

SAMSUNG GALAXY UNPACKED 2020: ALL THE BIG NEWS

TECH ADVISOR

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SURFACE BOOK 3 REVIEW



MICROSOFT'S LATEST PORTABLE POWERHOUSE



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FLIGHT SIMULATOR**

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Credit: Getty Images/baloon111

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The Microsoft Surface Duo arriving September

The bad news is it's US-only for now. **MICHAEL SIMON** reports

A recent Microsoft blog post (see fave.co/3gtjesY) brought both good and bad news for those waiting for its dual-screen smartphone – the Surface Duo. The good news is that it will ship September 10. The bad news is that initially it will only be

available to buy in the US, with a UK release thought to be some way off. It's also very expensive.

Microsoft will be charging \$1,399 (around £1,050) for the base configuration of its dual-screen Duo with 128GB of storage (add \$100 for

256GB). You're not getting much for your money other than the pleasure of being first. It has last year's top-of-the-line Qualcomm Snapdragon 855 processor, just 6GB of RAM, a relatively small 3577mAh battery and a single 11MP camera.

It's also heavy at 250g and not all that pocketable

at 145.2x93.3x9.9mm (versus 164.8x77.2x8.1mm for the Galaxy Note20 Ultra). It's more like a tiny touchscreen laptop than a phone, though you can use it to make calls.

But with Android 10 onboard rather than Windows – even a heavily skinned and specified version – the Surface Duo's competition will be the latest luxury Android phones. On that note, the Duo costs more than the just-released £1,179 Galaxy Note20 Ultra (see page 18), even though it has less-powerful specs. The Surface Slim Pen, which seems central to the experience, costs extra and can't be stored on the device. The Duo also doesn't support 5G, Wi-Fi 6, nor will it have an NFC chip for contactless payments. To start, it will be limited to



Yes, the Surface Duo is a phone, but that's not its primary purpose.

United States customers and will work on all three major carriers.

Its design is certainly interesting, though. Rather than a true folding display, the Surface Duo opens to a pair of 1,800x1,350 AMOLED displays with a 4:3 aspect ratio. Together, they total 8.1 inches of screen space and work more like a multi-monitor desktop set-up than a single screen. For example, when you tap a link on one side, it'll open on the other screen. It supports a variety of unique dual-screen features, including drag-and-drop and split-screen multitasking. Structurally, the Surface Duo lacks an outer screen like the Galaxy Z, so you'll need to open it up to use it. There's a 360-degree hinge for folding it back like a Chromebook

THE FOLDING FUTURE

While its concept might have seemed novel last year, Microsoft's Surface Duo joins a growing line-up of folding phones, including the Galaxy Z Fold 2, Galaxy Z Flip and Motorola Razr. Additionally, the LG Velvet has a Dual Screen accessory that turns it into a Surface Duo-like device with a second screen when opened.

However, Microsoft isn't trying to compete with the folding Android phones of the world. Calling it "the next wave of mobile productivity", Microsoft is touting the Surface Duo's ability to switch between Android apps and Microsoft 365, as well as its strong security – the company says that it wrote and reviewed "every line of firmware code in house" – as integral to the experience. In an enterprise-oriented blog post, Microsoft also pointed out the Duo's ability to integrate with Microsoft

Intune for managing multiple devices through the cloud.

But even as an enterprise device, the Surface Duo has a steep mountain to climb. Considering you can get a Surface Pro 7 for £699 from fave.co/3j9Z1u7, the Surface Duo is a pricey boutique device that doesn't seem to be all that convenient. Even if you can fit it in your pocket, you'll need to open it to use it or even see who's calling. Its size and lack of an outer screen will make simple things like taking pictures more difficult than other phones. And it remains to be seen how well the Duo will process photos and videos compared to other Android phones, even single-camera ones like the Google Pixel 4a (see page 73).



You'll need to open the Surface Duo before you can do anything with it.

Microsoft has built a device that plays by its own rules, but it's breaking many of the conventions we take for granted along with way. 5G isn't a necessity yet, but it will be in a couple of years. In a post-Covid-19 world, not being able to use your phone to make payments is going to feel antiquated. And the lack of wireless charging in a thousand pound phone is a major disappointment.

But one thing is clear: Microsoft is finally back in the phone game with the Surface Duo, and Windows and Android fans alike should take notice. Even if they don't buy one right away.

- Bluetooth 5.0, A2DP, LE, aptX Adaptive
- GPS with A-GPS
- NFC
- USB 3.1, Type-C 1.0 reversible connector
- Fingerprint scanner (side mounted)
- Non-removable 3,577mAh lithium-polymer battery
- Unfolded: 186.9x145.2x4.8mm; Folded: 145.2x93.3x9.9mm
- 250g

SPECIFICATIONS

- Unfolded: 8.1in (2,700x1,800; 401ppi)
Dual PixelSense Fusion Displays;
Folded: 5.6in (1,800x1,350; 401ppi)
Single PixelSense Display
- Android 10
- Qualcomm SM8150 Snapdragon 855 (7nm) processor
- Octa-core (1x 2.84GHz Kryo 485, 3x 2.42GHz Kryo 485, 4x 1.78GHz Kryo 485) CPU
- Adreno 640 GPU
- 6GB RAM
- 128GB/256GB storage
- Rear-facing camera: 11Mp, f/2.0, 23mm (wide), 1.0µm, PDAF
- Selfie camera: Uses main camera
- 802.11a/b/g/n/ac Wi-Fi dual-band



A new BlackBerry phone is coming with 5G, Android and a physical keyboard

Because that's just what we need. **MICHAEL SIMON** reports

Just when you thought BlackBerry phones were gone for good, a brand-new start-up is claiming that a new one is on the way. And in case you're wondering, yes it will have a physical keyboard.

In a press release (see [fave.co/32l3X8Q](https://www.fave.co/32l3X8Q)), Texas-based Onward Mobility announced that it has entered into an agreement with BlackBerry and FIH Mobile Limited to deliver a new 5G BlackBerry Android smartphone with

physical keyboard in the first half of 2021. Little else is known about the phone except that it will, according to the report, be “secure”, “feature-rich” and “enable productivity, without sacrificing the user experience”.

The company’s CEO also told the Register that the phone will be an “everyday device” that’s “the most secure and productive” with things like “a top-notch camera, and the other specs you’d expect from your day-to-day phone” as well as “competitive” pricing. Oh, and it will also “reflect the brand values from a keyboard typing experience and input experience”.

Of course, all that means nothing. This will be the third attempt for BlackBerry and the second to run Android after TCL tried and failed to make headway against the iPhones and Galaxies of the smartphone world. And as best we can tell, Onward Mobility was created specifically to sell BlackBerry phones, so that doesn’t bode well for its ability to



We’re fans of the BlackBerry KeyOne’s physical keyboard.

make a competitive phone in 2021, let alone one with a keyboard no one wants anymore.

But that doesn’t mean Onward Mobility isn’t confident. Its slogan is Mobile Invincibility, and it describes its team as having “unrivalled talent, foresight, and experience”. Whether that can translate into a successful BlackBerry phone in 2021 is another story.



Intel's Alder Lake chip pushes performance, then battery life, for laptops

Alder Lake is bringing performance that the prior Lakefield generation lacked. **MARK HACHMAN** reports

Intel's Alder Lake chip will build upon its predecessor, the first hybrid core known as Lakefield, by prioritizing performance over battery life for thin-and-light laptops, small-form-factor PCs,

and other compact designs. Announced last month as part of Intel Architecture Day, the chip will be available in 2021.

Alder Lake's performance focus fills an unmet need in the prior generation,

Lakefield, which Intel unveiled about a year ago. At the time, the company talked about using its Foveros technology to stack a 'compute' die on top of a 'base' die, saving space for small-form-factor PCs. But Lakefield also steals a page from rival Arm processors, combining four low-power 'Tremont' Atom cores for low-intensity tasks, with a single 'Sunny Cove' Core CPU for heavier burdens. Lakefield quietly debuted in a version of Samsung's Galaxy Book S, under the discreetly bland description of 'Intel Core processor with Intel Hybrid Technology'.

Unfortunately, what Lakefield gained in power reduction, it apparently lost in performance – early reviews of the Galaxy Book S were decidedly underwhelming. Intel's Raja Koduri (senior vice president, chief architect, and general manager of Architecture, Graphics, and Software) maintained a positive spin at Architecture Day: "Our goal with this architecture was to enable world-class battery life while maintaining snappy responsiveness that users expect from Intel processors."

With Alder Lake, Intel has evolved its strategy.



The 'Intel Core processor with Intel Hybrid Technology', or Lakefield, ended up in the Samsung Galaxy Book S, an ultralight PC weighing just 961g.

"We are advancing our hybrid architecture significantly with a focus on performance," Koduri said. Alder Lake will combine an unknown number



Intel calls Alder Lake a 'performance hybrid'.



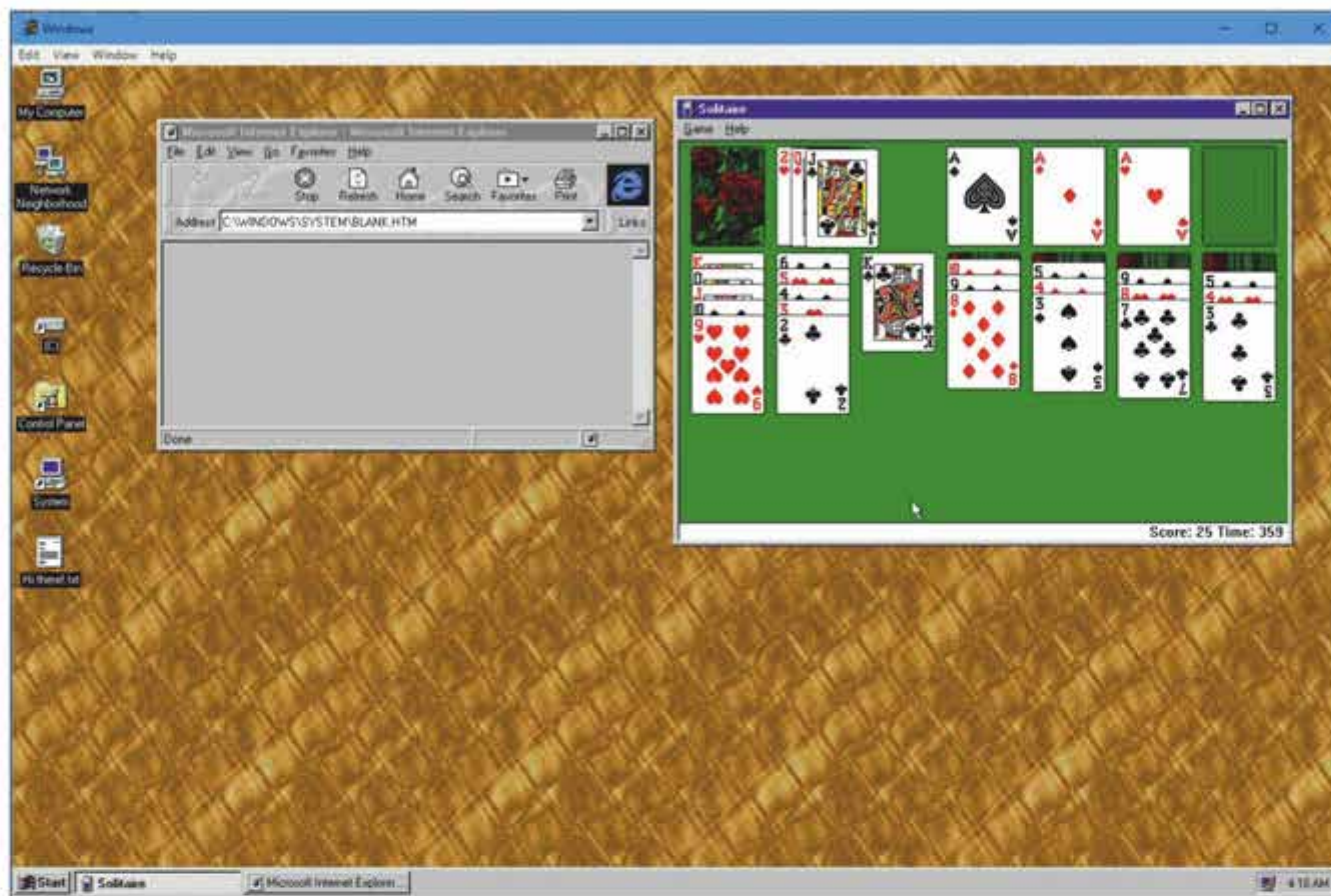
Intel improved Lakefield not just by hardware, but via software optimizations as well.

of performance-oriented Golden Cove cores (similar to Lakefield's Sunny Cove), with an equally unknown number of low-power Gracemont cores (successor to Lakefield's Tremont cores), with more emphasis on performance.

Koduri noted that an important part of Lakefield's design was working with operating system vendors to develop hardware-guided schedulers that offered the best mix of hardware responsiveness and battery life. Intel hopes to capitalize upon this further with Alder Lake by developing a 'next-generation' hardware-guided scheduler to leverage all cores seamlessly.

"Alder Lake will not [just] be great for performance, but it will be our best

performance-per-watt architecture," Koduri said.



Windows 95 turns 25: Relive the glory days with this nostalgic app

It's not fully functional, but close enough to the real thing for a trip back to the Windows days of yore. **MARK HACHMAN** reports

If you have about 200MB of bandwidth to spare and a taste for the nostalgic, why not take a moment and download Windows 95 as an app? Felix Rieseberg constructed one of Microsoft's iconic

operating systems as an Electron app, which is downloadable from GitHub (fave.co/3linmj5) for Windows, Mac or Linux. It's unknown whether Rieseberg received any help from Microsoft itself,

or whether or not what he constructed is technically legal. At this point, really, who cares?

'Windows 95 v1.0', as it's referred to, isn't totally functional. Apps like Notepad and Solitaire work, though Internet Explorer can't break out of the virtual machine and access the Internet. That's a shame, of course, because there's an AOL executable just waiting to be used. (We can confirm that Windows 95 v1.0 runs just fine on a Microsoft Surface Book 2 with 16GB of RAM – see screenshot on page 13.)

Unfortunately, classic games such as Space Cadet Pinball seem to have been omitted (though FreeCell and Solitaire are still there). But if you're eager to return to a time when autoexec.bat and BSODs were a thing, take a few minutes and relive the glory days.



Microsoft Flight Simulator could spur 'billions' in PC hardware sales

Flight Simulator's system requirements will drive eager players to upgrade or replace their systems. **GORDON MAH UNG** reports

Microsoft's beautiful and punishing Flight Simulator 2020 reboot will spur a staggering \$2.6 billion in PC hardware sales, Jon Peddie Research (JPR) estimates.

Flight Simulator formally launched August 17. Previews of Flight Simulator largely agree it's one of the most sophisticated flight sims, if not games, to release on the PC. You can read our thoughts on page 101.

Jon Peddie Research believes this will cause PC players to buy new CPUs, GPUs and monitors. Don't forget the accessories. JPR also expects strong sales in flight sticks, throttles, rudder pedals and even simulation seats, frames, and VR gear.

"Flight simulators are incredibly demanding on processing capability and reward high resolution, large displays, and VR use. When new flight simulators

are released, the hardware to run them at max settings and performance does not even exist yet,” said analyst Ted Pollack. “This creates a situation of constant hardware demand over the life of the title as fans chase the best experience.”

If the \$2.6 billion figure seems unbelievable, it’s based on the 2.27 million copies of Flight Simulator JPR expects Microsoft to sell. If each of those users subsequently spent an average of £1,000 on additional hardware to run Flight Simulator, that would get you to the JPR estimate.

Considering that many flight sim fans play only flight simulators, they are more willing than mainstream users to spend on their hobby. The game’s footprint

is 150GB, and it’s recommended that you run an SSD rather than a hard drive for game load performance. Microsoft’s recommended specs include a GeForce RTX 2080 or AMD Radeon VII GPU, along with a Ryzen 7 2700X or Core i7-9800X CPU. Price out those components or configured systems, and you can get to £1,000 easily.

It’s likely many won’t just buy new hardware to upgrade, either – they’ll buy entire PCs. “We’ve had a lot of interest from clients gearing up for Flight Sim 2020, and its release has shown this title is absolutely deserving of a full new PC,” Kelt Reeves, owner of Falcon Northwest, told PCWorld. Falcon Northwest got its start in 1992 making gaming PCs, many



	Min Spec AMD		Min Spec NVIDIA		Recommended Spec AMD		Recommended Spec NVIDIA		Ideal Spec AMD		Ideal Spec NVIDIA	
Min. OS version	Windows 10 Nov 2018 update (1809)		Windows 10 Nov 2018 update (1809)		Windows 10 Nov 2018 update (1809)		Windows 10 Nov 2018 update (1809)		Windows 10 Nov 2018 update (1809)		Windows 10 Nov 2018 update (1809)	
CPU	Ryzen 3 1200		Intel i5-4460		Ryzen 5 1500X		Intel i5-8400		Ryzen 7 2700X		Intel i7-9800X	
GPU	Radeon RX 570		NVIDIA GTX 770		Radeon RX 590		NVIDIA GTX 970		Radeon VII		NVIDIA RTX 2080	
VRAM	2 GB		2 GB		4 GB		4 GB		8 GB		8 GB	
RAM	8 GB		8 GB		16 GB		16 GB		32 GB		32 GB	
HDD	150 GB		150 GB		150 GB		150 GB		150 GB SSD		150 GB SSD	
Bandwidth	5 Mbps		5 Mbps		20 Mbps		20 Mbps		30 Mbps		30 Mbps	

Here are Microsoft’s minimum, recommended, and ideal system requirements.

of them aimed at flight simulator players. In fact, its office is located across from an airport in Oregon.

Reeves, who is still a gamer, said Flight Simulator is essentially the “Can it play Crysis?” game of today. That means more hardware will be sacrificed at the altar of Flight Sim. “It just eats all the CPU and GPU processing you can throw at it,” Reeves explained. “It’s the most taxing game we’ve seen on its generation of hardware since Crysis.”

It’s worth it, though, Reeves agrees. “As a former pilot myself, the realism it brings in every detail is just incredible. I suspect we’re going to be building PCs chasing performance in this title for years to come.”



Review: Samsung Galaxy Note20 Ultra

Price: £1,179 (inc VAT) from fave.co/34uV3ll



Our Samsung Galaxy Note20 Ultra review found three clear reasons to make the jump to this new flagship phone: Mystic Bronze, laser autofocus and the S Pen's new 8ms latency. And if you're looking for any reasons not to, well, there are plenty of those in this review too – namely,

it's gigantic, expensive and not a huge upgrade over the S20 Ultra.

But if you're a Note fan, you know exactly what you're getting and you know you want it: the biggest, fastest and most powerful Android phone you can buy. For everyone else, it's not so simple.

Samsung's flagships have become so good that reviews of them are all basically the same: yes they have the best specs, but they're also the most expensive (although the Note20 Ultra actually costs £20 less than the S20 Ultra). The maths is brutally clear: Even with trade-ins and carrier offers, you're still going to be paying more for this phone than for any other Note that came before it. There's no doubt that you're getting a lot for your money with the Note20 Ultra. But Samsung has raised the bar so high, the best might not be worth the price of admission anymore.



The 6.9in screen on the Galaxy Note20 Ultra definitely needs two hands to operate.



Sorry, Bixby lovers, the dedicated button is gone for good.

BIG, BRIGHT & BEAUTIFUL

There's no nice way to say it: the Note20 Ultra is the most unwieldy phone I've

ever used. Granted, it's about 15g lighter than the S20 Ultra, three-quarters of a millimetre thinner and only a couple of

millimetres wider, but that phone was already at the upper limit of what my hands and pockets could handle. The extra width on the Note20 Ultra, along with its very boxy shape, makes it feel uncomfortable to handle and carry.

The unwieldiness is due in no small part to the camera bump. You've seen it in photos, and it's every bit as obtrusive as it looks. The Note20 Ultra's impressive thinness actually works against it here, making the bump feel much thicker by comparison. The size also means it's tough to use when resting on a table. I even encountered some issues with charging pads. A case would help, but you wouldn't want to use one.

Why? Because the Note20 Ultra is flat-out gorgeous. Samsung's new

colours are dubbed 'Mystic', and they give the Note a refinement and dignity that contrasts with the pop-culture vibe one gets from the S20 Ultra's bright, iridescent 'Cosmic' colourways.

The Note20 Ultra has a luscious matte finish that's nicer than what I've seen on any Galaxy phone I've ever used. It doesn't need to grow on you like the iPhone 11 Pro's Midnight Green or wait for the right light like the Note 10's Aura Glow. It repels fingerprints like it was made of plastic, and it has a better grip than the glossy S20 does. The new bronze colour's matching, stainless-steel sides add a touch of sophistication, accentuated by the slivers of colour that peek out above and below the display. You'd be nuts to get any other

colour and even more nuts to put a case on it, even a clear one.

The front of the phone is equally fabulous. The bezels around the enormous 6.9in screen are about as thin as they can get without disappearing completely. The curved edges contrast nicely with the flat top and bottom.

Because it's a Samsung flagship, it



The bezels aren't completely gone on the Note20 Ultra, but they're not very visible.



The Note20 Ultra's matte finish is a massive improvement over the glossy S20 Ultra.

goes without saying that the display is big, bright and breathtaking. But I'll say it anyway. Samsung somehow manages top itself with each new flagship. If you go deep enough in the comparison with the S20 Ultra, you'll see a more consistent white balance and a higher max brightness (a whopping 1,500 nits using adaptive brightness), but all you'll notice are the vibrant colours and deep blacks.

The Galaxy Note20 Ultra has the same 120Hz display that Samsung introduced with the S20, so unfortunately, you still need to drop the resolution to Full HD to use the 120Hz setting, but it's a small sacrifice. Once you try it out, you won't want to go back,

but here it has an adaptive refresh rate to conserve battery life. So if you're reading an article, the rate will drop to 60Hz, but if you're playing a game or watching a movie, it'll increase to 120Hz. It's a great battery-saving feature and one that looks to be exclusive to the Note. Samsung has

announced the One UI 2.5 features that are coming to the S20 and the adaptive refresh isn't one of them.

POWER TO SPARE WITH SOME SPARING PARTS

The Note20 Ultra might not be a true 'gamer' phone like the Asus ROG Phone 3 or the Lenovo Legion Duel, but it packs just as much of a punch. The Snapdragon 865+ combined with 12GB of LPDDR5 RAM produced the best scores I've ever seen on an Android phone:

Geekbench 5

Single: 966

Multi: 3,067

Compute: 3,652

PCMark

Work 2.0: 12,298

So you're getting a phone that'll run everything at tip-top speed, including Microsoft's new xCloud Xbox gaming service. I'm no gamer (my Candy Crush obsession notwithstanding), and my Minecraft Dungeons-loving son was too young to try out the preview with his account, but Xbox fans will surely be happy with the performance.

You'll also be able to download Fortnite without side-loading, an unexpected benefit of Epic's recent war with Google and Apple. Because Samsung runs its own App Store and doesn't have terms as strict as Apple's

for developers, the new Epic Store with discounted V-Bucks is available at a tap. My son reports that while the on-screen controls were a little confusing at first, gameplay on the Note20 Ultra is 'OP' (that means good), and he was able to snipe some sweats.

The Snapdragon 865+ chip gets a little hot, however. In Fortnite and other graphically intensive apps, the back of the phone became noticeably warm to the touch, often topping 100 degrees Fahrenheit during the heaviest loads (per an infrared thermometer). It might become an issue on hot days. That's probably why the Asus ROG Phone 3 and Lenovo Legion Duel have specialized cooling systems.



The Galaxy Note20 Ultra (top) is only about three-quarters of a millimetre thinner than the S20 Ultra, but the difference is noticeable.

Also worth noting is that the Note20 Ultra's 4,500mAh battery is a little on the skimpy side. While that's bigger than what you'll find on most phones, it's smaller than the 5,000mAh battery in the S20 Ultra. But don't worry:



The bezels are thin, the camera is centred, and the screen is gorgeous on the Note20 Ultra.

your Note20 Ultra is still going to make it through the day, even with heavy users who want to keep 120Hz motion smoothness turned on.

Note20 Ultra users will have to settle for second-best when it comes to battery life, however. In benchmarks, I got better than 12 hours with 120Hz turned off, but only around nine hours with it on. My real-world experiences were similar: even with the new adaptive refresh rate, the Note's battery drained significantly faster when motion smoothing was on, which is just going to be a fact of life until it evolves. It's the main reason why the iPhone 12 probably won't include a ProMotion display – it kills battery life.

When you need to charge it, you'll get 25-watt fast charging, but not the 45-watt charging on the Note 10+ and Galaxy S20 Ultra. It won't make a huge difference – the Note20 Ultra will still fill up in less than 90 minutes using the 25-watt charger – but it's strange that Samsung removed support after just a year. The

camera bump also caused some issues with charging pads. More than once my phone didn't charge because the camera lifted the phone up enough where the coils weren't touching.

A MIGHTY NOTE-TAKER

Because this is a Galaxy Note phone, it has an S Pen on board, though it's not like the styli of Note past. For one, it's been moved to the left side of the device after living its whole past life on the right side.

The placement isn't the only thing that's new. Samsung has accelerated the S Pen's latency from 45ms to 8ms, which has a dramatic effect on writing and drawing. I never had an issue with



You'll want to take more notes with your Note20 Ultra's S Pen.

the old pen's performance, but the new S Pen feels as natural as writing on an actual piece of paper. That latency is the same as the Apple Pencil's, and it makes a huge difference when taking notes, marking up documents or just scribbling on the screen. It's even better with the higher refresh rate. Samsung's Notes app has been upgraded as well, with better handwriting support and annotated audio. I suspect you'll be using your Note to take notes more often than with previous Notes.

The rest of the S Pen's tricks aren't nearly as impressive. Samsung turned its stylus into a Bluetooth remote with the

Note 9 and added app gestures last year. Now the Note has even more 'air actions' that let you control all aspects of the phone with back, recents, home, and screenshot gestures. I could somewhat see the appeal of using the S Pen as a remote for the Camera or Gallery, but the use case for the new air

actions is extremely limited.

And that's if you can get them to work. While I was able to complete the handy tutorial that forces you practice each of the new gestures, getting them to work while using the phone wasn't so



The camera bump on the Note20 Ultra is very bumpy.

simple. I often triggered the wrong gesture or none at all.

I struggled to find a reason to use them. Even when I was using the S Pen, it was just as easy to tap the phone than wave my hand to go back a screen or switch apps.

The new S Pen is joined by a new version of One UI (2.5) that brings minor camera and interface tweaks, as Samsung continues to refine one of the best Android skins this side of the Pixel. Samsung has specifically designed One UI to be friendlier to giant phones. The menus, navigation, and layout all make the Note20 a little easier to handle. You'll still need two hands, but One UI is a pleasure to use.

A MORE RESERVED, MORE REFINED CAMERA

The Galaxy Note20 Ultra has a camera system rivalling that of any smartphone out there, but it's not quite as extravagant as the S20 Ultra's. That's a



The Note20 Ultra is impressively thin at 8.1mm, but the camera bump adds some girth.

good thing. The 100X Space Zoom that was plastered across the camera array on the S20 Ultra has been lowered to 50X, and the DepthVision lens has been replaced by laser autofocus.

Both changes serve the Note20 Ultra well. While the 108Mp lens is still largely unnecessary – I couldn't tell the difference between 108Mp pictures and 12Mp 'binned' images – the Note20 Ultra is definitely Samsung's best smartphone camera. It's no coincidence that it's also the least gimmicky, eschewing features like Dual Exposure on the Note 9 for the things that matter: improved night mode, lightning-fast focus and realistic zoom.



The Galaxy Note20 Ultra has impressive zoom, seen here (clockwise from top left) at 1X, 10X, 30X and 50X.

The zoom has its limits. When pushed to 50X, the Note20 Ultra still produces noisy shots. Drop to 30X and they're usable, but 10X yields the best results. If I were in charge of the Note 30's camera, in fact, I'd make 30X the upper limit and work on perfecting it. Samsung's zoom

Note.

However, at times it works a little too well. When the foreground is similar to what's behind it, the Note20 occasionally locked onto the wrong part of the picture. Other cameras were smarter. When it got it right, photos often had

is its biggest advantage over Google and Apple (for now). Even with fewer megapixels in its telephoto lens (12Mp vs 48Mp on the S20 Ultra), the Note20 Ultra takes better zoom shots.

The other big improvement is with autofocus. Focusing was an issue with the S20 Ultra that has never been satisfactorily resolved. For the new generation, Samsung added a laser autofocus sensor to the Note20 Ultra. It makes a huge difference over the S20 Ultra and is a far more useful fourth lens than a macro or depth one. I've never used a phone that focused this quickly without needing to tap the screen, and it helps all aspects of the



The Note20 Ultra's laser zoom is so fast and precise, the centre of subjects are often too in focus, leaving blurry edges.

an aggressive bokeh effect even without using Live Focus. In the photo of the flower above, for example, the back petals are out of focus. The same shot with the Pixel 4a has everything in focus.

Night mode also improves on the Note20 Ultra, pulling it close to equal footing with the iPhone 11 and Pixel 4. Shadows and lowlights aren't blown out as they are on other Galaxy phones. Pictures have less noise than on the S20 Ultra. It's a great improvement and puts

the Note20 Ultra on firm footing with the night mode champ. Hands down, the Galaxy Note20 Ultra is Samsung's best camera phone. You'll still get a



Even without a dedicated time-of-flight sensor, the Note20 Ultra (left) takes portraits that are as crisp as the S20 Ultra's.



The Note20 Ultra (left) takes sharper, more balanced, and less over-exposed photos in Night mode compared to the S20 Ultra. (It was very dark when I took these shots.)

healthy serving of Samsung's trademark oversaturation, and the app is still a bit more confusing than it should be. But more often than not, you're going to take your phone out of your pocket and snap a great picture with very little fuss,

whether you're far away or shrouded in darkness.

VERDICT

Nothing I write here is going to convince you about a Note20 Ultra either way. If you have £1,179 to spend on a phone and want the very best of Android, you've probably already decided to order one. And if you're a Note lover, it's likely already on the way. For everyone else, however, it's a tough sell. It's undeniably the best phone you can buy, but it's also probably more screen and power than most people need. No matter how you slice it, £1,179 is a lot of money to pay for a phone, even one as beautiful as the Note20 Ultra. **Michael Simon**

SPECIFICATIONS

- 6.9in (3,088x1,440; 496ppi) Dynamic AMOLED 2X capacitive touchscreen
- Android 10, One UI 2.5
- Exynos 990 (7nm+) processor

- Octa-core (2x 2.73GHz Mongoose M5, 2x 2.5GHz Cortex-A76, 4x 2GHz Cortex-A55) CPU
- Mali-G77 MP11 GPU
- 8GB RAM
- 256GB/512GB storage
- Three rear-facing cameras: 108Mp, f/1.8, 26mm (wide), 1/1.33in, 0.8 μ m, PDAF, Laser AF, OIS; 12Mp, f/3.0, 120mm (periscope telephoto), 1.0 μ m, PDAF, OIS, 5x optical zoom, 50x hybrid zoom; 12Mp, f/2.2, 120-degree, 13mm (ultra-wide), 1/2.55in, 1.4 μ m
- Selfie camera: 10Mp, f/2.2, 26mm (wide), 1/3.2in, 1.22 μ m, Dual Pixel PDAF
- 802.11a/b/g/n/ac/6 Wi-Fi dual-band
- Bluetooth 5.0, A2DP, LE, aptX
- GPS with A-GPS, GLONASS, BDS, GALILEO
- NFC
- USB 3.2, Type-C 1.0 reversible connector, USB On-The-Go
- Fingerprint scanner (under display, ultrasonic)
- Non-removable 4,500mAh lithium-polymer battery
- 164.8x77.2x8.1mm
- 208g



Four reasons to buy a Samsung Galaxy Note20, and four reasons not to

Newer isn't necessarily better. **MICHAEL SIMON** reports

You might think the new £849 Galaxy Note20 and £899 Galaxy S20 are two peas in the same pod as 'affordable' counterparts to their high-priced Ultra siblings. They're not.

While the Galaxy S20 is basically a smaller version of the S20 Ultra, with the same chip, RAM, and screen tech as its pricier sibling, the Galaxy Note20 shares very little with the Note20 Ultra.

Samsung has set the cheaper Galaxy Note20 apart from both the Note20 Ultra and the Galaxy S20 Ultra with a number of changes, many of which might make buyers think twice about buying one. Here's why your £849 might be better spent on the slightly older Galaxy S20 – or not.

1. THE NOTE20'S PROCESSOR IS FASTER THAN THE S20'S...

Samsung has opted to outfit the Galaxy Note20 with the Exynos 990 processor, which brings a 10-per cent boost in speed and graphics. Whether that translates into a performance boost that you can feel is another story, but anyone who buys a Note20 will have the best chip Samsung ever shipped.

...BUT THE GALAXY NOTE20 HAS LESS RAM

Like the Galaxy S20, the Galaxy Note20 Ultra is loaded with 12GB of speedy LPDDR5 RAM, but that's not the case for the Galaxy Note20. The 'cheaper' Note20 has 8GB of RAM only, so you won't be able to keep as many apps open at one time or lock any of them to the RAM for instant loading. Granted, 8GB is plenty for a phone – and the Ultra still has 12GB of RAM – but if you're paying the same price, you'd expect the same RAM.



The Note20 (right) is just a little smaller than the Note20 Ultra but it's missing a lot of features.

2. THE GALAXY NOTE20 HAS A NEW SPEEDY S PEN STYLUS...

The main reason for the existence of the Note line is its on-board S Pen stylus, and Samsung has made it even better on the Galaxy Note20. Latency has been reduced all the way down to 9ms, so writing will feel as natural as an actual pen, and it has a whole assortment of new tricks, including air gestures, PDF annotation in Notes, and enhanced handwriting recognition.

...BUT YOU CAN'T EXPAND THE GALAXY NOTE20'S STORAGE

The Galaxy Note line is generally synonymous with power users and



The new Notes app gives the Note20's S Pen super writing and drawing powers.

productivity, but the Note20 is missing several high-end features, including an expandable memory slot. While all models of the Galaxy S20 can expand their storage up to a terabyte with a microSD card, you're stuck with 256GB of fixed storage with the Note20.

3. YOU CAN WIRELESSLY CONNECT THE NOTE20 TO AN EXTERNAL SCREEN...

DeX has been one of the more underrated features of Samsung's premium Galaxy phones, letting you turn your phone into a mini PC with mouse and keyboard support, and bona fide desktop experience. What started as

a full dock turned into a charging pad, then a cable, and now you don't need any extra equipment at all. If you have a TV or monitor with Miracast support you can beam your Galaxy Note20 to it with just a tap.

...BUT THE NOTE20'S SCREEN IS SLOWER THAN THE S20'S

The Galaxy S20 was Samsung's first 120Hz phone, and we naturally

assumed it would also come to the Galaxy Note20. We were wrong. While the higher-priced Note20 Ultra has a fast 120Hz screen, the cheaper Note20 has the old 60Hz one. And while it's a good deal larger than the S20 (6.7 inches versus 6.2 inches), it also has a lower resolution.

4. THE GALAXY NOTE20 HAS A BIG BATTERY...

The Galaxy Note20 has a 6.7in display and 5G on board, so it's going to need a big battery to make it through the day. Samsung has fitted the Note20 with a 4,300mAh battery, about 10 per cent bigger than the 4,000mAh



You can beam your Note20 to a larger screen.

battery inside the Galaxy S20. That might not seem like much, but with fewer pixels and a 60Hz screen, the Galaxy Note20 could be one of Samsung's longest-lasting flagships in years.



The Galaxy S20 has the exact same camera as the Note20 – and a very similar bump.

...BUT THE EXACT SAME CAMERA AS THE GALAXY S20

While Samsung has added laser autofocus and refined the Space Zoom system on the Galaxy Note20 Ultra, the camera on the Galaxy Note20 is identical to the one on the S20 released in March:

Camera 1: 12Mp ultra-wide (120 degrees), f/2.2

Camera 2: 12Mp wide, f/1.8, OIS

Camera 3: 64Mp telephoto, f/2.0

Not that there's anything wrong with that. The Galaxy S20 has one of the best

cameras this side of the iPhone 11 Pro, so the Galaxy Note20 will take fantastic photos with very little effort. Still, it would have been nice to get a new feature or two.



The Samsung Galaxy Note20 is the right phone at the very wrong price

No glass, no 120Hz refresh for £849? No thanks. **MICHAEL SIMON** reports

If you don't want to spend £1,179 on the Galaxy Note20 Ultra, Samsung has a more affordable option for you: the Galaxy Note20. Like last year's Note10, the Note20 is a less-loaded handset, meant to bring the Note experience to a less-demanding crowd that still wants all the productivity benefits provided by the S pen. It could have been one of the best

phones of the year. Samsung has made all the right moves with the Note20, prioritizing a big screen, top-of-the-line processor, 5G modem and excellent camera. Looking at the spec sheet, I'd expect the Note20 to cost about £650. This would make the Note20 one of the best premium Android values this side of the £549 OnePlus 7T.

The only problem is it costs £200 more than that – a full £849 – and it's incredibly hard to justify the price. Unlike the Galaxy S20, which brings the same premium performance and speedy display as the higher-priced S20 Ultra, the Note20 cuts more corners than a kindergartener with a fresh pair of safety scissors.

Take the display. While it might seem like a slightly smaller version of the Note20 Ultra, the screen specs are far inferior to those of the flagship Note:

Galaxy Note20: 6.7in (2,400x1,080; 393ppi) Super AMOLED Plus capacitive touchscreen

Galaxy Note20 Ultra: 6.9in (3,088x1,440; 496ppi) Dynamic AMOLED 2x capacitive touchscreen

Now compare it to the Galaxy S20, which costs the same as the Note20:

Galaxy S20: 6.2in (3,200x1,440; 563ppi) Dynamic AMOLED 2x capacitive touchscreen



The Note20 looks like a glass phone, but it's made of plastic.

So while the Note20 offers an extra half-inch of diagonal screen size, you're losing a lot in resolution and refresh rate. You're also giving up the curved edge, though, depending on your preference, that might be a benefit. So why would anyone choose this phone over an S20 for the same price?

The deficiencies continue. You'll also get 4GB less RAM (8GB versus 12GB), no expandable memory slot, a heavier weight (192g versus 163g), the same camera and only a slightly bigger battery (4,300mAh versus 4,000mAh) for slightly less than the £899 Samsung charges for the S20. All that, and the back is made of 'reinforced polycarbonate', instead of the glass that every other flagship phone has.



The Note10 Lite has a lot in common with the Note20, except at £529 it costs hundreds of pounds less.

LITE BUT LUXURY

It didn't have to be this way. Earlier this year, Samsung introduced the Note10 Lite, with many of the same specs as the Note20, for £529. It has the same 6.7in display, 8GB of RAM and 128GB of storage, along with a larger battery (4,500mAh) and a higher-resolution front camera. And of course, because it's a Note, it comes with the S Pen on board.

Samsung fans will point out that the Note10 Lite doesn't have the Note20's 5G or Exynos 990. But those two components should make the Note20 about £150 more expensive, not over £300. At £849, the Note20's just not worth it, especially following the launch

of the laudable (if late) Google Pixel 4a (see page 73).

It's a shame because there's nothing wrong with the Note20. The move to a plastic back, a flat screen, even lower resolution, are all acceptable trade-offs to bring down

the price – if Samsung had actually brought down the price.

Instead, it's hard to see who would buy the Note20. Hardcore Note fans will surely gravitate toward the Note20 Ultra, Samsung fans will likely opt for the S10+, and budget-minded users will look to the A51 or A71, all of which come with 5G modems. That leaves the £849 Note20 without an audience other than the uninformed buyer who wanders into a carrier store with a pocketful of cash.



Samsung's incredibly powerful Note20 Ultra doesn't need to exist

Keep the S Pen, leave the phone. **MICHAEL SIMON** reports

The Galaxy Note20 Ultra is without a doubt the best phone Samsung has ever made. It's loaded with the specs and features that Android enthusiasts and Note loyalists want

and need, and can take on any and all contenders, including the upcoming iPhone 12 Pro Max. There really isn't a thing I'd change about it. And yet, I'm finding a hard time justifying its

existence. As the designs, performance, and features for Samsung's two flagship lines continue to blur, the difference between the flagship Galaxy Note and Galaxy S phones has become little more than the S Pen. Take a look at the specs for the two phones:

Galaxy S20 Ultra

Dimensions: 166.9x76.x8.8mm

Display: 6.9in (3,200x1,440; 496ppi)

Dynamic AMOLED 2X capacitive touchscreen

Processor: Exynos 990

RAM: 12GB LPDDR5

Storage: 128GB/512GB

Front camera: 40Mp, f/2.2, 26mm (wide), 0.7µm, PDAF

Rear camera: 108Mp, f/1.8, 26mm (wide), 1/1.33in, 0.8µm, PDAF, OIS; 48Mp, f/3.5, 103mm (periscope telephoto), 1/2.0in, 0.8µm, PDAF, OIS, 4x optical zoom, 10x hybrid zoom; 12Mp, f/2.2, 13mm (ultra-wide), 1.4µm, Super Steady video

Battery: 5,000mAh

Galaxy Note20 Ultra

Dimensions: 164.8x77.2x8.1mm

Display: 6.9in (3,088x1,440, 120Hz; 511ppi) Dynamic AMOLED 2X capacitive touchscreen

Processor: Exynos 990

RAM: 12GB LPDDR5

Storage: 256GB/512GB

Front camera: 10Mp, f/2.2, 26mm (wide), 1/3.2in, 1.22µm, Dual Pixel PDAF

Rear camera: 108Mp, f/1.8, 26mm (wide), 1/1.33in, 0.8µm, PDAF, Laser AF, OIS; 12Mp, f/3.0, 120mm (periscope telephoto), 1.0µm, PDAF, OIS, 5x optical zoom, 50x hybrid zoom; 12Mp, f/2.2, 120 degree, 13mm (ultra-wide), 1/2.55in, 1.4µm

Battery: 4,500mAh

Those are extremely similar phones. So much so, in fact, that I don't even understand why the Galaxy S20 Ultra costs more than the Galaxy Note20 Ultra. You're getting a higher-resolution telephoto lens with twice as much Space Zoom (100x versus 50x), a bit more battery and a few more pixels, but basically the phones are identical aside from their shape. Inadvertent or not, Samsung pitted them as direct competitors and made the decision to buy one over the other extremely difficult in the process.

So why does the Galaxy Note20 Ultra need to exist? Purists will point to the S Pen, of course, and Samsung has certainly leaned into its mighty stylus as the Note has matured. After gaining Bluetooth last year and Air Actions for remote control of apps, this year's S Pen doubles down on its capabilities with



The note Galaxy Note20 Ultra (right) looks fantastic, but it's somewhat redundant at this point.

navigation controls and gestures for common tasks such as back, forward, home, and recents. More importantly, the S Pen's latency has also been dramatically reduced to 9ms, which matches the phenomenal Apple Pencil.

True to its name, Samsung's Notes app has been given an overdue upgrade as well to take advantage of the new phone's capabilities, finally adding live sync, as well as improved handwriting recognition and the ability to annotate notes with recorded audio. You can also import and mark up PDFs, and there's also a new folder structure to make it easier to find and organize things. And DeX users can wirelessly connect to an

external monitor, so you don't need a USB-C-to-HDMI cable.

The Galaxy Note20 Ultra also has a new ultra wideband (UWB) chip to boost the capabilities of Nearby Share. All you'll need to do to share a file is point your Note20 Ultra at other UWB equipped Galaxy devices to automatically get a list of recipients. It could also one day function

as a digital key like Apple's U1 chip in the iPhone 11.

Don't get me wrong, those are some truly excellent features. But continuing to separate its two most expensive phones mainly on the basis of a stylus is silly. Where's wireless DeX in the Galaxy S20? Or the UWB chip? And why not let Galaxy S owners take advantage of the S Pen too? Even if it's an optional accessory like the Apple Pencil, I'm sure plenty of Galaxy S20 users would jump at the chance to buy an S Pen – which Samsung sells for a very reasonable £25 – even if they needed to carry it separately or buy a special case to attach it.

FEATURE DROP, SAMSUNG STYLE

Two separate lines just aren't necessary anymore. There's too much redundancy, too much confusion and too much of a feeling that Samsung is purposefully elevating some features and holding back others to keep the lines as separate as possible. But even without an S Pen, the Galaxy S20 is as much of a productivity phone as the Galaxy Note20, and there's nothing the S20 can do that the Note20 can't.

At this point, the Galaxy Note20 feels like a throwback to a different era. There's a reason why barely any other phones have styli – they're just not all that useful. As screens have gotten bigger and faster, the need for

fine control has become less necessary. Seriously, who is actually using their S Pen as a remote control more than very occasionally, if that?

Samsung has a chance to truly break not just its own smartphone mould but also set a new tone for premium smartphones. Instead of forcing two launches every year, Samsung could launch one phone with the best parts of both and focus on improving it as the year goes on. Google has started doing quarterly feature drops to keep its Pixel phones fresh, and Samsung could easily do the same to spur sales leading into the holidays.

Maybe the Galaxy S20 even gets a better processor after six months, some new features, a lower price – anything to keep it fresh. Samsung could hold an Unpacked and everything to drum up hype and headlines, while simultaneously extending the life of the Galaxy S and keeping its most loyal fans happy. And it might just remove its biggest competitor in the process.



The Note20 Ultra has a lot of great features, but there's no reason they can't come to the Galaxy S – pen and all.



Samsung's Galaxy Z Fold2 is vastly improved, but now it needs a purpose

Folding still needs to find its focus. **MICHAEL SIMON** reports

The follow-up to the Galaxy Fold is such a departure from the original beleaguered model that Samsung gave it a new name. The Galaxy Z Fold2 would seem to fix much of what was wrong with the original Fold, bringing

bigger outside and inside screens, better cameras and a smarter design with a stronger screen and sturdier hinge.

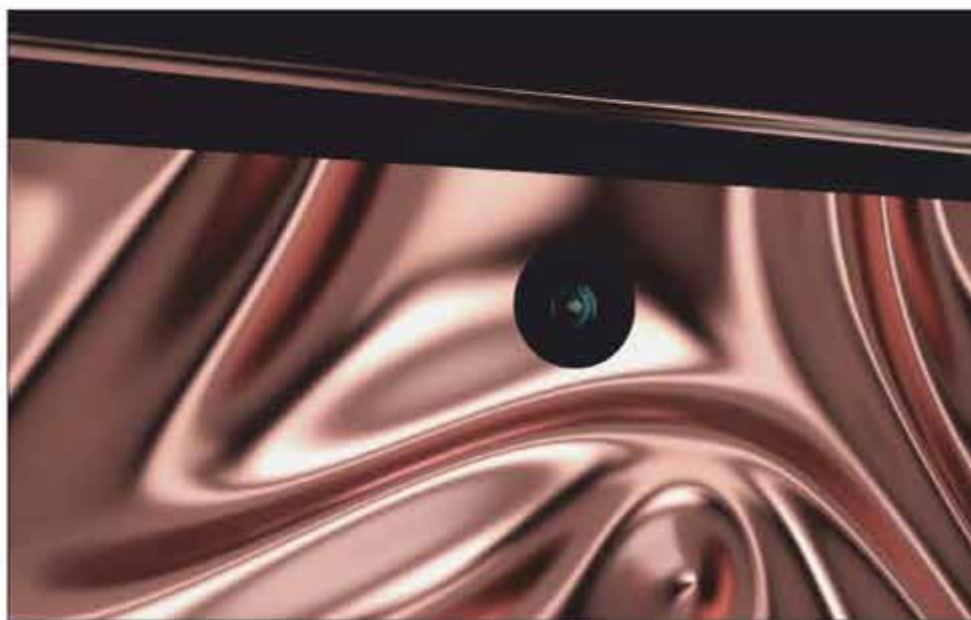
Whether that fits into 'the new normal' Samsung is selling with the Galaxy Note20 is another story. While

Samsung continuously stressed during Unpacked how its line-up of new 'power devices' are built for the new way of doing things remotely, the original Galaxy Fold doesn't really fit that mould. It's a device for traveling light and convenient, and, let's face it, to be seen by others.

Even for those able to afford the Fold, it's primarily an on-the-go, look-at-me device. The primary selling point is carrying a tablet that can fold down into the size of a phone, but with millions of people no longer commuting, that use case isn't nearly as compelling. Fewer people are spending money on new phones, let alone cutting-edge folding phones, and a flagship handset that won't live up to its full potential is a tough sell.

And that's even if it didn't cost a couple of thousand pounds. It's possible Samsung will lower the price to a more palatable level, but that's doubtful. The rest of the Unpacked devices aren't exactly priced to move, so Samsung's 'new normal' doesn't take shrinking budgets into account. The Note20 Ultra starts at £849, the Galaxy Tab S7+ starts at £799, and the Galaxy Watch3 will set you back at least £419. So I don't expect the Z Fold2 to bring any surprises with its price. If anything, it might cost more.

But the new Fold isn't about value. It represents the pinnacle of Samsung's innovation and its attention and hype are certainly deserved. The improvement over the original model are striking, with the removal of the ugly notch, the introduction of ultra-thin glass, and the



The Z Fold2 has ditched the ugly notch for a hole-punch camera.

addition of a 6.2in cover screen that's two inches bigger than the original and as large as the Galaxy S20. It opens to an even bigger 7.6in display (up from 7.3 inches); has a stronger hinge for finer adjustments; better dust protection for fewer unsightly bumps;



The Galaxy Z Fold2 has a giant 6.2in cover screen that's just as big as the Galaxy S20.

and an overall cleaner aesthetic, while retaining the character of the original.

We'll need to learn more about the specs, but based on what we know, Samsung has made needed and substantial improvements to the Fold and raised the bar for its competitors. Even with its botched roll-out and questionable durability, the original Fold offered the most promise for a foldable phone and the Z Fold2 continues in that vein with a smart sequel. Folding phones all have their flaws, but the Galaxy Fold is already head and shoulders above its closest competitors from Huawei and Motorola. Folding phones might not have the

wow factor that they did last year, but the Z Fold2 creates a solid foundation to build on. Assuming the glass holds up and the hinge does its job as well as the Z Flip that launched earlier this year, the Z Fold2 could run off to an insurmountable lead heading

into 2021, when the price will hopefully start to come down to something more reasonable.

Now Samsung just needs to give us a reason to buy one.



The Samsung Galaxy Tab S7+ delivers iPad Pro-level hardware

Great hardware can't overcome Android's flaws. **MICHAEL SIMON** reports

The Galaxy Tab might be a distant second to the iPad when it comes to tablet market share, but Samsung is hardly ready to concede the crown. Its newest tablet, the S7+, isn't just its best and biggest, but it's easily

the closest you're going to get to an iPad Pro without shopping in an Apple Store.

Samsung's Galaxy S tablets have always showcased the latest tech and specs, and the S7+ is no different. It offers the Snapdragon 865+ processor,

up to 8GB of RAM and 512GB of storage, a giant 10,090mAh battery, and 5G support.

But what gives the S7 its 'plus' designation isn't the specs, rather it's the 12.4in screen, the biggest in a Samsung-made Android tablet since the 18.4in Galaxy View. That's about

two inches bigger than the 10.5in Tab S6 and gives Samsung a true competitor for the 12.9in iPad Pro.

And what a screen it is. Samsung has been using OLED displays in its tablets for years, but the one in the S7+ is far and away its best. It's impressively bright and vibrant, with a 2,800x1,752 resolution. Samsung's first 120Hz refresh rate in a screen this big looks incredible and feels as smooth as silk. It's especially great with the S Pen, which now has a 9ms latency to match that of the Apple Pencil.

Writing feels as smooth as if you're writing on a piece of paper with a ballpoint pen, and the stylus is remarkably light compared to the Apple Pencil. It's also included in the box rather



The Galaxy Tab S7+ is built as well as an iPad Pro

than a £119 add-on. You'll want to get at least a Book Cover (£74) for the back, which provides a nice holder for the S-Pen. Otherwise, it will surely fall off its perch on the rear of the Tab S7+.

You could also opt for the Keyboard Cover for an extra \$230 (currently unavailable in the UK), and it comes highly recommended if you're going to do anything other than watch movies. At 12.4 inches, the Tab S7+ is a bit unwieldy, even if it is shorter (285x185x5.7mm versus 280.6x14.9x5.9mm) and lighter (575g versus 643g) than the iPad Pro. The keyboard isn't nearly as sturdy as the iPad Pro's Magic Keyboard – I struggled a bit to line up the magnetic backplate so the S Pen fits in its slot – but it makes

whatever you're doing on the Tab S7+ much more ergonomically feasible.

The keyboard includes a row of 16 intuitive function keys that brings a bit of PC functionality to the Tab S7+ and includes volume, brightness, and navigation controls. It's useful – though being able to use the secondary keys without holding 'Function' is a sorely needed toggle – but it also makes the trackpad a bit smaller than it is on the Tab S6's keyboard. I'd prefer backlighting, but the keys have a nice springiness to them, and typing is a pleasure.

There's no denying that Samsung has taken some inspiration from the iPad Pro, but the Tab S7+ is great in its own right. The AKG speakers are fantastic,

the camera is properly positioned on the landscape side, and the build quality is beyond reproach. I wouldn't mind a second USB-C port and maybe a Galaxy Fold-style fingerprint scanner built into the power button (Samsung's virtual in-display scanners aren't nearly as reliable), but otherwise there isn't much I would change about the Tab S7+.

SOFTWARE IS ANOTHER STORY

While the hardware gets an A+, however, the software and app support severely drag down the overall grade. Much of it is out of Samsung's hands – Android's UI and app support for tablets is woefully bad – but even when you stick with the stock Samsung apps, the S7+ experience just doesn't feel as natural as it does on

the iPad. iPadOS certainly has its issues, but using One UI 2.5 on the Tab S7+ feels like a stretched phone interface rather than a dedicated tablet one.

Take the new Notes app. While it's definitely one of the highlights of One UI 2.5, the interface still



The display is simply gorgeous, but you'll want to get a keyboard.



DeX on the Galaxy Tab S7+ turns Android into a Windows rip-off.

The unit I tested is a pre-production model, so some wrinkles will likely be ironed out. But the overall problems will remain: Android on tablets isn't great, and no level of hardware design will fix that.

The Galaxy Tab S7+ is the best tablet I've

feels like it was made for the vertical Note20 rather than the widescreen Tab S7+. Menus open in new windows rather than dropping down, the organizational sidebar is a permanent part of the home screen, and notes have black space on the sides that could be used for attachments or tools.

Where the Tab S7+ could set itself apart from the iPad and the rest of the field is with DeX. It's a separate environment accessible only when the keyboard or an external display is attached, and it turns your Android tablet into something of a Chromebook. There's a dock and PC-style controls, and windows are floating and resizeable, but even after several years of development, it's still very much a work in progress.

used aside from the iPad Pro. It's too bad Samsung can't just load it up with ChromeOS before it ships.



Samsung's Android update guarantee might be better than Google's

Get Pixel peace of mind with your Galaxy. **MICHAEL SIMON** reports

If steady updates are your priority when choosing which Android phone to buy, you basically have one option: the Google Pixel. Google famously promises three years of Android version and security updates with all Pixel purchases,

which is at least a year more than any other Android phone maker. Now Samsung is stepping up to change that.

As part of its Unpacked announcements that brought the Galaxy Note20 and Galaxy S20

Ultra, Samsung announced that its new phones will receive OS updates for “up to three generations”, including the “latest features” and “latest security”. That’s a huge commitment over the two generations it previously promises and excellent peace of mind for anyone buying a new Galaxy phone.

Samsung said that the guarantee applies to all “[Galaxy] S, N[ote] and Z series devices starting with the S10”. That unfortunately means its biggest sellers, the mid-range and budget Galaxy A phones, won’t get the same promise due to their slower processors. Samsung promises to support those phones “until hardware allows”.

Samsung clarified to our colleagues at PCWorld that its use of the term “generations” applies to “generations of Android” – in other words, Android 10, 11 and 12, and not Samsung’s One UI schedule. So that guarantee could actually be better than an annual promise since it isn’t dependent on when you buy the phone. Whether you buy a Galaxy Note20 today or next June, you’ll still get Android 13 in when it arrives, whenever that may be.

With the pandemic messing with development schedules, it’s possible that Android gets pushed back by weeks or months, which could cause issues with Google’s three-year guarantee. The

Android 11 preview period has already been delayed by a month, though it’s unclear whether that will affect the public release this autumn.

For example, if Android 13 releases in December 2022, someone who bought a Pixel 4 in March 2020 might not get it, but a Galaxy S20 owner will, even if they buy their phone today. That’s an excellent way to handle a world that’s very much in flux, giving Galaxy buyers confidence that their phones will stay fresh for years to come – or at least until they’re ready to trade it in for a new one.

Samsung didn’t say whether it will be pushing those updates quicker, but all signs point to yes, it will. Security updates for the Galaxy S20 have arrived incredibly quickly – in some cases arriving before the Pixel 4 – and just today it launched a beta for One UI 3 based on Android 11. So if you’re thinking of buying a new Galaxy Note20, there’s one less thing to worry about.



Microsoft Surface Book 3

Price: £2,699 (inc VAT) from fave.co/3aZg92L



The Surface Book 3 continues Microsoft's five-year mission to create the 'ultimate laptop', still uniquely melding a tablet and keyboard base that can be used to create, work, and game. But the goal is harder to achieve in 2020 than ever before.

At £1,599 up to £2,899, the Surface Book 3 is pricey. Worse, it offers little improvement over a new and very strong generation of dedicated laptops, from gaming machines with Nvidia's latest RTX hardware to consumer devices optimized for extreme battery life and connectivity.



Microsoft's 13.5in Surface Book 2 (left) versus the 15in Surface Book 3 (right).

Even Microsoft's own Surface Pro 7 provides a superior tablet experience to the Surface Book 3's.

It's a fantastic product for the do-it-all niche it serves. It's just that as laptops around it continue to evolve and improve, its niche continues to shrink. Here we look at the £2,699 15in model.

PRICES

Microsoft's Surface Book 3 product line is available in two sizes: 13.5in and 15in. The Surface Book 3 will ship with Windows 10 Home, a somewhat odd choice for a laptop priced like a mobile workstation. A separate version, the Surface Book 3 for Business, will ship with Windows 10 Pro.

What follows are the prices, and then the detailed specs, of both models.

13.5in

£1,599: Core i5-1035G7, 8GB RAM, 256GB SSD, Iris Plus

£1,999: Core i7-1065G7, 16GB RAM, 256GB SSD, GeForce GTX 1650 (Max-Q)

£2,449: Core i7-1065G7, 32GB RAM, 512GB SSD, GeForce GTX 1650 (Max-Q)

£2,699: Core i7-1065G7, 32GB RAM, 1TB SSD, GeForce GTX 1650 (Max-Q)

15in

£2,199: Core i7-1065G7, 16GB RAM, 256GB SSD, GeForce GTX 1660Ti (Max-Q)

£2,699: Core i7-1065G7, 32GB RAM, 512GB SSD, GeForce GTX 1660Ti (Max-Q)

£2,899: Core i7-1065G7, 16GB RAM, 1TB SSD, GeForce GTX 1660Ti (Max-Q)

SPECIFICATIONS & FEATURES

As you can see from the specs below, we were given the 15in Surface Book 3 with the Nvidia GeForce GTX 1660 Ti (Max-Q) GPU option for review. The Quadro RTX is the best choice if the Surface Book 3 is to be used as a mobile workstation. The RTX hardware supports real-time ray tracing (and Microsoft's gorgeous Minecraft RTX beta). But the GeForce GTX 1660 Ti should be an excellent choice for a consumer lifestyle.

Display: 13.5in (3,000x2,000, 267ppi) PixelSense 10-point touch; 15in (3,240x2,160, 260ppi) PixelSense 10-point touch (as tested)

Processor: (13.5in) Core i5-1035G7, Core i7-1065G7; (15in) Core i7-1065G7 (as tested)

Graphics: (13.5in) Iris Plus, Nvidia GeForce GTX 1650 (Max-Q) with 4GB GDDR5; (15in) Nvidia GeForce GTX 1660 Ti (Max-Q) w/6GB GDDR6 (as tested), Nvidia Quadro RTX 3000 (Max-Q) with 6GB GDDR6

Memory: (13.5in) 8GB, 16GB, or 32GB 3733MHz LPDDR4x; (15in) 16GB or 32GB 3733MHz

LPDDR4x (as tested)

Storage: (13.5in) 256GB, 512GB, or 1TB PCIe SSD; (15in) 256GB, 512GB (as tested) or 1TB

Ports: 2 Surface Connect, 2 USB-A, 1, USB-C, SDXC, headphone jack

Camera: User-facing: 5Mp, 1080p (Windows Hello); Rear: 8Mp, 1080p

Battery: Tablet: 22.2Wh; Base: 59.7Wh; Total: 81.9Wh

Wireless: 802.11 ax (Wi-Fi 6); Bluetooth 5.0; Xbox Wireless (15in only)

Operating system: Windows 10 Home (as tested), Windows 10 Pro

Dimensions: 13.5in Core i5 312 x232x13-23mm; 13.5in Core i7 312 x232x15-23mm; 15in Core i7 343 x251x15-23mm

Weight: 13.5in Core i5 (including



A pair of USB Type A ports and a full-sized SD card slot are on the left side of the Surface Book 3. You can see part of the tablet venting, running up the side of the display.



The 15in Surface Book 3 tablet feels massive in the hand.

keyboard) 1.534kg; i 13.5in Core i7 (including keyboard) 1.642kg; 15in Core i7 is 1.905kg

Colour: Silver

Price: Starting at £1,599; as tested £2,699

DESIGN AND DISPLAY

The Surface Book's unique design continues with version 3: It folds like a traditional clamshell laptop, or the display detaches to be used as a tablet. The Surface Book 3 reclines a bit less than other laptops do, about 50 degrees off of the horizontal.

You can even mount the tablet backward in 'presentation mode' for others to view your screen. Microsoft says it's sped up detachment time to

a second or two. The tablet will reattach itself if you don't remove it, I noticed. The beautiful PixelSense touch display is as good as ever. It produced 496 nits of luminosity by our measurement, twice what we consider comfortable for indoor work. Both 'enhanced' and 'sRGB' modes are available for colour fidelity in design work.

The ability to detach the display is the Surface Book 3's most distinctive feature, but not its best. Both the 13.5in and the 15in Surface Book 3 tablets are uncomfortably awkward to hold. Because they lack the kickstand of a Surface Pro 7, they're good for just one thing: drawing, using a Surface Pen or Surface Dial (neither included). Propping it up to watch Netflix simply isn't as effective as with a Surface Pro or Surface Go. The Surface Book 3 really works best as a traditional clamshell PC.

The Surface Book 3's price suggests a powerful Intel H-class Core chip might be inside, but because the CPU is mounted behind the display, the excellent Ice Lake U-series chips are used instead. The discrete GPU (if there is one)



The Surface Book 3 allows me to detach the tablet, reverse it, re-dock it and use my external keyboard instead of the base. Why would I do this with such an excellent keyboard? Because, as a lefty, I prefer gaming on a keyboard with a number pad, which the Surface Book 3 lacks.

resides in the base. The Surface Book 3's memory, however, has been substantially upgraded from the prior generation, from 1,866MHz DDR3 to the current 3,733MHz LPDDR4.

Microsoft's claim that the Surface Book 3 includes its "fastest SSD ever" applies only to the 1TB and 2TB SSDs in the most expensive versions. Our review unit's fast 512GB Toshiba SSD (the

same used in the 'Ice Lake' version of the Surface Laptop 3) sufficed for documents and a few games.

The Surface Book 3's trademark accordion hinge. It doesn't fold flat, probably irritating some. The USB-C port (left) and Surface Connect port (right) are also seen here.

The Surface Book 3's connectivity is frustratingly limited

to a single USB-C with no Thunderbolt support, the same as in the Surface Book



The Surface Book 3's trademark accordion hinge. It doesn't fold flat, probably irritating some. The USB-C port (left) and Surface Connect port (right) are also seen here.

2. Power and I/O are mostly handled by the two legacy Surface Connect ports, only one of which is exposed to the user while the tablet is docked. A pair of USB Type-A ports support legacy hardware.

COOLING

Microsoft uses a hybrid cooling solution: heat pipes within the tablet, and fans pushing heat out of vents within the base. To Microsoft's or Intel's credit (or both), the Surface Book's fans rarely turn on. When they do, they often push out little more than a gentle breeze – unless gaming or more intensive work is involved, when it heightens to a powerful whoosh. Part of that behaviour may be due to the default 'best battery' Windows power settings.

HAS MICROSOFT SOLVED THE SURFACE BOOK'S POWER PROBLEM?

Microsoft has apparently solved its inability to supply enough power to the Surface Book 2. (Because both the native charger as well as the Surface Dock couldn't deliver enough power, the Surface Book 2 was forced to run



The Surface Book 3 is surrounded by artfully concealed vents, both in the tablet section and along the base, as seen here.

down the battery – even while plugged in – to power the latest games and GPU-intensive apps.) Kicking up the Surface Book 3's supply voltage to 127 watts (and launching a new high-power Surface Dock 2, which we haven't tested) helps a lot. Gaming on the built-in display, plugged in, seems to work fine.

Unfortunately, if you're the type of person who prefers gaming on an external display, you have meagre choices. A sampling of USB-C hubs I had on hand allowed for only 30Hz output to an external 4K display – not really comfortable for gaming or productivity. The first-generation Surface Dock solves that particular display issue – it permits 4K/60 output as well as charging the Surface Book 3 if you're not tapping the discrete GPU. But as soon as you start

playing a game, the battery drains as the Surface Book 3 consumes its extra power. We'd expect the Surface Dock 2 to solve both of these issues, but it costs £260.

SURFACE BOOK 3: KEYBOARD, AUDIO AND WEBCAMS

Although you probably don't want to buy a £2,000 PC for the keyboard alone, I'm convinced that the Surface Book line-up offers the best of any laptop today. (Lenovo's ThinkPad keyboards, which also have a deserved reputation for quality, are a close second.)

The key travel is a luxurious 1.55mm (around 1.25mm is more common in the industry). Each key is firm and responsive. The slight air gap afforded by the Surface Book 3's accordion



The green LED means that the Surface Book 3 tablet is ready to detach.

hinge allows the keys to lie flush with the keyboard deck, versus sinking them into a slight depression as other laptops do. Both combine to offer the tactile illusion that your fingers are typing on a deeper keyboard.



The keyboard of the Microsoft Surface Book 3.

Microsoft still has the odd habit of changing up its function keys among its different Surface products. The keyboard backlight key is part of the F7 key on the Surface Pro line-up and F1 on the Surface Book. (You may want to use the lowest of the three



It's still a bit odd to see the Surface Book 3's rear-facing webcam tucked up into the corner.

backlighting settings, as the illumination is quite strong.)

Microsoft's glassy Precision trackpad is clickable almost to the top. The trackpad is spacious and affords generous palm rests on the corners of the Surface Book 3.

The audio experience differs along with the Surface Book 3 design. Laptops usually embed the speakers below the keyboard, so the sound bounces and resonates outward. Here, the speakers are mounted

behind the display, so the sound is broadcast directly at your face.

Overall, the Surface Book 3's audio experience is typical. The volume maximum is reasonable. The high end mashes together and becomes somewhat tinny. The bass is minimal. While the speakers are Dolby Atmos-enabled, there are apparently no controls provided to

adjust the audio balance, but I was able to download the Dolby Access app from the Microsoft Store.



The user-facing camera on the Surface Book 3.

Microsoft now includes a pair of far-field mics, probably more important for videoconferencing than for activating Cortana. The Surface Book 3 worked fine during my Zoom or Teams calls, so you should be able to set aside your headphones if you have access to a quiet workspace.

Microsoft includes its excellent webcams, front and rear, on the Surface Book 3. We experienced good clarity, colour and detail on the user-facing camera. (There's no sliding privacy shutter, though; here's why.) The rear camera is quite good, though it's a bit weird that it's offset into the corner.

There's another note of interest: the new Surface Book 3 also includes the new Chromium-based Edge browser. Microsoft is currently replacing the old 'legacy' Edge for the new version on all Windows 10 PCs via Windows Update.

PRODUCTIVITY PERFORMANCE

You should expect Microsoft's Surface Book 3 to perform admirably as a productivity machine, where its keyboard and display will really shine. In general, the Surface Book performed up to our expectations.

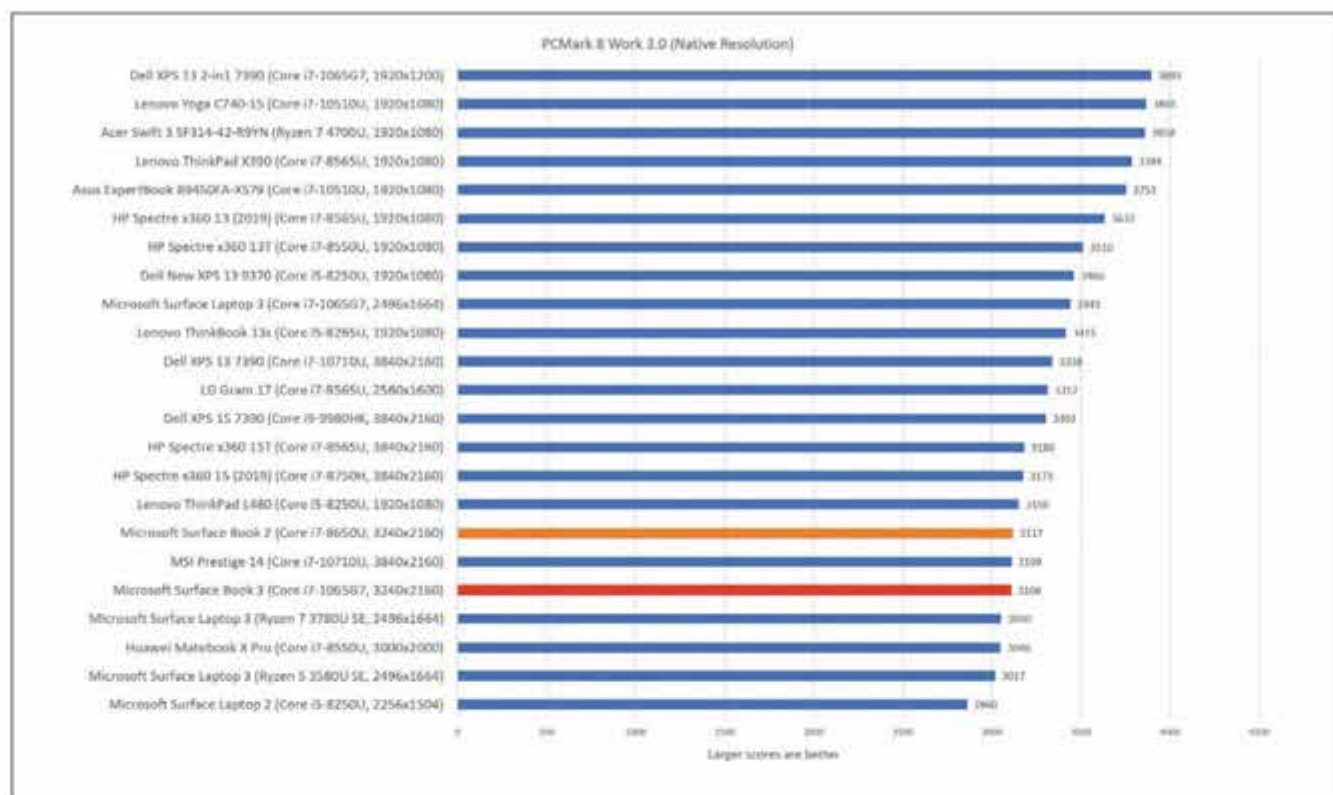
One odd bug we noticed was in playing back 4K videos at 60Hz over YouTube. (Typically, most video is



The Surface Book 3's CrystalDiskMark score for SSD performance. It's very good, and this isn't even the fastest SSD of the family.

encoded at 1080p at 30Hz. A 4K/60 video demands more bandwidth.) We loaded up a 4K/60 video of a walking tour of New York City's Times Square, with an ad blocker enabled and the video buffered. While the comparison Surface Pro 7 dropped frames intermittently (174 out of 10,037), the Surface Book 3 (with 32GB of memory and a discrete GPU) dropped 602 frames out of 10,019 – a constant drip-drip of about two frames dropped per every 30. We have queried Microsoft.

In our first series of benchmarks, we compare the Surface Book 3 against our stable of productivity notebooks, some of which would also work for content creation and gaming. HP's Spectre x360 15 falls nicely into that category, though



The Surface Book 2 and the Surface Book 3 track closely in our easier productivity tests.

unfortunately we’ve seen only the older 2019 model. Other laptops that do well here are the Dell XPS 13 2-in-1 7390, the larger Dell XPS 15 7390, and the Acer Swift 3 SF314-42-R9YN. We’ve saved gaming-specific tests for a second round of benchmarks, below.

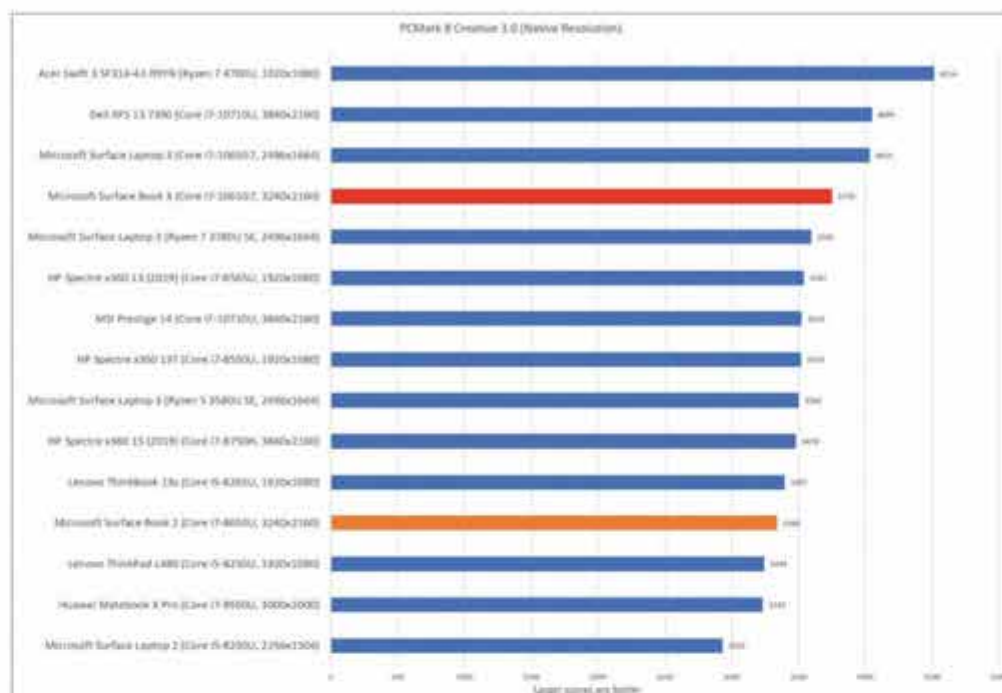
We use PCMark 8’s Work tests to determine how a laptop will do with general office apps, and the additional Creative test to assess performance in photo editing, video manipulation, and the like. We’ve added the Microsoft Surface Book 2 (shown in orange) for comparison. The Work test is pretty easy

for high-end laptops, so the differences aren’t as profound as you might expect.

There’s a slightly sharper jump between the Surface Book 2 and Surface Book 3 in the Creative test, though it still uses the integrated GPU, which dampens the gaming portion of the scores. The use of IGP also explains why the Surface Laptop 3 outperforms the Book 3, as it has fewer pixels to push. We’ll see results for the discrete GPU in the gaming tests.

Maxon’s Cinebench stresses the entire system, specifically the CPU and all of its threads. It’s no surprise to see performance comparable to the Surface

The PCMark 8 Creative test shows a slightly wider gap. The Surface Laptop 3's lower-resolution display helps it outperform the Surface Book 3.

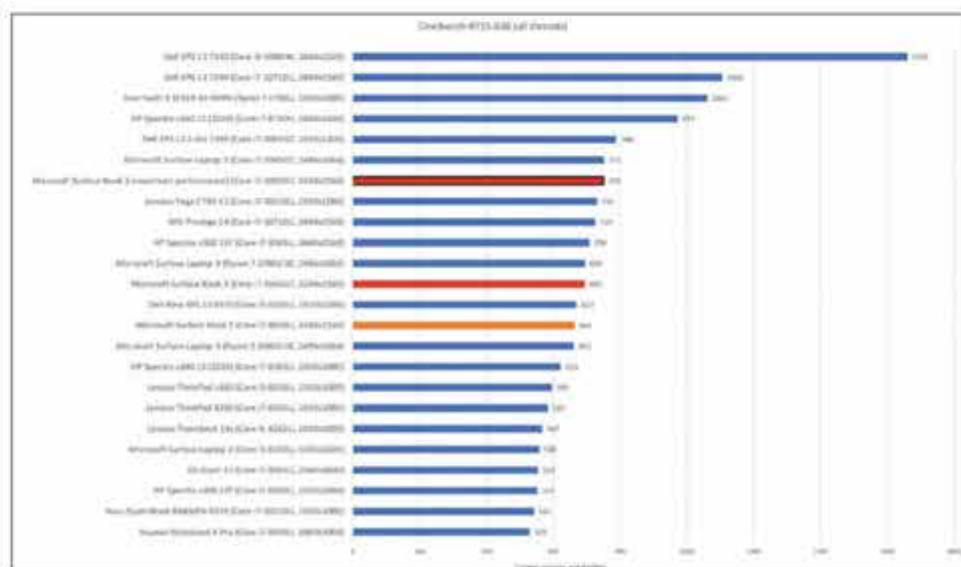


Laptop 3, because the CPU is the same. Note that the Surface Book 3's default Windows' power/performance setting is 'best battery life', which typically means lower performance. Though we also ran tests at higher performance settings, we didn't see meaningful differences in

most tests except this one. The higher performance setting is represented by an outlined red bar.

It's a slightly different story with our HandBrake test. This open-source tool stresses the system over a prolonged period, testing CPU stamina as well

We tested the Surface Book 3's in its default Windows power/performance setting of 'best battery life' (plain red bar) as well as higher performance settings (outlined red bar), with meaningful difference only in this test.





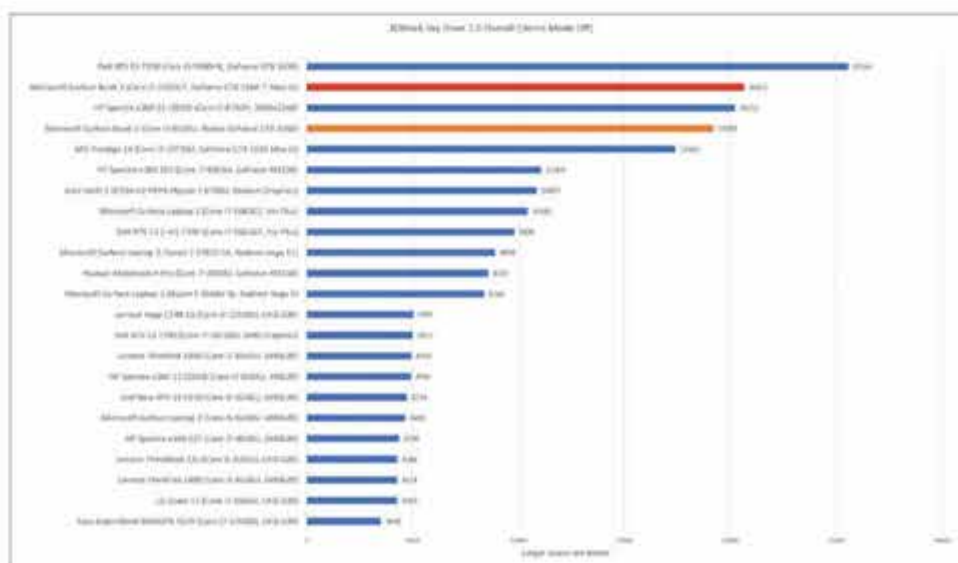
The Surface Book 3's HandBrake performance was nearly the same in its default 'best battery life' setting (shown here) compared to higher performance settings.

as thermal limits while transcoding a feature-length Hollywood film for an Android tablet. We take a harder look at the discrete GPU using UL's 3DMark test, which provides several benchmarks, shown in the following charts. First up is Sky Diver, against other productivity

machines, where only the tricked-out Dell XPS 15 surpasses the Surface Book 3.

GAMING TESTS

We've used some of 3DMark's more powerful graphics benchmarks to compare it to several gaming PCs, from



We tested the Surface Book 3's in its default Windows power/performance setting of 'best battery life' (plain red bar) as well as higher performance settings (outlined red bar), with meaningful difference only in this test.

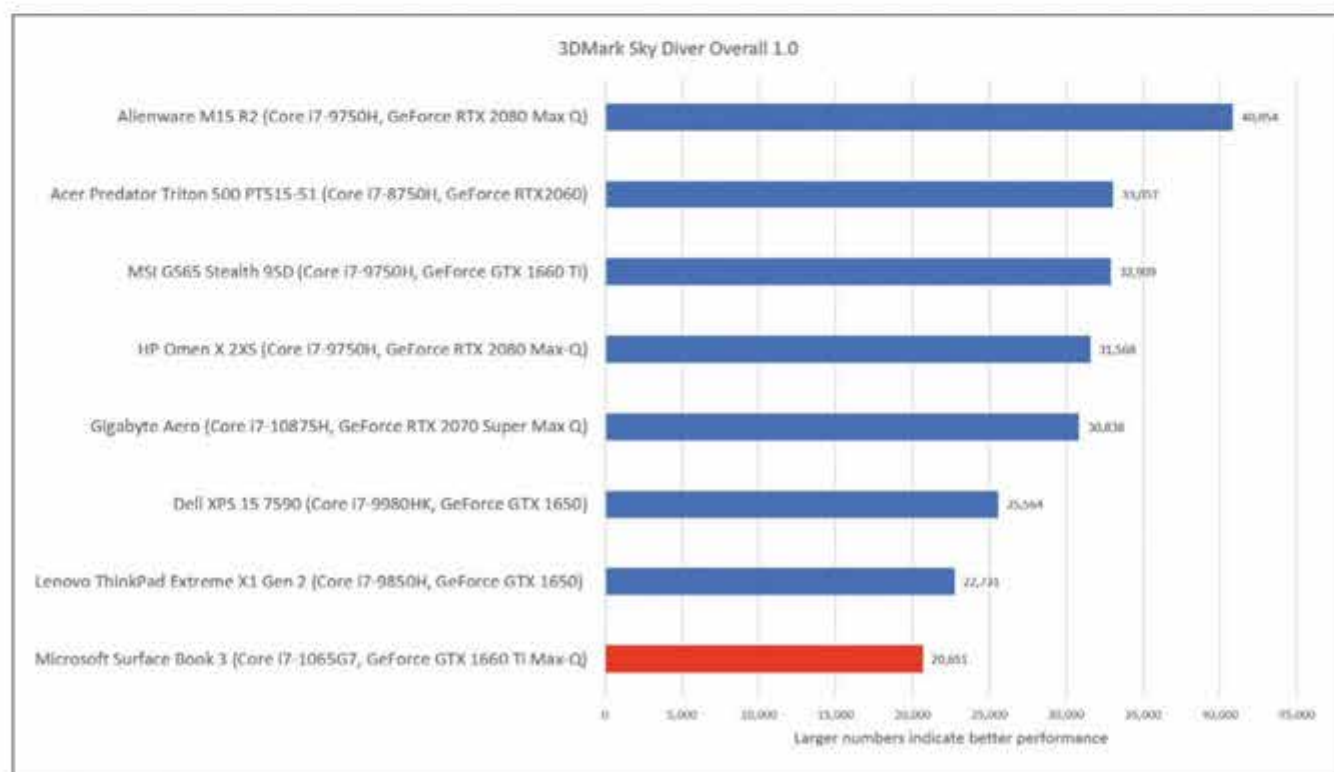
boutique builders to more mainstream names. The gist: while the Surface Book 3 can be used for gaming, dedicated gaming machines generally outperform it. Keep in mind that those machines use Nvidia GeForce GTX and RTX hardware that is much more powerful than the GeForce GTX 1660Ti (Max-Q) in the Surface Book 3. Gaming laptops can also take advantage of the gaming-centric Core chips from Intel's 'H' family, including the mighty Core i9.

First up, the Sky Diver benchmark again. While the Surface Book 3 posted high marks against productivity laptops, it falls to the bottom when pitted against gaming machines.

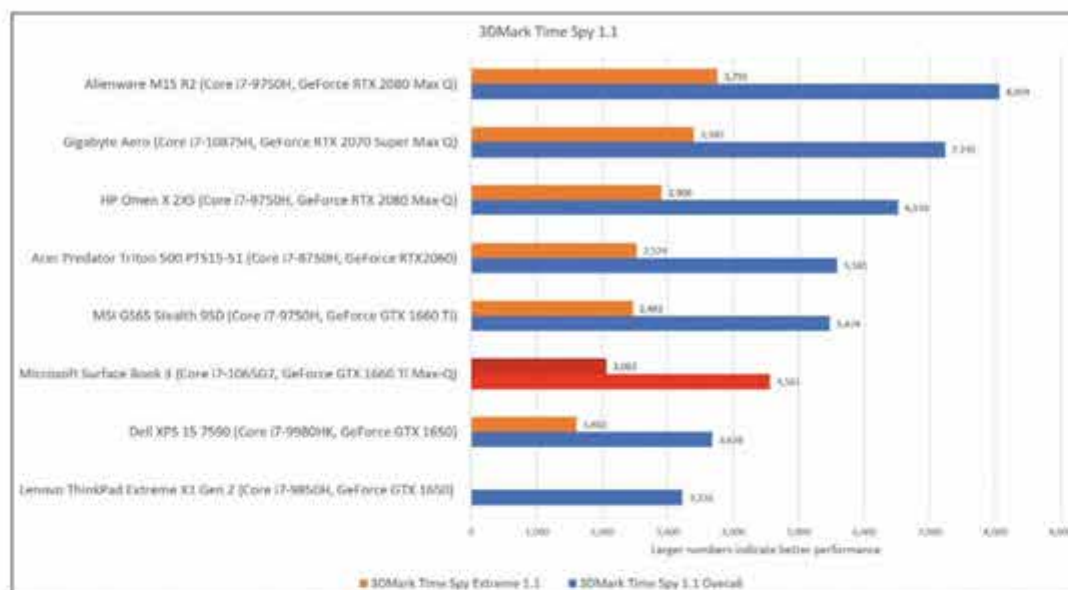
The 3DMark Fire Strike, Fire Strike Extreme and Fire Strike Ultra are older benchmarks designed to test Direct 11 performance on gaming PCs, at progressively higher resolutions and visual quality. We've compiled them all in one chart. The Surface Book 3 gets a passing grade here.

The pattern continued in the 3DMark Time Spy benchmark, optimized for DirectX 12 performance on gaming PCs. The Surface Book 3 leads the back of the pack, behind all gaming laptops but ahead of a few other high-end productivity laptops.

We also tested real-world gaming performance. Both games – Rise of the



The Surface Book 3 falls to the bottom of the gaming heap in this synthetic benchmark.



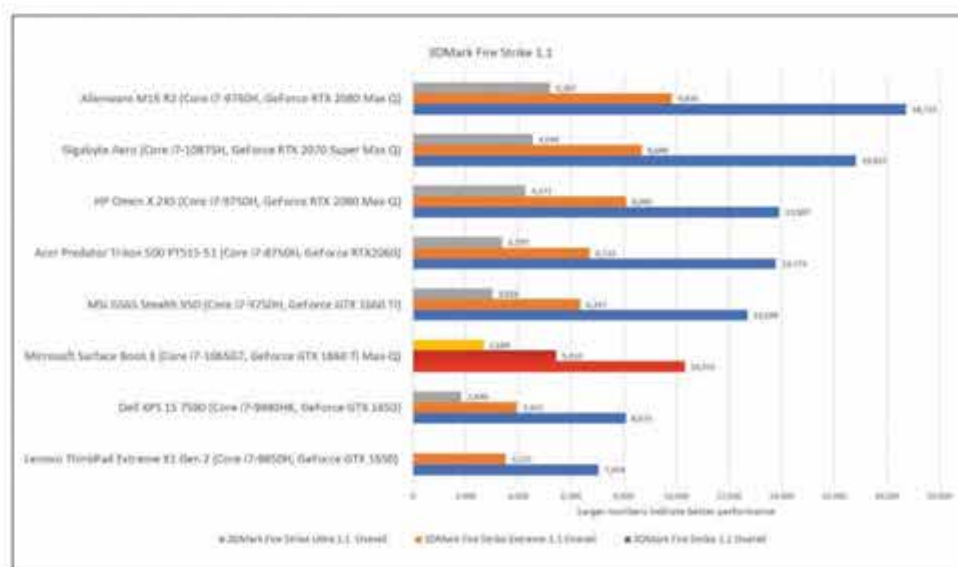
Again, the Surface Book 3 shows that it can serve as a lower-tier gaming PC, but can't hold a candle to dedicated rigs.

Tomb Raider and Middle-Earth: Shadows of Mordor – are a couple of years old, accurately pinpointing that the Surface Book 3 can serve as a gaming laptop, but with limitations.

The Surface Book 3 is an also-ran in Rise of the Tomb Raider. Anything above 60Hz is suitable for gameplay. (The Surface Book 3's built-in display only

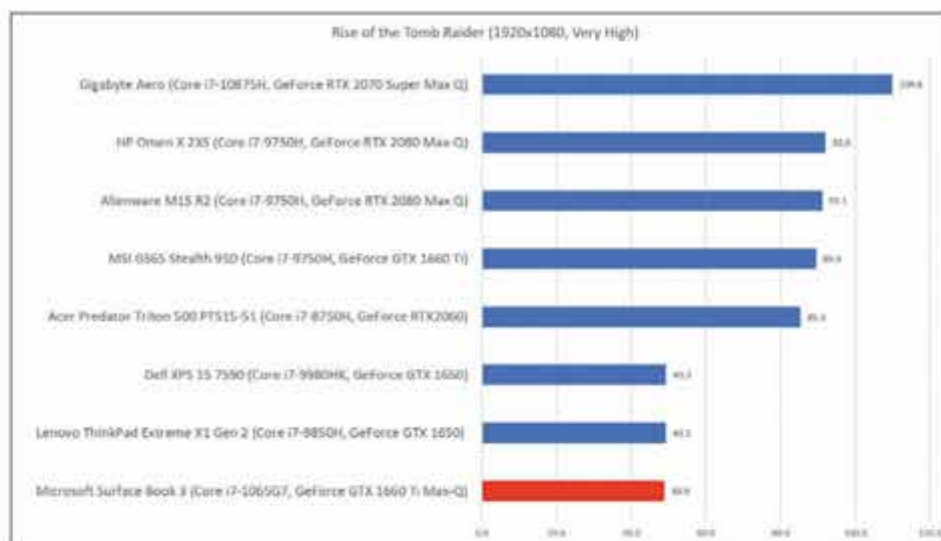
operates at 60Hz.) Anecdotally, we ran PlayerUnknown's Battlegrounds at 1080p (Ultra graphical settings) for 45 minutes or so, with 50 to 58 frames per second as measured by Windows' Xbox Game Bar.

Bottom line, don't buy the Surface Book 3 just for gaming, as there are gaming-specific laptops to be had for far less money.

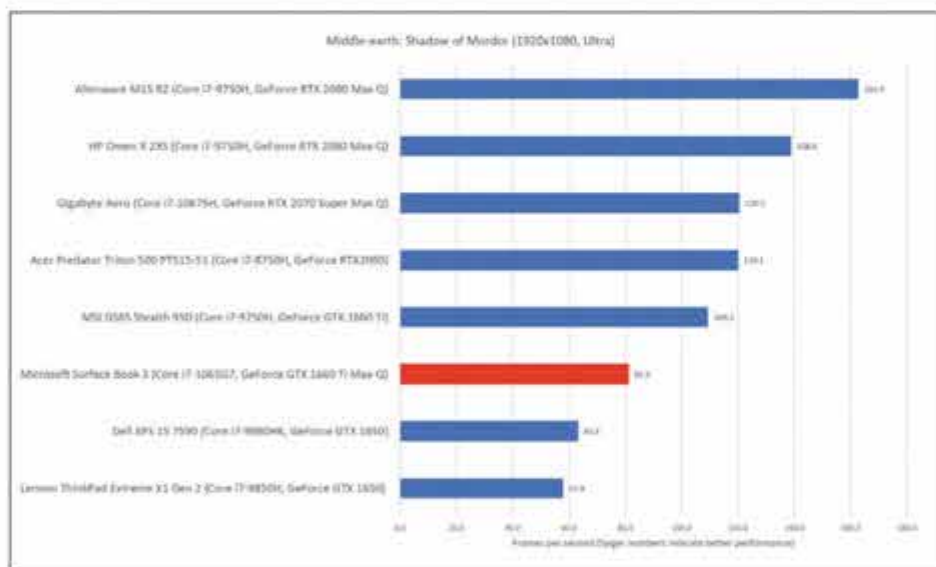


In 3DMark Fire Strike 1.1, the Surface Book 3 leads the back of the pack, ahead of high-end Lenovo and Dell productivity systems.

The Surface Book 3 is an also-ran in Rise of the Tomb Raised. Anything above 60Hz is suitable for gameplay. (The Surface Book 3's built-in display only operates at 60Hz.)



The Surface Book 3 nudges above its low-end rivals here. Shadow of Mordor is playable on the Surface Book 3 at 1080p resolution.



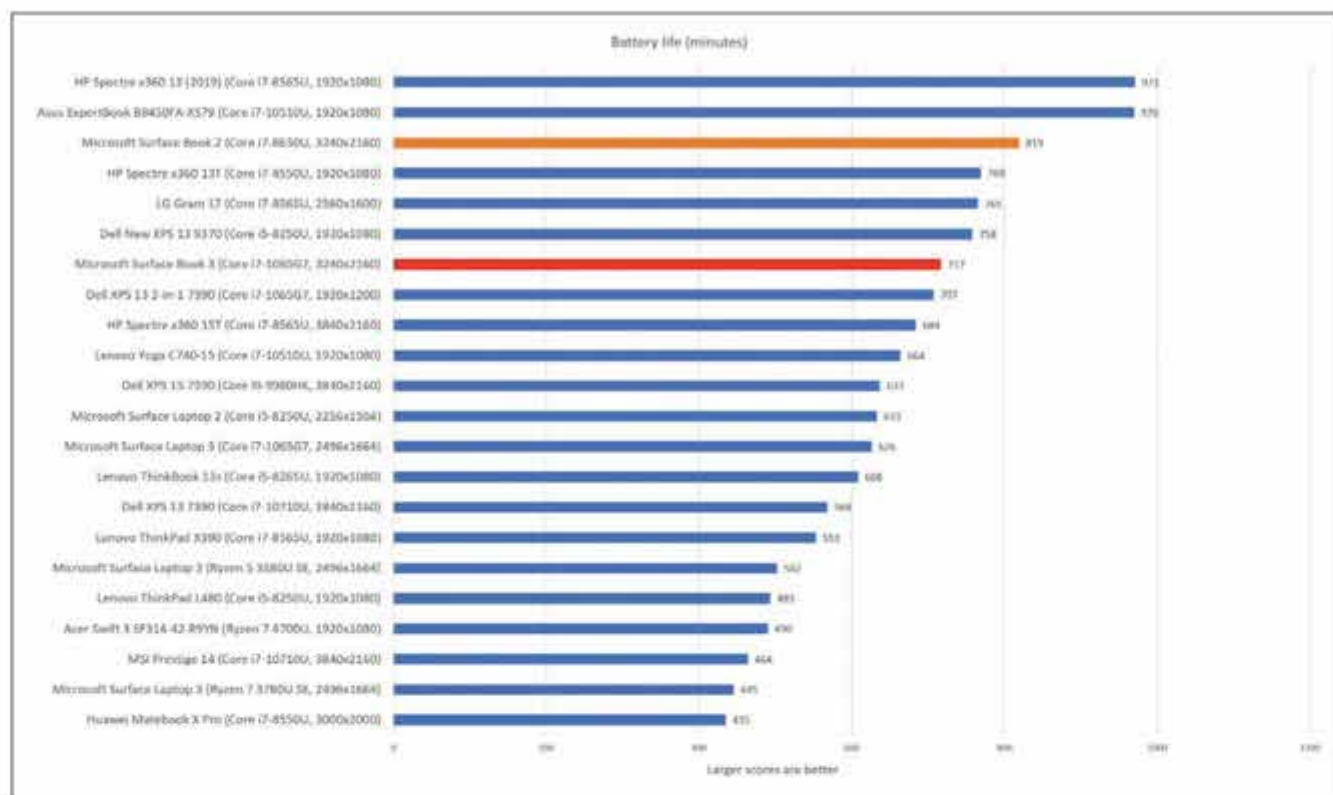
BATTERY LIFE

Our final test is battery life, a traditional strength of the Surface Book line. With a smaller 22Wh battery in the tablet and a larger 59Wh battery in the base, this dual setup once outstripped all other comers. Now, you have a number of single-battery laptops that surpass it, and that doesn't include devices that use Qualcomm's power-efficient

Snapdragon processor. Still, almost 12 hours of battery is great, as shown by our standard video rundown test. The Surface Book 3 charged to 53 per cent in an hour's time.

VERDICT

Microsoft's Surface Book 3 attempts to be all things for all people: the PC you create with during the day, and



Microsoft claims that the Surface Book 3 offers more battery life than the Surface Book 2, but our tests don't indicate that.

the laptop you relax with at night. Honestly, Microsoft's vision of a big, beautiful workstation/tablet/gaming PC/productivity machine has always deeply resonated with me. It's hard to find a gaming PC with such an excellent keyboard, or a productivity laptop with such a powerful GPU inside. All of this is elegantly wrapped, with the Surface bow on top. This is Microsoft's premier PC experience. And yet, the goal of the 'ultimate laptop' seems more out of reach than ever. If you want a dedicated productivity machine, you can do better. If you want a dedicated

gaming laptop, you can do better. If you want a dedicated tablet, you can do better. Why Microsoft hasn't built in a kickstand, making it a full-fledged tablet? Why exclude GeForce RTX hardware, disappointing the gaming community? Has Microsoft overcome its legacy of hardware bugs? What Microsoft has to realize is that specialized, competing devices now achieve more in productivity, gaming, power efficient and price than one device can ever accomplish. Microsoft's do-it-all Surface Book 3 fills its own unique niche. But it is still a niche. **Mark Hachman**



Lenovo IdeaPad Gaming 3i

Price: £699 (inc VAT) from fave.co/2YzYv0z



The Lenovo IdeaPad Gaming 3i is one of the most affordable gaming laptops you can buy anywhere thanks to a bargain-basement price of £699. That's certainly low enough to prove tempting, but at this level there's always a danger that too much has been compromised to meet the budget.

If that's the kind of money you have to spend on a gaming laptop, here's what you can get for your cash.

DESIGN

Happily, the Lenovo looks good so we're off to a good start. The matte black exterior is made from plastic, and the lid is enhanced at the corners with subtle angled sections. On the inside, the attractive blue backlight is paired with a smart logo finished in the same shade.

The IdeaPad Gaming 3i is easily the match of pricier portables aesthetically, but hands-on time reveals weaknesses. The screen flexes too much and the

base section has too much movement in its material.

It's strong enough to be taken out of the house, but it's worth bearing in mind. It's not particularly slim and light either, with a 25mm body that weighs 2.2kg. At this part of the market, those are entirely ordinary measurements though.

The Lenovo has two USB 3.2 Gen 1 ports and a Type-C connection, but the former ports don't support the faster USB 3.2 Gen 2 standard and the latter doesn't handle DisplayPort or Thunderbolt.

Another full-size USB port would have been welcome, too – plug in a mouse and an external hard drive and you're almost out of options so a USB-C hub might be a good idea. Elsewhere there's an HDMI port and an audio jack but no SD card reader.

The IdeaPad Gaming 3i has Gigabit Ethernet and dual-band 802.11ac wireless, but no Wi-Fi 6. It's got a 720p webcam with a privacy shield, but there's no Windows Hello login support and the image

quality is underwhelming. On the inside, you'll find a spare memory slot and a vacant NVMe connector. The latter can only be used if you remove the 2.5in bay, which is redundant because it has no SATA connector.

KEYBOARD

Lenovo has a hard-earned reputation for good keyboards, partly thanks to its ThinkPad range, and the IdeaPad doesn't disappoint. The keys have reasonable travel and a good typing action – it's fast and consistent, with a noticeable point of actuation. The keyboard is fast and crisp – certainly snappier than the typing units included on most gaming laptops, especially at this price.

The action is easily good enough for mainstream gaming and for long



The Lenovo's keyboard doesn't disappoint.

typing sessions. There are only minor downsides: the numberpad is a little narrow, and the backlight is only blue.

The trackpad is disappointing. Its buttons are too soft – they're not crisp enough for fast-paced gameplay. The pad is also installed on the left of the machine, which makes it awkward to alongside the WASD keys. A USB gaming mouse would be far better, of course.

DISPLAY

The Full HD IPS display has a 120Hz refresh rate, but without Nvidia G-Sync. That's fine for a machine like this: the resolution is ideal, and the refresh rate is high enough to deliver smooth motion in single-player games and mainstream e-sports titles.

You'll only want to move to 144Hz or beyond if you play particularly fast-paced games or if you're a keen e-sports player. If that's the case, you'll need a more powerful GPU – and that will involve spending at least £900.

The IdeaPad

Gaming 3i's brightness level of 314 nits is good enough for indoor use, but not outside. The black level of 0.23 nits is decent. Those figures create a contrast ratio of 1,356:1, which is good for an IPS display – it helps darker areas deliver proper depth, and there's good nuance throughout.

The contrast is undermined by colour figures, though. The colour temperature of 7,015K is cool and the Delta E of 5.74 is poor. The Lenovo's panel also only rendered a measly 56 per cent of the sRGB colour gamut, which is extremely low. The panel can't display many of the shades needed to provide a vibrant experience – which means the colours look washed-out and lifeless. The display can still be used for mainstream gaming and media, but it lacks punch, even when compared to other screens at this price.



The display's brightness level is fine for indoor use, but not outside.

The speakers are mediocre, too – they’ve got reasonable mid-range clarity, but there’s no bass, so the Lenovo’s audio lacks depth. Get a gaming headset if you’re serious about gaming.

PERFORMANCE

The IdeaPad Gaming 3i is underpinned by a GeForce GTX 1650 – an entry-level Nvidia graphics card with a modest 4GB of memory, 896 stream processors and no Ray-Tracing.

The Intel Core i5-10300H is a mid-range CPU with four multi-threaded cores, a base speed of 2.5GHz and a Turbo peak of 4.5GHz. It uses the Comet Lake architecture, but there’s little difference between this CPU and the Core i5-9300H used inside older machines. The 256GB Toshiba BG4 SSD delivered mid-range read and write speeds of 2,345MB/s and 1,522MB/s, which keeps the laptop responsive, but the drive isn’t capacious and there’s no secondary hard disk.

There’s 8GB of DDR4 memory, which is the bare minimum for a consumer laptop, and it’s only installed in single-channel configuration – so performance will be hindered.

Despite that, the GPU played Far Cry New Dawn and Wolfenstein at frame rates beyond 30fps at Ultra settings. You’ll only have to tinker with settings

in top single-player titles if you want them running at 60fps, or at faster frame rates to properly make use of the 120Hz display.

The GTX 1650 has no issue with e-sports – it’ll play any top title at triple-figure frame rates.

The IdeaPad Gaming 3i scored 23,386 points in Sky Diver, but this test illustrated that more power can be found elsewhere. The GTX 1650 Ti laptop GPU is marginally faster, and the GTX 1660 Ti is much quicker – in the Acer Predator Helios 300 (2020) it scored 29,647 points, but it’s a lot more expensive.

Geekbench 5 (multi-core)

Lenovo IdeaPad Gaming 3i: 3,997

Acer Helios 300 (2020): 6,022

MSI GS66 Stealth: 5,957

Asus ROG Zephyrus G14: 7,693

Acer Nitro 5: 4,452

PCMark10

Lenovo IdeaPad Gaming 3i: 4,671

Acer Helios 300 (2020): 5,111

MSI GS66 Stealth: 5,112

Asus ROG Zephyrus G14: 5,682

Acer Nitro 5: 3,929

3DMark Sky Diver

Lenovo IdeaPad Gaming 3i: 23,386

Acer Helios 300 (2020): 36,003

MSI GS66 Stealth: 34,390

Asus ROG Zephyrus G14: 33,007
Acer Nitro 5: 31,575

Wolfenstein (Medium 1080p)

Lenovo IdeaPad Gaming 3i: 93fps
Acer Helios 300 (2020): 113fps
MSI GS66 Stealth: 104fps
Acer Nitro 5: 104fps

Wolfenstein (Ultra 1080p)

Lenovo IdeaPad Gaming 3i: 54fps
Acer Helios 300 (2020): 103fps
MSI GS66 Stealth: 96fps
Acer Nitro 5: 96fps

Far Cry New Dawn (Medium 1080p)

Lenovo IdeaPad Gaming 3i: 62fps
Acer Helios 300 (2020): 85fps
MSI GS66 Stealth: 85fps
Acer Nitro 5: 80fps

Far Cry New Dawn (Ultra 1080p)

Lenovo IdeaPad Gaming 3i: 54fps
Acer Helios 300 (2020): 75fps
MSI GS66 Stealth: 75fps
Acer Nitro 5: 69fps

Battery Drain (120 nits, video loop)

Lenovo IdeaPad Gaming 3i: 6.13
Acer Helios 300 (2020): 4.5
MSI GS66 Stealth: 8.22

Asus ROG Zephyrus G14: 11.33
Acer Nitro 5: 6.32

There's little difference between the Core i5-10300H and its predecessor, which is found in the Helios 300 – the newer chip was faster in Geekbench but a little slower in PC Mark 10.

Still, it's enough power to handle day-to-day browsing, Office tasks and games – you won't encounter issues until you try to run loads of apps at once or tackle photo-editing. More power is available elsewhere, though. Laptops with the AMD Ryzen 5 4600H are only around £100 more than the IdeaPad Gaming 3i, and that chip is ten thousand points faster in Geekbench. If you want a laptop that can handle tougher applications, it's worth seeking out AMD silicon.

The Lenovo's modest components mean this laptop is a solid thermal performer. Its peak CPU and GPU temperatures of 81 and 66 degrees are fine, and it's quieter than most gaming laptops. The base panel does become a little warm after extended gaming, but it never gets hot enough to be uncomfortable.

BATTERY LIFE

This machine is middling when it comes to battery life. In our video playback test, it lasted for a decent six hours



The Lenovo is a decent choice if you're on a budget.

and a relatively small SSD. These are pretty understandable at the price so if you're on a tight budget, the Lenovo makes plenty of sense – it looks decent, it's not disastrous in any particular area and it's fast enough for everyday computing and gaming.

Mike Jennings

and 13 minutes, but in gaming it barely managed 90 minutes.

That's expected for an affordable laptop, and you'll need to double the budget if you want better longevity.

VERDICT

The cheapest version of the Lenovo IdeaPad Gaming 3i is the best – affordable, and with enough graphics power to handle mainstream single-player gaming and any e-sports title.

The CPU is good enough for daily use, and the Lenovo is quiet, with a good-looking chassis and a decent keyboard. Just be aware that the IdeaPad's price involves compromises. The screen is pallid, the trackpad is underwhelming, the port selection is a little limited, and the Lenovo is saddled with single-channel memory

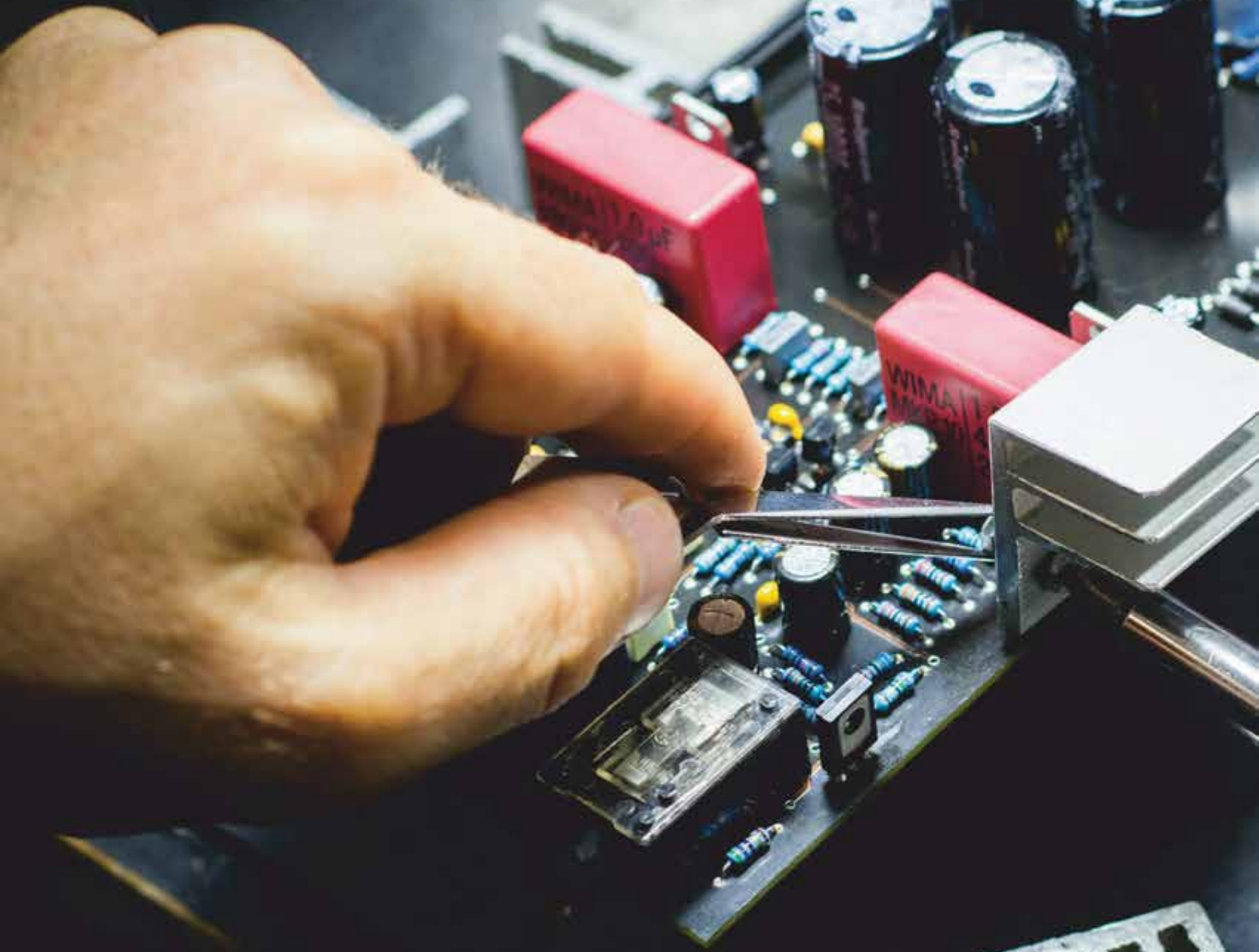
SPECIFICATIONS

- 15.6in (1,920x1,080) FHD, WVA, AntiGlare, LED Backlight, Narrow, Non-Touch, 120Hz display
- Windows 10 Home (64-bit)
- Intel Core i5-10300H CPU
- Nvidia GeForce GTX 1650 4GB GPU
- 8GB 3,200MHz DDR4 RAM
- 256GB Toshiba BG4 NVMe SSD
- 2x USB 3.2 Gen 1
- 1x USB 3.2 Gen 1 Type-C
- 1x HDMI
- 1x audio
- Dual-band 802.11ac Wi-Fi
- Bluetooth 5
- 359x250x25mm
- 2.2kg

TECH ADVISOR

OCTOBER 2020

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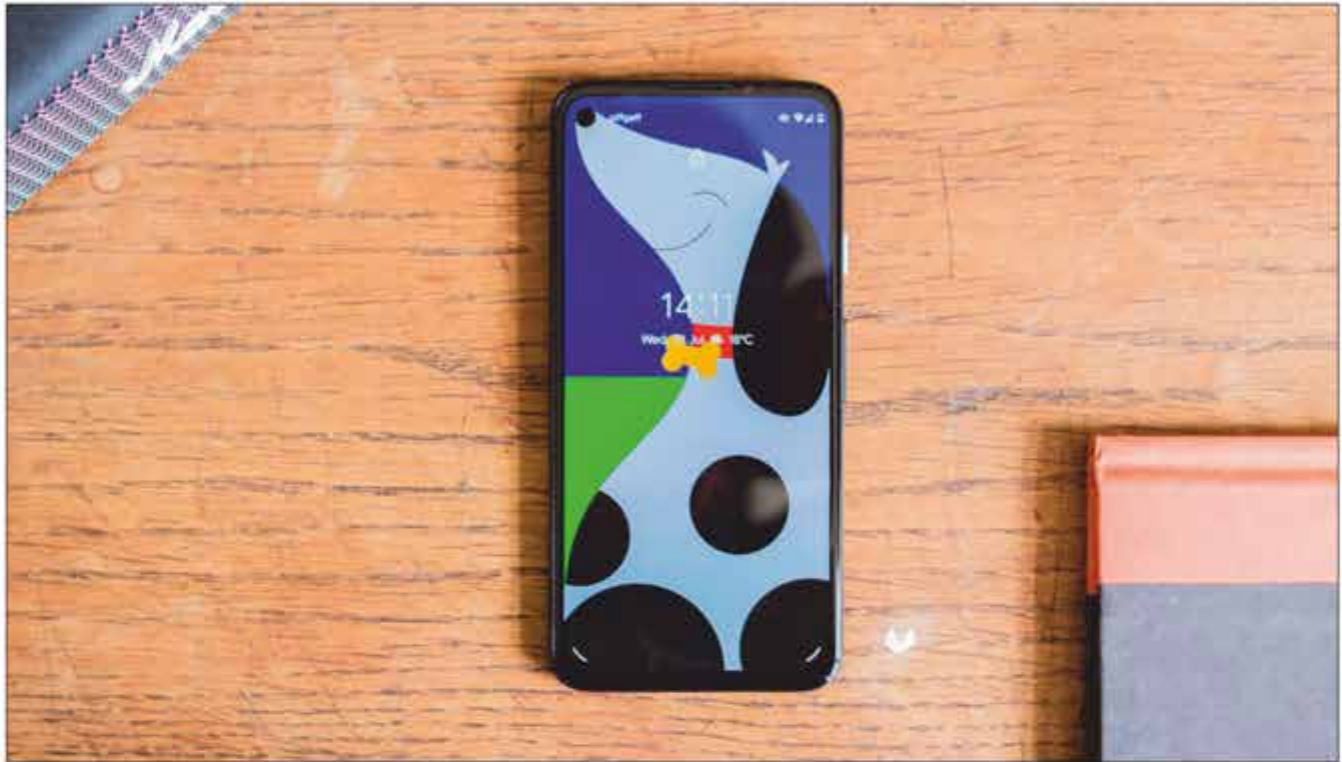
BUILD YOUR OWN PC

EVERYTHING YOU NEED TO KNOW

WINDOWS 10 AT 5

HOW IT TRANSFORMED THE PC





Google Pixel 4a

Price: £349 (inc VAT) from fave.co/2CdDOzA



It may have felt as though Google's new mid-range phone would never arrive, but the Pixel 4a is finally here.

On the whole, Google has done another fantastic job of getting the key things right here and at a cheaper price than the Pixel 3a. However, tech nerds are likely to be tempted by some rivals due to a couple of missing features.

When I say the Pixel 4a is here, that means the phone is official at long last. However, you can't actually pre-order it until 10 September, then it won't start

shipping until 1 October. The question is whether the Pixel 4a is worth waiting for.

DESIGN

It's a case of the same but different when it comes to the Pixel 4a's design. While it still looks like Google's handiwork, there are a few changes that make the 4a a bit better than its predecessor (the 3a), but also a little worse.

Starting at the back, the 4a still uses a polycarbonate unibody instead of the glass used on the flagship models. While

it might not feel quite as premium, it won't smash if dropped and is lighter.

The phone is still 8.2mm thick, but is a tad lighter at 143g – the Pixel 3a weighs 147g. It's also a little shorter at 69.4mm compared to 70.1mm, despite the larger screen. It's one of the most compact handsets on the market.

I was excited about the OnePlus Nord (see page 83), hoping it would be a smaller version of the OnePlus 8 closer to the OnePlus X design, but it's still huge at 158.3x73.3x8.2mm. There's a lack of smaller phones out there, so it's great to see the Pixel 4a fill this gap.

I like the soft matte finish, but it's a shame that the distinctive glossy section at the top has gone. The fingerprint

scanner is still at the back and is more subtle than on other Pixel phones.

The camera module in the corner might be square to match the Pixel 4, but there's only one lens there.

As you can see, I've been testing the Just Black colour and never has a name been more appropriate. The Pixel 4a is currently only available in this colour due to the supply chain issues.

There's a 3.5mm headphone jack, but fans of the Active Edge feature will be disappointed. The sensors Google previously put in the sides so you can squeeze the phone to launch the Assistant are missing on the Pixel 4a.

I assume this is partly to achieve a lower price point and focus on other features. To that end, it's no surprise that there is no waterproofing here either.

DISPLAY

Bezels are barriers and as such, slimming them down significantly on the Pixel 4a means the display is halfway to the Pixel 3a XL, despite the chassis getting smaller.

This is the first Pixel phone with a 'transmissive hole', aka a punch-hole where the screen completely surrounds the front-facing camera.



The fingerprint sensor on the rear of the Pixel 4a isn't as obvious as on other Google phones.



Unlike other Google phones there's a punch-hole camera on the front.

It makes the 4a look contemporary and is a big improvement on the bezels of previous Pixels as well as the notoriously disliked notch of the 3 XL. Speaking of XL models, there is no Pixel 4a XL so this is your only choice this year.

If you're new to the punch-hole notch, then it can feel a little strange at first, but it doesn't take long to get used to. Google includes a set of wallpapers that use it as a focal point, which also sort of hides it at the same time.

I find this 5.8in screen to be a nice sweet spot between usability and having enough real estate to enjoy content. It's so rare to find

a compact phone with a sub-6in screen these days that it's a big reason to get the Pixel 4a if larger handsets don't suit you.

Despite rumours of dropping the tech, the Pixel 4a has an OLED panel and still uses a Full HD+ resolution. At 443ppi, that's plenty of pixels for a sharp image without unnecessarily draining the battery.

Colours are vibrant, contrast is solid and there's HDR support, too. You also get always-on functionality complete with Google's Now Playing feature which tells you what music is playing nearby if it can



As you can see, the screen displays vibrant colours.

recognize it. It's one of the best screens you can get for this price. The only thing missing is a high refresh rate, but I don't think the 4a is aimed at users who will care about this.

If you are looking for 90- or even 120Hz, then you'll need to look elsewhere, probably to the OnePlus Nord (see page 83) or Realme X50 5G.

PERFORMANCE

5G is another thing you don't get on the Pixel 4a and this is because Google has gone for a Qualcomm Snapdragon 730G processor, where many rivals have the more powerful 765G. As per the display refresh rate, if 5G is something high up your priority list, then the Pixel 4a doesn't cut the mustard. However, Google will be launching a Pixel 4a (5G) later this year if you must have the latest tech.

If not, then the Snapdragon 730G provides perfectly smooth operation day-to-day and Google has bumped the memory to 6GB of RAM and 128GB of storage space. A nice upgrade on the 3a despite the price drop. There's still no microSD card slot, though.

You can see our benchmark results below compared to the main competition. Note that we haven't tested the Realme X50 5G yet, so the Realme 6 Pro is another option, although with a Snapdragon 720G and no 5G support.

Geekbench 5 (multi-core)

Google Pixel 4a: 1,640
Moto G 5G Plus: 1,864
OnePlus Nord: 1,963
Realme 6 Pro: 1,681

GFX Aztec Open Normal

Google Pixel 4a: 17fps
Moto G 5G Plus: 18fps
OnePlus Nord: 22fps
Realme 6 Pro: 16fps

GFX Aztec Open High

Google Pixel 4a: 11fps
Moto G 5G Plus: 11fps
OnePlus Nord: 11fps
Realme 6 Pro: 10fps

GFX Aztec Vulkan Normal

Google Pixel 4a: 14fps
Moto G 5G Plus: 18fps
OnePlus Nord: 21fps
Realme 6 Pro: 16fps

GFX Aztec Vulkan High

Google Pixel 4a: 10fps
Moto G 5G Plus: 11fps
OnePlus Nord: 13fps
Realme 6 Pro: 10fps

Pixel 4a battery charge in 30 minutes

Google Pixel 4a: 51 per cent
Moto G 5G Plus: 42 per cent

OnePlus Nord: 68 per cent

Realme 6 Pro: 65 per cent

PHOTOGRAPHY

There's something of a false economy going on with smartphone cameras, with many manufacturers adding as many lenses as possible – often for the sake of promoting an impressive number when you won't even use all of them.

Google does nothing of the sort here, but don't be fooled by the Pixel 4a's apparent lack of photography specs. As previously, the idea here is that you get the same main camera found on the flagship Pixel 4 inside a cheaper phone and Google's incredible software.

So the Pixel 4a has 12Mp rear camera with an f/1.7 aperture, although not the telephoto lens as a secondary option. It's got dual-pixel phase detection autofocus and optical image stabilization.

At the front, there's an 8Mp camera with an f/2 aperture. The main difference here is the positioning in the corner of the screen.

Having lots of cameras might sound appealing, but if you don't know what aperture means and you really just want a phone that can take great photos by doing all the hard work for you, then the Pixel 4a fits the bill.

Where rivals have overly complicated camera apps, Google lays things out in an intuitive way, making it simple to access the features you'll use all the time. That's namely the regular camera mode along with Portrait and Night Sight.

As we've found with the previous Pixel phones, the level of photography on offer here is excellent and in an essentially point-and-click method. The app offers useful pointers, such as moving slightly back to improve focus

and letting you know when you're holding the phone perfectly level.

Live HDR+ means you're looking at the final result before hitting the shutter button and you can adjust things like the brightness and shadows in the same way, too.

You can see the test photos below with low



The Pixel 4a has 12Mp rear camera with an f/1.7 aperture.

Here's a landscape shot.



This image was taken using the default settings.



light shots looking like regular photos and a night-time shot appearing to have some lighting rigged up. Night Sight can also handle astrophotography, although this isn't made clear in the app.

I haven't been able to test this due to weather conditions, but point the phone at the sky and it can take long exposures of the night sky. You'll just need a tripod or somewhere to rest the phone because holding it will cause too much movement.

You're likely to shoot video more often than use the astrophotography feature. While the Pixel 4a can shoot up to 4K resolution, note that it's capped at 30fps. You can shoot 1080p at up to 120fps and results are pretty

solid, especially with some smooth stabilization. Still, the primary feature here is photography.

The front camera takes excellent selfies and an exclusive Pixel feature called 'Portrait Blur' meaning you can add the bokeh effect of portrait mode on an image taken with the regular camera mode.

BATTERY LIFE

Google has bumped the size of the battery a litter here from 3,000- to 3,140mAh. Not enough to make a huge difference but, oddly, Google quotes a battery life of 24 hours for the Pixel 4a when the 3a is touted at 30 on the



Here's a standard selfie photo...



... and here's one using Portrait Blur.

This is a regular night-time shot.



Here, I used the Night Sight feature.



official store. Still, I've found battery life to be very good, with the 4a lasting me a day and a half on average without using any dark modes and with the always on-screen feature switched on. Things should get better over time as the Adaptive Battery feature works its magic – namely reducing power to apps you rarely use, according to Google.

Fast charging hasn't got any faster and there's no wireless charging of course (not without a glass rear cover). However, when the supplied 18-watt charger gets the Pixel 4a from dead to 51 per cent in 30 minutes, that's a pretty decent result.

SOFTWARE

It's no surprise that the Pixel 4a comes with Android 10, the latest version of Google's mobile operating system.

What you get when purchasing a Pixel device is Android in its purest form. This means everything is clean and simple, without a bunch of tweaks in an effort to make it unique and add value. It also means no bloatware in the form of pre-installed apps.

Even though third-party Android makers have gradually made their Android skins closer to stock, it's still refreshing to use a Pixel in comparison.

One thing that might be new to you is the gesture control, which is similar

to using an iPhone. You need to swipe up from the bottom of the screen to go home or pause that same swipe to bring up recent apps.

It's easy to get used to and you can quickly swap between open apps by swiping left and right along the bottom, too. The main issue is the lack of a back button so you have to swipe in from either side of the display.

In a way it's a clever solution, but it's easy for it to go wrong, especially if the keyboard is on-screen, so it typically gets registered as typing a word. Or it's easy to do when you don't want to, such as swiping through your camera roll.

If it gets too much, then you can, fortunately, switch back to the older style navigation buttons.

I don't think it's talked about enough, but a further advantage is that Google guarantees at least three years of Android updates. And those future versions of Android will arrive on Pixel phones before others. This gives the Pixel 4a a sort of hidden value that you might not have thought about.

VERDICT

Even though the Pixel 4a has tough competition this year, I still think it has a lot going for it. Even though it might not tick boxes that rivals do, such as support for 5G and a high refresh rate display,

there's plenty of charm and benefits here that will woo many buyers.

It will appeal to less techy users who don't care about going beyond 60Hz and who would rather have the compact design of the Pixel 4a along with easy-to-use stock Android 10 and the promise of at least three years of OS updates.

This isn't about playing smartphone Top Trumps, it's about providing a smooth and accessible experience, which I think Google has done very well. If you do want to play Top Trumps, then various rivals outpace the 4a. **Chris Martin**

GLONASS, GALILEO, QZSS

- NFC
- USB 3.1, Type-C 1.0 reversible connector
- Fingerprint sensor (rear mounted)
- Non-removable 3,140mAh lithium-polymer battery
- 144x69.4x8.2mm
- 143g

SPECIFICATIONS

- 5.81in (2,340x1,080; 443ppi) OLED capacitive touchscreen
- Android 10
- Qualcomm SDM730 Snapdragon 730G (8nm) processor
- Octa-core (2x 2.2GHz Kryo 470 Gold, 6x 1.8GHz Kryo 470 Silver) CPU
- Adreno 618 GPU
- 6GB RAM
- 128GB storage
- Single rear-facing camera: 12.2Mp, f/1.7, 27mm (wide), 1/2.55in, 1.4µm, dual pixel PDAF, OIS
- Selfie camera: 8Mp, f/2.0, 24mm (wide), 1.12µm
- 802.11a/b/g/n/ac Wi-Fi dual-band
- Bluetooth 5.1, A2DP, LE
- GPS with dual-band Yes, with A-GPS,



OnePlus Nord

Price: £379 from fave.co/2DNYVZJ



OnePlus made its name undercutting flagship phones, but over time the brand slowly became exactly what it had originally set its stall against. I loved the OnePlus 8 Pro, but – like many others – noted that it is a flagship through and through, with the price to match.

Enter the OnePlus Nord. Much has been made of the company's return to the mid-range market – even Apple

couldn't generate this much hype around an affordable phone when it launched the iPhone SE – and it's fair to say that expectations were high.

So has OnePlus done it again? Well let's put it this way: I moved from the OnePlus 8 Pro to the Nord for this review, and even though that phone costs more than twice as much, I'm in no rush to go back. The notorious flagship killer has killed again.



The rear camera module has moved to the corner, but otherwise things look much like the company's flagships.

DESIGN

The best thing I can say about the design of the Nord is that absolutely everybody I've shown it to has been shocked when I tell them it costs just £379.

The Nord looks and feels just like any other OnePlus phone – which is saying something, given that OnePlus's flagships are among the best designed out there. It runs a little smaller, but not by much – I actually wish they'd shrunk it down further, but OnePlus doesn't really make small phones.

Available in two finishes – Blue Marble and Grey Onyx – the Nord looks different to the flagships, but no less polished. There's a shinier finish, rather than the matte frosted glass of its big brothers, but that makes it look different – not worse. Expect fingerprints though.

The rear camera module has moved to the corner, but otherwise things look much like the company's flagships. You get the same controls: power button, volume rocker and the always-welcome notification toggle, still rare on Android phones.

OnePlus has essentially made two concessions to price here. The first is

the frame, which is plastic rather than the metal of the flagships. I'll be honest, I didn't even notice this until it was pointed out to me, and if I hadn't just told you I suspect you wouldn't have noticed either. It may have some impact on the phone's durability of course, but the Gorilla Glass 5 finish on the rear and screen should help somewhat.

The bigger change is the move to a flat display. This is really a matter of taste, and I know plenty of people who prefer a flat screen to a curved one, so it's hard to chalk this up as much of a downgrade either.

There's also no official waterproof rating for the phone, but OnePlus does claim that it will survive being submerged for up to 30 seconds in 30cm of water, which is longer than I ever intend to keep

it underwater. I'll admit I haven't dared test that claim myself, though.

Finally, as per usual there's no headphone jack. There's also only mono sound through the speakers, but that's par for the course at this price.

DISPLAY

Let's talk about that display. At 6.44in it's a touch smaller than the OnePlus 8, but it's roughly comparable. That means it's still a pretty sizable screen, though the 20:9 aspect ratio and slim bezels keep it usable.

The core specs are hard to complain about: FHD+ (2,400x1,080) with a pixel density of 408ppi, a 90Hz refresh rate and AMOLED to boot. To be blunt, this is a better screen than some flagships are shipping with – I'm looking at you, LG Velvet – and is quite possibly the best you'll find anywhere near this price.

Yes, you can get a 120Hz refresh rate screen for less in the Realme X50 5G, but it won't be AMOLED. Few people will notice or appreciate the jump from 90Hz to 120Hz, but the colour depth, brightness and accuracy of AMOLED is immediately apparent. OnePlus has made the right compromises here.

PERFORMANCE

Speaking of making the right compromises, the biggest downgrade

the Nord gets is in its chipset – and it really doesn't matter at all.

The Nord uses Qualcomm's Snapdragon 765G chip, which brings with it the same 5G support you'll find on flagships – though no Wi-Fi 6, sadly. OnePlus pairs it with either 8GB of RAM and 128GB of storage, or a souped-up model with 12GB RAM and 256GB storage – the one I've been testing.

Yes, there's a performance gap between the 765G and the flagship 865, and it looks stark in benchmarking comparisons to the OnePlus 8. But unless you're playing the absolute most demanding mobile games around, you simply will not notice while you're actually using the phone.

The Nord is just as fast, responsive, and reliable as any phone you can buy right now for day-to-day usage and will outpace many at this price.

Geekbench 5 (multi-core)

OnePlus Nord: 1,963

OnePlus 8: 3,400

Oppo Find X2 Lite: 1,845

Motorola Edge: 1,813

Realme X3 SuperZoom: 2,617

Huawei Nova 5T: 2,422

GFX Aztec Open Normal

OnePlus Nord: 22fps

OnePlus 8: 48fps

Oppo Find X2 Lite: 21fps
 Motorola Edge: 20fps
 Realme X3 SuperZoom: 40fps
 Google Pixel 3a: 11fps
 Huawei Nova 5T: 17fps

GFX Aztec Open High

OnePlus Nord: 13fps
 OnePlus 8: 31fps
 Oppo Find X2 Lite: 13fps
 Motorola Edge: 12fps
 Realme X3 SuperZoom: 26fps
 Google Pixel 3a: 7fps
 Huawei Nova 5T: 18fps

GFX Aztec Vulkan Normal

OnePlus Nord: 21fps
 OnePlus 8: 45fps
 Oppo Find X2 Lite: 21fps
 Motorola Edge: 19fps
 Realme X3 SuperZoom: 31fps
 Google Pixel 3a: 9fps
 Huawei Nova 5T: 13fps

GFX Aztec Vulkan High

OnePlus Nord: 13fps
 OnePlus 8: 30fps
 Oppo Find X2 Lite: 13fps
 Motorola Edge: 12fps



This is a better screen than some flagships offer.

Realme X3 SuperZoom: 323fps

Google Pixel 3a: 6fps

Huawei Nova 5T: 9fps

OnePlus Nord battery charge in 30 minutes

OnePlus Nord: 68 per cent

OnePlus 8: 57 per cent

Oppo Find X2 Lite: 68 per cent

Motorola Edge: 38 per cent

Realme X3 SuperZoom: 68 per cent

Google Pixel 3a: 47 per cent

Huawei Nova 5T: 54 per cent

PHOTOGRAPHY

If there's one area where the Nord's budget limitations show through, it's in the camera. Not because it's bad, but because it's a decidedly mixed bag.

First up, the main lens is a 48Mp, f/1.75 shooter using the popular Sony IMX586 sensor – the same sensor OnePlus has used in phones since the 7 Pro, though this year's 8 Pro upgraded to the more impressive IMX689.

This main lens is where the Nord shines. OnePlus has had the benefit of the best part of two years optimizing its software for this

specific sensor, and the results speak for themselves. This won't quite match a Pixel – or even the similarly priced iPhone SE – for sheer point-and-shoot performance, but it's pretty darn close.

Colours are bright and accurate, exposure is even, and there's both detail in contrast in spades. Especially once you factor in the price, this camera is a clear winner.

As for video, it'll handle 4K footage at 30fps – disappointingly not at 60fps, though the selfie camera will – with OIS and EIS to keep things steady.

Things get a little murkier once you move to other lenses and shooting modes however. The 8Mp, f/2.25 wide-angle inevitably loses some detail, but more than that the colour balance and contrast are off. Shots expose darker than through the main lens, with extra shadow eating up that detail even



This is a great camera for selfie shots.

more. The results aren't bad, but they aren't great either. Those two lenses are bolstered by a depth sensor to help with portrait shots, and a 2Mp macro camera that is clearly only here to make up the numbers. Like most low-megapixel macro cameras, this is absolutely terrible, with low detail, awful exposure and desaturated colour. There is no conceivable circumstance in which you'd ever want to use this camera, but the good news is that you don't have to: take a shot with the main lens, crop in and you can get a fantastic close-up shot that way.

Low light photos are decent, but nothing to write home about – I

suspect the 765G is slightly showing its limitations here. Still, my test shots were taken in near total darkness and the phone still managed to pick out colours spectacularly well, even if fine details are missing. Real low light shots outside at night or in dim bars should come out much better.

Finally, the front. In an unexpected twist you get two selfie cameras here, a trend that I thought had died out. In addition to a 32Mp main lens you get an 8Mp ultra-wide for group shots – both f/2.45. Unsurprisingly, the main shooter wins on detail and exposes for highlights a little better, but I'm actually impressed with the results out

A shot taken using the OnePlus Nord's main lens.





Here's the same subject, but shot using the wide-angle lens.



Another photo, this time using the 2x zoom.

Here's an image taken using the phone's Nightscape mode.



This selfie was taken using the default settings...





...this was
taken with
the wide-
angle lens
...



... and
here is a
portrait
selfie.

of both lenses – this is a great camera for selfie shots.

BATTERY

Battery life and charging speed have long been among the stronger elements of OnePlus phones, and the Nord is no exception. The 4,115mAh easily lasts a day's use with room to spare, though it won't quite make it all the way through the next one.

That's alright though, as the Warp Charge 30T fast charging was enough to top the battery up by 68 per cent in half an hour in my testing – which is enough to last the day, when push comes to shove. There's no wireless charging, but at this price the iPhone SE is pretty much the only phone out there

that does include the feature, so that's no real surprise.

SOFTWARE

The Nord ships with Android 10, and runs the same Oxygen OS 10.5 software as the company's other phones.

If you haven't used a OnePlus phone before, Oxygen is arguably the best Android skin around right now. It's clean and simple to use, but packed with customization options if you want them, along with a few custom features like the distraction-free Zen Mode and the Fnatic-sponsored gaming mode.

Disappointingly, OnePlus still hasn't added an always-on display to its OS, but the company assures fans that one is on the way, and it should be added



Oxygen is the best Android skin around right now.

within the next year. OnePlus has actually stripped Oxygen back ever so slightly for the Nord by shipping the phone with Google's Messages and Phone apps, rather than OnePlus's own counterparts. It's a small touch that avoids duplication and gives users access to features like RCS messaging.

There's one final area where the Nord beats most of its Android rivals: updates. OnePlus is promising two years of software updates and a third year of security patches for the Nord, which is the kind of commitment you'll struggle to find outside of Apple. It's a promise that if you get a Nord, it should stick with you for at least two years if you want it to.

VERDICT

The OnePlus Nord is the best mid-range phone in the world right now. It looks and feels like a phone twice its price, with a display and main camera lens to match. The 765G processor more than holds its own, and all of the camera lenses are solid except the forgettable macro shooter.

More importantly, you won't find better at this price, or a better selection of the priority features for most users on a budget, with luxuries like wireless charging or an OTT 120Hz refresh rate ditched in favour of a focus on the fundamentals. The Nord would be a

good buy at £100 more – at this price, it's a steal. **Dominic Preston**

SPECIFICATIONS

- 6.44in (2,400x1,080; 408ppi) Fluid AMOLED capacitive touchscreen
- Android 10, OxygenOS 10.0
- Qualcomm SDM765 Snapdragon 765G (7nm) processor
- Octa-core (1x 2.4GHz Kryo 475 Prime, 1x2.2 GHz Kryo 475 Gold, 6x 1.8GHz Kryo 475 Silver) CPU
- Adreno 620 GPU
- 6GB/8GB/12GB RAM
- 64GB/128GB/256GB storage
- Four rear-facing cameras: 48Mp, f/1.8, 26mm (wide), 1/2.0in, 0.8µm, PDAF, OIS; 8Mp, f/2.3, 119-degree (ultra-wide); 5Mp, f/2.4, (depth); 2Mp, f/2.4, (macro)
- Dual selfie camera: 32Mp, f/2.5, (wide), 1/2.8in, 0.8µm; 8Mp, f/2.5, 105-degree (ultra-wide), 1/4.0in, 1.12µm
- 802.11a/b/g/n/ac Wi-Fi dual-band
- Bluetooth 5.1, A2DP, LE, aptX HD
- GPS with dual-band A-GPS, GLONASS, GALILEO, BDS, SBAS, NavIC
- NFC
- USB 2.0, Type-C 1.0 reversible connector, USB On-The-Go
- Fingerprint scanner (under display)
- Non-removable 4,115mAh lithium-polymer battery
- 158.3x73.3x8.2mm
- 184g



Evercade

Price: £79 (inc VAT) from fave.co/31qrA0b



These days, you've got endless ways to play retro games using emulation on PCs, Raspberry Pis, or even Android phones – most with varying degrees of performance or legality. But the new Evercade handheld console is tackling retro gaming emulation in a highly focused and legally legitimate way. Unlike the recent flood of Chinese-based handheld emulators like the PocketGo

V2, Evercade (the company) works with major publishers to release physical cartridges featuring tailored emulation so that each game plays the way you remember.

If you're a retro game enthusiast looking to find easy, accurate and legal ways to play titles from a variety of gaming eras – outside of buying the original hardware, of course – then the Evercade is worth a hard, long look.

WHAT IS THE EVERCADE?

The Evercade is a handheld console that emulates classic games. It's roughly the size of a Nintendo Switch Lite, with a 2,000mAh battery and a 4.3in LCD screen (the same size as a Sony PSP) sporting a 16x9 aspect ratio. Evercade's quad-core 1.2GHz ARM processor packs enough oomph to run 8- and 16-bit games, with plenty of leftover overhead to power future releases. Same goes for the 16x9 screen – all of the games I tested were presented in the original 4x3 aspect ratio, with wider aspect ratio systems coming soon.

For inputs, you'll find a D-Pad, four face buttons, two shoulder buttons, two volume buttons, Start/Select and Menu, which is used to access various settings like save states. Ports include a Micro-USB port for charging, a 3.5mm headphone jack, a Mini-HDMI port for connecting to a TV and a cartridge slot.



The Evercade has a clean and classic look.

You heard that right. The Evercade doesn't store ROMs on a microSD card like most handheld emulation devices. Instead, the company is producing physical cartridges like the Gameboys of old. Going cartridge-based serves a couple purposes. First off, it hearkens



Cartridges in 2020?

back to the days of classic physical media and it really tugs at my nostalgic heartstrings. Getting a cartridge in a plastic case reminiscent of Sega Master System games, complete with an included manual, should definitely appeal to retro game collectors.

More importantly, Evercade told me the main reason for using cartridges is so it can deliver new content from new systems onto the console without needing to run a firmware update to the console itself. Firmware or bug fixes can be deployed if needed through plugging the device into a PC via the Micro-USB port but, Evercade wants the experience to be as plug and play as possible.

Cart-based emulation also allows for an emulator to be tweaked to work better for a specific game/platform, rather than the one-size-fits-all approach found with other emulators. While it's fun digging into RetroArch to tweak emulation settings for each retro game on your Raspberry Pi, I trust the minds at Evercade to aim for appropriate settings per game –

which has proven true in my time with the device (more on that later).

Each cart is publisher-specific and retails for around £20, featuring between six to 20 games depending on the line-up. Evercade says it will be releasing new cartridges at a fair pace, and you can see the up-to-date list of available games on the Evercade website (go to fave.co/2EyMMlu), but the company sent over the first 10 releases for this review:

- Atari Collection 1
- Namco Museum Collection 1
- Data East Collection 1
- Interplay Collection 1
- Atari Collection 2
- Namco Museum Collection 2
- Interplay Collection 2



The first 10 releases, with a nice number attached to each box.

- Mega Cat Studios Collection 1
- Piko Interactive Collection 1
- Technos Collection 1

Future releases include Atari Lynx collections 1 and 2, The Oliver Twins Collection, and a Xeno Crisis & Tanglewood dual game cartridge, with more planned. Hopefully Evercade can court even larger publishers who have extensive retro gaming catalogues like Konami and Capcom (I'll buy every version of Castlevania III: Dracula's Curse under the sun) because there are glaring omissions. Unfortunately some publishers like Nintendo would most likely never agree to have their retro games appear on the Evercade. Going with fully licensed cartridges definitely limits the Evercade's potential library compared to retro handhelds that expect you to stock your own (legally grey) digital ROMs.

HOW DOES THE EVERCADE PLAY?

The Evercade console's large size surprised me, especially compared to the other handheld devices I've reviewed lately. But after a bit of time with it in my hands I realized just how much more comfortable it is – allowing me to game for longer sessions. Yes, the size makes it harder to throw in a pocket and go, but it's still sleek and portable.

From hitting the power switch to getting in game, things couldn't be more easy. After the splash screen you're greeted with a slideshow of titles available on your chosen cartridge; simply press a button to launch the game you want to play. As I said before, the Evercade's ARM processor has plenty of power to run games from the 8- and 16-bit era. I never encountered a single hitch in emulation, menu navigation, or loading save states.

You have to fuss around with emulation settings in some games on other retro handhelds. Not the Evercade. Having the games take centre stage without worrying about performance was an absolute joy. Admittedly, I don't have extensive knowledge of most of the games in the catalogue, but my gameplay experiences felt smooth and natural. Given the care that was put into each experience, and the work done directly with the publishers and developers, I feel confident that the games were running as intended.

When it comes to controls, I'm not a huge fan of the circular d-pad – not because of its shortcomings, but because of personal preference. It offers plenty of travel and circular movement but not enough clear delineation between cardinal directions for my taste. I do love the feel of the slightly convex

face buttons, however. They have a satisfying pressure and ‘click’ upon press. Evercade’s large buttons are definitely stiffer than most other emulation-based handhelds, but in a sturdy way that feels good. I wish there was more separation between them, though – I often found myself accidentally hit two buttons at the same time.

My index fingers rested easily along the length of the concave shoulder buttons. They’re a bit too sensitive though, making it unfortunately easy to trigger an unintentional press. I also wish there was a bit more travel, but the click itself feels very satisfying.

Sliding the cartridge in and out of the system was quite a pain on our review unit, as the slot that receives them is a bit too tight. Other reviews mentioned it as well. Evercade assures me that this will be corrected during final production. I’m hoping that’s the case because I missed out on the joy of slotting in a new cart into my handheld.

The Evercade includes a Mini-HDMI port on the top of the device to plug into a TV or monitor, and doing so turns off the integrated display. It’s recommended to plug the HDMI cable into the unit before powering on the handheld, because once it detects something plugged into that port, the software restarts in order to switch outputs – you

can’t seamlessly move back and forth like you can on the Nintendo Switch. Also worth mentioning: the first unit I was sent for review had a finicky port that caused the device to reboot at the slightest bump to the cable. The second unit Evercade sent me didn’t exhibit that problem.

All in all the Evercade’s a solidly built device with plenty of internal horsepower to play more demanding games in the future. The classic design and aesthetics give it a timeless feel, and the build quality feels like it should hold up for many years to come. No, it’s not perfect, but for the most part I love playing on it.

WHO IS THE EVERCADE FOR?

Playing on the Evercade is a substantially different experience than using other handheld emulation devices. I think it will appeal to a smaller audience – but one that is more deeply invested in the retro gaming experience. Even though I have an extensive ROM library that I load onto every other retro device I have, I typically stick to playing the same handful of games I know and love. Sure, that’s partly because I’m reviewing these devices, but it’s also because in the face of almost endless options it’s easier to sink back into a familiar game than to try something new. But with the Evercade, I felt like I was sitting down



Despite translation errors the manuals have loads of charm.

with a hand-picked list of games that were professionally recreated for me to experience – many for the first time. I found myself much more engaged in exploring the games on offer because they're served up in such a special way. From sliding the cartridges out of their plastic cases, to reading the small blurbs for each game inside the printed manuals, to taking my time exploring each of the high-quality games in these curated cartridges, using the Evercade felt like diving into a small-scale Criterion Collection of retro games.

Beyond that, it feels good knowing that each of these collections were made with the participation of the actual game publishers – meaning there is no legal grey area to worry about. As a

content creator myself, I'm thrilled to support the people involved in making games, and it's not often you get a chance to do that with retro titles unless there are remasters involved. It also keeps you from having to scout around sketchy ROM sites to download the games you want to play (though you should be dumping your own ROMs).

To wrap all those thoughts together, retro game enthusiasts who prefer high-quality emulation and want help support the companies involved will probably get the most out of the Evercade.

VERDICT

I've reviewed several retro game emulation devices over the years, but I've never had an experience like the one Evercade delivers.

From the physical design to the high-quality, fully legal emulation, the Evercade feels like a hand-crafted experience that is more than the sum of it's parts. Its strong point is also its weak point, though; the Evercade's future hinges on more cartridges being released so retro enthusiasts can expand

their libraries. That said, while there's no guarantee on how many cartridges will wind up landing down the line, there's already a pretty deep catalogue to dive into right now. Bottom line? This charming cartridge-based handheld is highly recommended for retro gaming connoisseurs. **Hayden Dingman**



Microsoft Flight Simulator

Downloading, installing and loading Microsoft Flight Simulator is a slog, but in the end it's more than worth it. **MARK HACHMAN** reports

It's 8am on a clear, sunny day in Oakland, California. No, it's a rainy afternoon in Hong Kong. Or is it evening in Paris? Microsoft Flight Simulator doesn't care.

At a time when gorgeous 'open world' games are the norm, Flight Simulator helps set the bar even higher. Yes, it offers a stunning recreation of a virtual world, with weather and realistic landscapes, real-world traffic and ocean waves, and even, apparently, animals.

But the virtual world is our world, our planet, and you can go anywhere in it.

For me, that's the whole point of Flight Simulator. Even if we weren't severely limited in our movements by the current pandemic, most of us will never see the entirety of our planet. Travel to exotic locales also comes with costs – not just the price of a flight and hotel and food, but the pollution spewed by the planes, trains and motor vehicles used to get there. Microsoft's Flight Simulator



Flight Simulator's 'home' screen.

allows me to be that happy noob simply exploring the world, without worrying about all those other considerations.

HURRY UP AND WAIT

Microsoft's Flight Simulator ships in three editions:

Standard Edition: £59.99 from fave.co/3aURBYN

Deluxe Edition: £79.99 from fave.co/3gvmSTj

Premium Deluxe Edition: £109.99 from fave.co/31sML1W

All three will be available when the game launches Monday. Xbox Game Pass for PC subscribers will receive the Standard Edition for free.

Note that Flight Simulator requires an incredibly intensive process to install

and play it – the virtual equivalent of driving to the airport, parking, checking in, and more. Our installation (of the Premium Deluxe Edition, Microsoft confirmed) required about 70GB of files to be downloaded. Unpacking them all filled up about 110GB

total. The whole process took about two hours over a broadband connection.

The system requirements are worth studying. While they reach back far enough to accommodate many generations' worth of PCs, you do need Windows 10 version 18362.0 or higher; at least 8GB of RAM; and discrete graphics with dedicated memory. The minimum, recommended, and ideal system requirements are below:

Actually playing the game takes even more time. My PC – a Surface Book 3 that falls somewhere between Microsoft's 'recommended' and 'ideal' system requirements for Flight Simulator – required a few seconds to show me that the game was being loaded, and a whopping three to four minutes to move past the introduction to the main menu. In a world where Windows PCs are



You'll see this screen quite often.

almost immediately responsive, it all feels excruciatingly slow. The 15-second audio loop the game plays will soon drive you insane. You may as well go fetch a coffee while the game's being loaded.

While Flight Simulator offers everything from tutorials to challenges (such as landing at a particular airport), most people will want to jump right into Flight Simulator's virtual world. The game pulls data from Microsoft's real-world services, including

Bing Maps and its weather forecasts, promising that you'll have the option of experiencing the actual, current weather as it happens.

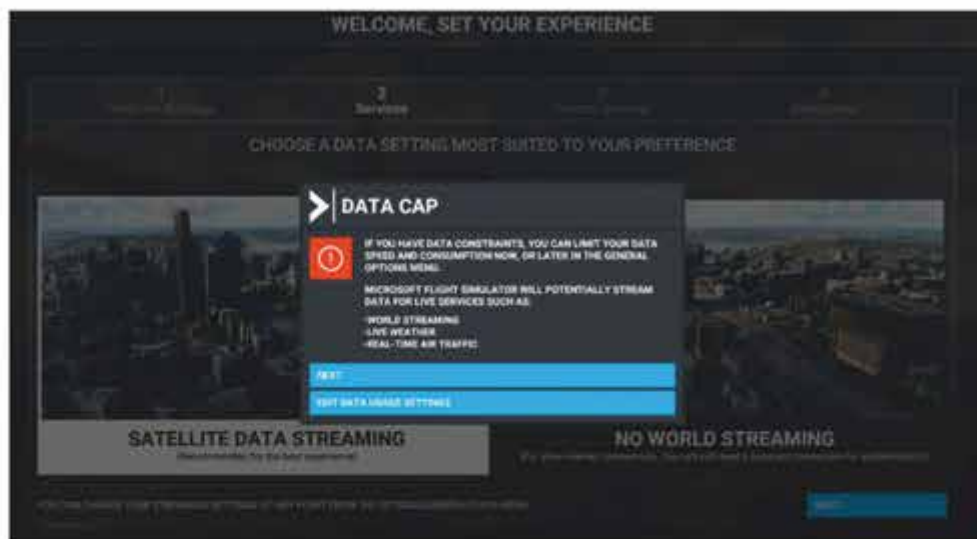
Our limited review time meant that I didn't have a chance to chase down a hurricane, but the oddly hazy

skies outside my Bay Area home were replicated in the virtual space when I took flight above San Francisco.

What it does mean, though, is that in addition to opening your wallet for Flight Simulator, you'll also need to keep track of how much data the game uses. Over a couple of days' use, Flight Simulator



Flight Simulator is accessible to mice, keyboards, and even controllers.



Keep an eye on your data usage in Flight Simulator, especially if you live in rural areas or those with bandwidth caps.

sucked up 2GB of data on my account. There are controls to limit bandwidth as well as the total available data the game uses over the course of a month. If you live in a rural area with limited bandwidth, you may have to dial down the live, real-world features a bit.

Early on, you'll be asked to select a difficulty level, ranging from 'easy' to a 'middle ground' to a more hardcore sim experience. This choice matters. Damage to the aircraft can occur not just from an outright crash, but

from undue stress on the airframe and engine. Catastrophic damage ends your flight – and forces you go back through the prolonged loading process to try again. You might want to toggle on unlimited fuel, too. Like Flight Simulator's graphics

options, however, there's opportunity to tweak and adjust to your heart's content – or just skip all that and jump in.

Gamers who grew up with Wing Commander and X-Wing probably learned how to use a joystick, and



Flight Simulator offers a wide variety of assistive features to make gameplay more fun... or more realistic.

perhaps a throttle – and then, if you're like me, you buried them in a box for the next 20 years. Fortunately, Flight Simulator plays smoothly with just an Xbox controller, along with the option to use a mouse or keyboard for supplementary commands.

A MAGICAL EXPERIENCE

Flights begin with a bit of scene-setting, showing your aircraft on the tarmac from a variety of angles. With a controller, one joystick simulates the plane's controls, with yaw and pitch; the other governs your view of the instrument panel and outside the windows. Just taking off can be a challenge to first-timers who are unfamiliar with the controls, but Microsoft helpfully provides a toolbar which exposes itself if you move the mouse to the top of the screen. An AI control (the 'head' icon) will automatically check off your pre-flight checklist and remain in contact with Air Traffic Control – and will even fly the plane for you, if you want. Tips will occasionally pop up, such as a reminder

to stow the landing gear after take-off. Flight Simulator implicitly understands that there are hobbyists and enthusiasts who enjoy tinkering with aircraft systems, and there are those who are just there for the ride.

I absolutely fall within the latter camp. I recall playing the original Flight Simulator when it came out in the late 80s, and immediately giving up on it – it simply wasn't the real world. With the Flight Simulator reboot, it comes pretty darn close.

Once in the air, all of the technical wizardry fades away. You simply can't help but marvel at the graphical detail... everywhere. The golden hills of the East Bay, the deep green of the Northern California coastal forests. The traffic on the roads as you swoop down. Diving



The interiors of the aircraft are as detailed, or more, than the outside world.



The only thing Microsoft Flight Simulator needs is a dedicated photo mode, though the 'Showcase' feature as part of the external camera mode helps do the job, Microsoft says.

in a 747 doesn't lend itself to close examination of textures and structures, but it appears that many buildings in urban centres are, in fact, buildings, rather than just textures overlaid onto terrain. Naturally, one of the first things I flew over was my own house, just to see if the nearby schools and shopping centres looked as I imagined them to be. They certainly did. Flight Simulator includes a number of 'handcrafted' airports, which include more than the usual level of detail. While I'm not sure how much you'll notice taking off or landing, the baggage carts and other details scattered around the recreation of

LAX, for example, certainly add validity to Microsoft's recreation of the world.

Clouds... look like clouds. I really want to go hunting for some big, lazy thunderheads, but I haven't had time quite yet. Are Uluru, Machu Picchu and the Pyramids all visible from the air? What's the weather like flying through a hurricane? Are there updrafts over the Sahara? I don't know, but the world's there for me to find out.

I can't really speak to performance, as Microsoft doesn't appear to make a frame counter available. Microsoft recommended that I play the game on 'high' settings, though I turned



Flights begin with a close-up of the aircraft.

down the resolution to 1080p for the gameplay stream we've embedded above. I played on a Surface Book 3 (Core i7-1065G7/32GB RAM/GTX 1660Ti Max-Q), and I'd have preferred a faster GPU.

Recording video does rob a few CPU cycles from gameplay, but you'll probably want a desktop or a dedicated gaming PC to play it. (I would hate to ask you to turn down the graphics options, however, as for me that's why you'd want to own the game!) Flight Simulator employs a 'rolling cache' that seems to store recently-used textures and objects, but it seemed to have the most influence when I circled around and flew over

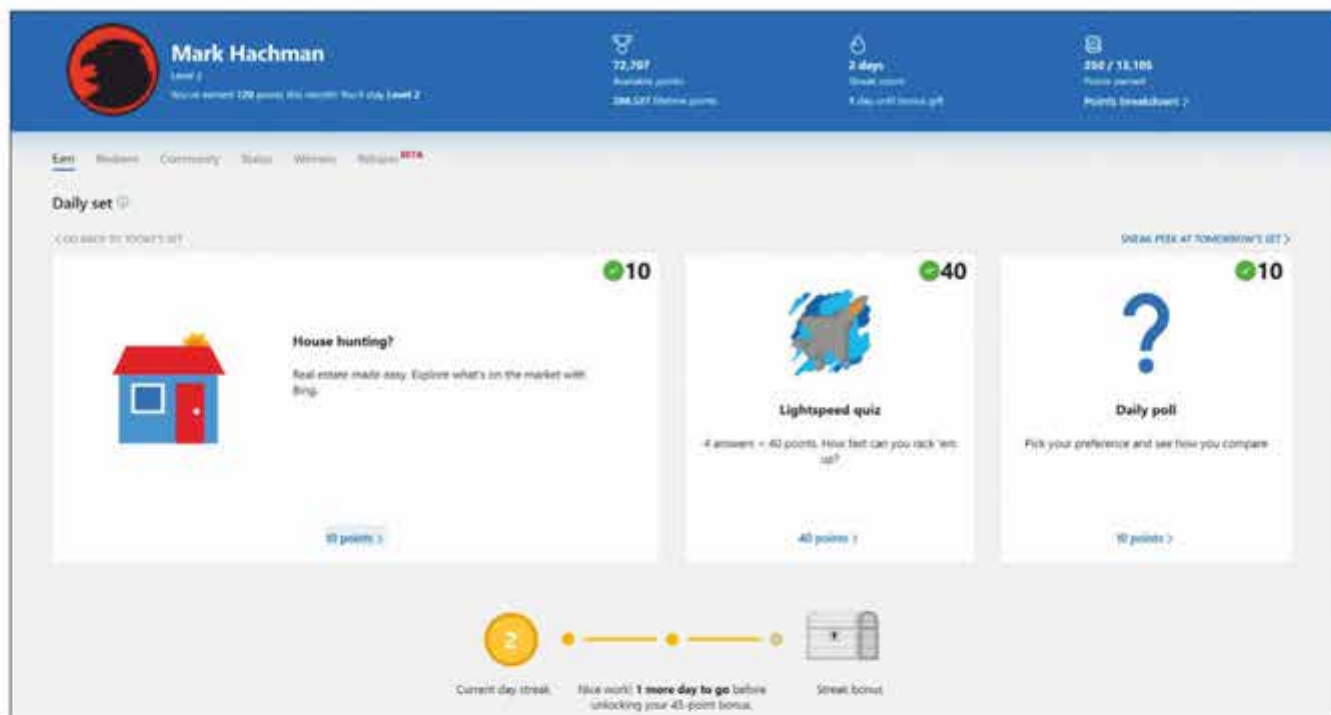
the same terrain twice. The 'reload' penalty for crashing makes landings that much more nail-biting, especially if you're winging it, so to speak. The helpful 'window' that guides you to your destination is Flight Simulator's equivalent of the Forza driving lines, but far more useful.

About the only thing I could have done without was the constant chatter between my AI copilot and the tower, which added realism but just became annoying after a while. And is there a photo mode? Microsoft's settings helpfully provide a search box, but other than the usual methods of taking screenshots, there didn't seem to be

an easy way to play tourist. (I asked Microsoft about this, but received no response.)

One of my favourite sites on the Internet is MapCrunch, which has a very simple, similar premise: it 'teleports' you to a random point within the vast network of Google Maps images. (It recently opened with a view of Vestfjarðavegur, Ísafjarðarbær, Iceland.) Random.earth does the same, but within Google Earth.

For me, Flight Simulator is a hybrid of the two: a chance to explore our vast, beautiful world without ever leaving my desk. One day maybe I'll be able to do the same in real life.



How to use Microsoft Rewards to get Xbox Game Pass for PC for free

Microsoft Rewards is an easy way to pick up the equivalent of a little free cash on the side without any extra effort. **MARK HACHMAN** reports

Microsoft Rewards is basically free money, and not enough people know how to use it. We're going to show you how to use Microsoft Rewards to help buy all the things you want – an Xbox Series X, Starbucks, Amazon gift cards – beginning with the awesome Game Pass for PC subscription.

Like the name says, Microsoft Rewards is Microsoft's incentive programme for using its consumer services. Using Bing earns you points. Playing Xbox games can earn you points. Playing PC games can earn you points. You can 'chase points' as much as you'd like, and earn more and more. Or you



Xbox Game Pass Ultimate bundles Microsoft's Netflix-esque Xbox Game Pass and Xbox Game Pass for PC subscriptions with its Xbox Live Gold service.

can chill, go about your daily activities as you normally would, and still earn points. All of these points can be traded in for stuff you'll actually want.

We'll use the awesome Xbox Game Pass for PC, which costs £3.99 per month, as our target. Game Pass for PC is part of Xbox Game Pass Ultimate's 'Netflix-for-games' subscription, which we've already shown can be purchased for peanuts if you know the trick. But why pay at all? Microsoft Rewards is the answer to that.

WHAT CAN YOU EARN WITH MICROSOFT REWARDS?

As we go through our tutorial, keep your eye on the prize: a one-month Game Pass for PC subscription is 7,000

points. You can pay 6,300 points for a Microsoft gift card, though that can only be applied to games, apps, movies/TV shows, or devices like a Surface or Xbox – not Game Pass.

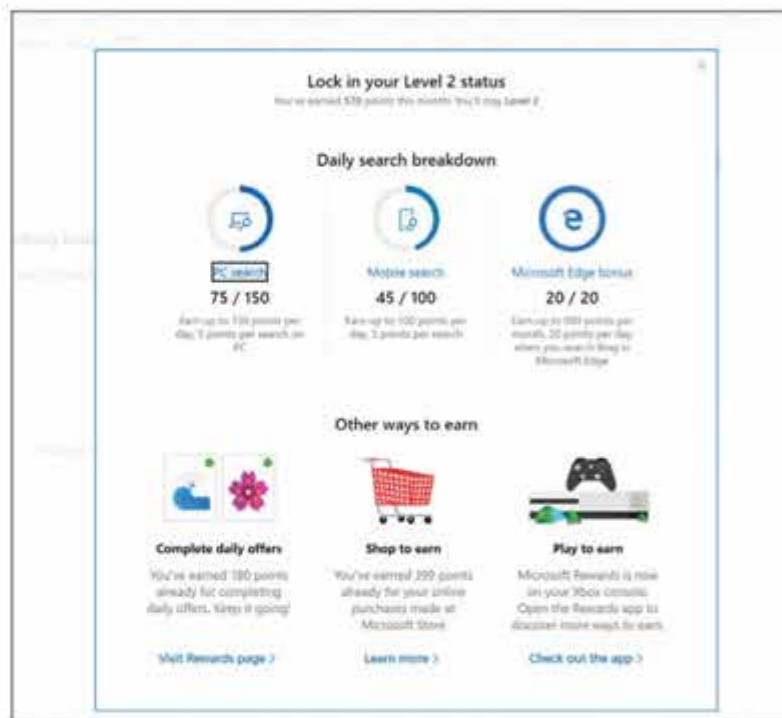
But the Microsoft Rewards redemption page offers all sorts of possibilities:

Microsoft gift cards and Game Pass subscriptions, including Game Pass Ultimate; gift cards to retailers like Marks & Spencer, John Lewis, TK Maxx, Currys PC World and Lastminute.com, or food offers at Pizza Express, Caffè Nero and Starbuck. You can even donate your points (and their cash value) to charities such as WE, CARE, Special Olympics, UK Youth, Ability Net or Stonewall. Microsoft will often 'pay' you points to double your donation.

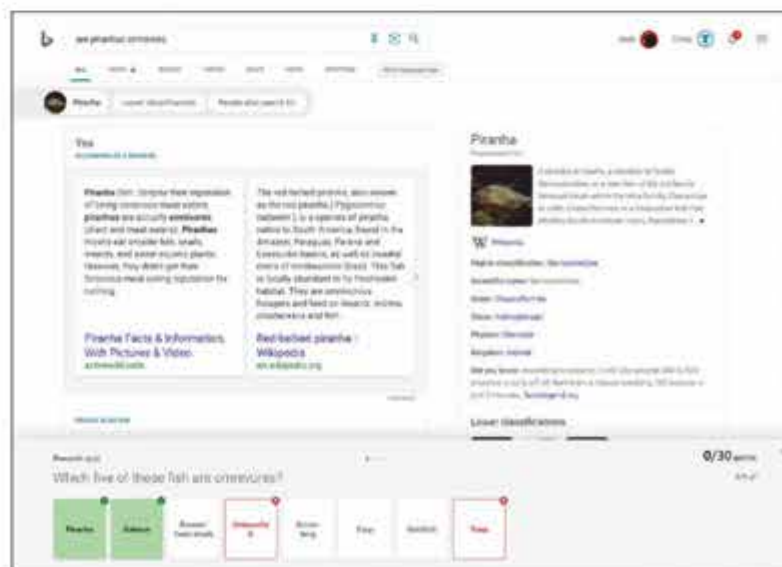
Microsoft has an odd tiering system, which offers discounts after progressing from Level 1 (at 500 points or less) to Level 2. That means you'll spend even less to "buy" what you want with Rewards points as you earn more throughout the month.

USING MICROSOFT REWARDS FOR PC (AND MOBILE)

There's one prerequisite: Microsoft Rewards requires a Microsoft account.



Microsoft awards you Rewards points for searching on desktop and mobile...



...and by completing quizzes.

You'll probably have to sign in to your account when you visit the Microsoft Rewards introductory page. Quickly click through to the Microsoft Rewards

Dashboard page (the image at the top of this story) to open the door to your free stuff. If you're signed up and logged in, Microsoft Rewards points will automatically accumulate – there's nothing more you need to do.

There are two big ways to earn Microsoft Rewards on the PC: searching via Bing and doing fun quizzes. Each day, Microsoft will 'pay' you up to 150 points for searching with Bing on your PC, up to 5 points per search. If you search with Bing on your smartphone, you can receive 100 points more (5 points per search). Using the solid Microsoft Edge browser nets you a bonus of up to 20 points, too.

("But that means I have to use Bing," some of you may whine. I'm a habitual Bing user; I switched to Bing in 2017, back to Chrome when Bing fell down, hard; and back to Bing over the past year or so after Microsoft fixed Bing's issues. You could still

use Google in a pinch.) In effect, doing nothing more than using Edge and Bing to search on your PC (30 days x 150 points, plus 30 days x 20 points equals 5,100 points) without any extra effort on your part.

If you'd like, you can also gamify the process. Every day Microsoft offers you three choices: a 'daily set' of a quiz, a poll, and a fact. Clicking each of them will generally earn you an additional 50 points a day. Microsoft will also add bonus points for three successive days that you perform daily sets, such as 45 points per three-day streak. If you miss a day, your daily-set streak resets. But don't feel too bad, as some of the quizzes will automatically archive down lower in the dashboard.

If you keep up with your 'daily sets', the 1,500 points you'll receive plus the 5,100 points from searching gets you close to our target of 7,000 points. Add that to the bonuses should put you at, or very near, that 7,000 figure. Victory! But why stop there?

If there's one area in Microsoft Rewards has neglected, it's earning points for playing PC games – something

we'll talk about in the next section. But you can also earn Rewards points for buying them, using actual cash.

USING MICROSOFT REWARDS ON XBOX

Accumulating Microsoft Rewards points on the Xbox is all about playing games. Initially, Microsoft Rewards was primarily a PC-only undertaking. Now, there are arguably more ways to accumulate Rewards points on Microsoft's console than anywhere else.

While there's no Microsoft Rewards app for the PC or Android, there is one for the Xbox. Go to the Microsoft Store app to download it. Once there, you'll need to make sure you're logged in after you open it up.

Not surprisingly, Microsoft makes playing games itself a game. Every



The Rewards dashboard on Xbox has numerous ways for you to earn points.



Microsoft constantly adds fun little tasks for you to do to earn Rewards points.

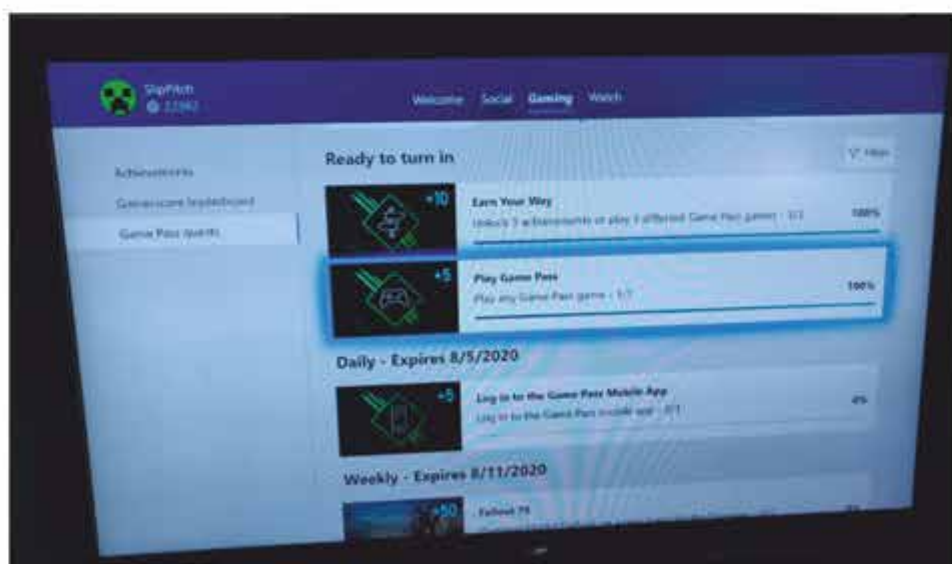
week, you'll have the opportunity to do the Rewards Weekly Set, with three tasks: you might simply have to log in on three successive days, or watch a trailer for an upcoming game, or accumulate three Xbox Achievements in any game. Keep doing this, and you'll earn points, plus big 1,000-point and even 2,500-point bonuses once you hit milestones like the ten-week mark. Note that you can still earn Achievements from playing PC games, but they have to be downloaded via the Windows 10 Xbox app, and the

developer has to have Achievements enabled. But wait, there's more.

Way down at the bottom of the Microsoft Rewards app, there's something called 'Other ways to earn'. While that section serves as a summary of your PC searches on your PC and mobile, it also leads to another section

called 'Game Pass Quests', where even more Rewards points lurk.

In general, Game Pass Quests are chump change. You'll receive a handful of points for playing a game in Game Pass (for PC or Xbox) and earning achievements in Game Pass



Don't forget to turn in your Quests for extra points.

games. Quests can be achieved daily (like logging into the Game Pass app for Android) or weekly, and constantly change. They can be as simple as 50 points just for logging into an app, or require more complex accomplishments like surviving for 50 days in Cities: Skylines. However, there's generally a fairly large reward (1,000 points) for completing a succession of weekly and daily quests.

There's one catch: unlike every other Rewards task, you must redeem Game Pass Quests manually. Other Microsoft Rewards points that you earn are automatically added to your total. You don't need to log on to your Xbox to do this, however, as the Xbox Game Pass app for Android allows you to redeem Quest points, too.

OTHER WAYS TO WIN REWARDS POINTS

Until recently, Microsoft would send you a weekly email with the opportunity to win Rewards points by clicking through links, as well as the occasional 'hidden link' which awarded even more. That seems to have gone away in favour of the expanded Xbox opportunities.

There are occasional crumbs hidden away, too. Microsoft Rewards extension for Chrome promises some additional points, and the Bing app for Android

used to (that implementation has been broken on my phone for months).

HOW MANY POINTS CAN YOU EARN FROM MICROSOFT REWARDS PER MONTH?

Microsoft Rewards is always in flux, so the value of individual tasks and the total amount of Rewards points available is constantly changing. Sharp-eyed Rewards hawks keep an eye out for discounts on gift cards, stretching your Rewards even further. Special promotions constantly pop up.

With that said, one member of Reddit calculated that you can earn up to 18,000 points per month, or about \$22.50 (see fave.co/2D3iWeY). At that point, the amount of effort required to chase every Rewards point wouldn't seem to be worth your time.

Smart Rewards users, then, balance their time against their potential rewards. Sure, you can probably afford an extra £5 per month for Microsoft's Game Pass for PC. But there's something oddly rewarding about just 'getting it for free' – and Microsoft Rewards scratches that itch.



Credit: Getty Images/baloon111

How to check and monitor your hard drive's health

No hard drive lives forever. IAN PAUL reports

Of all the PC components, few require more care and attention than a hard drive. We've all heard the admonishments to defragment drives, and clean up junk files to keep all our 1s and 0s sparkling. No matter how well you care for it, however, at some point that drive is going to fail.

Sometimes you can hear it coming, sometimes it happens suddenly in the middle of a project, and other times it just refuses to boot one morning.

Whatever way your hard drive meets its end, it's a certainty you'll see it happen if you use a PC long enough. Hard drives are complicated

little devices. The primary components are the magnetic platters that contain the data, as well as the head that reads and writes the data.

Those moving parts are the great benefit and big flaw of your hard drive. One ill-timed drop of a laptop, or a sudden move of a desktop tower, and the drive can be irreparably damaged. Wait long enough, however, and the drive will just fail on its own.

That's why hard drives need closer monitoring than a solid state drive, which has no moving parts. They die too, but usually not under the same conditions. While you can't always predict when or how your hard drive will bite the dust, you can take a few steps to see it coming.

GET SMART

The first tool for keeping tabs on a hard drive is its Self-Monitoring, Analysis and Reporting Technology, or SMART, feature. This system is built into most modern hard drives and SSDs, and it's designed to report when your drive is failing or encountering issues. Drive manufacturers can take their own approaches to SMART, but they generally measure similar performance points such as read error rates, mechanical shock, hard disk temperature, seek time performance, and so on.

```

Microsoft Windows [Version 10.0.18362.900]
(c) 2019 Microsoft Corporation. All rights reserved.

C:\Users\ > wmic diskdrive get model,status

Model                                Status
CT500P1SSD8                          OK
Samsung SSD 850 EVO 500GB            OK
WDC WD1003FZEX-00H3CA0               OK
SanDisk Cruzer Blade USB Device      OK

C:\Users\ >

```

An example of WMIC in action.

Most of the time the SMART system works in the background, but you can bring it to the fore in a number of ways.

The simplest way is to use the Windows command line utility WMIC, which stands for Windows Management Instrumentation Command-line (utility). This basic tool is a simple yay/nay health result based on the SMART statistics. Open a Windows command prompt and enter the following: **wmic diskdrive get model,status**. The results should look something like the above image. It's preferable to ask for the model as well as status so that you can determine more quickly which drive is failing if a problem is reported. This is not so much an issue for laptops, but it's helpful for desktops with multiple drives.

CRYSTALDISK INFO

If you'd like something with a little more detail then another option is to use

CrystalDisk Info (fave.co/2QlFDhm). CDI is a free desktop program that can display a lot of information about your disks, but the top area is probably enough for most people.

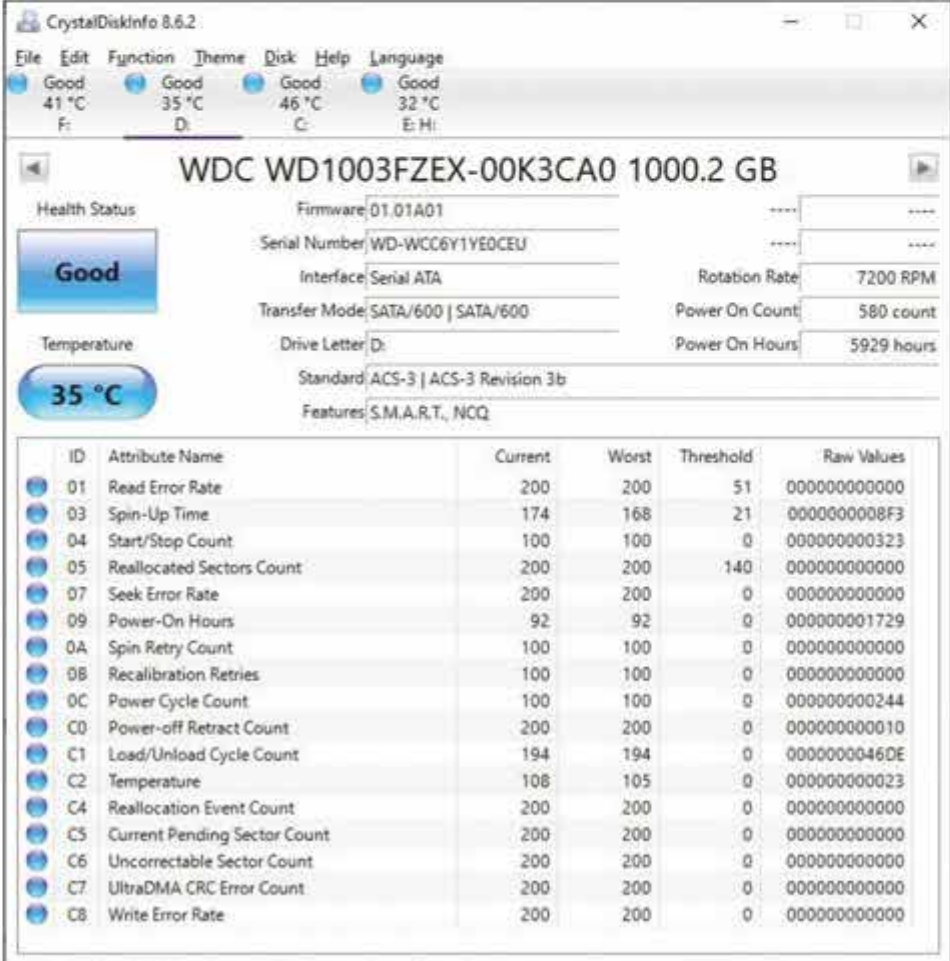
Here, CDI displays a status for each drive using a colour-coding system: Good (blue), Caution (yellow), Bad (red) and Unknown (grey). Most of the time you should just see a Good status, but if you see one of the others it's time to keep an eye on that drive.

But here's the thing about checking the SMART status: It's not 100-per cent reliable. Consider a Google study published in 2007 (fave.co/3aWmeNq): The authors found that 36 per cent of the drives monitored for the study reported no SMART issues at all before failing.

Things haven't changed much either. In 2016, Backblaze reported that it was seeing 23.3 per cent of its data centre drives failing without reporting issues from the five SMART

attributes it tracks. Statistically speaking the majority of discs do report SMART issues before failing; however, statistics become less reliable when trying to predict the fate of a single drive. In other words, your particular drive might report issues before failing, or it might not.

SMART is also a part of SSDs, but it has the same drawbacks and limitations as hard drives. The best solution right now for SSDs is to use monitoring tools provided by the drive maker such as Crucial's Storage Executive, WD's SSD



CrystalDiskInfo 8.6.2

File Edit Function Theme Disk Help Language

Good 41 °C F: Good 35 °C D: Good 46 °C C: Good 32 °C E: H:

WDC WD1003FZEX-00K3CA0 1000.2 GB

Health Status: Good

Temperature: 35 °C

Firmware: 01.01A01

Serial Number: WD-WCC6Y1YE0CEU

Interface: Serial ATA

Transfer Mode: SATA/600 | SATA/600

Rotation Rate: 7200 RPM

Power On Count: 580 count

Power On Hours: 5929 hours

Drive Letter: D:

Standard: ACS-3 | ACS-3 Revision 3b

Features: S.M.A.R.T., NCQ

ID	Attribute Name	Current	Worst	Threshold	Raw Values
01	Read Error Rate	200	200	51	000000000000
03	Spin-Up Time	174	168	21	0000000008F3
04	Start/Stop Count	100	100	0	000000000323
05	Reallocated Sectors Count	200	200	140	000000000000
07	Seek Error Rate	200	200	0	000000000000
09	Power-On Hours	92	92	0	000000001729
0A	Spin Retry Count	100	100	0	000000000000
0B	Recalibration Retries	100	100	0	000000000000
0C	Power Cycle Count	100	100	0	000000000244
0D	Power-off Retract Count	200	200	0	000000000010
C1	Load/Unload Cycle Count	194	194	0	0000000046DE
C2	Temperature	108	105	0	000000000023
C4	Reallocation Event Count	200	200	0	000000000000
C5	Current Pending Sector Count	200	200	0	000000000000
C6	Uncorrectable Sector Count	200	200	0	000000000000
C7	UltraDMA CRC Error Count	200	200	0	000000000000
C8	Write Error Rate	200	200	0	000000000000

CrystalDiskInfo 8.6.2 showing the status of a WD hard drive.

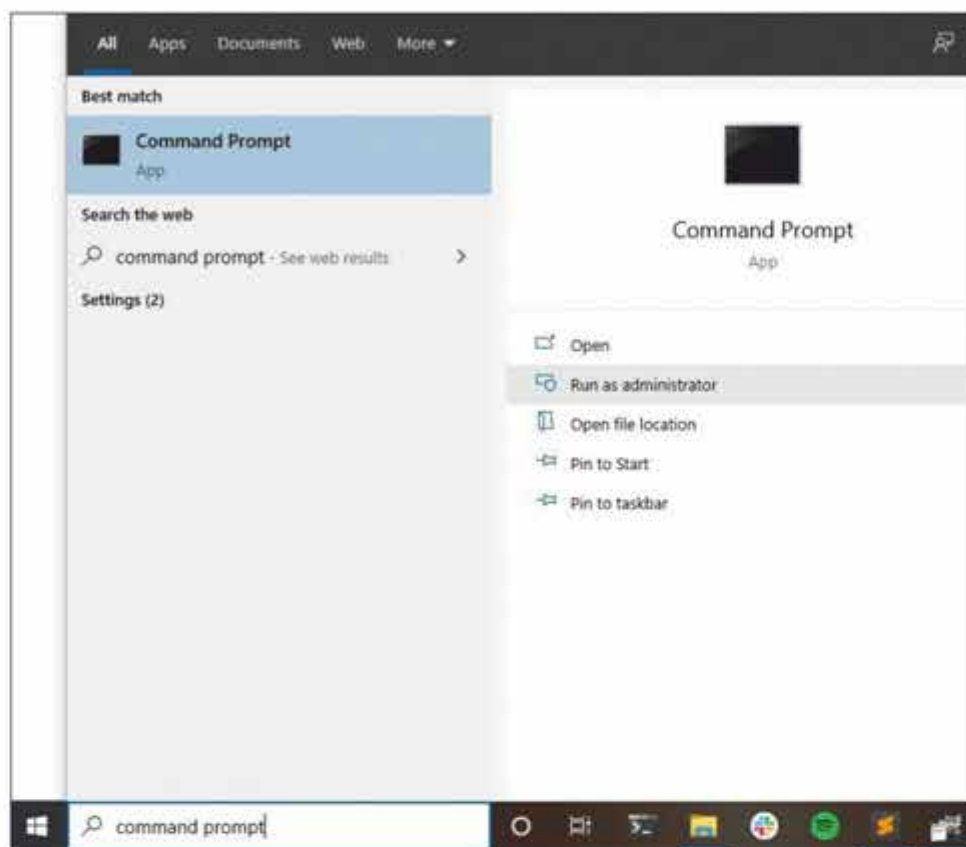
Dashboard, or Samsung's Magician Software (for EVO 860 and up).

BEYOND SMART

While SMART is a useful tool for monitoring your drive's health, you should also keep an eye on how your drive behaves and sounds. If you start to hear a grinding noise emanating from your PC, for example, that is mostly likely the hard drive. Either its end is near, or it's going to start malfunctioning soon.

Even if you don't hear a funny noise, your drive can cause odd things such as frequent crashes, a high number of error messages, folder or file names that have odd characters in them, very sluggish performance, or documents suddenly filled with garbage. Most of these issues are a pretty clear sign your drives are about to end, but not always.

First, check to see if your storage device drivers are up to date. This is a good basic step for any component, and it may improve your



Run the command prompt as an administrator to use 'chkdsk.'

storage drive's performance if you're encountering issues.

If a driver update doesn't help, run Windows' built-in 'chkdsk' (check disk) command-line utility. For those looking to take extra care, run it every few months, at the start of each quarter, for example. 'Chkdsk' runs only with elevated privileges. To do this, search for command prompt in the Windows 10 search box, and then select Run as administrator from the options as pictured here.

To just check the status of all your drives type **chkdsk** for a read-only

status of your drives. If you want it to fix problems you need to run the check disk program with the **/F** or **/R** options. The **/F** option focuses on fixing filesystem errors, while the **/R** option also checks for bad physical sectors on the drive – don't use the **/R** option on an SSD as this option is not built for solid state drives. The **/R** option can take a very long time to complete, and needs to work on a reboot so only run that when you have the time. The **/F** option also needs a reboot to run but requires less time.

An example command might be **chkdsk d: /r**. That command tells the utility to check only your D drive. In this scenario the C: drive is an NVMe SSD and D: is the higher-capacity hard drive that requires servicing. Windows 10 is set to run chkdsk automatically, so you may be alerted to issues before you do a manual run of this utility.

LIFE AFTER DEATH

To avoid the worst effects of dying storage drives, make sure you're doing regular backups. The best option is to use something that saves multiple historical states of your data such as Windows' built-in File History. That way if a recent backup has the same garbage drives, you can go back in time to retrieve earlier versions of them.

It's also a good idea to use a cloud backup service so you have a third copy of your data that's off-site. An alternative would be to have two hard drives doing File History backups, and keeping one off-site, with regular swaps to keep each drive as current as possible.

Once you start seeing serious hard drive errors that can't be fixed with check disk, it's time to replace the drive as soon as possible. If the errors can be fixed, you can probably eke a little more life out of the drive, but it's still a good idea to replace it and avoid further heartache.

