It's not the lightest phone at 172g, but again this isn't a handset that gives a sense of being overly heavy.

Samsung continues to do a good job by offering IP68 waterproofing (up to 1.5m of fresh water for up to 30 minutes) and a headphone jack. There's no wireless charging despite the glass rear cover that, like most, is a little slippery.

The A8 will be available in black, gold and orchid grey colours.

Display

The display is the main upgrade since the Galaxy A7 because Samsung has, for the first time, brought the Infinity Display to the A range. The A8 has an on-trend 5.6in 18:9 screen. It looks great and somewhat



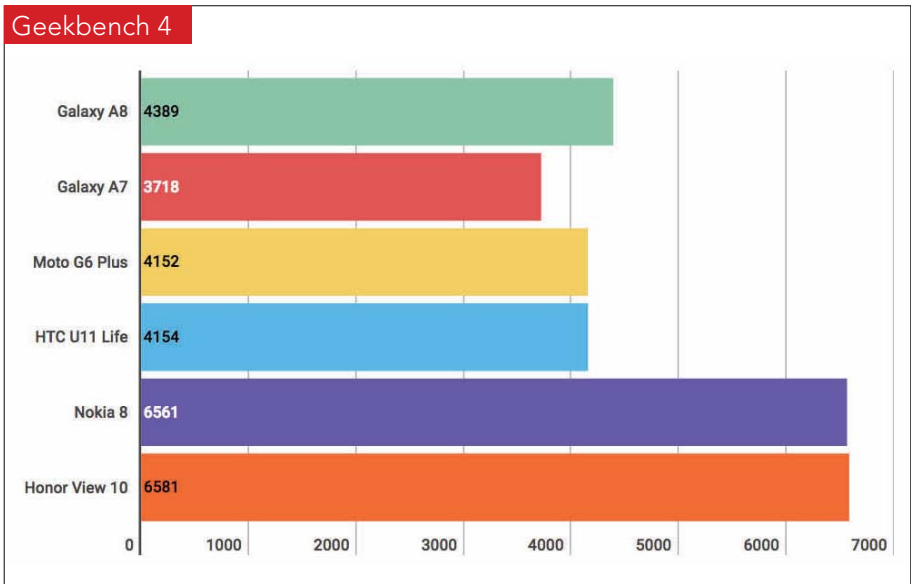
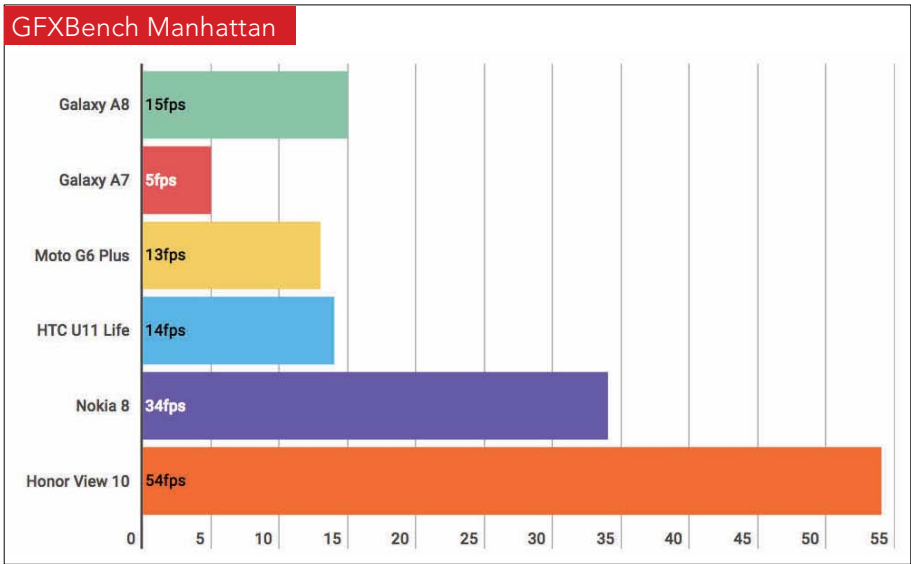
The A8's Infinity Display looks great

helps justify the inflated price. It might not have the dual edge feature of the S8, but Samsung has to keep something for the flagship. Also, the resolution is slightly lower at 2,220x1,080, though that's still an impressive 441ppi. It's also brighter than average at a maximum of 355cd/m².

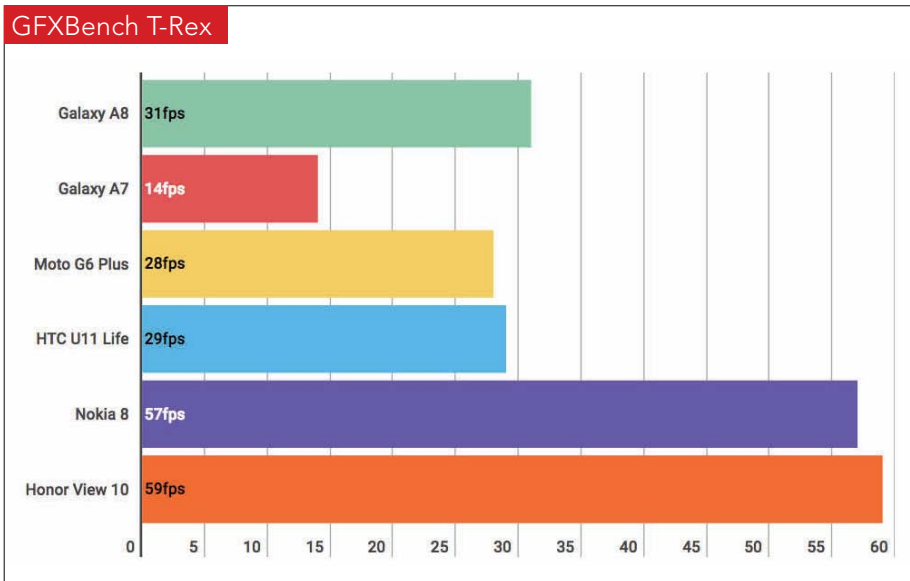
You don't get the edge panel, but you do get attractive rounded corners and the always-on feature. So the A8 displays some information (there are a few different layouts to choose from) even when the phone is locked – without using much power.

Processor, memory and storage

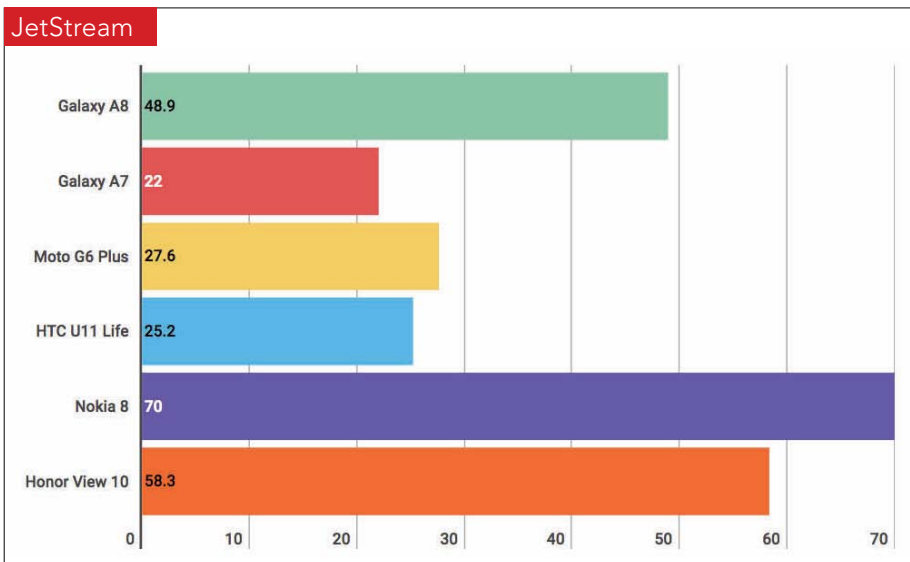
Inside the Galaxy A8 is Samsung's own Exynos 7885 processor. It's a small upgrade on the 7880 found in the A7, still with eight cores but at higher clock speeds. It also has the Mali-G71 GPU found in the Galaxy S8.



GFXBench T-Rex



JetStream



As previously, there's 32GB of storage and a microSD card slot for adding up to 256GB more. However, there's now 4GB of RAM instead of 3GB which is welcome.

In our benchmarks, the Galaxy A8 doesn't perform as well as we expected. Rather than putting up numbers similar to phones of a similar price, such as the Nokia 8 and Honor View 10, it's around the same level as devices a lot cheaper. That said, this is a case of the phone performing differently in benchmarks to real life. We've found it suitably responsive and smooth during our time with it. The main improvement from the A7 is in the graphics department.

Connectivity and audio

The Galaxy A8 has the usual array of features, including Bluetooth 5.0, dual-band 11ac Wi-Fi, GPS, NFC and offers Cat 11 LTE.

As you'd expect, the phone has USB-C but retains the headphone port, which is good to see. Oddly, the single speaker is placed on the side of the phone above the power button. It doesn't make a huge difference compared to the normal position next to the USB port. The speaker itself sounds pretty average.

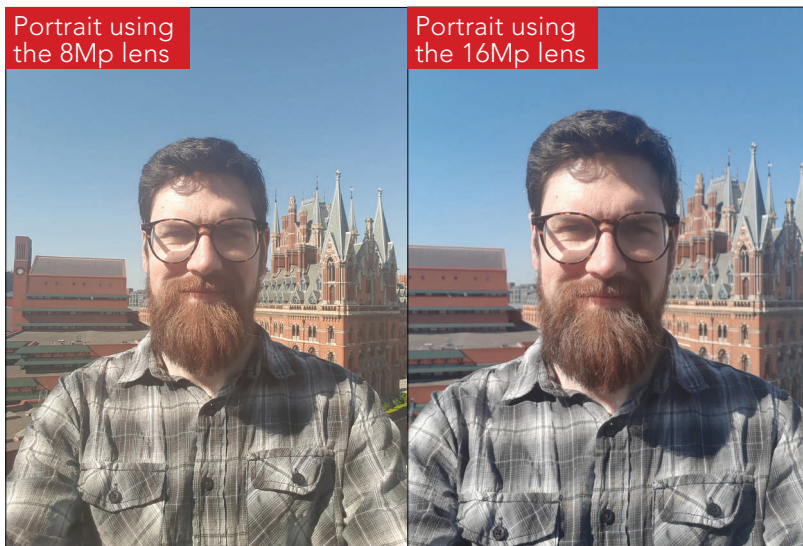
Cameras

When it comes to photography, the A8 is doing things backwards to most other phones. Instead of having dual rear cameras and a single at the front it has the reverse, so on the front are 16- and 8Mp cameras, both f/1.9. One of the main reasons for this is so that you can use Live Focus. This gives you a bokeh effect blurring the



background and you can adjust the amount of blur afterwards. It works pretty well and is unusual to find on a front camera. You can also switch between them to 'take the type of selfie you want' – either blurred background or not, but really they are pretty similar in terms of how much you can fit in the frame (76- and 85 degrees), so you'll probably stick with the 16Mp option for the better detail. Sadly they don't offer autofocus





and are limited to 1080p video recording, but you do get Auto HDR. You can also play with the beauty mode if you care and there's a 'wefie' option to fit more people in – it's essentially a panorama with the front cameras.

At the back is a lone 16Mp with a Galaxy S8 matching f/1.7 aperture. It offers phase detection autofocus and a single LED flash. We'd like to see optical image stabilization and video recording higher than 1080p at 30fps, but, again, Samsung needs to separate the flagship level.

Overall, we're impressed with the cameras on offer here. The rear camera offers detailed and colourful shots and also works well in low light. It's at the front where the A8 stands out with lots of features you don't find elsewhere for selfie lovers.

Battery life

The A8 has a 3,000mAh battery, which is average for smartphones these days. In our Geekbench 4 battery test, the phone managed a disappointing four hours, 30 minutes, with an efficiency score of 2700. For context, the Moto G6 was able to go twice as long and scored 3516. Like the performance benchmarks, this is something of an anomaly as we've not had any issues with the A8 lasting through a day of normal usage.

When it comes to charging, the supplied USB-C charger offers Fast Charging. Starting from zero, and you can get 39 percent from a 30-minute charge.

Software

The A8 doesn't ship with the latest version of Android but comes with 7.1 Nougat, which is a shame. The interface is simple and clean, and while there's no dedicated Bixby button on the side as there is on the S8 and S9, it's only a swipe away from the main home screen – this is instead of Google Assistant. You can still use Google Assistant via the app and we still think it's better than Bixby, but there's nothing stopping you from using both.

Overall, it's a very similar experience to the Galaxy S range as you get pre-installed apps from Samsung, Microsoft and Google. You also get features such as Multi-Window and Samsung Pay, and it's the first A phone to support the Gear VR headset.

Verdict

The Galaxy A8 is by far the best A-range device to date and effectively the S8 mini we always wanted. The S9

is here now, but that's not too different so it's a similar situation. If you're looking for that Samsung style in a cheaper form, then the A8 is the right choice for you. There are, however, some excellent phones in the mid-range that offer a similar experience for less money such as the Honor 10. **Chris Martin**

Specifications

- 5.6in (2,220x1,080, 441ppi) Super AMOLED capacitive touchscreen
- Android 7.1.1 (Nougat)
- Exynos 7885 Octa processor
- Octa-core (2x 2.2GHz Cortex-A73, 6x 1.6GHz Cortex-A53) CPU
- Mali-G71 GPU
- 4GB RAM
- 32/64GB storage, microSD up to 256GB
- Fingerprint scanner
- Rear-facing camera: (f/1.7, 1/2.8in, 1.12µm), phase detection autofocus, LED flash
- Dual front-facing cameras: 16Mp (f/1.9, 1/3.1in, 1.0µm); 8Mp (f/1.9, 1/4in, 1.12µm), 1080p
- 802.11ac Wi-Fi
- Bluetooth 5.0
- A-GPS, GLONASS, BDS
- USB 2.0 Type-C 1.0
- 149.2x70.6x8.4mm
- 172g

Honor 10

Price: £399 inc VAT from fave.co/2J6vrnF ★★★★★



Honor has been doing a pretty good job of stepping out of Huawei's shadow, usually helped by the explosively shiny blue it clads its phones in. The Honor 10 is no different and feels every bit an Honor device despite having its parent company's name stamped on the back.

The phone comes with all the 2018 bells and whistles (Android Oreo, notch, face unlock), high end specs and a price to make OnePlus blush. The Honor 10 could well turn out to be the smartphone deal of the

year – as it is certainly the best mid-range phone on offer right now.

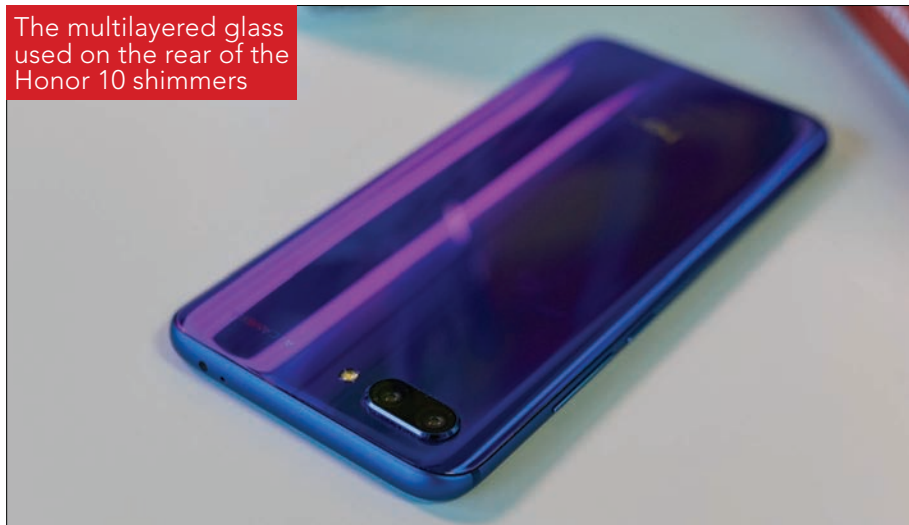
Design

Despite its similarities to Huawei phones, the Honor 10 is pretty unique in look. Also shipping in a grey version, our review unit is in attractive Phantom Blue, a gradient of blue and purple that is actually quite different to the Twilight Huawei P20 Pro of the same shifting shades. We might even prefer the Honor.

The multilayered glass really does shimmer, with vertical lines refracting light at every angle. It's awesome if you like the colours and will get people asking you what phone you have. Honor's blue phones have always stood out, but this is next level.

Around the front is a familiar 2018 story with a notch at the top of a 19:9 display. It's not the end of

The multilayered glass used on the rear of the Honor 10 shimmers



the world, and you can black out the status bar and 'hide' it if you want, but that does seem defeatist to us – though Honor joins Huawei and LG in offering the option. The phone looks very, very similar from the front to the Huawei P20 Lite rather than the regular P20 or P20 Pro.

This means the display of the 10 is taller than on the Honor 9 and has an under-glass fingerprint scanner inside the black chin on the front of the phone. We aren't talking actually in the display, but instead an area subtly marked with a dotted line on the chin where a button sensor might normally be.

It's a cool touch and the first time we've seen it, but the functionality is less responsive than having an actual button as you have to press down harder. It also makes it harder to locate than an actual button would.

There are rear dual cameras, one round the front, USB-C, a headphone jack, bottom firing speaker and a lesser-spotted IR blaster. Not a bad list when most phones double the price this year don't have all that.

The volume rocker and power key sit on the right in what is a svelte, compact design. You might need to shrink the keyboard to do so, but we found it can be used one hand most of the time. Honor also puts a cheap silicone case in the box to help you grip on and keep the inevitable fingerprints at bay.

Just be aware that it isn't waterproof – a small reminder of the corners cut to achieve the price.

Display

The 19:9, 5.84in IPS LCD display has a resolution of 2,280x1,080. This equates to a vibrant 432 pixels per



The display is 19:9 because of the extra room the notch affords

inch and it looks great. An LCD rather than an OLED, it struggles in direct sunlight but in every other situation looks very good.

Viewing angles are noticeably excellent and while you aren't spoiled with the deep blacks of an OLED display, it's among the best LCDs you'll find – though it won't go as amazingly bright as the one on the LG G7 ThinQ we reviewed last month.

The display is 19:9 because of the extra room the notch affords. It's neither here nor there to us about the notch, but we do find it annoying that you lose notification icons and information more often than on a normal screen.

You may also run into scaling issues where the notch accidentally covers up an icon or piece of information.

But the software is clever enough that if you turn the phone to watch video in landscape, it hides the notch and displays the video without cutting anything off.

But the notch does cause some issues. The operator name disappears if you have too many notifications, and sometimes icons are obscured by the right edge of the notch. It is only a small thing, but it's a fault, and it's annoying.

The chin also contains the fingerprint sensor, which is shown with a dotted outline but is under the glass. It's a cool touch, but actually makes the feature harder to use. It's more difficult to locate with no button to feel for and it's less responsive than we would like as you have to push down harder.

It looks cool, but it doesn't work very well. Thankfully, face unlock is incredibly fast and easy to set up, and we found this method preferable.

Processor, memory and storage

The Honor 10 bears a passing resemblance to the cheaper Huawei P20 Lite, but its specifications are very much similarly high-end as on the flagship P20. In fact, almost identical.

This means the Honor 10 has the top of the line Huawei Kirin 970 processor found in the P20 Pro and Mate 10 Pro. The Mali-G72 GPU is the same as in the P20 line also, along with 4GB and 128GB storage in the UK (other regions will get other configurations with more of both).

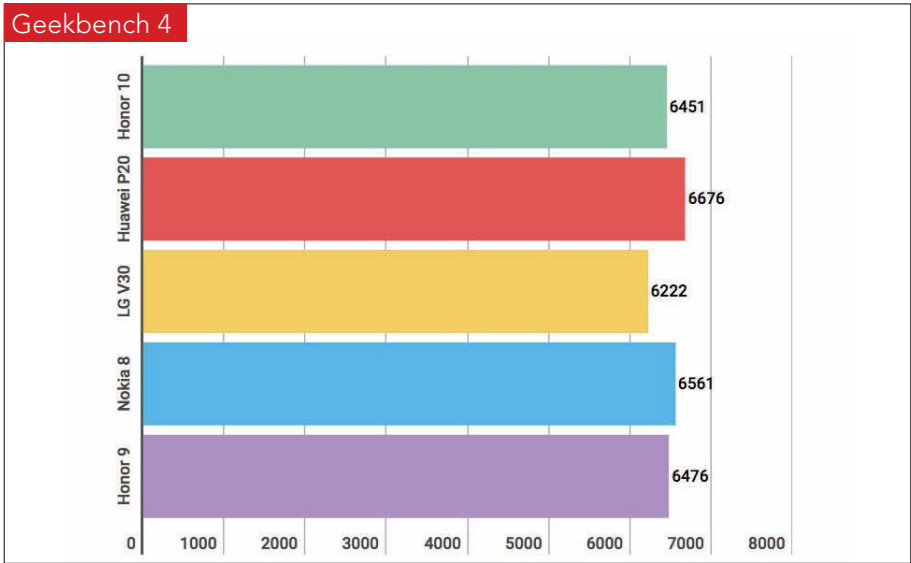
Its notable that this storage, though generous, is not expandable. The Honor 9 was, but the change to a very high 128GB is a good trade-off – unless you

carry all your music around with you, you won't run out of space for a long time.

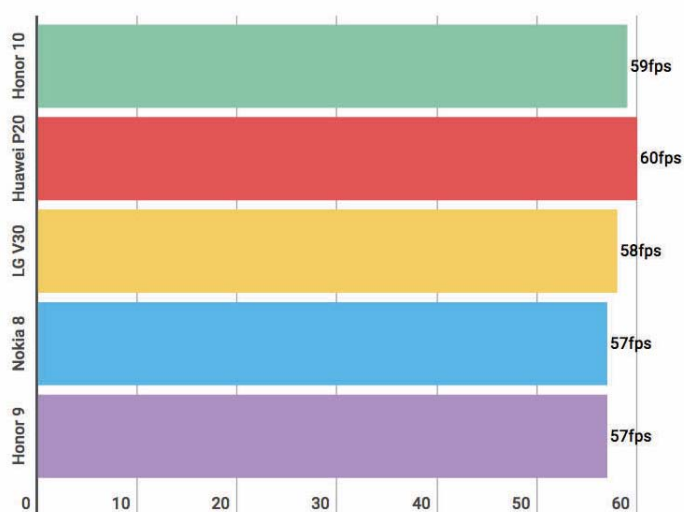
This means the Honor 10 screams along with no issues. We benchmarked its performance against phones of the same price and specifications, with the results below. We compare it to the Huawei P20 for obvious reasons, but also to the LG V30 as another example of a more expensive phone, the Nokia 8 because it currently retails for the same £399, and the previous generation Honor 9.

The Honor 10 has higher scores than the V30 and Nokia 8 in some of the GFXBench graphics tests as those phones have higher resolution displays. Otherwise, the Honor 10 is evidently a very fast phone.

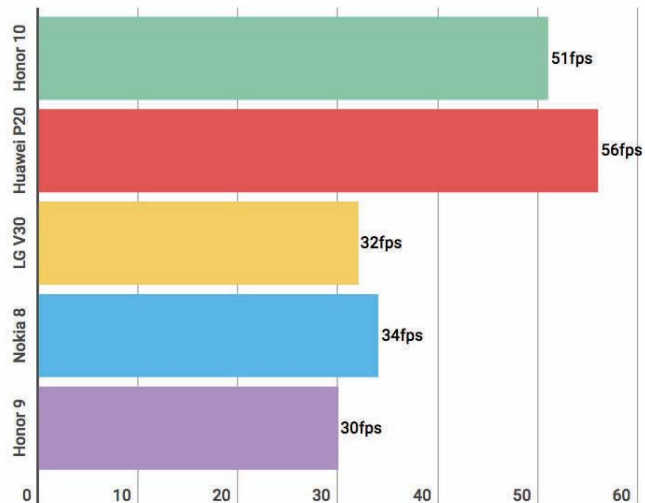
It scores very similarly to the P20 phones and proves Huawei charges a premium price on its

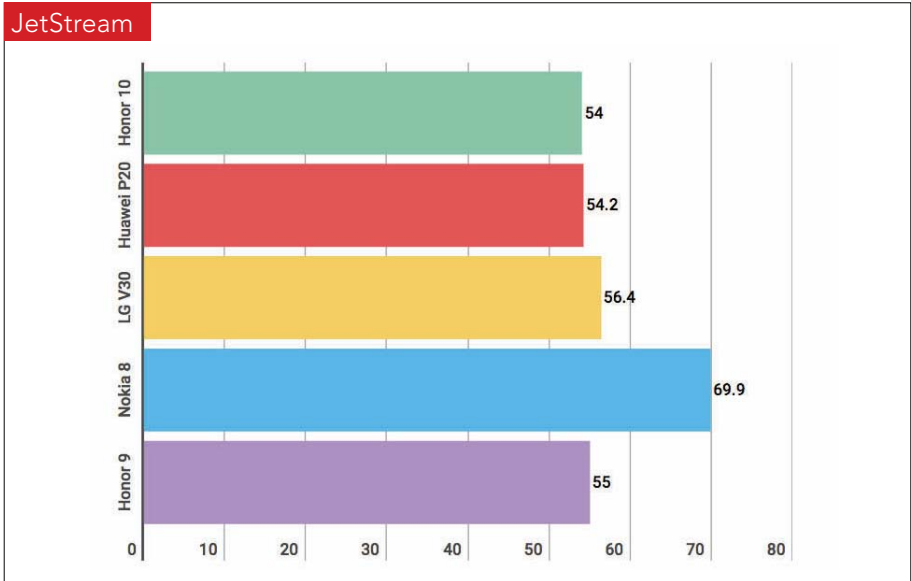


GFXBench T-Rex



GFXBench Manhattan





products when they can sell on the Honor 10 for at least £200 less.

All you need to know is that for the money, this is a ridiculously capable smartphone. Buying it now will likely have you set for at least the next three years before any noticeable degradation in performance.

Connectivity and audio

Bluetooth support remains at 4.2 rather than 5.0, and drop outs were fairly frequent when paired with wireless headphones, which is a shame considering the aptX codec here means the quality is actually quite good when it works. You do have a headphone jack here, but no headphones in the box. This is a dual SIM smartphone by default too, and the software allows for

granular control of the settings if you want calls and texts on one SIM and data on another, for example.

Cameras

The dual cameras of the Honor 10 are very good for a mid-range phone – though as we have established by now, this is a flagship that's simply cheaper than most. The main colour sensor is 16Mp f/1.8 coupled with a 24Mp monochrome sensor that allows better dynamic range and depth sensing for portrait mode and 2x zoom.

Stills look great, and while this isn't the best camera on a smartphone, Honor has done some good things. More gimmicky is the AI feature in the main camera – and it's cringeworthy that it actually says 'AI camera' on the back of the phone.

However, when on, the feature reads your scene or subject and boosts colour and detail where it thinks the sensors were lacking, using post processing algorithms. For the most part, it actually helps a lot, and will particularly please those who want to post straight to social media.

What it does mean is the photos are then less true to life than they were, but you can flick between the two versions to see which you prefer – just remember to shoot in AI mode in the first place. You can toggle it on and off in the improved and mercifully simpler camera app (compared to previous versions of EMUI).

These features are similar, but not identical, to those AI smarts found on the Huawei P20. The P20 integrates it better, and though the Honor 10 has the same night mode option, it doesn't perform as well as



on the Huawei – so maybe that extra £200 gets you what we do consider an amazing feature (the P20 has a better aperture and OIS where it counts). Despite the improvements, the camera is where the phone often lags a touch, which is odd considering the decent specs on offer.

Portrait mode is merely okay here – Honor still adds beauty mode to it and the selfie version which is maddening, and even



when turned off we feel there is a smoothing and whitening of faces that isn't to our tastes. Though all these bokeh effects are subjective as to preference, we can still say with confidence that this is not as good as on the Google Pixel 2 or iPhone X.

That selfie camera is a 24Mp f/2.0 sensor is good but nothing special, and you can't do bokeh despite the 'portrait' mode in the app – all you can do is fiddle with the beauty settings, which never look flattering.

All cameras can also do portrait lighting, nicked straight off Apple with no shame. It's pretty bad – the filters are more fun. Better are the video capabilities, with the Honor 10 able to shoot in 1080p at 60fps or 4K at 30fps. This is becoming standard, but again is good to see on a mid-range device. Electronic stabilization at the default resolution setting helps keep the jitters to a minimum.

Battery life

The real-world battery life of the Honor 10 is one of its downsides. We expected more out of the phone, as in 2018 there aren't many high-spec phones that get



us worried we might run out of power before the end of the day, but the Honor 10 is one of them.

It has a 3,400mAh battery – the same as, you guessed it, the Huawei P20 – and like that phone we were skirting with 20 percent left warnings earlier in the day than we'd have liked. While we didn't get caught short with the Honor 10, it again shows that as the specs are better than the price suggests and therefore work the phone hard, it doesn't excel in battery life where other cheaper phones do.

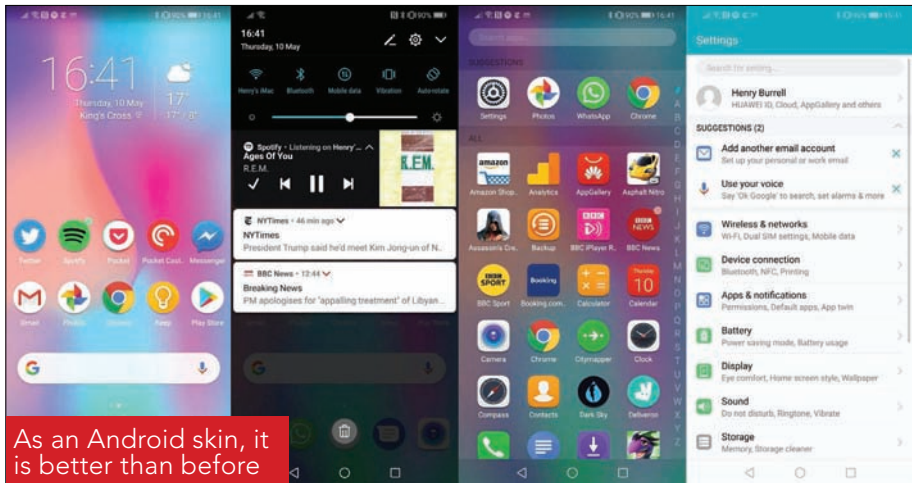
In the Geekbench 4 battery test with the phone brightness set to 120cd/m², the phone scored 2340, lasting for only three hours, 54 minutes. The P20 lasted five hours, 17 minutes with the same 3,400mAh battery, so something is amiss with the Honor 10's battery stamina, and that's a real shame.

Huawei's Super Charge has carried over to the Honor 10, and it's amazingly fast – the fastest charger we have ever seen on a phone bar none. From dead, it charged the Honor 10 to 65 percent in 30 minutes while turned off, which is nuts. It just about makes up for the subpar battery life.

Software

As with Huawei phones, whether or not you buy the Honor 10 may depend if you like the look of EMUI. Thankfully as an Android skin it is a lot less horrible than it once was, but it's still change for change sake in some cases with menus, notification panels and icons very different from stock.

In fact, it's a little like iOS in how it defaults to a grid of home screen icons, but this is Android



– change it to the app drawer. The Honor 10 has been very slick and smooth thanks to the Kirin 970 processor working its magic.

We do like how you can hide the notch, and it oddly makes the phone feel quite a bit different. But our only complaints lie in the changes EMUI makes when it doesn't need to – particularly to Oreo.

Oreo in stock Android handles notifications gracefully and easily, but EMUI contrives to make it all look and feel more like iOS. We wish it wouldn't, but it's more forgivable on this £399 Honor phone than on a Huawei phone that hits £800.

Verdict

Even though battery life is a little underwhelming, it's a minor quibble with what is an exceptionally good phone for the price. The display, cameras and build quality are verging on those of a phone twice the

price and the performance is the best we've seen on an Honor phone.

The software is the best EMUI has ever offered, and the notch is not a big deal when all is said and done. The 128GB storage as standard is also a major plus, and dual SIM is also welcome. Add to that a headphone jack, and the Honor 10 could well be the best featured mid-range phone ever – it's certainly the best you can buy in 2018. **Henry Burrell**

Specifications

- 5.84in (2,280x1,080, 432ppi) IPS LCD capacitive touchscreen
- Android 8.1 (Oreo)
- Hisilicon Kirin 970 processor
- Octa-core (4x 2.4GHz Cortex-A73, 4x 1.8GHz Cortex-A53) CPU
- Mali-G72 MP12 GPU
- 4/6GB RAM
- 64/128GB storage, microSD up to 256GB
- Fingerprint scanner
- Dual rear-facing cameras: 16Mp (f/1.8) and 24Mp B/W, phase detection autofocus, LED flash
- Front-facing camera: 24Mp, f/2.0, 1080p
- 802.11ac Wi-Fi
- Bluetooth 4.2
- A-GPS, GLONASS, BDS
- USB 2.0 Type-C 1.0
- 149.6x71.2x7.7mm
- 153g

Wanle Gamers Console for iPhone

Price: £18.99 inc VAT from fave.co/2xQoMNe ★★★★★



Available for every iPhone model from 6 to X, the Wanle Gamers Console for iPhone is undeniably a conversation piece, although experience tells me that some of those conversations might occasionally involve someone sternly telling you to shut up. From what I can tell, the 'Sound' button doesn't actually silence the case, which means you should never expect to play the 27 games packed

within while you're in a hushed reception room or waiting for a movie to begin. It might start chirping when you slip it in your pocket or when you hold the phone the 'wrong' way when making a call.

Wanle's case looks like a Game Boy from a few feet away, right down to the yellow-green display and the two jauntily slanted grey buttons perched below the directional pads and action buttons. You have to flip your phone upside down in order to play it – as the rear camera hole would get in the way of the Wanle case's screen if held normally – but otherwise that's all it takes to start enjoying the games. The only real setup involves slipping one of the two coin-sized batteries that come with the package into the case, attaching the case to your phone, and hitting the power button.



That's basically
Frogger, believe
it or not

Just don't expect a Game Boy-like gaming experience with its £18.99 price tag. It may look like Nintendo's handheld device, but Wanle's case has far more in common with the little one-off handheld games on sale in the 1980s, where the basic action and graphics barely changed and you sometimes had to use your imagination to get the most out of it. In other words, if you're planning on slapping down cash on this so you can play Game Boy classics such as Super Mario Land, Gargoyle's Quest, or Battletoads, you've seriously got the wrong idea.

The Wanle case's screen looks to simpler times, in stark contrast to the iPhone's retina screen and TrueDepth camera that scans faces and lets you play Fortnite. From a distance, in fact, you could easily mistake almost all 27 Wanle games for Tetris.

It's all so abstract that it's not always clear which game you're playing. That's partly because the games don't even have names. Instead, each game corresponds to an arbitrary letter of the alphabet and you need to scroll one at a time to select one. As you scroll, the bricks at the top rearrange themselves to resemble a letter while the ones in the middle act out a preview of the game you'll play. Meanwhile, the bricks at the bottom spell out the level you'll start at, which can be changed by pressing the left or right buttons on the D-pad. Somehow, the system manages to be simple and confusing at the same time.

I scrolled to 'E' to find the Frogger knock-off, in which I manoeuvred a single block through rows of moving bricks. The letter 'D' let me play a Galaga clone, although I had to imagine the missiles since they

didn't show up on screen. Games I-Z are all variants on Tetris, ranging from the standard tile-matching puzzler to one that made the stack of blocks move to the right every few seconds.

As for its actual effectiveness as a case? It depends. Aside from the fact that it saddles you with two screens to worry about (and Wanle's is extraordinarily prone to scratches), the case itself seems perfectly capable taking a few punches as long as they're aimed at the iPhone's back. It's thick, for one, and the rubbery buttons may even allow for a little 'bounce' when it falls. (My one real problem is that the circular battery is visible through the white version of the case.)

While it might protect the back, however, I wouldn't put too much faith in this case as a defender against shattered screens. Since it rests flush against the front of the phone, there's little protection against dreaded display-down drops. And considering that the iPhone's display faces the pavement when you're playing the case, that's more than a little terrifying. One careless drop in a moment of frustrated gaming, and boom, there's an expensive screen repair on your hands.

But in certain, specific instances, it's a case I'd like to use. When I'm out with friends and that inevitable moment comes up when I whip out my phone to check the time or take a photo, I'm almost certain one of those friends is going to notice it. In fact, I'm almost as certain that one of them will want to talk about it and probably want to give it a try. Though if I'm being honest, I'll be watching them closely the whole time to make sure they don't drop it, which kind of defeats the purpose of it being a case.



The case doesn't extend far past the display, which means you'll likely be in trouble if your phone hits the ground screen-first

Verdict

The Wanle Gamers Console is too prone to making noises at inopportune times for use as a daily carry, and its dicey display protection makes it a dubious candidate for protection. Still, it does a remarkable job of looking like a Nintendo Game Boy and the games, while simple, are fun and varied. Plus, considering you can pick one up for just under £19, it'll make a fun conversation piece for parties or outings with friends. **Leif Johnson**

Best free backup software and services

Most free backup products are competent, if in some way limited. JON L. JACOBI looks at your different options



Finding a good free backup solution is easier than you'd think. A host of companies would love to give you free online backup or free backup software – and perhaps surprisingly, nearly all of them are quite competent.

Of course these companies aren't really in it for the satisfaction of knowing your data is safe. Their

free versions usually only provide enough storage for essential data, or are lacking some advance features that pros would employ. They hope you'll love the program or service so much, or find it so useful that you'll eventually fork over some cash for additional storage or those advance features.

But wait, you say: I have free online storage through Apple's iCloud (fave.co/2t7jwA4) or Google Drive (fave.co/2oTJDIM), or Microsoft OneDrive (fave.co/2t8mK6v). Then there are services like Dropbox (fave.co/2MDzVnP), with 5GB for free.

The issue with all those services is that they are not necessarily true backup, but syncing. That is, when you delete a file from any device or online, it's deleted from every device. True backup means retaining data indefinitely no matter what's happening with the data elsewhere. Read on for our top picks in free online backup and free backup software.

What to look for

Online storage and backup services

Capacity: Obviously, you'll need as much storage as you have data, plus a little or possibly a lot more if you want to track changes and save previous versions of files. Some services keep multiple versions of files, some don't. In many cases there's a time limit.

Cost: Nearly all online services charge for a maximum allowable amount of data, and generally uploads are free. Aside from the free tiers available from a service like Dropbox, pricing is fairly consistent across services, though you definitely get more capacity for

your money from some vendors, notably Backblaze (fave.co/2MBJtQs). However, there may be additional charges or limitations on downloads. For instance, Amazon's Glacier (fave.co/2t7irrY) is intended solely for backup and archiving. It's very cheap per GB and uploads are free, but you're charged for downloading.

Features: In addition to backup, you may want to share your files with others, work with them from mobile devices, or even edit them with office applications such as those available with Dropbox, Google, and OneDrive. If you do intend to work online, we recommend that you maintain a local copy as backup.

OS and device support: Most services provide client backup software for the major operating systems (Linux, OS X, and Windows) and both Android and iOS. Make sure the service you sign up for supports all of your platforms. Note: iDrive even supports Windows Phone.

Privacy: If you are concerned about the privacy of your data, make sure you use a service that allows the use of a personal encryption key that you define. Do NOT lose it, as it is absolutely required to restore your data. Sadly, using your own key often limits the types of services (for example, no mobile backup) available.

If private encryption keys aren't available, read the privacy policy, especially with the free services – there are significant differences.

Reliability: Generally speaking, data centres are backed up to the hilt. Some of the larger ones

iDrive still supports
Windows Phone



even back up to different geographical locations. Availability (hopefully 24/7) can also be important. Check for news of outages and the vendor's own service blogs. If there are too many outages in service, buy accordingly. In truth, all the services we're aware of are near-100-percent reliable.

Speed: Speed, in many cases, is far more dependent upon your broadband connection than that of the online service, though the geographical location of the storage and the equipment in between can make a significant difference. Check the location of the data

servers if speed is important to you. Or, just give the trial a whirl and see if you can live with it.

Backup software

As with most things, don't over-buy backup software. Features you don't need add complexity and may slow down your system. Additionally, if you intend to back up to a newly purchased external hard drive, check out the software that ships with it. Seagate, WD, and others provide backup utilities that are adequate for the average user. And, of course, while we describe the features to look for, you're going to find fewer of them in free software. That's life in the cheap lane.

File backup: If you want to back up only your data (operating systems and programs can be reinstalled, though it's mildly time- and effort-consuming), a program that backs up just the files you select is a major time-saver. Some programs automatically select the appropriate files if you use the Windows library folders (Documents, Photos, Videos, and so on).

Image backup/Imaging: Images are byte-for-byte snapshots of your entire hard drive or partition, and can be used to restore both the operating system and data. Imaging is the most convenient to restore in case of a system crash, and also ensures you don't miss anything important.

Boot media: Should your system crash completely, you need an alternate way to boot and run the recovery software. Any backup program should be able to create

a bootable optical disc or USB thumb drive. Some will also create a restore partition on your hard drive, which can be used instead if the hard drive is still operational.

Scheduling: If you're going to back up effectively, you need to do it on a regular basis. Any backup program worth its salt allows you to schedule backups.

Versioning: If you're overwriting previous files, that's not backup, it's one-way syncing or mirroring. Any backup program you use should allow you to retain several previous backups, or with file backup, previous versions of the file. The better software will retain and cull older backups according to criteria you establish.

Optical support: DVDs and Blu-ray discs are great archive media. If you're worried about optical media's reliability, M-Disc (fave.co/2K2ddE) claims its discs



DVDs are still great for archiving data

are reliable for a thousand years, backed up by US Department of Defense testing.

Online support: An off-site copy of your data is a hedge against physical disasters such as flood, fire, and power surges. Online storage services are a great way to maintain an off-site copy of your data. Backup to Dropbox and the like is a nice feature to have.

FTP and SMB/AFP: Backing up to other computers or NAS boxes on your network or in remote locations (say, your parent's house) is another way of physically safeguarding your data with an off-site, or at least physically discrete copy. FTP can be used for off-site, while SMB (Windows and most OS's) and AFP (Apple) are good for other PCs or NAS on your local network.

Real time: Real-time backup means that files are backed up whenever they change, usually upon



Off-site storage is a great way to protect yourself from physical disasters

creation or save. It's also called mirroring and is handy for keeping an immediately available copy of rapidly changing data sets. For less volatile data sets, the pay-off doesn't compensate for the drain on system resources. Instead, scheduling should be used.

Continuous backup: In this case, 'continuous' simply means backing up on a tight schedule, generally every five- to 15 minutes, instead of every day or weekly. Use continuous backup for rapidly changing data sets where transfer rates are too slow, or computing power is too precious for real-time backup.

Performance: Most backups proceed in the background or during dead time, so performance isn't a huge issue in the consumer space. However, if you're backing up multiple machines or to multiple destinations, or dealing with very large data sets, speed is a consideration.

Any backup is better than no backup

Free or paid, we highly recommend that you back up at least your essential data against theft, malware or ransomware, and natural disasters, not to mention user error. Even if you work online, a local backup is a lot quicker to restore. And this goes beyond PCs: we get a lot of emails asking how to get data back from a stolen phone – the users generally don't like the answer.

How we test

Backup software: We run each program through the various types of backups it's capable of. This is largely

to test reliability and hardware compatibility, but we time two: an approximately 115GB system image (two partitions), and a roughly 50GB image created from a set of smaller files and folders. We then mount the images and test their integrity via the program's restore functions. We also test the USB boot drives created by the programs.

Online services: The performance of online backup services will vary according to their location and the network equipment between you and the data depository. We installed the software and backed up the same 2GB data set to check for any major issues or glitches in the client software.

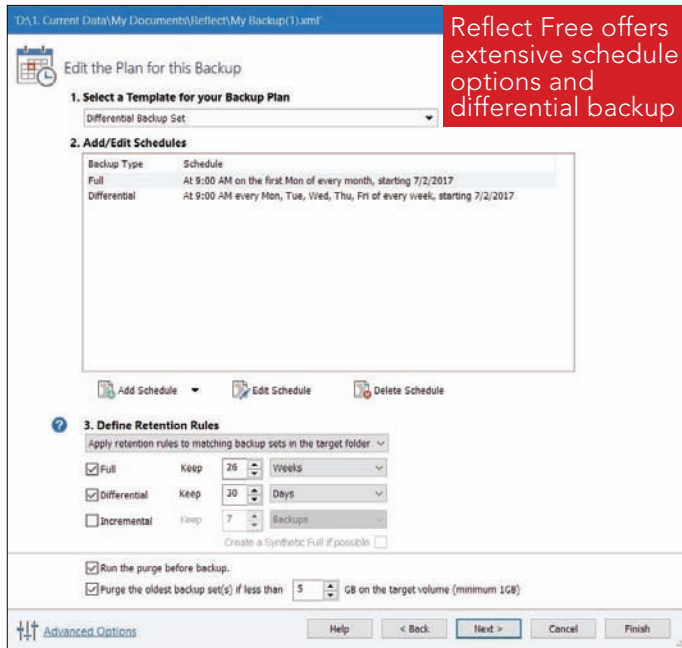
Macrium Reflect Free

URL: fave.co/2t48r2L

Macrium was one of the first to release a free version of its backup software. Ten years later, to the benefit of users everywhere, Reflect Free 6 remains a stable, reliable way to quickly image and restore your system. It doesn't offer as much functionality as Aomei's Backupper Standard 4 ([page 92](#)), but there's something to be said for a backup program that hasn't failed its fans in over a decade.

Design

Though Reflect is a bit old-school in appearance, the look somehow works better with the free version. Fewer options, less clutter, cleaner lines. Reflect Free is limited to imaging disks or individual partitions (no cloning,



file backup, or other choices), but there's an option to select only those partitions required to restore the Windows operating system.

If you want file and folder backup, you'll need one of the pay (£47.95 or more) versions. Same deal with incremental backup, though the free version does support differential (all changes since the initial backup). Note that even the pay versions back up only folders, not individual files. You can always drag files to a folder, but it's still a slightly puzzling omission.

You may not be able to back up specific files or folders with Reflect Free, but there are extensive scheduling options and retention rules (how long

to keep and what to delete when space is low), and jobs are saved as standard XML files. Password protection and email notifications are available only in the pay versions.

Reflect Free supports both MBR and GPT disks (it was late to the GPT game), and it has a great boot media creator, which lets you change flavours of Windows PE to best suit the operating system being backed up. It also lets you choose the drivers you want to install. PE allows driver injection (adding them at restore time), so you're likely okay there anyway.

Performance

Macrium claims increased performance for the latest version 7, of which a free version is promised soon. That might be nice, as Reflect Free 6 took just over nine minutes to perform our 115GB system backup. That's about two minutes slower than any of the competition, though CPU usage was minimal. Backup generally takes place during off hours or in the background, so we don't lend performance a lot of weight in our evaluations.

On the bright side, the free version of Reflect spawns only a single background process, down from the three that the pay versions create. And much better than the six invoked by Acronis True Image.

Verdict

If all you want to do is image your system or data, then Macrium Reflect Free 6 is a great way to do it. We've been using it for seemingly forever, and it's never let us down yet. That counts.

If you want sync or plain file copying, then look at the equally free Aomei Backupper Standard or Paragon Backup & Recovery (**page 86**). There's no rule against having more than one backup program installed.

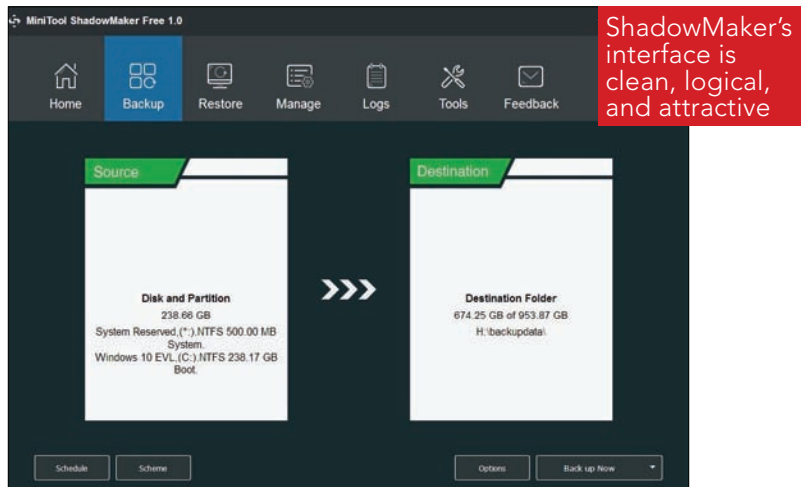
MiniTool ShadowMaker

URL: fave.co/2t78gn9

I'm always happy when a program makes backup quick and easy. MiniTool ShadowMaker makes me very happy. Being available in a free version that has all the features the average user needs makes me even happier. I'd say ecstatic, but hey, this is backup, not true love or world peace we're talking about.

Setup and interface

MiniTool ShadowMaker is a 70MB download, and installs with just one process running in the background



– its scheduler. As it's a Windows-only program, and creates bootable media in the Windows PE (Pre-install Environment) format, I'm not sure why the company didn't leverage the existing Microsoft scheduling. However, it seems to be fairly common for programs to go their own way instead.

The ShadowMaker interface is nicely done up in the Windows 10 style. Functionally, it's the tabbed dialog that's popular for step-by-step tasks, and it's exceptionally logical and easy.

Free features

ShadowMaker backs up full partitions and can also clone entire drives. There's no file copy as such, but most users, at least the less technical types, are better off backing up everything. It's a numbing experience to restore a backup and realize that what you are really missing, isn't there. Don't ask us how we know that.

The free version of ShadowMaker performs incremental backup, which backs up any changes since your last backup. This isn't the same thing as a differential backup, which backs up everything that's changed since your last full backup, ignoring any partial backups that might have happened in between. You're free to limit the number of backups. The program will cull older ones to make room for the new ones, actually removing backup 'sets', in other words, the full and incremental portions of a prior backup.

Beyond choosing the partitions (drive letters) to back up; you can manage the level of compression; define email alerts and notifications; choose between backing up only used sectors or all of

them; decide to shut down the computer post facto; and password-protect the images.

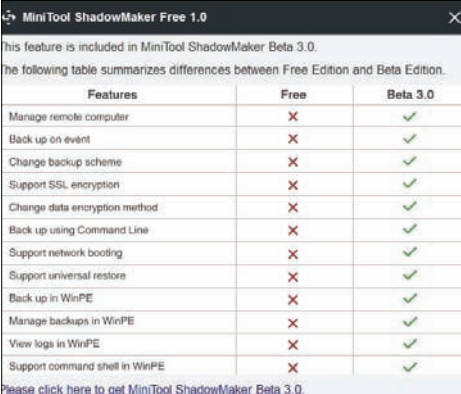
As mentioned, there's also boot media with full restore functionality. If you only need to restore certain files, ShadowMaker will mount the image as a virtual hard drive so you can browse it and copy stuff off.

Pro features are still in beta

The relationship between the free version and the pro version that's under development is a bit sketchy at this point. There's no pay version on the MiniTool site, just a free beta 3.0 with the pro features. You can see the features that are missing from the free version in the image below or at the product pages online.

One beta/pro feature of interest to the average user is the ability to create full (other than the original) and differential backups. As noted above, a differential backup contains all the data changed since the last full backup, while incremental backups contain only the data that's changed since the last backup of any type. Incremental backups are faster, but differential backups restore faster.

Another significant beta/pro feature is the universal restore, which means you can restore to hardware that's not identical or extremely



MiniTool ShadowMaker Free 1.0

This feature is included in MiniTool ShadowMaker Beta 3.0.

The following table summarizes differences between Free Edition and Beta Edition.

Features	Free	Beta 3.0
Manage remote computer	✗	✓
Back up on event	✗	✓
Change backup scheme	✗	✓
Support SSL encryption	✗	✓
Change data encryption method	✗	✓
Back up using Command Line	✗	✓
Support network booting	✗	✓
Support universal restore	✗	✓
Back up in WinPE	✗	✓
Manage backups in WinPE	✗	✓
View logs in WinPE	✗	✓
Support command shell in WinPE	✗	✓

Please click here to get MiniTool ShadowMaker Beta 3.0.

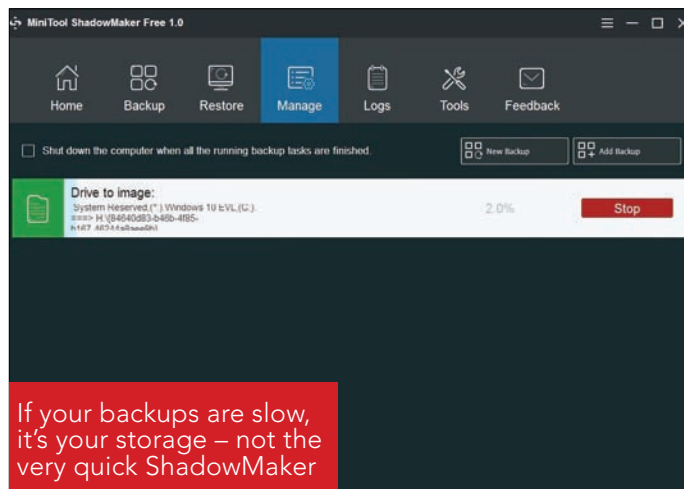
These features are available in the 3.0 beta, which will be pay eventually

similar to the device from which you backed up. If your old PC died, for instance, and you want to move the old files to a new PC, this can be important. That said, we often recommend that users take advantage of the clean install on their new PC and reinstall programs, then simply copy the data back.

The beta and pay versions can also back up from remote computers on the local network, given the proper permissions.

Performance

We were pleasantly surprised at how quickly ShadowMaker imaged our Windows and system reserved partitions: well under 5 minutes for about 120GB worth of data. Of course, it was copying from and writing to NVMe SSDs, so most users will see significantly slower times. We will, however, state unequivocally that it won't be the program's fault.



Mounting and dismounting the proprietary images was quick and easy as well, though we still prefer Paragon's trick of creating .VHDs that Windows itself can mount. All in all though, we were impressed with ShadowMaker's performance.

Verdict

Yes, that's a joke. While not as versatile as Aomei Backupper, and perhaps not as well known as Macrium Reflect, ShadowMaker is a super-competent, nicely rendered imaging program. It works and it's free. Have at it, and take a look at the pro version when it appears.

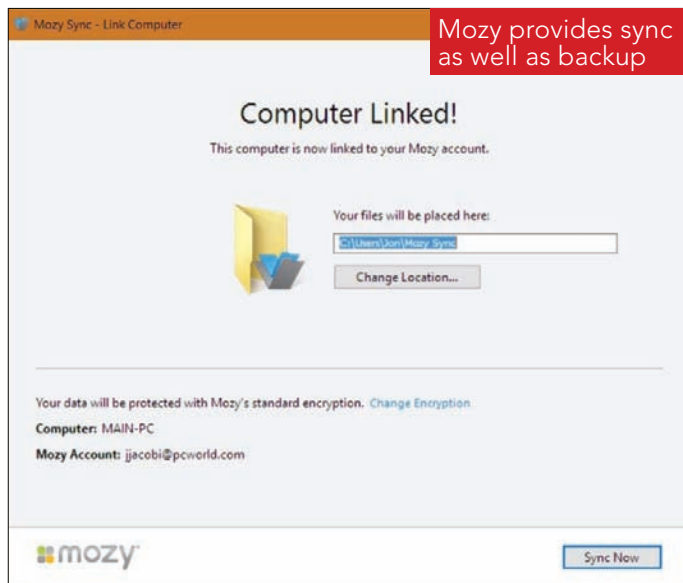
Mozy Home

URL: fave.co/2I0MPZO

Reviewing Mozy again after almost a decade is like coming home. After all, it was the online backup service the pretty much got the ball rolling with 2GB of free storage – back when 2GB covered most people's needs. Times have changed and data sets have ballooned, but with Dell EMC behind it, Mozy is still one of the most confidence-inspiring online backup services available.

Features

Probably the nicest thing about Mozy is that it both backs up and provides the sync folder functionality that you get with Google, OneDrive, and the like. It's not as versatile overall as iDrive, but it does cover the two most important roles. Clients are provided for Windows, OS X, and Linux (Pro only), as well as Android and iOS.



Mozy keeps up with the times by allowing you to back up the same data set to a local hard drive. Local backups restore far more quickly (in most cases) and give you the duplicate backup that should be part of any coherent backup strategy.

It retains file versions for 90 days and offers up to 448-bit Blowfish security. That's probably massive overkill for most users, but it's nice to know it's available.

Setup and use

Mozy Backup does a good job of automatically corraling the files you'll want to back up – pretty much everything in the user folders, such as My Documents. Beyond that, you're on your own. However, if you

are storing stuff elsewhere, you should know its whereabouts.

Mozy Backup and Mozy Sync are downloaded and installed separately, and while both are easy to use, they could integrate better with the operating system – and each other. For instance, there's no quick access icon for the sync location, as you'll get with Dropbox and the like.

And if you right-click on Mozy's Sync folder (Users/"Username"/Mozy Sync) you're actually afforded the option to include it in the Mozy Backup. Unnecessary redundancy certainly isn't a fatal flaw, simply indicative of how the two services could be meshed better.

Pricing and plans

Mozy Home is free for 2GB. Don't scoff: That's probably enough to back up your most important documents. Beyond that, you'll pay \$6 (around £4.60) per month for 50GB of storage, while the best deal for most users is likely the 125GB plan for three computers at \$10 (£7.60) a month. Backblaze it isn't, but Mozy is competitive cost-wise if your data set is relatively tame.

Verdict

Mozy is a venerable and highly reliable and secure online backup service that worked quite well in our hands-on. Getting both backup and sync in one package is nice, and shows that the company understands the target audience. But better client software, at least on the Windows end, is in order if it wants to keep up with the competition.

Paragon Backup & Recovery 16 Free Edition

URL: fave.co/2K1UWqV

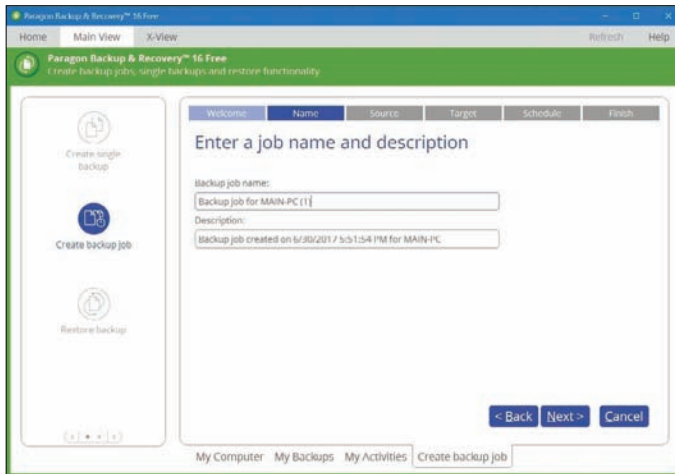
Paragon's Backup & Recovery 16 Free Edition is not only free for home users, it's unique among consumer programs in that it backs up using virtual hard drives as the container format. This can be Paragon's own pVHD, VMware's, or the VHD/VHDX supported by most flavours of Windows.

What's the big deal about virtual hard drives? Windows itself will mount VHD files, so you can grab files off of a VHD with any PC, not just a machine with Backup & Recovery installed. You can also attach a VHD file directly to a virtual machine and use it there. It's convenient for users in a number of ways a proprietary format is not.

Design and features

Beyond its signature VHD ability, Backup & Recovery 16 is a modernized, simplified version of Paragon's well-established imaging technology and programs. All of the main imaging capabilities found in the company's Hard Disk and Partition Manager are intact: imaging of entire system, whole disks, partitions, or sets of files you select.

It also has the same advanced Windows PE recovery media builder. The builder sports user-definable network and driver options and will create USB sticks or ISO files. Though not available in the free version, Backup & Recovery 16's feature set is filled out with a simple file transfer utility for one-way mirroring of data. The file transfer utility also supports direct writing to



Notice the tabs at the bottom of the Window. Once you spot these, and those elsewhere, you can navigate Backup & Restore easily

optical discs for archiving – the only function in the program that does.

The £24.57 paid version of Backup & Recovery offers granular scheduling, with complete control over the type (full/incremental/differential) and allows you to save your settings as 'strategies'. With the free version, you're stuck with the four are provided by default. They aren't necessarily the ones we would choose, but they'll do for free. Backup & Recovery, whether the paid or free version, doesn't sport niceties such as cloning, a recovery boot partition, or backup to online services.

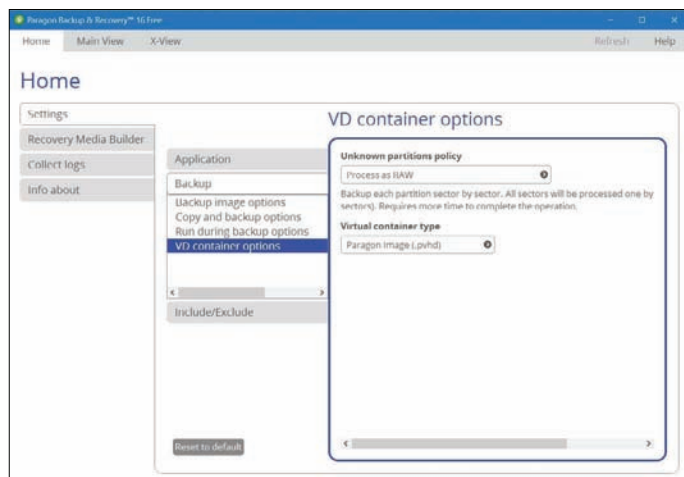
Ease of use

Using Backup & Recovery is simple, though it took us a few minutes to catch on to the less-obvious tabs that

lead you to the various options and functions. We also aren't quite sure why there are separate options and wizards for creating single backups and those to be run on a schedule. Normally, one-offs are taken care of by simply not creating a schedule.

Overall, however, the interface is clean, well-organized, and nicely walks you through creating a backup job. Advanced functions let you choose variables such as the size at which to split the archives, the level of compression, a password, and more, but these functions aren't available for VMware and Windows format virtual hard drives, only Paragon's proprietary format.

Our only workflow complaint is that there doesn't seem to be a way to clone a job. Even if all you want to do is change the destination, you must recreate the job.



Backup & Recovery backs up to several types of virtual hard drives. VHD types can be mounted natively under Windows

One thing we truly appreciate about Backup & Recovery is that, unlike some other programs, it doesn't create proprietary background services (Acronis True Image installs a whopping six) that slow down your system when no backups are occurring. It uses Windows' own perfectly adequate imaging and scheduling functions.

As to performance, the program was middle-of-the-pack: not as fast as Aomei Backupper or Acronis True Image, but not particularly slow. Backup & Recovery is pretty light on the CPU usage, and it won't bog down your system while it's in use.

Verdict

Backup & Recovery is free for private use, effective, decently fast, and is probably all most users should need. It's not quite as versatile as Aomei Backupper, but backup to virtual hard drive is a trick we really, really like. Actually, as both are free...

Best free online backup: iDrive

URL: fave.co/2ME6DWr

There's no more complete online backup storage service than iDrive. And though it's not the cheapest, it's still affordable and comes with backup clients for nearly every PC and device, including Windows Phone – a rarity these days. The company also provides additional storage for syncing all your devices and PCs, allows sharing of files with anyone, and has the ability to back up to a local drive.

Plans and pricing

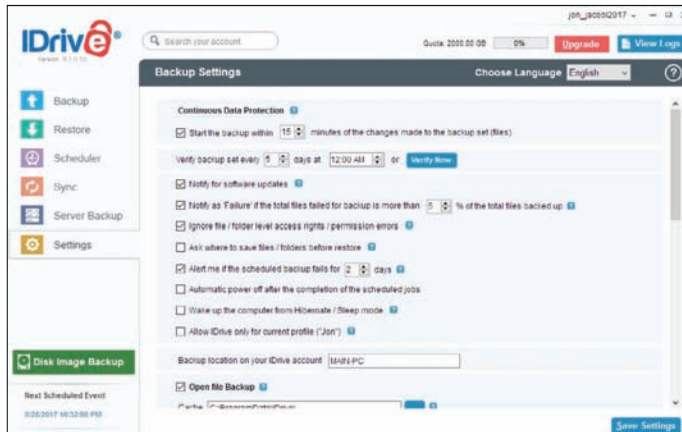
iDrive has two personal plans that cover one user with unlimited computers and devices: \$52.12 (around £39.60) per year for 2TB, and \$99.50 (around £56.65) a year for 5TB. If you enable the separate sync service, you get an equal amount of storage just for that task, at no extra charge.

Business plans allow unlimited users and computers, but significantly less storage per dollar, starting at \$99.50 for 250GB. Don't get completely caught up in the price-per-gigabyte game: The size of your essential data is probably a lot smaller than what's being offered as a minimum these days, unless you're into HDR and 4K.

iDrive also has a very nice ship-it-to-you restore policy. You can get up to 3TB of data delivered to you on a hard drive for free – the first time. Business users get three times. Subsequently, there's a \$60 (around £45.50) charge. You can also send your data to the company for safekeeping in the same manner. If your bandwidth is challenged, or you simply prefer keeping it off the grid, this Iron Mountain-like feature is just what the doctor ordered.

Features

One of our favourite iDrive features is the continuous data protection (CDP). If you have a rapidly changing data set, it's nice to have files backed up when they are changed, not just on a schedule. iDrive also supports nearly every type of PC and device: Windows, OS X, Android, iOS, various NAS boxes, and as we said, even Windows Phone. Also nice are the snapshots, which



iDrive's client will back up files as the change. That's CDP, or Continuous Data Protection

make it easy to restore your PC to a particular point in time. The iDrive local client is nearly identical to iDrive's online dashboard, so you can change settings, including turning on and off CDP using either. iDrive will also create a local backup using the same data set that's being backed up online. That allows you to maintain the Rule of Three: your original data, a copy, and a copy of the copy. Also, it's much faster to restore from a hard drive than from any online service.

Verdict

If you don't require online document editing, iDrive truly has the most comprehensive set of backup and backup-related features of any online service we've tested. And, they're all available at the basic service level, making iDrive less expensive than it seems. Good stuff.

Best free backup software:

Backupper Standard 4

URL: fave.co/2t6Ztle

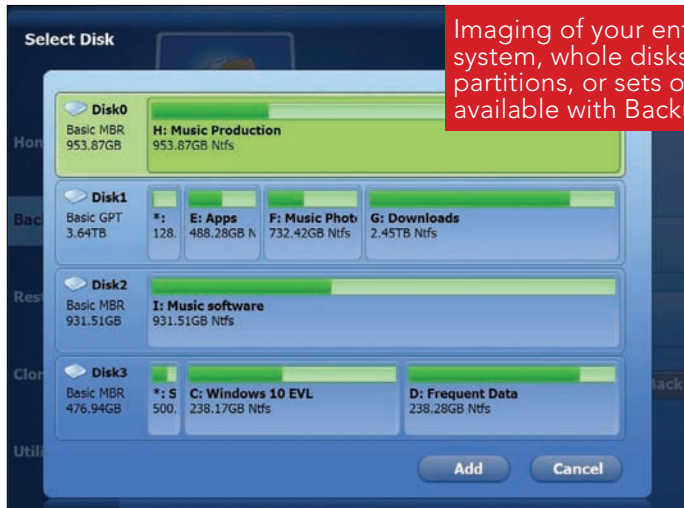
Would you rather pay for your backup software, or get it for free? All things being equal, and with the free Aomei Backupper Standard they pretty much are, we're generally going to opt for the latter. Backupper even sports real-time sync, mirroring files to an external folder whenever changes occur.

Design and features

Backupper Standard's bitmapped interface may be retro, but the layout and workflow are so intuitive, even beginners should have few problems figuring out what to do. At least you have some idea of backup concepts involved.

We spotted a couple of mild interface glitches in Aomei Backupper. When you increase the size of Windows objects in the Display Preferences (to 125 percent in this case), Backupper's window actually shrinks. There are other tiny scaling glitches, such as the bottom of a dialog cut off, but nothing that renders the program unusable. Hopefully this will be addressed soon with a new look and a rendered (drawn in real time), not static bitmapped GUI.

Despite being free, there's little missing from Backupper Standard's feature set, which includes: imaging, file backup, disk cloning, and plain file syncing. There are a plethora of scheduling options as well as syncing, including the aforementioned real-time synchronization. Syncing isn't true back up – it's keeping



a mirror of your important data in another location – a great hedge against losing recent work.

Backupper Standard will image entire drives or partitions, verify them, and mount them so you can grab a few files from one. The pay version adds imaging of dynamic volumes, and merging images – tasks few end users will ever need to perform. The system cloning offered in the \$54.95 (around £41.75) paid version could be very useful, as could the network boot function. But that’s speaking from an IT perspective.

Aomei provides both Linux and Windows PE boot images, which can be burned to CD or installed on USB drives.

Performance

Backupper Standard’s performance was the yin and yang in our round-up. It was the fastest backing up

disks and partitions, but easily the slowest backing up sets of files. On the other hand, CPU usage was light, and speed isn't of much consequence for a task running in the background.

Backupper Standard has a heavy footprint, spawning three background processes: the core, shadow copy, and a scheduler. We often wonder why companies ignore a perfectly good scheduling app (Window's own) that's already running in the background. To be fair, Acronis True Image spawns six background processes.

Help wanted

Don't get us wrong: It's great that companies keep their help files online so they can be constantly updated, but there should be local help as well, just in case. Like just in case you can't get on the Internet and need to back up you PC right now! Even tool tips would be useful, but as with EaseUS ToDo Backup, there are none. This is an exceedingly minor complaint and probably out of line considering the program's price.

Also, after making a comment like that, we should point out that we've never had the slightest operational difficulty with Backupper. All backups and restores have gone off flawlessly. And here's a link to the PDF help that you can keep for offline use.

Verdict

It's a heck of a thing when a program vies both for best value, and best overall. But that's Backupper Standard for you. Give it a whirl before you plop down your hard-earned cash on something else. It's likely all you'll need. Now about the name...

What does Google know about you?

Google holds a lot of data about its users, but you might be surprised just how much it knows, writes **MATT EGAN**



In order for the search giant to identify you, you have to have a Google account. Without one Google may well have anonymous data about you as a cookie on a phone or computer, but it is impossible to know what data that is (just as it is impossible for Google to know who you actually are). So all of the information below relies on you being logged in to your Google Account, which I'm sure you have. Ever logged in to an Android

phone or tablet, used Gmail, or used YouTube as a registered user?

The email and password you use for those things (or Google Calendar, Docs, Drive, and so on) is your Google Account. You may – as I do – have several. In which case you will need to repeat all of what follows for each account. Amuse yourself by spotting the differences between each account.

First, let's check the basics.

How well does Google know me?

Google used to be only a search engine. Remember that? Almost certainly you still use Google Search, a lot. And Google collects a lot of data about the searches you make, as it says a lot about you. Sign in and head over to Google and view the search history that Google holds about you. It's actually quite freaky to see what Google knows you searched for. You can also see your YouTube search history [here](#).

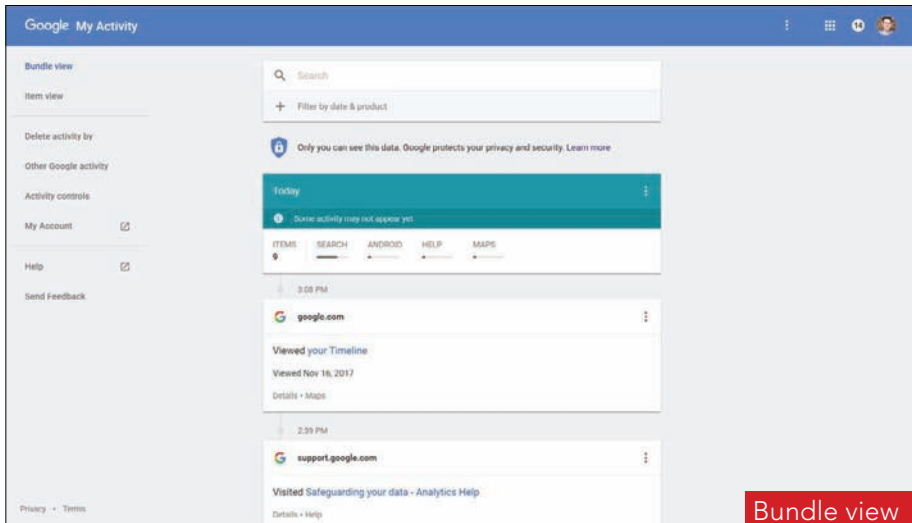
More prosaic but also critical basic information can be found in your account details. Sign in and head to myaccount.google.com to see the basic data you gave to Google. Head to Dashboard and you can see records of an array of Google tools, and your activity with them. We'll click into a couple of these further along, but suffice to say that this is an important dashboard for finding out what Google knows about you. Here's the basic data it is likely to hold about you:

- Name, gender and date of birth
- Email addresses
- Phone numbers

- Where you live
- Where you work
- Website you've visited
- Searches you made on Google Search
- Your ad preferences (more below)
- Your interests
- Places you've visited around the world
- Your YouTube search history and recently watched videos
- What you've said to the Google Assistant

How can I see my Google activity?

With ease, thanks to a relatively new tool that gives you a timeline of events and the ability to delete those events individually, should you want to. Log into your account and head to the My Activity page. You'll see something like the screenshot below. This is what's



called the Bundle view. You can drill down to the real details if you click Item view at the top left.

You can see more activity by clicking Other Google Activity from the left pane. This gives you links to many other Google services such as Sound searches, when you've left YouTube feedback or clicked on 'Not interested' on video suggestions, Google Play library information, Interests, News preferences, Call & Message information and even more.

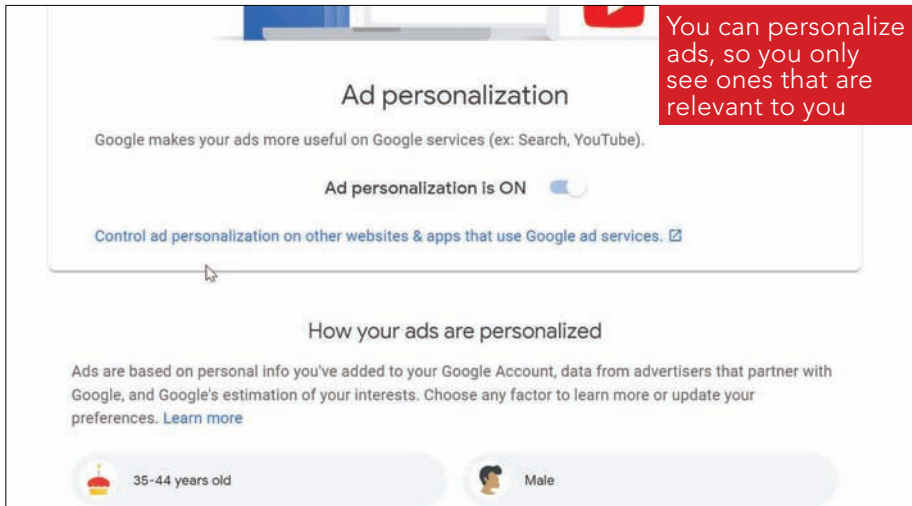
To remove items, click the three vertical dots on any item in your activity to see a Delete option. However, bear in mind that only you can see this activity log: it isn't visible to others.

What does Google think you're interested in?

The principle reason Google tracks all this data about you is so that it can more successfully target you with advertising, in order to pay for the free services you access. Depending on your point of view (or demographic) this is either a sinister menace or a cool way of getting free stuff.

But it is interesting to find out just what Google thinks it knows about you, and how it uses that to target ads your way. Sign in and head to Settings. You will see what Google considers to be your gender and age, as well as your interests.

If you haven't told the truth when entering basic information – or you've never entered it – you might find it amusing that Google has your age or gender completely wrong. When I do this test with my work email account Google thinks I am some sort of tech

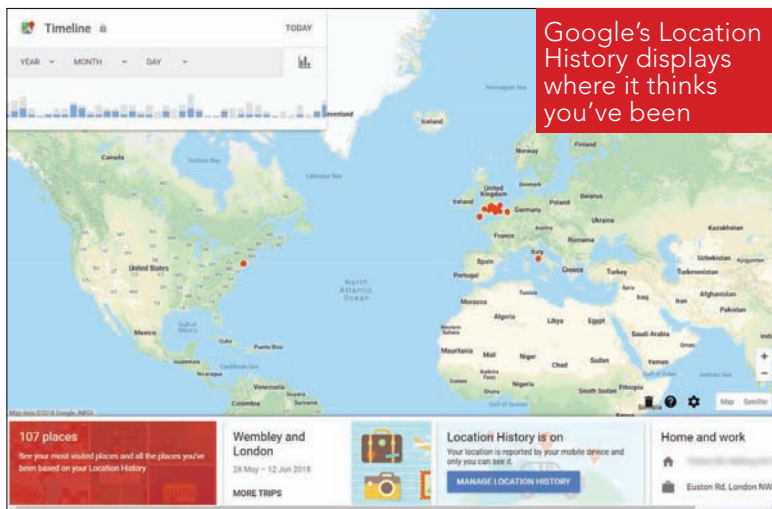


maniac. Which makes sense. But on my personal account my interests are naturally more broad. This matters because within this page you have the option to opt out of interest-based advertising.

These are adverts targeted at you because Google thinks you will be interested in their content. Personally, I am happy to remain in – in part because I earn my living from advertising on this website, but mainly because it amuses me that all the adverts I see at work are for tech.

How to stop Google collecting your interests

You can opt out of interest-targeted ads by simply toggling off 'Ad personalization' using the button shown above. You can also opt out of allowing website owners to track you via Google Analytics. Simply head over to the Google Analytics opt out page.



Where does Google think you've been?

One of the options available from the Google Settings Dashboard outlined above, is the ability to find out where Google thinks you have been. You can head there directly at Location History. This is typically tracked using the GPS in your phone: chances are even if you don't use an Android phone you'll still be signed into your Google account on an iPhone.

Stop Google collecting location information

Click on Manage Location History at the bottom of the page and toggle off Location History.

What devices, apps and services have access to your Google data?

In many ways this is the most important test of all. One of the benefits of Android is that it lets you know what

permissions are required by each app you install on Android. But you encounter myriad Google apps and services on multiple devices. This page lists the devices and services, and what access they have. Click on a listed device and you can see further details and the opportunity to revoke, on the right-hand side.

How can to change which Google information is visible to others

With Google's About Me tool. This shows what's publicly visible, and you can click the pen icon to edit anything to remove it or change it.

It is well worth using Google's Privacy Checkup tool as well. Head to the Dashboard and click on the Get Started link. Now just go through the list and pick the options you're happy with.

How To: Download Windows 10 for free

Microsoft would rather you paid to upgrade to Windows 10, but you can still use it for free. MARTYN CASSELY shows how



Microsoft stuck to its plan of giving a free copy of Windows 10 to anyone who wanted to upgrade from Windows 7 or 8.1 for just one year. However, it's still possible to make the transition without spending £120 on the Microsoft Store for Windows 10 Home.

Windows 7 or 8 product key

Amazingly, if you download the Windows 10 installation media from Microsoft, (fave.co/2JWEJTB) it will still accept a valid Windows 7, 8 or 8.1 product key when it prompts you to enter an activation key for Windows 10.

Windows will then show that it is activated with a digital license, so you're then free to re-install Windows 10 on that PC or laptop at a later date. It's helpful to link this with your Microsoft account because this enables you to re-activate Windows 10 if you make any major hardware changes, such as a new motherboard.

If you don't link it, you'll be unable to reactivate your digital license after serious upgrades. To link it, simply sign in with a Microsoft account in Settings > Update & security > Activation > Add a Microsoft account.

The original upgrade offer ended on 29 July 2016 and since then Microsoft has been directing people to pay the £120 from its website.

Savvy users found out that Microsoft quietly left one avenue open for upgrade: users of Assistive Technologies could still upgrade for free. With no means testing, anyone could use this until Microsoft shut this down on 31 December 2017.

Don't activate

Again, you can download Windows 10 from Microsoft's website and install it. It will prompt you for an activation key. But it's possible to skip this and ignore the nagging messages once you begin using Windows 10.

Aside from a few things that won't work, such as the personalization options, Windows 10 remains completely usable. This is against Microsoft's terms of

use, mind, but it's helpful if you need to install Windows 10 as a virtual machine or to test something.

Use the 90-day Enterprise trial

For the completely legal and above board way to use Windows 10 for free, you can download the 90-day trial of the Enterprise version (fave.co/2l3BeJb). Obviously, it will expire after three months, but if you just want to test how Windows 10 runs on an older PC or laptop, this is a decent option.

Don't forget, too, that you can install the Home version of Windows 10 using the previous method here and then pay to buy a licence key once you've decided you're happy with everything.

And if you do decide to buy a licence key there are ways of getting it a lot cheaper than Microsoft's price. We explain everything in What's the difference between Windows 10 OEM and retail licence keys?

How To: Delete files that won't be deleted

If you're struggling to remove certain files from your Windows PC, then we recommend you follow **MARTYN CASSERLY's** steps



Sometimes you might come across a file that simply won't delete, no matter how many times you hit the Delete key or drag it to the Recycle Bin. This can be for a number of reasons, but the upshot is the same – it's incredibly frustrating. To overcome this situation we've put together five different approaches that can finally rid you of these meddlesome files.

Just bear in mind that Windows system files are usually protected against deletion, as this can cause problems with the operating system, so be sure you're not trying to get rid of these. Of course, it's always wise to run a full backup in case anything goes wrong. Read our round-up of the best free backup services on [page 68](#).

Close apps

Often, the problem of a file that can't be deleted can be caused by an app that is currently using the file. You might not know that the software in question is doing this, but the simplest way to fix things is to close down all the open applications on your PC.

Once everything is shut down, try deleting the file and hopefully you'll find that it will now disappear without further problems.

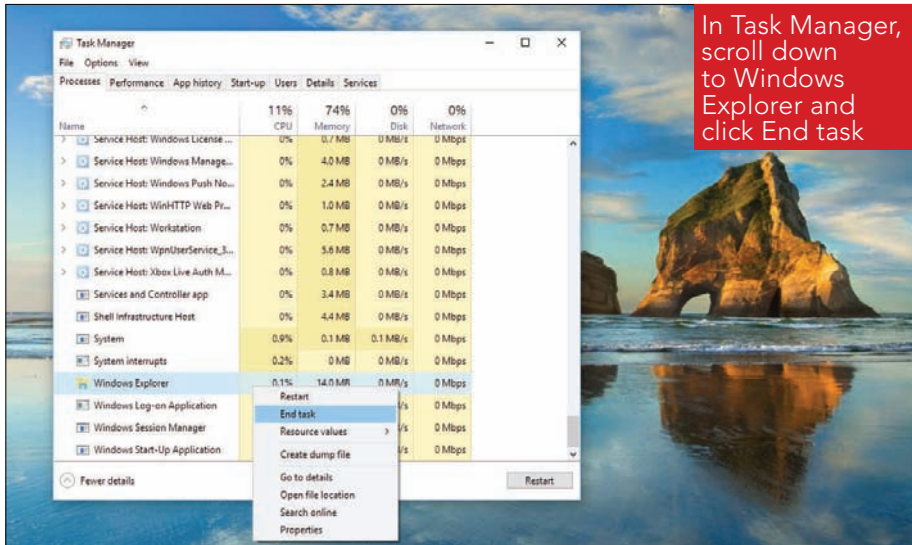
Close Windows Explorer

While closing all of your apps can often do the trick, it's also possible that the thing blocking deletion of the file is Windows Explorer – also called File Explorer.

To close this you'll need to open Task Manager (right-click on the taskbar and then select it from the pop-up menu) and scroll down until you find Windows Explorer. Right-click on it and then select End task from the menu.

Reboot Windows

Another thing to try before tackling more advanced methods is rebooting your PC. It's hardly scientific, but from time to time apps or even Windows itself can get



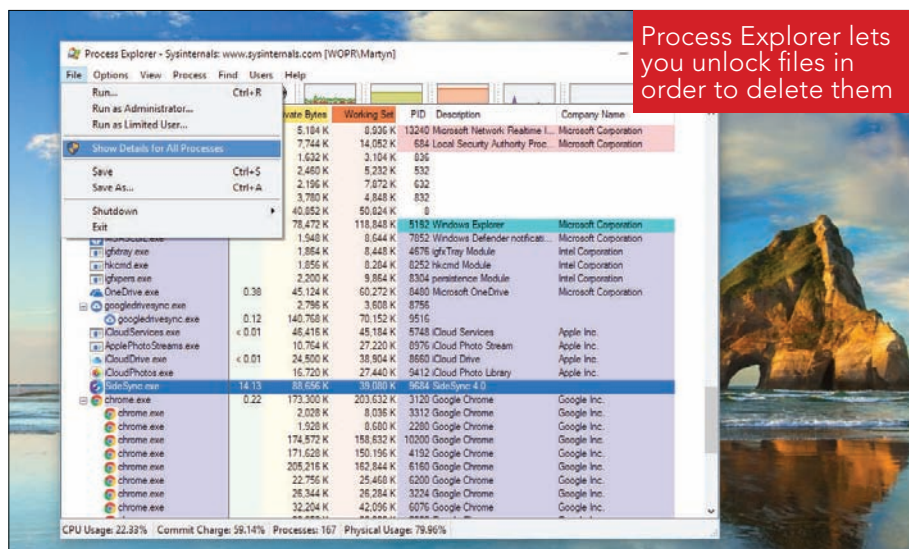
into a weird state that affects how things work. In many cases, a quick reboot can clear these issues.

Use Safe Mode

If none of the methods above have given you any joy, the next option is to use Safe Mode in Windows. This only loads up the OS itself and a bare minimum of files and drivers. So, if the file you're trying to delete has been locked somehow, Safe Mode could make it available once more. Now navigate to the file and try deleting it. If things go well then it should accept its banishment with no complaints.

Use a dedicated app

If the file remains undeletable, then it might be time to invest in a third-party app that specializes in this area.



Some options are File Assassin (fave.co/2K00O3R), Long Path Tool (fave.co/2MGQK18), and Microsoft's own Process Explorer (fave.co/2MFynd5).

The latter is free and is generally regarded as an excellent tool for unlocking files in order to delete them. Download Process Explorer from Microsoft's site, then install it on your PC. Launch the app and you'll see a window that looks very much like the standard Windows Explorer. Go to File in the upper left corner, then select Show Details for All Processes.

You can now either scroll through the list until you find the file, but the faster way is to click on the Find option in the menu bar at the top of the window, then select Find Handle or DLL.

Type the name of the file into the search bar, click Search and if the file name appears click on it and

you'll see the details open up in the other Process Explorer window. Now, right-click on the file listing in the Process Explorer window and you'll be presented with two choices: Close Handle and Properties. Select Close Handle and the file will be unlocked from the app using it. You might need to repeat this final step if multiple apps are holding the file.

Once that's done you should now be able to finally delete the file.

