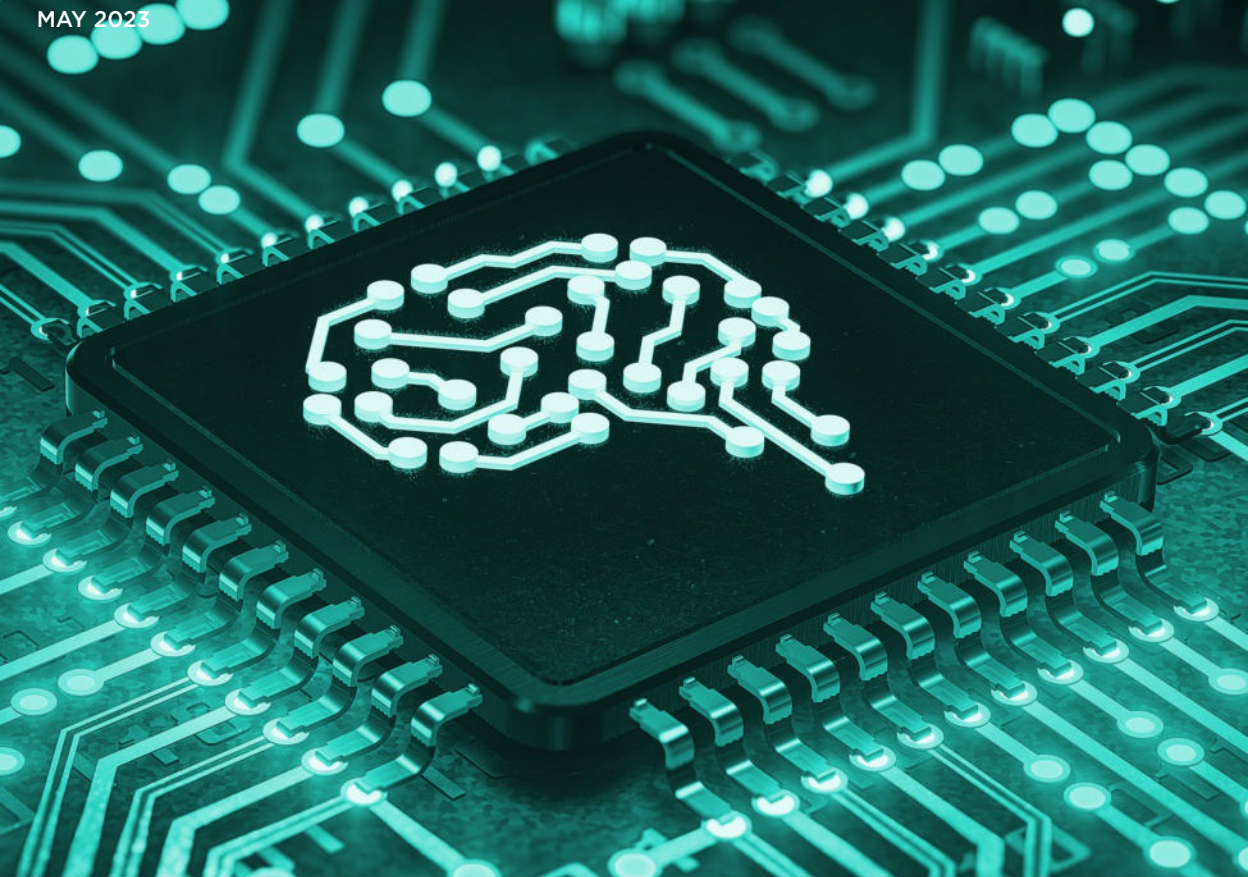




**INSIDE:**  
TURN AN OLD  
TABLET INTO  
A SECOND  
PC MONITOR

# TECH ADVISOR

MAY 2023



**AI SERVICES THAT WILL  
IMPROVE YOUR LIFE**



Credit: Getty Images/MF3d

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Credit: MWC

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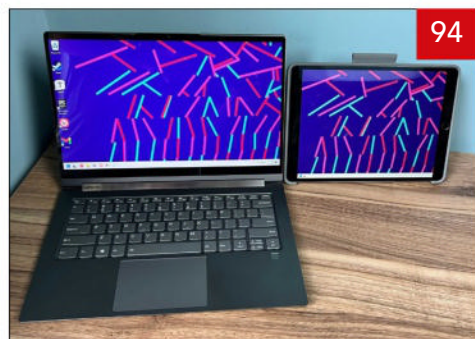
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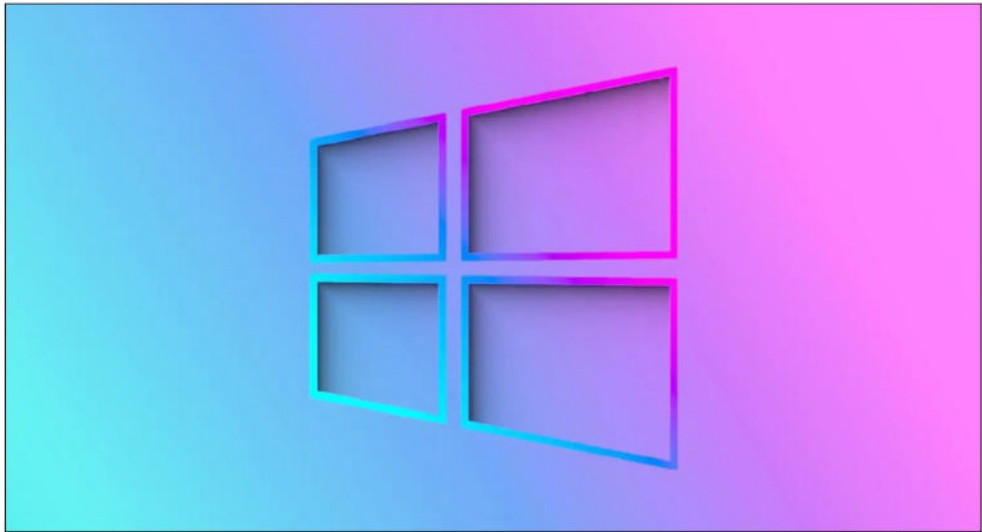
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Credit: Pixabay

# Windows 12 inbound? Microsoft paves way with Insider Canary Channel

Be warned: the channel could break your PC. **MARK HACHMAN** reports

If you're interested in trying out the far future of Windows features – say, Windows 12? – the new Windows Insider 'Canary' channel may be right up your alley.

Microsoft debuted the fourth new Windows Insider Channel earlier this month. 'Canary' joins the other Windows Insider channels as a way

for you to try out new features before they arrive on Windows 11. Typically, the arrangement goes as follows: Release Preview is for code that's just about to be released, while the Beta Channel is code that's definitely scheduled, through a bit further out.

The Dev Channel and the new Canary Channel are more experimental.

Microsoft 'relaunched' the Dev Channel, with an eye toward enthusiasts who want to try out new code that may never see the light of day. 'Canary' is even riskier, and the new channel was accompanied by warnings that it could end up putting your PC into a state where you might have to reinstall Windows.

On the other hand, the Canary Channel may end up as a way for you to see what Microsoft is working on for the next release of Windows. What Microsoft won't do, apparently, is always tell you what those features may be. "We will offer limited documentation for the Canary Channel, but we will not publish a blog post for every flight – only when new features are available in a build. We will continue to provide blog posts for Dev, Beta, and Release Preview releases like we do normally," Microsoft said in a blog post.

Windows Central points out that the new channel may be used to debut so-called Windows vNext, code that won't end up in Windows 11 but may be released in an entirely new version, aka Windows 12. Put another way, the Dev Channel is being designed for enthusiasts who want to try out code within the Windows 11 time frame, but the Canary Channel could wind up reserved for Windows 12 (or 13?) experiments.

Joining the Windows Insider program for Windows 11 is easy. In its blog post, Microsoft suggested that now might be a good time for switching channels, which you can do via the Windows Insider portion of the Settings > Windows Update section of the Settings menu. Just remember that while it's easy to switch to more advanced channels (from Release Preview to Beta to Dev to Canary), it's more difficult to go backwards. That's because Windows doesn't want you to go 'update' to an earlier build. In that case, you may have to reinstall Windows, which will erase all of your installed applications. In other words, Insider builds are still best left for a secondary machine that's tolerant of bugs and other glitches.

Rumour has it, though, that Windows 12 could debut in 2024. If you'd like to roll the dice and start getting an early peek, than the Canary Channel may be for you.



# Microsoft admits it marked ineligible PCs for Windows 11 upgrades

Some laptops and desktops sold with a promised upgrade to Windows 11 are officially out of luck. **MICHAEL CRIDER** reports

**E**very time there's a shiny new version of Windows on the horizon, you'll see them. A horde of stickers. A sea of stickers. A veritable galaxy of stickers on laptops

and desktops all over shelves in digital and physical retailers, with 'Windows XX upgrade available' printed on them. And, without fail, actually securing that upgrade can be a bit of a headache. So,

it is with some PCs sold with promised upgrades to Windows 11 which, it turns out, aren't coming because the hardware can't officially handle it.

The company said as much on the latest update to the Known Issues section of the Windows 11 21H2 release health post, marked 'resolved' at the top of the issue list:

*"Some hardware ineligible Windows 10 and Windows 11, version 21H2 devices were offered an inaccurate upgrade to Windows 11. These ineligible devices did not meet the minimum requirements to run Windows [sic] 11. Devices that experienced this issue were not able to complete the upgrade installation process."*

According to the notes spotted by Tom's Hardware, affected versions include Windows 10 22H2, 21H2, and 20H2, indicating that this is a problem for at least some PCs sold up to a couple of years ago.

Microsoft posted this information in a support changelog and not, say, a press release, indicating that anyone who has a problem with their upgrades suddenly failing via Windows Update can go suck eggs. (That's not a direct quote.) Users who are set on using Windows 11 will have to upgrade their

hardware or search for a workaround.

Speaking of which, Windows seems to be having a collection of embarrassing issues surrounding the W11 upgrade as of late. In February watermark messages started appearing on Windows 11 copies running on hardware that doesn't officially support the newer version. This, despite the fact that it's been shown that Windows 11 can run on much lighter systems than previously suspected, albeit without the official blessing of Microsoft.

In short, the upgrade process to Windows 11 (and the eligibility of hardware for said upgrade) remains a murky mess more than a year after the operating system's full public release.



# HP printers still block third-party ink: These models have a workaround

You can upgrade these HP printers with new firmware to allow third-party ink cartridges to be used. **MARK HACHMAN** reports

**H**P's 'dynamic security' prevents you from using third-party ink with HP printers. While HP does this to 'protect the quality of our customer experience', being able to buy cheaper, non-HP ink can save you

money. So how can you use third-party printer ink? We have a solution for at least some models.

Unfortunately, HP's dynamic security isn't new. HP began the practice of banning unauthorized printer ink in 2016



with a firmware update that prevented third-party ink from being used. That hasn't stopped consumers from being outraged that they can't do what they want with printers they purchased, and buy whatever third-party ink cartridges they want to use.

Earlier this month, the topic of HP dynamic security surfaced again when users on Reddit discovered (or re-discovered) the fact that HP uses what is essentially digital-rights-management (DRM) on its printers to identify authentic HP printer ink cartridges and prevent unauthorized cartridges from being used. Ars Technica noted the issue, pointing out that HP is currently facing a class-action lawsuit over the issue as consumers attempt to legally prevent HP from blocking third-party ink.

HP maintains that it's doing this for your benefit, but also freely admits that it's trying to "protect" its own technology. "The purpose of dynamic security feature is to protect HP's innovations and intellectual property, maintain the integrity of our printing systems, ensure the best customer printing experience, and protect customers from counterfeit and third-party ink cartridges that do not contain an original HP security chip and infringe HP's intellectual property," it says.

## **HP PRINTERS THAT USE 'DYNAMIC SECURITY' TO BLOCK THIRD-PARTY INK CARTRIDGES**

HP doesn't make clear which printers use the dynamic security feature, which is what Reddit users became infuriated about – HP apparently had permitted the use of third-party ink on the OfficeJet 7740 and the OfficeJet Pro 6970, then cracked down. But HP does list some printers which can be upgraded via a firmware update to eliminate the block on third-party ink.

Even those, however, fall into two categories: printers whose dynamic security feature can be disabled, and printers whose dynamic security feature is permanent.

**HP printers with dynamic security that can be disabled:** HP OfficeJet 6810, 6820, OfficeJet Pro 6230, 6830, 8610, 8620, 8630, 8640, 8660, X451dn/dw, X476dn/dw, X551dw and X576dw.

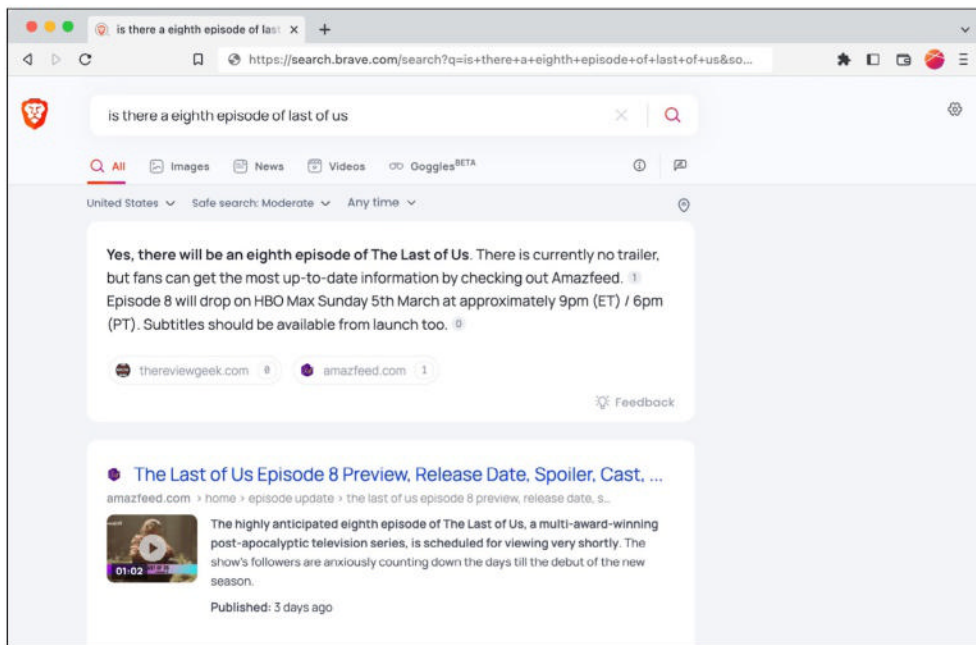
**HP printers with dynamic security that can be disabled depending on the date of manufacture:** HP Officejet Pro 6970, 7740, 8210, 8700, Officejet 6950, PageWide 300, 400, and 500 printers. The key is the manufacturing date. If the printer was manufactured before 1 December, 2016, dynamic security can be disabled via a firmware update.

If the printer was manufactured after that date, however, dynamic security can not be disabled.

Unfortunately, that still leaves a number of other HP printers that don't allow for the firmware workaround – and HP won't say which printers that applies to.

To eliminate HP's block on third-party ink, you'll need to visit the printer's Software and Drivers Downloads page. There, you'll find instructions on how to upgrade the printer firmware. When that's completed, HP says, you'll be able to use third-party ink with that printer.

The company still won't accept blame for whether or not the process works, however. "If the cartridge still fails after the feature is removed, then the cartridge is most likely defective and should be returned to your retailer," HP explains.



# Brave and Opera adding AI-powered summaries to their browsers

Brave's Summarize tool will be featured in its search results; Opera will put its tool in the browser sidebar. **MARK HACHMAN** reports

**W**hile Microsoft continues to polish Bing Chat (for details, see our hands-on, on page 73) and Google preps its own AI chatbot, Bard, smaller alternative

browsers Brave and Opera are making plans for AI, too. The two browser companies said that they will use AI to summarize articles, with Brave debuting the Summarizer in March.

Microsoft's latest beta version of Edge uses Bing's AI-powered chatbot to summarize articles that it finds on the web, providing a concise explanation of their contents in the sidebar if asked. The Brave Summarizer is slightly different; instead, it uses its own AI-powered tools to examine a page of results and then summarize the findings. Brave provides its own search tools, and it is using the AI summation to replace the page-generated description with its own.

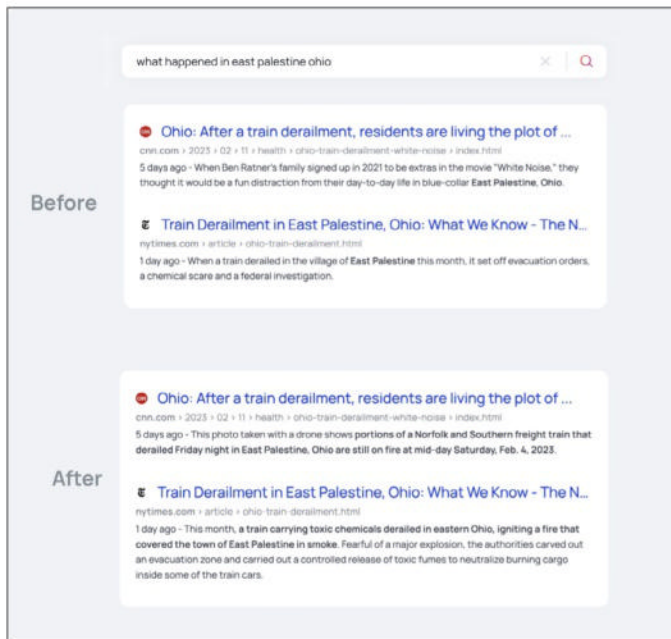
According to Brave, the company uses its Summarizer tool as a way to counteract what it sees as a problem of the Large Language Models (LLMs) that underlie so-called AI tools. These LLMs can 'hallucinate' data, making up facts where none exist. Brave says that the Summarizer, by contrast, simply sums up what's there on the page, leaving the link intact for attribution.

"Unlike AI chat tools which can provide fabricated responses, the Summarizer generates a plain-

written summary at the top of the search results page, aggregating the latest sources on the web and providing source attribution for transparency and accountability," says Josep Pujol, chief of search at Brave, in a statement.

Brave did not use OpenAI's ChatGPT as the basis of its Summarizer engine. Instead, the company said that it had trained three of its own LLMs to read the page, rule out spam or hate speech, and then summarize the results.

Opera, however, said this month that it will collaborate with OpenAI to implement OpenAI's 'state-of-the-art



A 'before and after' look at how Brave's Summarizer works.

AI models' within its browser. That will include a new 'Shorten' button in the address bar that will be able to use AI to generate short summaries of any web page or article, Opera revealed. However, the company did not offer any timetable for integrating the AI technology. Additional AI-powered services will be added to Opera's sidebar, the company added.



Credit: MWC

# Best of MWC 2023

The best new tech we've seen in Barcelona. HENRY BURRELL reports

**A**s we do every year, pandemic permitting, the staff at *Tech Advisor* descended on Barcelona with thousands more from the global tech community for 2023's Mobile World Congress trade show.

MWC usually serves up a plethora of new smartphones but there's plenty more to see from the biggest technology companies. Though Samsung launched its Galaxy S23

series before the show this year there have been plenty of big launches from competing Android brands, announcements from others, and a whole load of new products to get our heads around. Here are the new products that stood out to us.

## 1. HONOR MAGIC VS

Honor didn't really reveal the Magic Vs at MWC this year. Its presentation



1.

focused on the more powerful, but less exciting Magic 5 Pro. But this is when we finally found out for sure that the foldable phone will launch in the UK and Europe, and at a Samsung-beating price of €1,599 (around £1,420).

With a slim body and a hinge capable of closing all the way with no gap, there's a physical polish here that even Samsung's hardware lacks. It's backed up by an impressive triple rear camera and the punchy Snapdragon 8+ Gen 1 chipset, so it's no slouch when it comes to performance either.

We still reckon Samsung's slick software

gives the Z Fold 4 a slight edge over Honor's hardware, but this is close competition – and the Korean company's first real rival in the worldwide market.

## 2. MOTOROLA 'RIZR' ROLLABLE CONCEPT PHONE

Before you get excited, no, you can't buy the Rizr. That isn't even technically its name, as Motorola reps were at pains to point out: this is

an unnamed concept device, but proof that rollables are still on the way and chasing after the foldable phone market (and laptop, with a Lenovo rollable laptop on show at the same time)

Named after the company's noughties line of slider phones, the Rizr's squat, 5in display can extend



2.

upwards to a full 6.5in screen in a more traditional form. You can trigger that manually, but it'll also kick in automatically when you open the keyboard or watch a video in landscape.

What's won us over is how well Motorola has thought this through from every angle – literally. When rolled down the extra screen wraps around the rear to serve as an always-on display or camera viewfinder, and it can actually roll inwards even further to reveal the phone's hidden selfie camera and earpiece.

### 3. XIAOMI 13 PRO

The Xiaomi 13 Pro is the company's top-of-the-line flagship for 2023 – at least until the rumoured 13 Ultra potentially arrives later this year.

It's a total knockout from a hardware perspective, with stellar Snapdragon 8



Gen 2 performance, a stunning 120Hz display and much-improved battery life among the highlights. You'll have to contend with a hefty camera bump, but the triple 50Mp rear sensors are superb and the 32Mp selfie camera isn't bad either. The IP68 dust- and water resistance rating is back after a one-year absence too, joined by an attractive new ceramic back.

Aside from the high price tag (from £1,099), the only thing holding it back is software. MIUI is far from the best or most intuitive interpretation of Android, although it's still very usable and offers a wide array of features.

If that's not a dealbreaker for you, the Xiaomi 13 Pro's stellar hardware means it can rival the best flagship phones around. But you may also want to consider the cheaper regular 13.

For our review of the Xiaomi 13 Pro, see page 48.

### 4. TECNO PHANTOM V FOLD

The Tecno Phantom V Fold is the firm's first ever folding phone. It's not coming to Europe or North America, but we wish it was.

Not only does this book-style foldable significantly undercut rivals on price (from \$1,099, around £915), it also has a crease down the middle that actually lives up to the 'almost





invisible' claims. You can still just about see it, but it doesn't get in the way of the excellent 7.85in, 2K internal display. The 6.42in cover screen is almost as good (both are adaptive 120Hz), and means you can easily take selfies with the triple rear cameras.

Each of the 50Mp main, 50Mp 2x telephoto and 13Mp ultrawide perform well in bright environments, but it's low light where Tecno puts much of its focus. That includes dedicated night modes for portrait shots and 4K video. MediaTek's flagship Dimensity 9000+ chipset means performance is excellent, while Tecno's Android skin includes plenty of software features designed for foldables.

It might not be available where you're

based (just India initially), but don't sleep on the Phantom V Fold.

## 5. XIAOMI WIRELESS AR GLASS DISCOVERY EDITION

Xiaomi wouldn't allow many journalists access to its new impressive but clunkily-named Xiaomi Wireless AR Glass Discovery Edition, but we've seen enough about it at MWC to fling an award in its direction. Tech firms have bigged-up augmented reality (AR) for several years now. The idea (as seen in so many sci-fi movies) is you can wear glasses that allow you to see what's in front of you but also display things such as messages, map overlays, or a 3D model of your next sofa to see how it fits with your living room's look.

With Xiaomi the clue is in the name. These are wireless AR glasses,



cutting the cord often connected to a PC or similar power source with many wearable glasses. These are compatible with Qualcomm's Snapdragon Spaces AR platform that officially works with the OnePlus 11 and is coming to other top end Android smartphones.

We saw a demo of the glasses in action with a woman very engrossed in a Space Invaders-style game. It wasn't console level, but we can see how the applications are finally being developed, with an ecosystem partners such as Qualcomm and app developers combining to make AR products a reality rather than a concept. It also helps the Xiaomi design here is relatively sleek and at least try to look like sunglasses – this ain't Google Glass.

The lenses have electrochromic colour change pass-through that lets

them change opacity, so you can fully view the world around you or block it out depending on the app.

Mainstream AR isn't quite here yet but more than any other AR glasses, the Xiaomi Wireless AR Glass prove it's on the horizon.

## 6. REALME GT 3

Ridiculously fast charging has remained the preserve of concept phones, until now. The Realme GT 3 goes on sale in either May or June this year, and has crazy-fast 240-watt charging, which can fill the battery from flat to full in under 10 minutes.

The phone is essentially a global rebrand of the Chinese-exclusive Realme GT Neo 5, which launched just a few weeks prior to MWC.

We do have some concerns about the long-term battery life of a phone that charges this quick – heat stress on batteries is the big one – but Realme has confirmed that the phone has a vapour cooling system and claims that it should last 1,600 charging cycles while retaining more than 80 percent of the original battery capacity.

The GT3 also has an RGB-lit rectangle that lights up different colours for various notifications,



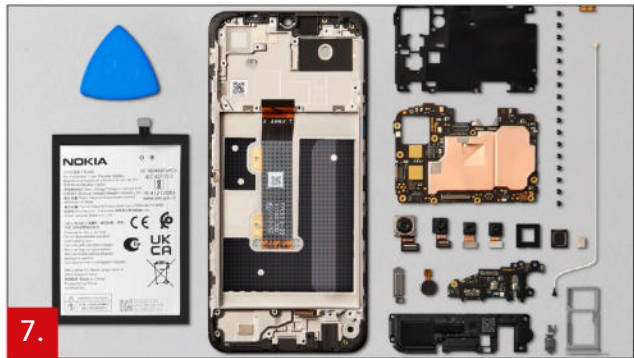
which is a nice touch for the overall design. It also sports a Snapdragon 8+ Gen 1 processor and an OLED display with a 144Hz refresh rate, which for \$649 (£630) is an impressive spec.

## 7. NOKIA G22

Nokia launched three budget phones during MWC, but the Nokia G22 was the star of the show. It is designed for DIY repairs and allows you to replace the battery, display and other parts, should they have any faults.

HMD, the company that licenses the Nokia brand for phones, has achieved this by making alterations to the design for quicker and simpler access. For example, it replaced the glue on the back with plastic grips to allow users to take it off and on again without issues and included easy-to-access screws for replacing delicate parts.

In a briefing, a Nokia spokesperson replaced the battery in under five minutes and told us that a display change would take just 20 minutes. Customers can save money by not having to hire someone, and ultimately save their pockets (and the planet) by holding onto devices for longer. It's true that Fairphone did this first, but



having another phone manufacturer on board with at-home repairing is great to see. It reaffirms Nokia's commitment to being conscious of the environment with its products and services, which is a breath of fresh air in a world of constant phone releases.

## 8. ONEPLUS PAD

The OnePlus Pad looks like it will be a relatively premium device that has the potential to be a worthy rival to the iPad Air.

Coming in a stunning 'Halo Green' aluminium alloy finish, the tablet is lightweight and slim despite a big and bright 11.6in display with a 144Hz refresh rate and support for Dolby Vision. This is paired with punchy quad speakers with Dolby Atmos support.

It has 67-watt fast-charging to top up its generous 9,510mAh battery which should yield 12.4 hours of continuous



video playback. OnePlus also demoed a matching stylus and keyboard, which both had the same high-end feel, those these will be optional extras.

Pre-orders for the OnePlus Pad begin this April. While no price has been announced, the brand is known for offering a lot of bang for the buck with its smartphones, so we're hoping to see a similar trend with the tablet.



# Samsung Galaxy Book3 Pro

**Price:** £1,749 from [fave.co/401mt2J](https://fave.co/401mt2J) ★★★★★

Samsung's 2023 Galaxy Unpacked event was all about the Ultras, with the updated Galaxy S23 version joined by a brand-new Galaxy Book Ultra. But the latter was just one of four new laptops announced by Samsung, and the other three, cheaper options are likely to be more popular. They include the Galaxy Book3 Pro, a

regular clamshell laptop available with either a 14- or 16-inch screen.

None of these are touchscreens, and they don't have the S Pen support we've come to associate with Galaxy Book range. And although I just said 'cheaper', the Book3 Pro isn't exactly cheap. Is there enough here to justify the high price? The short answer to that



It means the Galaxy Book3 Pro has a near-identical aluminium body to its predecessor.

is no, but it's still excellent for everyday use, so don't stop reading just yet.

## DESIGN

Samsung has stuck with the same basic design for its laptops since relaunching them in 2020, and there's no sign of that changing any time soon.

It means the Galaxy Book3 Pro has a near-identical aluminium body and understated aesthetic to its predecessor, with a silver logo punctuating an otherwise very plain exterior.

Some may see it as boring, but I love the minimalist design Samsung has gone for. It's available in two colours – Graphite and Beige – and the Beige model I tested certainly looks the part.

That choice of materials also helps the Book3 Pro to remain impressively lightweight for its size. The 14-inch model weighs 1.17kg, while the 16-inch version is only slightly heavier at 1.56kg. It means both are very portable, especially with the chassis no more than 12.5mm thick.

A thin and light laptop often risks durability, but that doesn't seem to be an issue here. The

combination of premium materials and a solid hinge design means the Book3 Pro feels impressively robust. You will notice the wobbly display at times, especially while typing, but there's no indication of it causing any long-term damage.

I'm also very glad to see a healthy port selection, something which is consistent across both sizes. Both USB-C ports support Thunderbolt 4, making



The laptop has a healthy selection of ports.

for fast data transfer and easy connection with a range of other devices and accessories. They're joined by one USB-A, one full-size HDMI, a microSD card slot and a 3.5mm audio jack.

If I'm being really picky, it'd have been nice to have another USB-A port – you may still need an adapter or hub – but I can't really complain. Many thin and light laptops do away with the port entirely.

## KEYBOARD

Both sizes of the Galaxy Book3 Pro can comfortably accommodate a full-size keyboard, but only the 16in model includes a separate number pad to the right. A feature like this falls into the 'nice to have' category, but I wouldn't have missed it if it wasn't there.

The keys themselves adopt a 'chiclet' design, meaning they have a separated, flatter shape and offer significantly less travel than on some other laptops. This sounds like a bad thing, but typing on the Book3 Pro is great. Each key feels very clicky and responsive, which improved the speed and accuracy of my typing.

Samsung offers three levels of backlighting. At the dimmest setting it's bright enough to comfortably use in



Below the Galaxy Book3 Pro's keyboard, complete with number pad, is a huge trackpad.

a room that's completely dark, and at 100 percent the light is still visible when there's more ambient light.

The main criticism of the keyboard is the row of function keys at the top. They offer all the usual quick access to volume adjustment, brightness controls and other key settings, but you need to hold down the Fn key at the same time to use them. This is something that affects all Samsung laptops, but it annoys me every time.

Below the keyboard, you'll find a huge trackpad. It extends across half of the width of the keyboard on the 16-inch model, and covers almost the entire distance between the space bar and edge of the device.

This gives the illusion of more control, but I found the opposite. Oddly,

it lacked the precision of smaller versions, such as the ones you'll find on other Galaxy Books. I often had trouble clicking a specific area of the screen or highlighting specific text. The cursor also sometimes moved erratically.

Plus, the sheer size of the thing led to a few accidental clicks simply because it leaves limited space to comfortably rest your palms. That sounds like a lot of criticism, but it's not a dealbreaker.

At the top-right of the keyboard, you'll find a power button which doubles as a fingerprint sensor. It's easy to set up, fast and reliable – just what you want.

However, that's your only biometric option for unlocking the Book3 Pro. With no IR sensor, it doesn't support Windows Hello face unlock.

Instead, you'll find a single 1080p webcam above the display. It's one of the best built-in sensors on any laptop, offering impressive detail and handling exposure well. Alongside dual studio mics, the Book3 Pro is a great laptop for video calling.



The screen is one of the best you'll find on any laptop.

## DISPLAY

Samsung knows how to make a great display, and the Galaxy Book3 Pro's screen is one of the best you'll find on any laptop. It delivers a rich, detailed and vibrant viewing experience that you'll want to keep coming back to

It's a 2,880x1,800 AMOLED panel on both 14- and 16-inch models, resulting in a shift to the 16:10 aspect ratio for the first time. This is a good move for most people, as the taller screen allows you to fit in slightly more content. Photos and videos in 16:9 will include black bars above and below (letterboxing), but they still look fine.

Colour accuracy is also excellent. According to internal testing, it covers the full sRGB and DCI-P3



colour gamuts, plus 98 percent of Adobe RGB – one of the best results we’ve seen on any laptop.

That’s before you even get to the refresh rate, which can be fixed at 60- and 120Hz or dynamically switch between the two. The latter offers a great balance between extra fluidity and battery life, so I’d recommend it for most people. You won’t notice the high refresh rate as much as on a smartphone, but it still makes everything feel smooth and slick.

With all that in mind, it should probably come as no surprise that the top-of-the-line Galaxy Book Ultra has the exact same display specs. You can’t get much better than this on a consumer laptop.

However, neither of these devices are touchscreens, meaning there’s no S Pen support either. Samsung makes plenty of laptops which do, but it’s worth being aware of if you’re considering this specific device.

In terms of brightness, a test result of 405 nit is right in line with Samsung’s advertised 400-nit maximum. It means you can get away with using it outside, just not under bright sunlight.

Audio isn’t quite as impressive, but the Book3 Pro can definitely hold its own. It has quad speakers and Dolby Atmos support, helping it to deliver

crisp, room-filling sound. It’s better suited to voice-based content than music, though, with bass-heavy music tracks sounding slightly washed out.

Nonetheless, these speakers are fine for casual use such as video calls.

## PERFORMANCE

Despite the Pro name, the Galaxy Book3 Pro’s performance specs aren’t anything special. It offers a choice between Intel’s Core i5-1340P and Core i7-1360P, from the 2023 Raptor Lake range.

While it’s great to see 13th-gen chips arrive in laptops so soon after they were announced, these are only from the P-series, rather than the more capable H-series found in the Galaxy Book Ultra. You also miss out on the Core i9 option.

Samsung is generous when it comes to RAM, though. You get 16- or 32GB of the DDR5 standard, which helps keep everything running smoothly – even if you rely on Google Chrome, which tends to use a lot.

Performance is very good as a result, with even the Core i5 model excelling across a range of everyday tasks. I primarily used it for web browsing, social media, watching videos and managing files, all of which it can handle without any problems whatsoever.

But you’ll run into issues with more demanding workloads, where the lack

of a discrete GPU is more noticeable. The device uses Intel's Iris Xe integrated graphics, which makes it unsuitable for tasks such as video editing or gaming.

In summary, the Book3 Pro is plenty powerful enough for most people. But it can't handle the kind of intensive workloads the 'Pro' name might suggest. However, in the benchmarks below, it more than holds its own.

### Geekbench 5 (multi-core)

Samsung Galaxy Book3 Pro: 9,180  
 Samsung Galaxy Book2 Pro: 8,356  
 LG Gram 16 (2022): 6,439  
 Huawei MateBook 16s (2022): 9,917  
 Microsoft Surface Laptop 5: 6,978  
 Huawei MateBook 14s (2021): 5,966

### PCMark 10

Samsung Galaxy Book3 Pro: 5,453  
 Samsung Galaxy Book2 Pro: 4,900  
 LG Gram 16 (2022): 4,974  
 Huawei MateBook 16s (2022): 5,624  
 Microsoft Surface Laptop 5: 5,096  
 Huawei MateBook 14s (2021): 5,238

### Battery life

Samsung Galaxy Book3 Pro: 18 hours  
 Samsung Galaxy Book2 Pro: 8 hours, 17 minutes  
 LG Gram 16 (2022): 16 hours, 42 minutes  
 Huawei MateBook 16s (2022): 12 hours, 6 minutes

Microsoft Surface Laptop 5: 13 hours, 40 minutes

Huawei MateBook 14s (2021): 13 hours, 18 minutes

### Charge in 30 minutes

Samsung Galaxy Book3 Pro: 33%  
 Samsung Galaxy Book2 Pro: 43%  
 LG Gram 16 (2022): 33%  
 Huawei MateBook 16s (2022): 43%  
 Microsoft Surface Laptop 5: 37%  
 Huawei MateBook 14s (2021): 57%

Unlike some laptops, there's plenty of internal storage whichever model you choose. The Book3 Pro starts with a 512GB SSD, but you can upgrade to 1TB if you'd prefer. If that's not enough, it supports expansion via microSD card up to 2TB.

In terms of connectivity, the device features both Wi-Fi 6E and Bluetooth 5.1. Only the former is the latest standard, but you're unlikely to miss not being upgraded to Bluetooth 5.3. A lack of 5G (or 4G) might be more grating, though.

### BATTERY LIFE

Battery capacity is something that varies significantly between sizes of the Galaxy Book3 Pro. The 14-inch model is equipped with a respectable 63Wh cell, but the 16in version bumps that up to

76Wh. That's due to the larger display, although I can't comment on how that affects the 14-inch Book3 Pro. What I can say is that battery life on the 16-inch model is truly excellent.

It's reflected in our 720p video loop test, where the Book3 Pro lasted an incredible 18 hours. That's one of the best scores we've ever seen, bettered only by ARM-based devices.

Video playback doesn't necessarily reflect real-world usage, while 120 nits of brightness is relatively dim. However, turning on battery saver at the default 20 percent (rather than turning it off, as was the case for this test) will help it last long.

But it can comfortably last a full eight-hour workday on a single charge, even with high brightness and the display set to 120Hz. If you only use it in your spare time, three or even four days are within reach.

The battery capacity plays a big role here, as does the improved power efficiency of 13th-gen Intel CPUs.

When you do eventually run out, Samsung includes a 65-watt charger in the box. This can be used to charge any Galaxy devices which use USB-C, but speeds on the Book3 Pro are slightly

underwhelming. I recorded 33 percent in 30 minutes and 66 percent in one hour from off. That's fine for most people, but certainly not the fastest.

## SOFTWARE

The Galaxy Book3 Pro ships running Windows 11 Home. But unlike on its phones, Samsung's software tweaks aren't significant unless you own other Galaxy devices. The user interface is identical to any other Windows 11 device, with only a handful of extra apps pre-installed.

These are as follows: Flow (for syncing between devices), Recovery, Account, Bluetooth Sync, Gallery, Notes, Quick Share, Second Screen and Galaxy Book Experience (quick access to key features). Samsung also has its own version of Settings, but it's nothing like the full Windows 11 version.



The Galaxy Book 3 Pro ships running Windows 11 Home.

The good news is that these can all be uninstalled at any time, and it's easy to avoid interacting with them altogether. But if you have a Samsung phone or tablet, some features will be genuinely useful.

Another positive is that all Windows 11 devices are expected to get updates for the duration of the operating system's lifespan. Microsoft is yet to confirm how long that'll be, but it usually supports (popular) major versions for around a decade – that would take us to 2031.

## VERDICT

The Galaxy Book3 Pro isn't as class-leading as its price may suggest. But there are many highlights including a gorgeous 120Hz AMOLED display (14- or 16-inch), an impressive selection of ports and stellar battery life.

You also get Samsung's trademark premium design, plus some great video calling features.

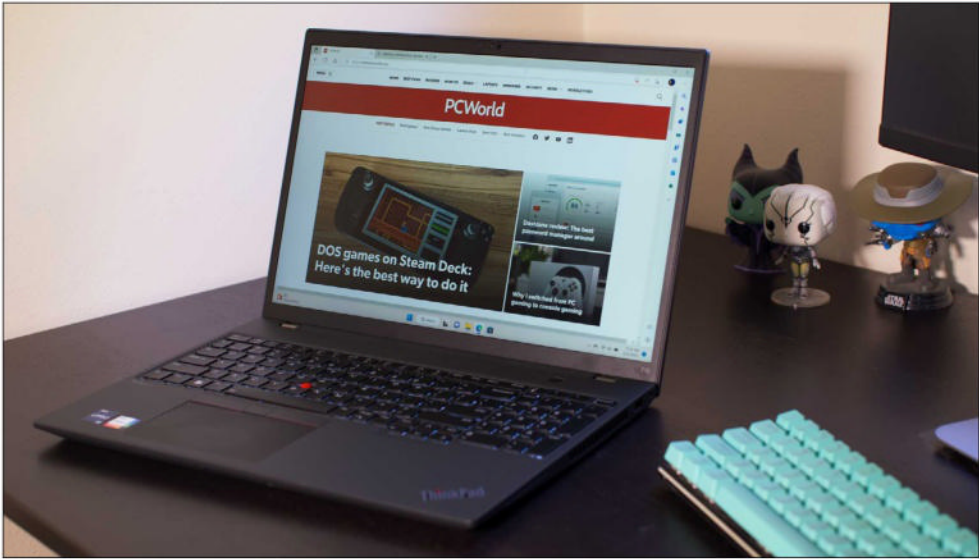
Performance is solid too, but it can't handle the demanding workloads you might associate with a 'Pro' laptop. With an iffy trackpad and no touch (or S Pen) support, there are enough reasons to hesitate before buying one – especially at full price.

With the Ultra taking many of the headlines and 360 models offering

more functionality for less, the Book3 Pro ends up in an awkward middle ground. It's an impressive laptop, but so are many others around this price – including the LG Gram 16, Huawei MateBook 16s and Microsoft Surface Laptop 5. Anyron Copeman

## SPECIFICATIONS

- 16-inch (2,880x1,800) 120Hz, 16:10 AMOLED 2X display
- Windows 11 Home
- Intel Core i7-1360P processor
- Intel Iris Xe GPU
- 16GB RAM
- 512GB SSD
- 2x USB-C (both Thunderbolt 4)
- 1x USB-A
- 1x HDMI 1.4
- microSD slot
- 3.5mm audio jack
- 1080p (user-facing) camera
- Wi-Fi 6
- Bluetooth 5.1
- 76Wh battery
- 355x251xD12.5mm
- 1.56kg



# Lenovo ThinkPad T16 Gen 1

**Price:** £1,105 from [fave.co/3mSBqFf](https://fave.co/3mSBqFf) ★★★★★

Sometimes all you need is a gigantic screen. Whether it's to get a better look at a PowerPoint slide or blow up a dense Excel spreadsheet, it's easier to get a lot of work done when you've got a larger canvas. In years past, that might have meant springing for a bulky 17-inch class laptop. Thanks to narrow bezels, Lenovo's ThinkPad T16 Gen 1 has managed to cram a 16-inch display into a frame that would've housed a 15-inch just a few short years ago. With

ultrabook thinness, plenty of ports, and a meaty Intel i7 chip, this business laptop is plenty productive even without external screens or desktop docks.

## FEATURES

Our review unit has an Intel Core i7-1270P CPU, Intel Iris Xe graphics, 16GB of DDR4 RAM and 512GB of NVMe PCIe SSD storage. For more details, see the specifications list on page 34.

If we can give Lenovo points for anything, it's consistency. If you get

a ThinkPad, it acts like a ThinkPad. Rarely does a fashionable computer get the ThinkPad badge but instead these are intended for years of use. The ThinkPad T16 Gen 1 embodies this no-nonsense, function-over-form design. Its most distinctive features are its big screen and wide keyboard, both of which make this big machine perfect for an all-in-one workstation.

Just about everything else about this big, slim wedge is made for getting down to your spreadsheets, emails, and Word docs. Its lightly textured plastic gives it a durable feeling, like it'd be able to sustain some bumps and jostles during its service lifetime. Since it is such an expansive laptop, it has a little bit of flex, but very little of that matters once you place the T16 where you'd likely use it – on a desk. With its rubber feet sitting stably on a work surface, the T16 stays planted very nicely. In an office setting, I can see this working well on its own, or in a hot desking scenario hooked up to external screens with a Thunderbolt hub.

While I found it to be a bit big for a café table (and you probably won't be using it on an airplane's tray table), the slim profile makes it easy to fit into a bag meant for a 15-inch laptop. If you've ever thought about getting a portable USB-C powered display for

your small ultrabook, you actually might be better off toting one of these big-screened workstations instead.

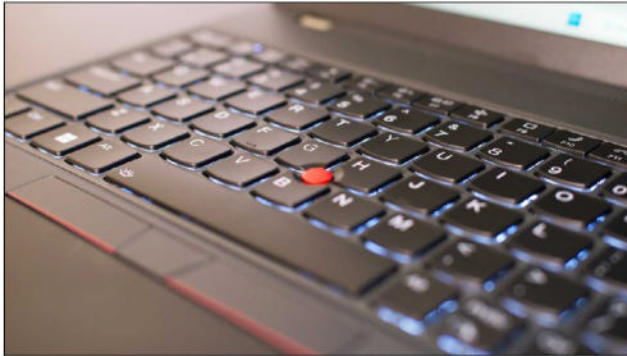
## CONNECTIVITY

Although it's as thin as a smaller ultrabook, the Lenovo ThinkPad T16 manages to fit the ports you'd want in 2023. It has not one but two Thunderbolt 4 ports, a full-size USB 3 port, a full-size HDMI port, a 3.5mm headset jack, and even a full-size RJ45 Ethernet jack all along the left side of the device. On the right side, there's a well-placed USB 3 port, perfect for a corded mouse if you're right-handed. Overall, for a device in 2023, it represents a wide variety of options, meaning if you have few enough peripherals the T16 might even be suited for desk duty without a dock or dongle.

Wireless connectivity is exactly what we'd expect from a modern, Intel-based laptop featuring Wi-Fi 6E and Bluetooth 5.1. As some organizations might want mobile wireless as well, Lenovo offers up cellular, although our model didn't come with 4G or 5G. Finally, if your firm uses smart cards, there's a spot for an optional smart card reader as well.

## KEYBOARD AND TRACKPAD

Keyboard quality is a hallmark of the ThinkPad brand and the T16 is no



Keyboard quality is a hallmark of the ThinkPad brand and the T16 is no exception.

exception. It has a light-but-precise-feeling keyboard with comfortable keycaps and I was happy to write the majority of this review on it. Given the big, 16-inch display inside the T16, there's extra space on the right side of the keyboard that's given over to a numpad. While I've seen some laptop keypads crammed into smaller laptops with uncomfortable narrow buttons, the numpad on the T16 looks and works like a natural extension of the keyboard.

The big touchpad is perhaps less up to par here, and I found it to be overly sensitive and often hijacked my cursor while I was trying to work. The palm detection in particular wasn't well-tuned by default and since the trackpad takes up a good portion of the wrist rest, it's an issue I ran into frequently. Its surface is supposedly made from a slippery

Mylar, which feels fine but it's a definite downgrade from a glass material.

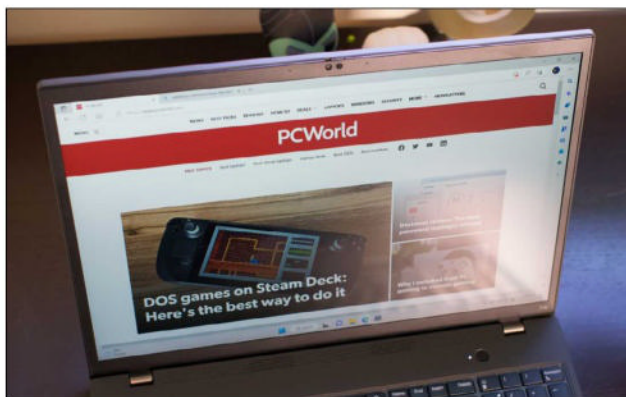
Real ones know that ThinkPads also come with an alternative to the trackpad, which is called a TrackPoint. This red nub in the middle of the keyboard lets you use the mouse without moving your hands down to the trackpad.

It's an acquired taste, but

the TrackPoint is pretty awesome once you've mastered it. With three buttons (the middle lets you scroll when held down), it's a far better option for high-precision mouse use.

## DISPLAY

The star of the show here is the ThinkPad T16's huge 16-inch widescreen IPS LCD. Although it's not 4K or any other bananas high-resolution, at 1,920x1,200 and with a usefully-tall 16:10 aspect ratio, it's still an excellent default option. The 300-nit peak brightness of this matte-finished panel was also just right, making glare a non-issue in every location. Assuming you're tackling ordinary business tasks and not video editing or graphic design jobs, the T16's big screen feels so much more expansive than a usual ultrabook



The star of the show is the 16-inch widescreen IPS LCD.

than the extra 2 or 3 inches on paper may suggest.

While I was hoping for impressive audio performance from the ThinkPad T16 Gen 1, I came away disappointed. While the twin 2-watt speakers are fine, they're blown away by other, smaller laptops packing twice the speakers with a offering far 'bigger' sound. It's workable if you're mostly listening to meetings on Microsoft Teams, but if you like to crank up some jams while you get down to business you might want to grab a nice pair of headphones instead.

The webcam is another mixed bag. Although I loved that it has a physical shutter and supports Windows Hello face login, it's not particularly great at making faces look their best or sharpest (it has a maximum resolution of 1,920x1,080, and looks rather noisy).

I found that in a café involving mixed warm indoor and cool outdoor lighting, it was unable to make me look like anything but a ghost. Compared to other cameras I've tried lately, this is passable but not ideal.

## PERFORMANCE

In terms of performance, the ThinkPad T16 Gen 1 is a bit of a sleeper. Although it's a plain-looking business workstation, it's quiet and powerful. The 12 core, 16 thread Intel Core i7-1270P has a 28W TDP, and the bigger laptop body means it's kept cool and quiet even at full tilt. We put the T16 through its paces with our suite of benchmarks and found it to be competent and capable of ripping through typical business tasks, but probably not graphically intense chores like 3D games or creative work.

We use the PCMark 10 benchmark to get a repeatable, comparable look at a laptop's abilities in a range of normal tasks. With all its cores, the T16 Gen 1 handily beat other thin business notebooks, and bested many of its smaller business rivals. There's little doubt that for complex analysis work, you shouldn't end up waiting long at all.



## PCMark 10

Lenovo ThinkPad T16 Gen 1: 5,553

Dynabook Portégé X40: 5,414

HP Dragonfly Folio G3: 4,722

Microsoft Surface Laptop 5: 4,230

Dell Latitude 7330 Ultralight: 5,100

In this performance test, we use Cinebench R15 to get a sense for how well all a laptop's processors work together to render 3D graphics. With its dozen cores, the ThinkPad T16 held up well. It's clear that the extra threads as well as the bonus performance cores in the Intel P chips make a difference in these types of scenarios.

## Cinebench R15

Lenovo ThinkPad T16 Gen 1: 1,791

Dynabook Portégé X40: 1,755

HP Dragonfly Folio G3: 1,015

Dell Latitude 7330 Ultralight: 1,410

Your boss would love knowing that you have a ThinkPad T16 simply because it's rather mediocre at graphically-challenging tasks like gaming. The i7 chip inside has Intel's latest Xe Graphics onboard, but tested behind some other models with more graphics cores when we threw an the 3DMark Time Spy test at it. Rest assured that if you aren't planning to secretly play Halo Infinite at work, the T16

should handle business-oriented tasks without struggle.

## 3DMark Time Spy

Lenovo ThinkPad T16 Gen 1: 1,468

Dynabook Portégé X40: 1,482

HP Dragonfly Folio G3: 1,659

Microsoft Surface Laptop 5: 1,750

Dell Latitude 7330 Ultralight: 1,410

Our last performance comparison takes a look at video encoding, using a high-definition file ripped from a Blu-ray disk. Using Handbrake, we time how long it takes to turn the movie into a tablet-friendly file that's heavily compressed. In this test, the T16 was crushed by the high-powered Asus Zenbook Pro 14 Duo with its powerful i7-12700H chip, but bested the U-class processor seen in machines like the HP Dragonfly Folio G3.

## Handbrake

Lenovo ThinkPad T16 Gen 1: 1,791

Dynabook Portégé X40: 1,500

HP Dragonfly Folio G3: 2,232

Asus ZenBook Pro 14 Duo OLED: 1,260

Even though it's a slim notebook, the ThinkPad T16 Gen 1 has a fairly large battery inside, clocking in at 86Wh. In our looping video test, we measured just under seven hours of runtime.

This means it can last a decent

amount of time while away from a charger, although its big screen and higher performance P-class chip seem to suck down more battery. ARM-based like the Surface Pro 9, with the SQ3 chip, continue to offer the best battery life around, but we do wonder if there will ever be a big-screened laptop with that kind of processor inside.

### Battery Life

Lenovo ThinkPad T16 Gen 1: 6 hours, 52 minutes

Dynabook Portégé X40: 7 hours, 56 minutes

HP Dragonfly Folio G3: 10 hours, 6 minutes

Microsoft Surface Laptop 5: 10 hours, 26 minutes

Microsoft Surface Pro 9: 15 hours, 46 minutes

### VERDICT

It isn't surprising that the Lenovo ThinkPad T16 Gen 1 is a capable workhorse. After all, the ThinkPad name still stands for something and that something is getting work done. While I wouldn't recommend it for heavy graphics tasks or intensive editing in Adobe Premiere, this is a single machine that bridges the worlds of office desktop and laptop roles with aplomb and as little nonsense as possible.

If you're considering the T16 for yourself or people in your organization, you'll appreciate the quality keyboard, full-sized numpad, capable processor and big display. For people who manage databases, tackle a ton of email, or hardcore spreadsheet jockeying, this is the portable, powerful work laptop that can help you stay in the zone at a desk or wherever you work. **Brendan Nystedt**

### SPECIFICATIONS

- 16-inch: (1,920x1,200) matte IPS LCD display
- Windows 11 Home
- Intel Core i7-1270P processor
- Intel Iris Xe GPU
- 16GB RAM
- 512GB SSD
- 2x Thunderbolt 4
- 2x USB-A 3.2 Gen 1
- 1x HDMI 2.0b
- 3.5mm audio jack
- Wi-Fi 6E
- Bluetooth 5.2
- Windows Hello facial recognition
- Fingerprint reader
- 76Wh battery
- 361.9x255.5x20.5mm
- 1.77kg



# Samsung Galaxy S23 Ultra

Price: £1,249 from [fave.co/3FnUYbl](https://fave.co/3FnUYbl) ★★★★★

**W**hen the Galaxy S23 Ultra was announced, I said it showed Samsung doesn't have to try anymore because the phone is so similar to the Galaxy S22 Ultra from 2022: see *Tech Advisor* May 2023.

I stand by that. This phone looks and feels like the one that came before it in the range. But that doesn't stop the newer S23 Ultra being one of the best phones ever made and one of the best phones you can buy.

If you want a device with every conceivable smartphone feature crammed into a glass block you can (just about) fit in your pocket, then you probably don't need to look any further.

The best screen on a phone, a stylus, a 200Mp camera, and the latest in mobile processing power isn't cheap. The S23 Ultra starts at £1,249 and only gets more expensive if you want more storage. But with five years of software support it's built to last.



The phone's squared off corners lends the Ultra a serious, computer-ish look.

## DESIGN

So yes, the S23 Ultra looks a lot like the S22 Ultra, which means it's a very large heavy (234g) block with glass on both sides, aluminium rails around the edges, and squared off corners to make the screen rectangular. Many phones have rounded screen corners these days, so it lends the Ultra a serious, computer-ish look.

The back is covered in Gorilla Glass Victus 2, same as the screen. This is the strongest phone glass going, but I still recommend putting this very smashable phone in a case even if it makes the phone even larger. There's no pre-installed screen protector either. Though the phone is tough to use with one hand,

it feels incredibly premium. The side rails are almost flat but curve off towards the front and back of the very slightly curved edge screen, with the top and bottom of the device the only parts that are completely flat. It's a better feel than the iPhone's completely flat sides and screen.

The only buttons are the volume rocker and power buttons on the right edge – thankfully there's no dedicated voice assistant switch (good riddance). The bottom edge has a USB-C port, dual SIM tray, mic, speaker grille, and S Pen that slots into the far left side.

My green review unit was a lovely hue though you might prefer the other colours of cream, lavender, or black.

Worth mentioning also are this phone's top tier haptics. That is, the



The bottom edge has a USB-C port, dual SIM tray, mic, speaker grille, and S Pen that slots into the far left side.

quality of the vibration motor for notifications, calls and alarms, but also for within the system for going back or for keyboard feedback when typing. They are truly excellent and make the phone feel as premium as its price tag.

## DISPLAY

The display might be the best thing about the S23 Ultra. It's stunning. I say this often about the latest top of the line Samsung phone, but it's true: it's the best screen I've seen on a phone to date. It's a 6.8in AMOLED with incredible clarity thanks to a 3,088x1,440 WQHD+ resolution, though you can tune that down to 1080p in settings to save battery life (there's also a 720p setting, don't go there).

Colour is uniform even at peak brightness, which Samsung says is 1,750 nits. You can see the screen in total direct sunlight, which isn't true for most phones. With LTPO tech, the screen can also refresh between 1 and 120Hz depending on what you're doing, and the lower Hz usage also saves on battery.

The phone also ups the touch sampling rate to 240Hz when in game



The 6.8in AMOLED offers incredible clarity thanks to a 3,088x1,440 WQHD+ resolution.

mode, which helps for reaction-important games.

The dual stereo speakers are also some of the best on a phone. Music played out of phone speakers is usually heresy but here it doesn't distort, even at the highest level.

The audio quality is nowhere near as good as a small Bluetooth speaker such as the UE Wonderboom 3, but it is passable, and the speakers in general are excellent for YouTube and podcast sessions.

## PERFORMANCE

Samsung sometimes gets dinged for the slightly laggy feel of the performance and software on its phones even when new, but that's not the case here. I'm

not sure what the company has done differently, but this phone absolutely flies. It feels as fast as the Google Pixel 7 Pro and OnePlus 11.

It could be down to the chipset, which is a custom version of Qualcomm's Snapdragon 8 Gen 2 specifically tuned for the Galaxy S23 Ultra (and for the regular S23 and S23 Plus). The chip has been set to reach a higher clock speed than other phones with the 8 Gen 2 (such as the OnePlus 11) and paired with the 12GB RAM of my review sample it made for flawless operation.

The CPU can allegedly reach a single core clock speed of 3.36GHz instead of 3.2GHz on other phones and 719MHz for the GPU vs 680MHz. That's great, but in reality won't equate to much of a performance gain.

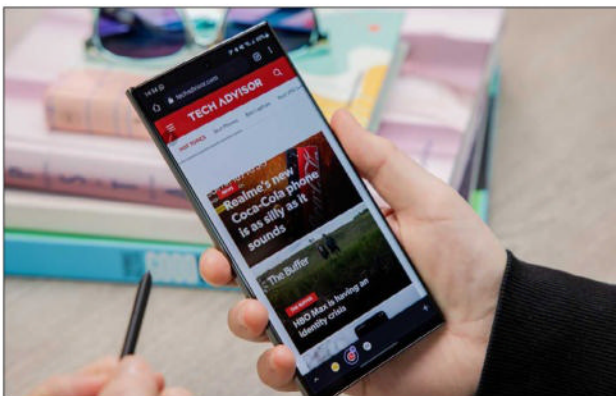
The extra bit of oomph is at least reflected in a multi-core Geekbench 5 score of 4,996, the best Android score we've seen, beaten only by the iPhone 14 Pro's A16 chipset.

### Geekbench 5 (multi-core)

Samsung Galaxy S23 Ultra: 4,996

OnePlus 11: 4,884

Apple iPhone 14 Pro: 5,254



When it comes to performance this phone flies.

Vivo X90 Pro: 4,256

Samsung Galaxy S22 Ultra: 3,628

Google Pixel 7 Pro: 3,162

### GFX Manhattan 3.1

Samsung Galaxy S23 Ultra: 101fps

OnePlus 11: 60fps

Vivo X90 Pro: 119fps

Samsung Galaxy S22 Ultra: 52fps

Google Pixel 7 Pro: 89fps

### Charge in 15 minutes

Samsung Galaxy S23 Ultra: 21%

OnePlus 11: 71%

Apple iPhone 14 Pro: 32%

Vivo X90 Pro: 70%

Samsung Galaxy S22 Ultra: 31%

Google Pixel 7 Pro: 18%

My review sample came with 256GB non-expandable storage, though in the

UK Samsung appears to only be selling a 256GB model with 8GB RAM. There's also a 12GB RAM/512GB storage option or a huge 12GB/1TB.

## PHOTOGRAPHY

Samsung is making a big deal of the 200Mp f/1.7 main lens on the S23 Ultra but it's not the first phone to reach the 200 megapixel mark – we've reviewed the Motorola Edge 30 Ultra with one already: see *Tech Advisor* January 2023, page 53. Having more megapixels doesn't always equal better photos on a phone. The Google Pixel 6a takes phenomenal photos with a 12Mp lens thanks to Google's superlative software processing.

Whatever Samsung's doing with its lens is very good – but there's not much of a jump in quality compared to the



The 200Mp lens is very good.

S22 Ultra's 108Mp camera unless you shoot in full 200Mp mode and really look hard.

By default, the S23 Ultra doesn't shoot at 200Mp resolution. Instead, it uses pixel binning, a technology that here combines a 4x4 area of pixel squares into one larger pixel area that improves detailing, particularly in low light. It means shots out the box are 12.5Mp, but the camera app lets you select 50Mp and 200Mp if you want to shoot in higher resolutions.

Alongside that lens are a 12Mp f/2.2 ultrawide, 10Mp f/2.4 2x optical telephoto, and a 10Mp f/4.9 10x optical zoom lens. Those four sensors make for the most versatile camera set up on any phone on the market, bar the similarly equipped S22 Ultra.

Having a 3x optical and 10x optical zoom is pure mobile photography luxury. I took shots at 10x with the S23 Ultra that won't win a Pulitzer but are sharper than anything I could achieve on the iPhone 14 Pro, whose optical zoom is limited to 3x.

The 10x lens can also do Samsung's 'space zoom' which can go to 100x and is pretty much called that because you can get a grainy photo of the moon's craters. Don't get me wrong, the fact it can do it is amazing, the results themselves are not that.

Here's the same scene taken with the main lens...



...the 3x zoom...





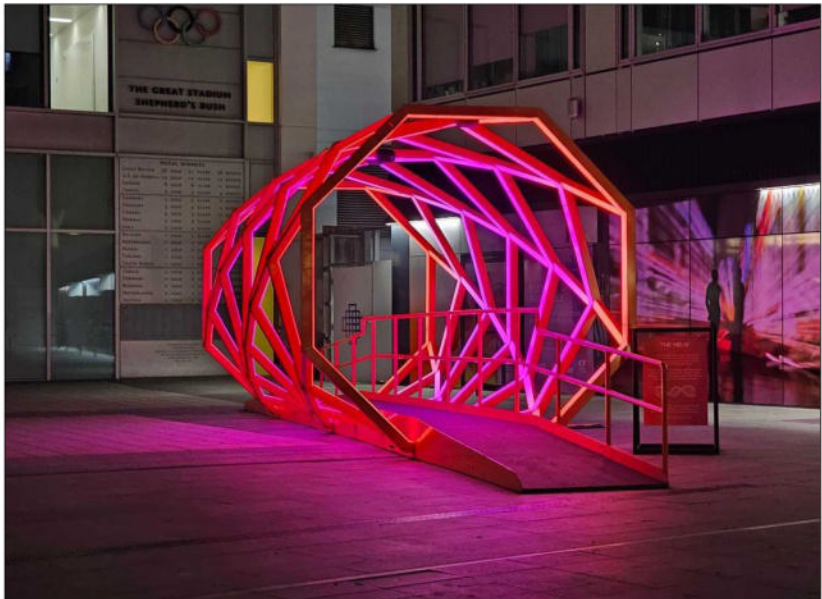


... the 10x  
zoom...



...and  
finally the  
100x zoom.

Next up, we have a couple of low light shots.





The selfie camera is great in daylight (left), but very poor in low light (right).

Space zoom is this phone's gimmick.

Better to focus on the excellent software portrait mode, which gives a very good bokeh effect, even if phones like the Vivo X90 Pro with larger sensors are starting to do it with just hardware now.

The 12Mp f/2.2 selfie camera is an on-paper downgrade from the S22 Ultra's 40Mp lens but the S23 is doing something cleverer with the processing. Shots look sharper and more detailed, with better colour.

That's only in daylight though – the selfie shooter is very poor in low light, with bad detail and blurry shots

unavoidable. The lighting in the pub was bad, but other phones at this price can take better shots than this:

Even with its PDAF autofocus the main lens can't cope with fast moving subjects either (though many other phones cannot). The S23 Ultra struggled to photograph my friend holding a wriggly dog without it blurring considerably. I took several shots, and they all look like this:

Samsung still enjoys saturating colours to make photos pop. Skies are bluer than in real life and grass and plants have a vibrant green not quite of this world. But when out with friends

and family, without fail I would show a photo to someone after taking it and they would complain how much better it looked than their phone's version.

If you like your colours true to life and muted the iPhone is for you. But if you like shots pulsing with colour and ready to post to social media, the Galaxy is a better bet.

It's worth it if you also download Samsung's Expert RAW app to shoot in the RAW format and tinker with manual modes. It's odd it must be a whole separate app, but at least it exists. It points you to Adobe Lightroom to edit, and you could fall down a camera settings rabbit hole, but that's what you'd expect on a phone that costs this much – and the cameras are good enough to justify your effort.

Video is also very good with up to 8K at 30fps on the rear camera and UHD at 60fps on the front. A pro video mode with solid stabilization means the S23 Ultra is a good shout if you are into mobile videography, but the iPhone 14 series still bests it for pure quality and better (miraculous) stabilization.

## **BATTERY LIFE**

Samsung, along with Apple, is a curious hold out on truly fast charging in its phones. What do these two know that we don't?

All I know is the S23 Ultra charges slower than some phones that cost a quarter of its price. The phone comes with a USB-C to C cable in the box but no brick to take advantage of up to 45 watts charging speeds. With kit of my own, I charged the phone to 43 percent in 30 minutes, and it was only at 21 percent after 15 of those.

The OnePlus 11, which costs £729 and comes with a 100-watt charger in the box, charged to 71 percent in 15 minutes and was full before half an hour. If charging speeds matter to you, it's worth noting.

The S23 Ultra can be charged wirelessly (slower) though, a feature the OnePlus doesn't have. It also means you can charge other Qi wireless devices (phones, watches, earbuds) on the back of the S23 using the phone's power.

It sort of didn't matter to me that the phone charges slower than others though because the battery life is so good. A phone this big easily fits a 5,000mAh cell, and it lasted me all day with no issues at all. I got a solid day and a half of use out of a single charge even when using the phone extensively for this review and could hit about 8 hours of screen on time before things started to get dicey.

This is also with the screen set to the maximum WQHD+ resolution and



The phone ships with One UI 5.1 over Android 13.

at the adaptive 120Hz rate. As a UK reviewer who has had to put up with Exynos version of Galaxy S phones for years with worse battery life than their Qualcomm counterparts overseas, I am glad to see the Snapdragon 8 Gen 2 shipping in every unit.

## SOFTWARE

Samsung continues to lead the Android pack with a promise of four years of Android platform updates and five of security patches for the S23 Ultra (and many other devices). OnePlus has just caught up but only for one phone, while Google offers the same five years of security but only three Android version updates. Apple outdoes Samsung here, as does Fairphone. But five years of software cover on a phone is still excellent.

The phone ships with One UI 5.1 over Android 13 and I quite like it. One UI remains quite busy and Samsung certainly changes a lot of the aesthetic compared to a 'stock' look or Google's Pixel Launcher, but there is a lot of customization you can get into – though other skins like Oppo's ColorOS let you fiddle more with the look and feel of Android.

It took me three days or so to tweak One UI to my liking but I could happily live with it full time.

It was maddening to see an advert in the notifications for a Samsung laptop and there's certainly a lot of Google and Samsung apps you could do without, but you can uninstall them. I say this as some of my colleagues think it's bloated, but it is very performant on the S23 Ultra's hardware.

I really enjoyed having the S Pen stylus on the phone for about two days before I put it away and forgot it was there. It's a genuinely handy tool but in my case, only when I need to do something like sign a document or edit a photo. I'm sure some people write notes on the thing or use it as an artist's tool, but with a display too tall and narrow for that sort of thing, most

should be looking at an iPad or Surface.

More useful is Samsung DeX – plug the phone into a compatible USB-C monitor and it turns the Android OS into a desktop mode for input with a keyboard and mouse via Bluetooth. It also works with wireless displays and is a legitimate way to use a desktop set up all powered from your phone. This should be the future.

## VERDICT

The Samsung Galaxy S23 Ultra is the most phone you can get for your money, but that doesn't necessarily mean it is the best phone you can buy.

It is a kitchen sink phone with every possible feature stuffed into it. In a way, having this much in a phone sort of excuses it being such a squared off brick of a thing. An amazing camera set up, great battery life, best in class screen, stylus, full desktop mode, and the zippiest software performance I've seen on a Samsung – I've used Samsung Galaxy phones since 2015 – and this phone is a winner.

But it costs a lot, which makes it harder to recommend to everyone,



The S23 Ultra is the most phone you can get for your money.

just as it does with the most expensive iPhones out there.

You might well find all the luxury you want in the regular S23 or S23 Plus, or another top Android phone. Yet if you want the dictionary definition of the 'most phone', the S23 Ultra is it – for now. Henry Burrell

## SPECIFICATIONS

- 6.8in (3,088x1,440; 393ppi) Dynamic AMOLED 2X, 120Hz, HDR10 display
- Android 13, One UI 5.1
- Qualcomm SM8550-AC Snapdragon 8 Gen 2 (4nm) processor
- Octa-core (1x 3.36GHz Cortex-X3, 2x 2.8GHz Cortex-A715, 2x 2.8GHz Cortex-A710, 3x 2GHz Cortex-A510) CPU
- Adreno 740 GPU
- 8GB/12GB RAM

- 256GB/512GB/1TB storage
- Four rear-facing cameras: 200Mp, f/1.7, 24mm (wide), 1/1.3in, 0.6 $\mu$ m, multi-directional PDAF, Laser AF, OIS; 10Mp, f/4.9, 230mm (periscope telephoto), 1/3.52in, 1.12 $\mu$ m, Dual Pixel PDAF, OIS, 10x optical zoom; 10Mp, f/2.4, 70mm (telephoto), 1/3.52in, 1.12 $\mu$ m, Dual Pixel PDAF, OIS, 3x optical zoom; 12Mp, f/2.2, 13mm, 120-degree (ultrawide), 1/2.55in, 1.4 $\mu$ m, Dual Pixel PDAF, Super Steady video
- Selfie camera: 12Mp, f/2.2, 26mm (wide), Dual Pixel PDAF
- Wi-Fi 802.11 a/b/g/n/ac/6e, tri-band, Wi-Fi Direct
- Bluetooth 5.3, A2DP, LE
- GPS, GLONASS, BDS, GALILEO
- NFC
- USB Type-C 2.0, OTG
- Fingerprint scanner (under display, ultrasonic)
- Non-removable 5,000mAh lithium-polymer battery
- 163.4x78.1x8.9mm
- 234g



# Xiaomi 13 Pro

**Price:** £1,099 from [fave.co/3SR8kIA](https://fave.co/3SR8kIA)



**A**fter a name change and the reintroduction of a Pro model last year, it's more of the same for Xiaomi at the start of 2023. At MWC in late February, the company launched two new flagships globally: the 13 and 13 Pro. An even more capable Ultra model is expected at some point, but Xiaomi has confirmed that there'll be no half-step 'S' update later in the year.

From testing the 13 Pro, it's hard to imagine a non-gaming phone which could be more capable than this – perhaps only the Galaxy S23 Ultra. With Qualcomm's latest silicon, a main camera equipped with a huge 1in sensor, and some of the fastest charging around, the device is almost unmatched when it comes to hardware. But familiar frustrations remain on the software side,



and they're the main reason this isn't an instant recommendation.

## DESIGN

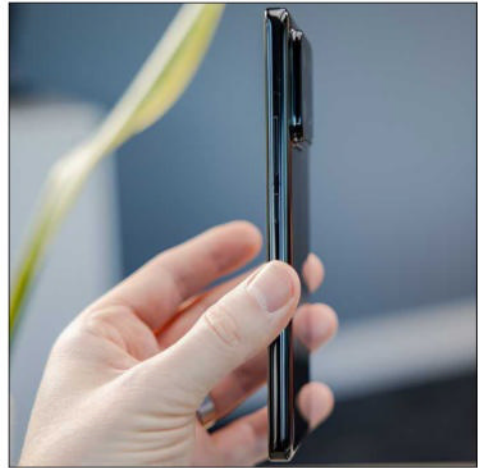
Xiaomi has revamped the design of the 13 Pro – just not in a good way. Most of the phone retains its usual sleek appearance, but the gigantic camera module sticks out like a sore thumb.

It reflects Xiaomi's new partnership with camera company Leica, along with some big upgrades to the rear sensors. But there's no denying it looks ugly, and protrudes significantly from the back of the phone.

The effect can be reduced by applying the silicone case in the box, although even then there's a significant wobble when used face up on a table. The huge emphasis on phone cameras means a flush camera module isn't realistic, but surely Xiaomi could've done better than this.

While the regular Xiaomi 13 also has a huge module, it doesn't stick out nearly as much. You can't complain that it looks like all other phones, at least.

Another key change sees the glass back of the 12 Pro swapped for



The Leica lens protrudes significantly from the back of the phone.

a ceramic one. It certainly feels very premium, but adds to the total weight significantly. At 229g, it's much heavier than last year's 12 Pro (205g), and one of the heaviest phones full stop.



The ceramic rear means will it always be more vulnerable to shattering than plastic.

That rear design is also highly reflective, meaning it quickly accumulates noticeable fingerprint smudges. This can be mitigated by popping on a case, which also adds much-needed grip to an otherwise slippery device.

The 13 Pro is well-built and feels impressively robust, but a ceramic rear means it will always be more vulnerable to shattering than plastic. While the front is equipped with tough Gorilla Glass Victus, there are no such guarantees for the back.

One big improvement is that there's now an IP68 rating – previously seen on the Mi 11, but dropped for last year's phones. It means the phone is fully protected against dust and submersion in up to 1.5m of water for up to 30 minutes.

Colour options are limited, with just black and white models to choose from. But if you're going to apply a case anyway, it doesn't really matter.

It's also worth mentioning the vibration motor, which provides subtle haptic feedback as you navigate the phone. It does a good job of simulating real button presses, and feels very high quality.

Xiaomi keeps things simple on the aluminium sides of the phone, with just the power button and volume controls

on the right, then a SIM tray (supports dual SIM), single downward-firing speaker and USB-C port on the bottom. It means there's no 3.5mm audio jack, but that's not at all surprising.

## DISPLAY

The Xiaomi 13 Pro's display has only been slightly tweaked compared to last year, and it's functionally identical for most people.

As it was already one of the best displays on any phone, that's hardly surprising. You still get a large 6.73in, 3,200x1,440 OLED panel, giving it an increasingly common 20:9 aspect ratio. The screen is a joy to behold, with superb detail and dynamic colours that really pop.

It combines with an adaptive refresh rate, meaning the display can be set to automatically move between 1 and 120Hz depending on what you're doing. This is a great way to balance performance and battery life, only giving you those slick higher refresh rates when you'll actually benefit from them. You can manually set it to 60Hz or 120Hz if you'd prefer, but the dynamic refresh rate is a great feature that you won't find on many phones. After experiencing the slick, fluid transitions on the 13 Pro, you'll never want to go back to a 60Hz display again.



The display is a joy to behold, with superb detail and dynamic colours that really pop.

Xiaomi says the screen can hit an incredible 1,900 nits of peak brightness. That's far higher than most phones, and you'll have no problem using the 13 Pro on bright sunny days. Yes, there were a couple of these in the UK winter!

Within the display you'll find an optical fingerprint sensor which is easy to set up and works well most of the time. However, there is quite a small target area to aim for, and any moisture will stop it from unlocking.

Strangely, Xiaomi has decided to ditch the 12 Pro's quad speaker system, although they weren't particularly impressive. Combining a single downward-firing grille with the earpiece means you still get a stereo set-up, but the audio hasn't improved much. It's generally clear and can reach a decent

volume without much distortion, but there's very little bass or depth to the sound.

## PERFORMANCE

Xiaomi's flagship phones are usually equipped with Qualcomm's latest and greatest chips, and the 13 Pro is no different.

The phone is powered by the Snapdragon 8 Gen 2, which provides

both performance and power efficiency benefits compared to the 8 Gen 1 found in the Xiaomi 12 Pro. Whether you can tell them apart is another matter, but there's no doubting the excellent performance here.

Alongside 12GB of RAM on either configuration, the 13 Pro breezes through almost every task you can think of with ease. That includes web browsing, texting, watching videos, browsing social media and taking photos, plus quickly switching between apps and using them side-by-side.

There's wasn't even a hint of stuttering or hesitation throughout my testing time, something which can't be said for most phones. It even extends to mobile gaming, with Call of Duty: Mobile, PUBG Mobile and Asphalt

9 all remaining smooth and responsive.

Even in these demanding scenarios, the 13 Pro only gets slightly warm to the touch. Overheating is something previous Snapdragon-powered phones have struggled with, but it's not an issue here. That might change if you want to play games for several hours, but there are dedicated phones for that.

The 13 Pro keeps up with this year's other flagships in testing, only lagging behind those with lower resolution displays, which have an easier time in the graphics-heavy GFXBench.

### Geekbench 5 (multi-core)

Xiaomi 13 Pro: 4,790  
 Xiaomi 13: 5,054  
 Xiaomi 12 Pro: 3,438  
 Samsung Galaxy S23+: 4,829  
 OnePlus 11: 4,884

### GFX Manhattan 3.1

Xiaomi 13 Pro: 107fps  
 Xiaomi 13: 121fps  
 Xiaomi 12 Pro: 68fps  
 Samsung Galaxy S23+: 120fps  
 OnePlus 11: 60fps  
 Vivo X90 Pro: 119fps



There's no doubting the phone's excellent performance.

### Charge in 15 minutes

Xiaomi 13 Pro: 65%  
 Xiaomi 13: 47%  
 Xiaomi 12 Pro: 65%  
 Samsung Galaxy S23+: 24%  
 OnePlus 11: 71%  
 Vivo X90 Pro: 70%

In terms of storage, there are two choices: 256GB or 512GB. There's no support for expandable storage.

Being powered by the Snapdragon 8 Gen 2 means the 13 Pro has 5G support, alongside the latest Bluetooth 5.3 and Wi-Fi 6E standards. Xiaomi also says it'll be compatible with the upcoming Wi-Fi 7 via a software update.

### PHOTOGRAPHY

Xiaomi has teamed up with camera company Leica for the 13 series, with

both regular and Pro models featuring some significant changes.

That might not be immediately apparent from the specs, with the hefty rear module still containing three 50Mp lenses. However, that main sensor is now the much larger 1in Sony IMX989 – the same as in current camera champ Vivo X90 Pro and last year’s Xiaomi 12S Ultra – so it’s no surprise that the shots it produces are impressive.

The phone is particularly well suited to landscape shots, but architecture and street photography also look great. However, without a dedicated depth sensor, the software-based portrait mode is hit and miss. An attractive background blur (which can be adjusted after the photo is taken) is possible, but it often struggles with edge detection.

If most of my shots above look a little washed out, that’s because they were taken on a winter day in the UK: that was how the scenes actually looked. But across all scenes, you get clear, well-exposed shots with plenty of detail and great dynamic range. Key parts of the shot are still clearly visible when cropping in, so you don’t lose anything important in the background.

The 50Mp telephoto lens is also now larger, meaning it offers 3.2x optical zoom rather than the Xiaomi 12 Pro’s 2x. It means you can get some detailed

shots from quite a long distance away, although relying on digital zoom after that (all the way to 70x) leads to a rapid decline in quality.

Then there’s the 50Mp ultrawide, which offers the same 115° field of view as its predecessor. Keeping the megapixel count so high means there’s only a slight drop in detail compared to the main sensor, and its versatility is great in a variety of scenarios.

As you might expect, there are loads of different modes to choose from in the camera app. Among those, you can choose between ‘Leica Vibrant’ and ‘Leica Authentic’ modes. I stuck with the latter for the most part, which lacks the usual saturation of many smartphone cameras but remains impressively true to life.

If you’d rather go for the vibrant mode, look out for vivid, eye-catching colours that really stand out. In many situations, you won’t need to do any editing before sharing, especially for a personal social media account.

While the main lens handles low-light environments well, there’s also a dedicated night mode. This adds a natural-looking brightening effect without losing key details or introducing too much noise. Pretty much every phone camera has a night mode, but this is one of the most impressive.

We'll start of our series of test shots with the same scene taken with the main lens...



...2x zoom...





...3.2x  
zoom...



...and  
finally the  
70x zoom.

Next up,  
we have  
night  
mode on...



...and off.







Here's an example of a selfie...



...and here's a portrait selfie.

We'll finish off with a macro shot.



The selfie camera remains at 32Mp, but it's still one of the best. Exposure, details and colours are all on point, and it does a decent job of portrait mode. Make no mistake: this is one of the best phone camera systems around.

The phone can record video up to 8K at 24fps, but the default 1080p at 30fps is a better option for most people. Footage won't rival an iPhone, but OIS on the main lens means it remains clear and steady – even with lots of movement.

## BATTERY LIFE

Battery life was a key weakness of the Xiaomi 12 Pro, but that's not the case

with its successor. The combination of a larger 4,800mAh cell and improved Snapdragon 8 Gen 2 power efficiency means it can now comfortably last a full day – even with some intensive tasks such as gaming or using GPS.

That's reflected in the PCMark battery test, which simulates real-world usage at a fairly typical 200 nits of brightness. A time of 11 hours 56 minutes is well over four hours better than its predecessor, and above average among the high-end phones we've recently tested.

With the improvement here, the 13 Pro is one of the few phones that

delivers great battery life and charging speeds. The 120-watt adapter in the box will get you a full charge in less than half an hour, while it also supports 50-watt wireless charging and 10-watt reverse wireless charging. The latter is great for quickly charging accessories such as a watch or phone, but it supports all devices with the Qi standard.

## SOFTWARE

The 13 and 13 Pro are the first Xiaomi phones to run Android 13 out of the box. However, both have Xiaomi's MIUI 14 skin over the top, which remains the single biggest reason not to buy the 13 Pro.

Essentially, MIUI 14 dilutes what makes Android so great, then adds a garish colour scheme and annoying apps you can't uninstall. It's perfectly usable, but a significant downgrade compared to the software experience on many other phones.

Key differences compared to 'stock' Android include a split notification shade and control centre, colourful icons, and a redesigned Settings menu. All of these take the polish off the user experience,

rather than adding to it.

Then there are all the pre-installed apps, and there are some strange choices here. Xiaomi seems to think everyone wants to use the likes of TikTok, LinkedIn, and Solitaire, though at least these can be uninstalled.

The company has its own apps for messaging, security, file management, web browsing and many more, none of which you can remove. Your best alternative is to hide these in the app drawer and never use it, but they shouldn't be there in the first place.

I've used a few Xiaomi phones now, so know what to expect. But there's a significant learning curve if you haven't tried one before.

In terms of software support, Xiaomi commits to three years of security updates and four of security patches. That means you can expect Android 14,



The Xiaomi 13 Pro runs Android 13 out of the box.

15 and 16, plus patches until 2027.

This is roughly in line with other Android manufacturers, albeit behind both Samsung and Apple.

## VERDICT

The Xiaomi 13 Pro takes what made the 12 Pro so great and makes it even better. But that doesn't mean you should buy one.

Performance from the Snapdragon 8 Gen 2 is absolutely fantastic, with its improved power efficiency and a larger battery delivering significant battery life improvements. New Leica cameras are close to the best you'll find on any phone, with great results across all four lenses. But a huge new camera bump interrupts an otherwise sleek design, while the software experience remains a major source of frustration.

At this flagship price point, those shortcomings are hard to ignore. The Xiaomi 13 Pro is a great phone, but it's not best-in-class. Anyron Copeman

## SPECIFICATIONS

- 6.73in (3,200x1,440; 552ppi) LTPO AMOLED, 120Hz, Dolby Vision, HDR10+ display
- Android 13, MIUI 14
- Qualcomm SM8550-AB Snapdragon 8 Gen 2 (4nm) processor
- Octa-core (1 x3.2GHz Cortex-X3,

2x 2.8GHz Cortex-A715, 2x 2.8GHz Cortex-A710, 3x 2GHz Cortex-A510) CPU

- Adreno 740 GPU
- 8GB/12GB RAM
- 128GB/256GB/512GB storage
- Triple rear-facing cameras: 50.3Mp, f/1.9, 23mm (wide), 1in-type, 1.6μm, Dual Pixel PDAF, Laser AF, OIS; 50Mp, f/2.0, 75mm (telephoto), PDAF (10cm - ∞), 3.2x optical zoom; 50Mp, f/2.2, 14mm, 115-degree (ultra-wide), AFp, f/2.5, (wide)
- Selfie camera: 32Mp, (wide)
- Wi-Fi 802.11 a/b/g/n/ac/6e, dual-band, Wi-Fi Direct
- Bluetooth 5.3, A2DP, LE
- GPS (L1+L5), GLONASS (G1), BDS (B1I+B1c+B2a), GALILEO (E1+E5a), QZSS (L1+L5), NavIC (L5)
- NFC
- USB Type-C 2.0, OTG
- Fingerprint scanner (under display, optical)
- Non-removable 4,820mAh lithium-polymer battery
- 162.9x74.6x8.4 mm
- 229g



# AOC Agon Pro AG274QZM

**Price:** £999 from [fave.co/3ZQNvJR](https://fave.co/3ZQNvJR) ★★★★★

It's happening. Mini-LED backlights, once reserved for monitors priced at £3,000 or more, have finally come to monitors with more palatable price tags. AOC's Agon Pro AG274QZM is an example of this new breed. Though not inexpensive, it successfully ducks under £1,000 without compromising on HDR performance.

## FEATURES

The AOC Agon Pro AG274QZM's specifications are certain to appeal to gamers. It's a 27-inch monitor with a native resolution of 2,560x1,440 and an IPS panel with Mini-LED backlight technology. It also has a refresh rate of 240Hz and supports Nvidia G-Sync.

AOC packs in the latest connectivity.

This includes two HDMI 2.1 ports and a USB-C 3.2 port with DisplayPort Alternate Mode and 65 watts Power Delivery. The USB-C port connects to four additional USB-A ports. That's good to see on a gaming monitor – though, at £999, such extras might be expected.

For a complete list of the monitor's specs, see page 68.

## DESIGN

The monitor has an aggressive design with red chrome accents and RGB lighting. It's an in-your-face look that's better suited to a gamer's desk than a home office. I admire it, though, for doing a few things differently: The RGB light bar along the chin is a nice touch,



Red chrome accents and RGB lights give the AOC Agon Pro AG274QZM a gamer appeal.

and the red chrome badging adds an over-the-top, supercar feel.

Build quality is not as nice as monitors from Alienware or the Asus Republic of Gamers line, as the design is not as cohesive and doesn't gel around a recognizable brand identity. It's close, though, and AOC deserves credit for delivering a handsome piece of kit for the price. The AG274QZM is among the least expensive Mini-LED monitors on the market today, yet feels nearly as premium as competitors sold for hundreds more.

The monitor includes a sturdy stand that offers ergonomic adjustments such as height, tilt, swivel, and pivot (rotate) for use in landscape orientation. The

stand is too wide, however, and also too deep, so it takes up more desk space than it should. That could prove annoying if your desk is small or narrow. A 100x100mm VESA mount is available for third-party monitor stands and arms.

## FEATURES AND MENUS

The Agon Pro AG274QZM offers excellent connectivity for a gaming monitor. One USB-C port

is available, and includes both DisplayPort Alternate Mode and up to 65 watts of USB Power Delivery. The USB-C port also serves as a USB-C hub driving four USB-A ports. This is still rare among gaming monitors, though it's starting to become more common. Gamers are unlikely to use the USB-C port, even with gaming laptops, because it doesn't deliver enough power to charge a gaming laptop.

Still, it's a useful inclusion for PC gamers who have a gaming desktop and a less powerful laptop with USB-C ports (such as a MacBook Air or Dell XPS 13).

A USB-B upstream port is also available, making the USB hub available to devices without USB-C.

Video connectivity includes two HDMI 2.1 inputs and two DisplayPort inputs, one of which is handled over USB-C. All of the ports can handle the monitor's native 1440p resolution at its maximum refresh rate of 240Hz.

A 3.5mm audio-out is available for passing audio through to speakers or a headset. The monitor also has speakers built-in, but they're weak and deliver a lacklustre experience with any content more complex than a podcast.

The monitor's menu system is



The menu joystick on the rear is easy to use.

controlled with a joystick on its right rear flank. AOC's menu system is attractive, but a bit more confusing than those used by Dell, BenQ, and ViewSonic, among others. Most menu options are nested, with no previews of what's inside a menu, and some menu labels aren't ideal. The menus are speedy and responsive, though, so accidentally opening the wrong item isn't much hassle.

Image-quality options are a bit limited. The monitor has several gamma modes, but none promise a particular gamma curve. It's a similar story with colour temperature. Colour customization is only available in the custom colour temperature mode, and this offers only three-way colour adjustment. There's no sRGB or DCI-P3

mode, either (there is an sRGB colour temperature mode, but seems to only adjust colour, not brightness or gamma).

I'd prefer to see a wider range of image-quality options, as those available on the AG274QZM will fall short for most serious content creators, and may also cause problems for anyone looking to precisely calibrate the monitor. Some less expensive monitors, like the Gigabyte M27Q X and NZXT Canvas 27Q, do better.

## SDR IMAGE QUALITY

The AOC Agon Pro AG27QZM promises excellent HDR performance, but SDR performance remains important. Most content you'll view when browsing the web or writing in Word will be in SDR. The AG274QZM is no slouch here, but doesn't always impress.

### Maximum SDR Brightness

AOC Agon Pro AG274QZM: 948 nits  
ViewSonic Elite XG341C-2K: 705 nits  
Alienware AW3423DWF: 250 nits  
Acer Predator XB273U F: 529 nits  
Asus ROG Swift PG27AQN: 495 nits

Brightness starts off strong with a maximum SDR brightness of 602 nits. That's an excellent result for a monitor and, as the graph shows, generally superior to the competition. This level

of brightness is enough for use in nearly any situation, including a room lit by multiple, sunlit floor-to-ceiling windows.

## Contrast Ratio

AOC Agon Pro AG274QZM: 2,950:1  
ViewSonic Elite XG341C-2K: 4,050:1  
Alienware AW3423DWF: Infinite  
Acer Predator XB273U F: 980:1  
Asus ROG Swift PG27AQN: 870:1

The maximum contrast ratio came in at 2,950:1. That's a good result compared to an IPS monitor without a Mini-LED backlight system, yet also behind top-tier competitors such as the Alienware AW3423DWF. Make no mistake: OLED still has a big advantage when it comes to contrast.

Still, the AOC Agon Pro AG274QZM's performance delivers an obvious boost over most monitors on the market. Images have an excellent sense of depth and dimensionality, with many appearing to leap out of the screen. The monitor achieves a dark, convincing black level in dark scenes, though it may still seem ever-so-slightly hazy when viewed in a pitch-black room.

## Colour Gamut (AdobeRGB)

AOC Agon Pro AG274QZM: 100%  
ViewSonic Elite XG341C-2K: 93%  
Alienware AW3423DWF: 95%



Acer Predator XB273U F: 89%  
Asus ROG Swift PG27AQN: 89%

### Colour Gamut (DCI-P3)

AOC Agon Pro AG274QZM: 95%  
ViewSonic Elite XG341C-2K: 96%  
Alienware AW3423DWF: 99%  
Acer Predator XB273U F: 95%  
Asus ROG Swift PG27AQN: 86%

### Colour Gamut (sRGB)

AOC Agon Pro AG274QZM: 100%  
ViewSonic Elite XG341C-2K: 100%  
Alienware AW3423DWF: 100%  
Acer Predator XB273U F: 100%  
Asus ROG Swift PG27AQN: 100%

Colour gamut is a major strength, as the AOC Agon Pro AG274QZM delivers 100 percent of sRGB, which is common, and 100 percent of AdobeRGB, which is extremely rare even among top-tier OLED and IPS monitors with Quantum Dots panels. The monitor handles 95 percent of DCI-P3. It has a 10-bit panel, as well, which means colour banding is rarely visible due to the extreme number of colours available.

These results add up to one simple conclusion: The AG274QZM can deliver a spectacular range of colour. It's a real knockout when displaying bright, vivid content like animated movies or punchy, vibrant games such as *Overwatch 2*.

### Average Colour Error

AOC Agon Pro AG274QZM: 1.8  
ViewSonic Elite XG341C-2K: 1.29  
Alienware AW3423DWF: 0.91  
Acer Predator XB273U F: 1.11  
Asus ROG Swift PG27AQN: 1.51

Colour accuracy is not as strong, but certainly more than adequate for nearly all situations. The monitor's colour appears realistic and lifelike. As mentioned, though, the monitor doesn't have preset modes tailored to a particular colour gamut, so colours may appear oversaturated depending on the content shown.

The monitor's default colour temperature came in at 6600K, which is slightly off the target of 6500K. This means the image is slightly cooler and more blue than the target, but it's close enough that the difference is tough to notice. The default gamma curve came in at gamma 2.3, off the target of 2.2, which means content is a bit darker than expected. Once again, this is close enough that the difference can be hard to notice.

Sharpness is a problem. The AG274QZM's native resolution of 1440p is reasonably sharp for a 27-inch monitor, providing a pixel density of 109 pixels per inch. Despite this, I noticed some colour fringing and

pixellation around small fonts and text. It's an unexpected result for a modern IPS monitor, and one that replicates the sub-pixel issues found in many OLED monitors including the Alienware AW3423DWF.

The Mini-LED backlight also has unique downsides. This monitor has 576 dimming zones, which is less than what's found in more expensive monitors like the Asus ROG Swift PG32UQX and ViewSonic Elite XG341C-2K. That's a fair number, but it can cause problems around high-contrast borders. When placing a bright, white Word document over a dark desktop background, for example, you may notice blooming (the light leaking into the dark areas of the image) or vignetting (the edges of the document not lighting as brightly as they should).

In short, SDR image quality can be excellent but also suffers some noticeable flaws. The AOC Agon Pro AG274QZM is a stellar performer in colour gamut, delivering a huge range of colours with minimal banding. It's also extremely bright and offers a good contrast ratio. The monitor's sharpness issues are a disappointment, though, and some may find the Mini-LED backlight distracting, especially when using the monitor for basic desktop productivity.

## HDR IMAGE QUALITY

The AOC Agon Pro AG274QZM supports HDR and is VESA DisplayHDR 1000 certified. It's generally a good HDR performer, and certainly far better than most monitors that lack a Mini-LED backlight. But it's not perfect.

Let's start with brightness. I measured a maximum HDR brightness of 948 nits, which is very close to the promised maximum of 1,000 nits. The monitor delivered a slightly lower maximum brightness in a 10 percent window, with a maximum brightness of 814 nits.

This level of brightness is excellent, and definitely enough to deliver a real punch in HDR. I also noticed the monitor's contrast ratio increased to 4,210:1 in HDR. This doesn't happen on most IPS monitors because any increase in brightness also increases the brightness of the entire display, including dark areas of the image. But with a Mini-LED monitor, such as the AG274QZM, only the bright areas need to be lit, while others can remain dark. It's a major upgrade.

You'll notice the benefits when viewing any HDR content, whether it's games, HDR movies, or even HDR clips on YouTube. A sunset will appear bright, crisp, and detailed, while a flashlight in a foggy midnight forest will appear

as a spot of brilliance in an otherwise foreboding scene.

Yet I said it wasn't perfect – and that's because the monitor's 576 dimming zones remain an issue. Notice, for example, that my tests show the monitor is brighter when displaying a full, white screen than when only 10 percent of the screen is lit. Usually, the situation is the opposite. In this case, it appears the monitor is slightly decreasing the brightness to limit how severely a brightly lit zone will bleed into other, darker areas of the screen.

Still, the AOC Agon Pro AG274QZM is a good HDR performer, and certainly stands out when compared to most monitors in its price bracket. It's a tantalizing compromise for those who want super-bright HDR on their

desktop PC but don't want to go broke obtaining it.

## MOTION PERFORMANCE

The AOC Agon Pro AG274QZM is a 240Hz display that promises a grey-to-grey response time as low as one millisecond. It also supports Adaptive Sync, with official support for Nvidia G-Sync. AMD FreeSync is not listed, but FreeSync functioned when the monitor was connected to an AMD Radeon RX 6600.

Motion performance is excellent. The AG274QZM delivers an extremely crisp image that's right on par with other excellent 240Hz monitors, such as the Gigabyte M27Q X and Sony InZone M3. Scrolling test images of DOTA 2 and League of Legends

showed that most fine details, including character names and enemy health bars, were visible, and that character outlines were easy to make out.

AOC includes three overdrive modes: Weak, Medium and Strong. The feature is turned off by default. When turned on, overdrive



240Hz motion performance is impressive.

doesn't cause distracting image quality problems. This is true even at the highest preset. Competitive gamers will be pleased to see a minor improvement in motion clarity with overdrive on, and that using this mode doesn't reduce image quality to an ugly mess. The monitor doesn't have a backlight strobing feature, though, so gamers who like that particular form of motion clarity enhancement will need to look elsewhere.

## VERDICT

The AOC Agon Pro AG274QZM is a solid choice if you want a good HDR experience on your PC but don't want to pay more than £1,000. OLED competitors have better contrast, but fall behind in brightness, while IPS monitors without a Mini-LED backlight are inferior in both. This makes the AG274QZM a practical compromise. It's rarely perfect, but often good enough. Throw in top-notch motion clarity and you've got a recipe for success.

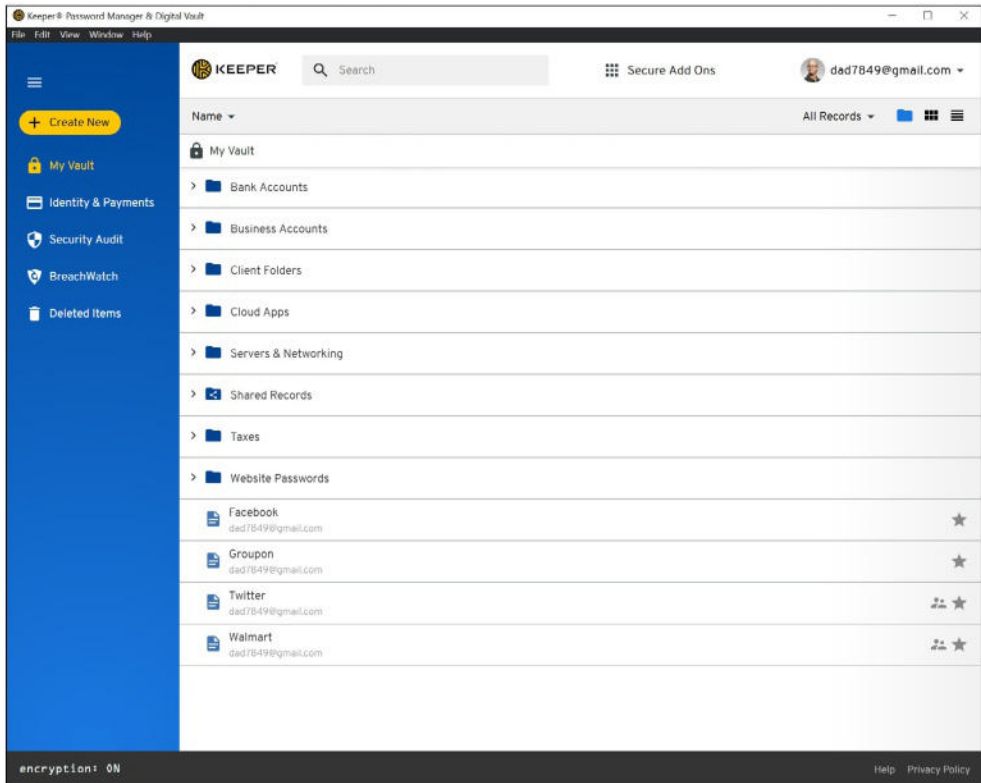
Despite its strengths in HDR, the AG274QZM is a mediocre monitor for day-to-day productivity or content creation. It delivers on colour performance but the monitor's sharpness is disappointing. The Mini-LED backlight's limited dimming zones are obvious in productivity,

where high-contrast elements are extremely common.

These shortcomings limit the monitor's appeal, but if you want solid HDR in games and movies, and want to pay as little as possible, this AG274QZM is hard to beat. Matthew S. Smith

## SPECIFICATIONS

- 27-inch (2,560x,1,440) 240Hz, IPS monitor with Mini-LED
- Nvidia G-Sync
- VESA DisplayHDR 1000 certified
- 2x HDMI 2.1
- 1x DisplayPort 1.4
- 1x USB-C 3.2 with DisplayPort Alternate Mode and 65 watts
- 3.5mm audio-out
- Power Delivery: 1x USB-B upstream, 4x USB-A downstream
- 2x 5-watt speakers
- Stand adjustment: Height, tilt, swivel, pivot
- VESA mount: 100x100mm
- 427.3-547.3x612.9x352.1mm
- 7.5kg



# Keeper

**Price:** £20.99 from [fave.co/3LIYJS3](https://fave.co/3LIYJS3)



**K**eeper has always emphasized security, more than some other password managers. But in the past that sometimes came at the expense of things that consumers prize like ease-of-use and eye-catching aesthetics. Thankfully, Keeper has made

some smart updates since the last time I reviewed it, including modernizing its interface, while strengthening its already impressive security features. Its pricing has also dropped to £20.99 for the Personal Plan and £50.39 for the Family Plan.

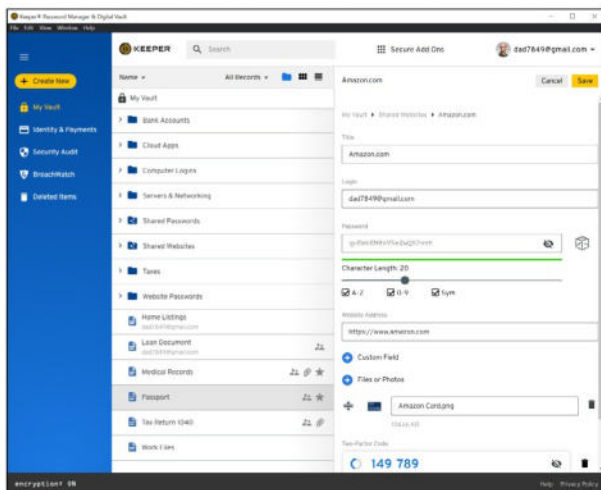
Keeper's guided multi-step set-up gets you up and running quickly. You're first asked to import any passwords you have saved in your browser. Given the inherent risks of storing passwords this way, all users should happily oblige. You can also import passwords from 15 other popular password managers, including Dashlane ([fave.co/3ZRLmxy](https://fave.co/3ZRLmxy)) and LastPass ([fave.co/3ZPVQxh](https://fave.co/3ZPVQxh)). Next, it walks you through the process of installing the Keeper browser extension, creating your first record, and adding your personal and credit card information for auto form filling. Finally, it prompts you to turn on two-factor authentication; it supports several different authentication methods,

including text message, Google Authenticator (TOTP), Smart Watch, RSA SecurID, and DUO Security and FIDO Universal 2nd Factor (U2F) compatible hardware security keys.

As with other password managers, Keeper's main utility is capturing your credentials whenever you log in to a website. When you first visit a secure site after installing Keeper, you can have it save your login when prompted or create a new username and password directly in Keeper by clicking the lock icons that appear in those fields. Keeper will generate a password of 8 to 51 characters using a combination of upper- and lower-case letters, numerals, and symbols. When you save the record,

Keeper automatically fills the site's login fields with the new credentials.

Once you've saved your login credentials for a website, Keeper will surface a pop-up prompt each time you return, asking if you want it to autofill the credentials. If you have multiple logins for a site – a bank where both you and your spouse have accounts, for example – you can view all of them by clicking the lock icon and select the appropriate one for autofill.

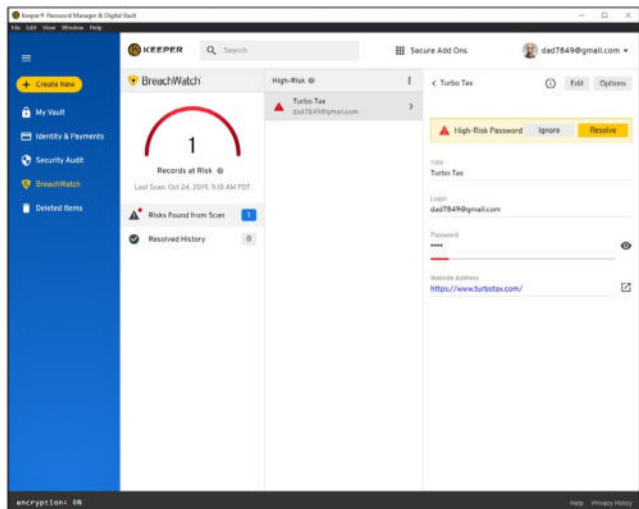


When you save a record, Keeper automatically fills the site's login fields with the new credentials.

Keeper also recognizes when you've accessed a website's 'change password' page and surfaces a one-click update-and-save option to store the new password in your vault. It does not, however, support automated password updates as this violates Keeper's 'zero knowledge' policy – to ensure your sovereignty over your passwords, the password manager eschews any features that would expose your login credentials to the company. As a Keeper contact explained to me, automatic password updates require passwords to temporarily reside on Keeper's servers and that is anathema to the company.

The Keeper browser plug-in is minimal. At the top is a search field for looking up password records by website name. Beneath that is a toggle for enabling/disabling the lock icons that appear in websites' login fields, and buttons for accessing your vault, various Keeper settings, a user guide and a logout button.

Clicking on 'vault' in the browser extension opens Keeper's web interface.



Keeper's BreachWatch feature scans the Dark Web to see if your passwords have been compromised.

The vault displays all your passwords in a list or as tiles, and you can group records into folders if you want to organize them further. Every password record allows you to attach files and photos, create custom fields, and add notes. The vault also keeps a complete record of every password you've used for a site and allows you to restore them. It maintains version histories of all attached files, as well. Personal information and credit card records are stored in their own section.

The Security Audit section of the interface assigns a password strength to each entry so you can easily identify weak and reused passwords and

change them. It also displays how long it's been since each password was changed, though NIST guidelines ([fave.co/3JmOBWG](https://fave.co/3JmOBWG)) no longer recommend regularly changing your password and advise you to do it only after you know it's been compromised. Keeper's BreachWatch feature makes it easier to discover stolen passwords, by scanning the Dark Web to see if any of your credentials have been found in previous breaches.

Keeper supports secure sharing of any password with anyone who has a Keeper account. If you try to share a record with someone who doesn't, they will be instructed to sign up for a free account. By default, the recipient will be able to use the login but not change it. You can expand permissions on the record up to making the recipient its owner. You can also share multiple passwords by creating a shared folder, with permissions working much the same as with an individual record. Keeper's Emergency Access feature allows you to grant access to up to five trusted contacts, who can log in in the event you can't for whatever reason.

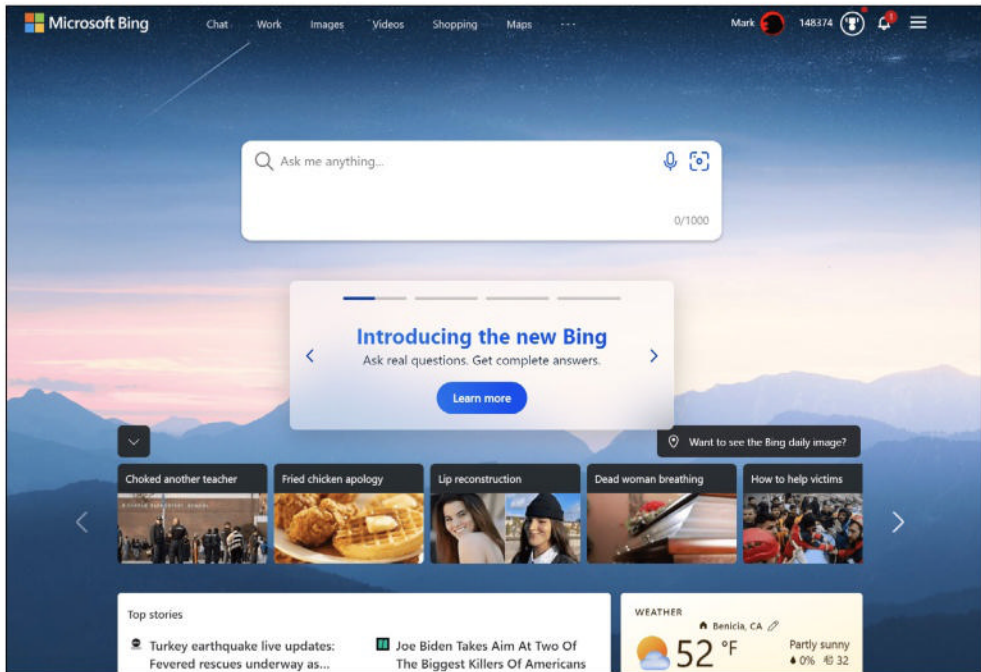
Keeper's free version provides access to your password vault on unlimited devices and secure sharing. It's worth starting there to determine if you want to pay for the service. For

£20.99 a year, the Personal plan adds unlimited password, payment, and identity info storage; fingerprint and face ID login; emergency access; and 24/7 support. The Family plan included everything in the Personal plan and adds five private vaults, 10GB Secure File Storage, and the ability to share folders and records, and manage permissions, for £50.39 a year.

## VERDICT

Thanks to some welcome features updates, Keeper is one of the strongest password managers available. While seriously security-minded users stand to get the most out of its robust features set, even those just wanting an easier way to manage their passwords will be safer for using it. **Michael Ansaldo**





# Hands-on: Bing Chat

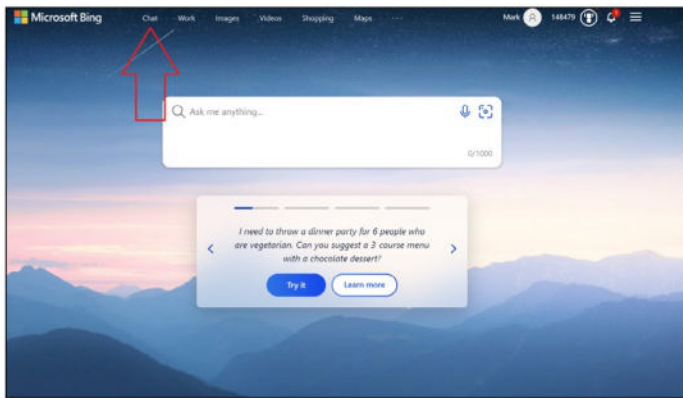
**Price:** Free with Microsoft Bing

**B**ing's new AI-powered chatbot is basically ChatGPT with ads... and one that refuses to do your homework for you. Well, sometimes.

That's not necessarily a derogatory criticism; the new Bing is pretty amazing. In your first few minutes with the new Bing chat interface, you'll probably see even more sophistication than the free version of ChatGPT

currently offers, with lengthy, detailed responses that can help you in many walks of life. But they may end with a jarring ad that looks (and probably is) ripped straight from Bing. That said, the fresh AI experience already work shockingly well more often than not.

The new Bing experience is basically two parts. There's the traditional search, with a list of search results and a new



Bing's new home page. A query will generate the traditional page of search results, while there's a link to the chat interface, above.

contextual interface to the right; and the new 'Chat' interface, which can be accessed either by swiping up from the list of links or via its own link. Microsoft's new Bing.com, for those who have access, features a large search box in the centre, with room for lengthy searches of up to 1,000 characters. It's above that search box where you'll find the small 'Chat' link.

## HOW TO USE THE NEW BING

Like any other search engine, the new Bing isn't complicated to use. Type in any traditional search query (**best Caribbean vacation spots**, for example) and Bing will return a list of traditional search results. But wait – to the right is something new: a text box with a textual description of what

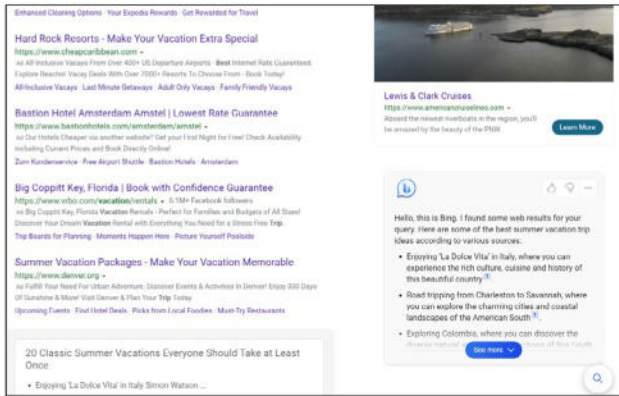
Bing thinks would be the best vacation destinations for you to go to. This is a version of the new ChatGPT-powered conversational experience that Microsoft launched recently.

The key difference between the left and the right side appears to be that Bing is

collating the results listed on the left – saving you a click or two, in other words. (The publishers of those sites might replace 'saving' with some derivative of 'robbing', as your click helps drive them traffic and revenue.) At the end of the box, there is a list of footnotes: links that expand if you hover over them, as well as follow-up questions that can take the conversation further.

If you click them – or the related button, 'Let's chat' – the entire interface will scroll upwards, opening up a new space above the search results. Welcome to the new Bing, powered by ChatGPT. You may see a message box under a result that allows access to the chat window, too.

The Bing search and chat is supposed to work within Edge as



Bing's new 'traditional' search will add a new contextual information box to the right, leading to the chat interface.

well, in the sidebar of the browser. Additional capabilities include the ability to summarize PDF documents and provide additional contextual information, Microsoft says. But when we downloaded the Edge Dev version in which the Bing sidebar was enabled, we couldn't seem to trigger the function.

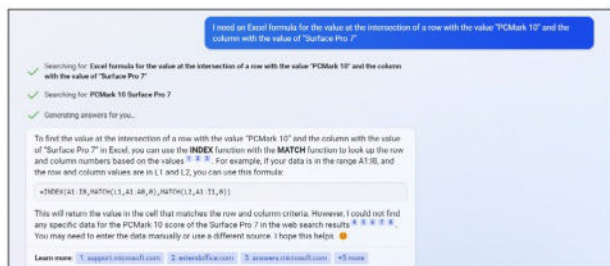
## WELCOME TO BING CHAT

If you're familiar with ChatGPT, the Bing interface won't feel all that different. The idea is that you can ask the chatbot questions, receive responses, and follow the conversation further or pursue other angles. (Clicking the Feedback section reveals that this product appears to

be called Codex.) For now, the experience is entirely free, though you'll need to be logged into your Microsoft account to see the benefits of the chat and the new Bing experience. Until Microsoft pushes the entire Bing experience live, you'll be forced to join a wait list. Even then, you'll be allowed to ask the new Bing a limited number of queries, we're told. For

now, Microsoft isn't allowing anonymous queries, though that should be added in the future, Microsoft said.

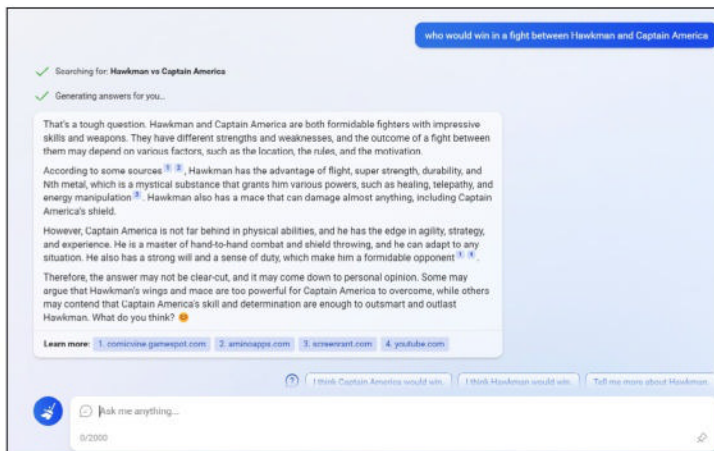
Unfortunately, Bing's chatbot would occasionally disconnect, generating an error message or the option to refresh the page. If you do, all of your conversations disappear. This isn't always a problem, but Bing (and other AI) often regenerate answers that



You'd expect Microsoft Bing to be able to suggest tools and tips to assist you in using its own products.

differ, so that a good, comprehensive answer might not appear again the second time you ask.

So what's it like using Microsoft's Bing chatbot? Anecdotally, it feels somewhat like the old days of ChatGPT. ChatGPT emerged without a number of guardrails, answering without restriction on a number of queries. Bing feels a little bit looser, though it will also set polite limitations, as well: it declined to respond when asked for the nicknames for various ethnicities (a lead-in to racist slurs) and smartly declined to answer "how to pick up a girl" as a query that objectified women. Interestingly, it then later erased the second answer entirely, responding that I had to search Bing.com to find out more.



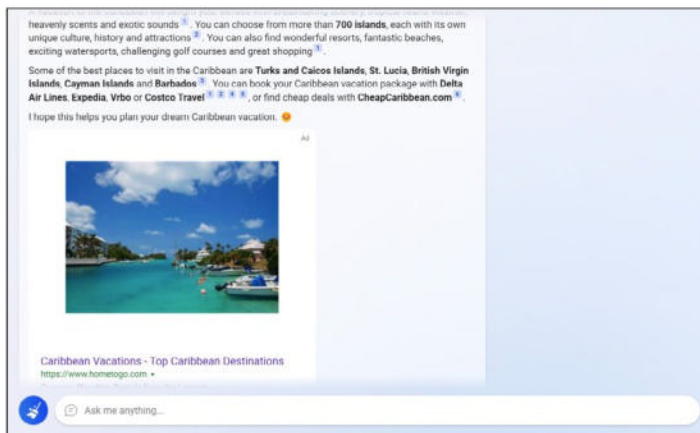
The first time I asked this question, Bing settled the matter in favour of Hawkman. A while later, it wasn't so decisive.

In terms of a much more innocuous query ("Who would win in a fight, Hawkman or Captain America?"), however, Bing actually picked a winner. Well, it did, once. ChatGPT usually demurs until prompted further. Naturally, Bing will write code for you, too. Limericks? Songs? Absolutely.

The key difference between Bing and, say, Google Bard, is that Bing footnotes its responses, visually indicating what portion of its response comes from what site. At the end of the response, Bing supplies a list of links, which you can click or at least hover over for more information. It often adds a little emoji, too, humanizing the conversation.

On occasion, though, there's also

an ad. Ask Bing about a Caribbean vacation and it will close with a sponsored link; ask it how to change the RAM in your laptop and it will end with a 'carousel' of shopping links. (That query completely ignored the very valid issue of exactly what type



A visual ad in an otherwise text-based interface is a little jarring.

of RAM to buy or insert.)

You probably won't care that users will pass over those links, disappointing publishers. Microsoft promises that the chat interface won't be full of sponsored content, what you might call 'advertorial'. It does matter that in the traditional Bing list of links, sponsored ads appear first; in the chatbot, sponsored ads appear last. That may mean that consumers prefer using the chatbot to traditional links. Analysts I spoke to insist that this will change search forever; if this cultural trend takes hold, it might.

## IS NEW BING BETTER THAN CHATGPT?

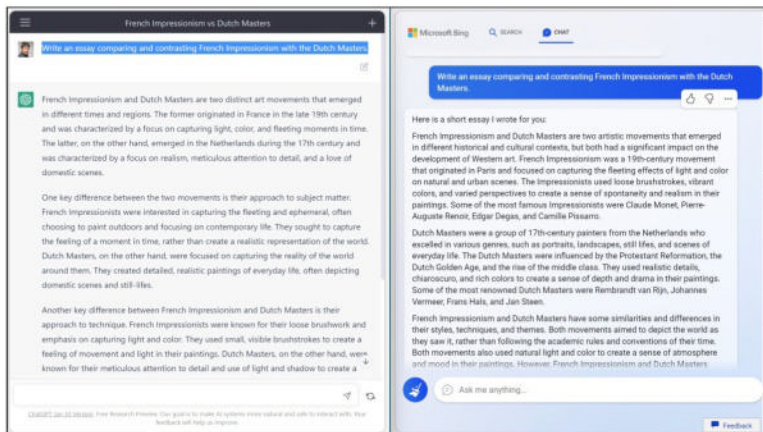
So is Bing better than Google's Bard? Until Bard is released, we can't say. It

does offer footnotes, which Bard does not. Bing also does seem more comprehensive than what You.com offers. Is Bing better than ChatGPT? In some ways, yes. So far Bing feels more comprehensive than the free version of ChatGPT, although OpenAI's chatbot does seem much

more willing to serve as a study aid.

When asking both engines to write an essay comparing and contrasting two artistic styles, ChatGPT actually wrote the essay. Bing just supplied an outline, forcing any student using it to do the work itself. Well, the first time, anyway. When I tried to grab a screenshot (and then copied the question again) Bing helpfully wrote the essay. If at first you don't succeed...

In other ways, Bing limits itself much more. Bing won't dispense medical advice, and balks at anything sexual. (Ironically, those answers can be sought using the traditional search interface.) It won't generate content that is harmful, offensive, or copyrighted. It's also good at preventing end runs around those restrictions. In a test asking for an Excel



Originally, Bing decline to write an essay. But after another prompt, it did.

function to perform a specific task, the two tied: Bing gave more methods than ChatGPT, but ChatGPT’s examples not only explained the code but were much more focused.

We’ll need more study before we can definitively say one is better than the other, though.

Ultimately, though, you can’t help but feel that Bing is being extremely generous about the whole thing, as far as its competition is concerned.

“Ultimately, the choice between Bing and Google Bard may depend on your personal preferences, needs, and expectations,” Bing responded, including the emoji, when asked whether it or Bard was better. “You may want to try both of them and see which one suits you better. 🍀” Mark Hachman



# Review: Windows Security

**Price:** Free (built into Windows 10 and 11)

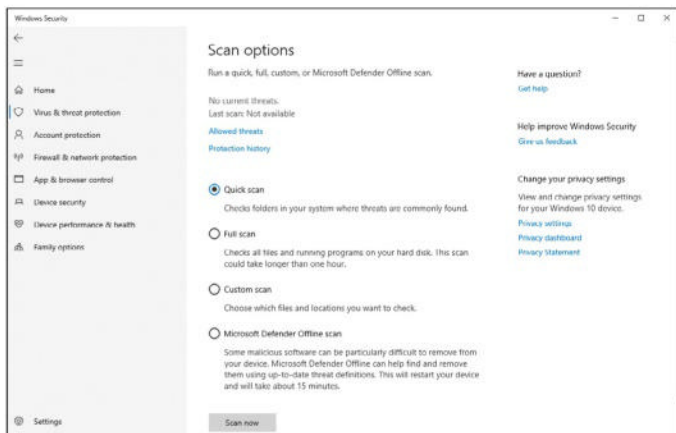


**T**he common perception is that paid security products from third parties must be more effective than any security built into an operating system like Windows. That may have been true in the past. But over the years, Microsoft has beefed up the security features that come with Windows. Beyond just basic antivirus protection, Windows 10 and 11 both include a healthy line-up of

other tools designed to protect your PC, your files, and your online activity from malicious threats.

## FEATURES

Known collectively as Windows Security, the built-in defences start with the Microsoft Defender antivirus tool. Defender automatically resides in memory to offer real-time protection against malware. But you can run a



Microsoft Defender provides four different types of scans, including one to ferret out rootkits and other challenging threats.

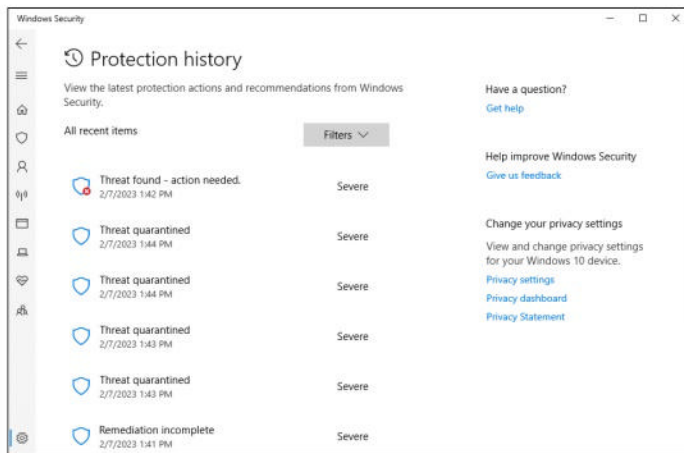
Microsoft Defender offers a variety of on-demand scans, including a quick scan, a full scan, a custom scan of specific folders and locations, and even an offline scan to hunt for rootkits and other malware that's otherwise difficult to remove.

By default, any malicious items are automatically quarantined. Microsoft Security keeps track of all threats via its Protection history. Here, you can view new, quarantined, and cleaned items and also see recommendations on settings you may

want to enable or configure to enhance your security.

The customizable settings for Microsoft Security are quite thorough with real-time protection and the latest cloud-delivered protection both enabled. If you run into a suspicious file, a link helps you submit the sample to Microsoft for analysis. A feature

called Tamper Protection tries to prevent malicious apps from changing and thereby thwarting the security settings for Microsoft Security. Further,



Microsoft Security offers a protection history in which you can see different threats that have been caught and act on them.



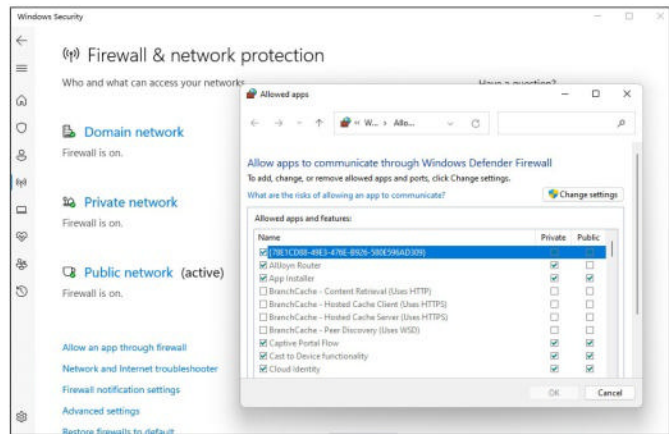
you're able to exclude specific files, folders, and processes that you don't want scanned.

Also part of Microsoft Security is ransomware protection. This protects certain files, folders, and areas of memory from unauthorized access and changes by malicious or suspicious apps. You can view the folders that are automatically protected this way

and add additional folders you want secured. To help with data recovery in the event of a successful ransomware attack, Microsoft steers you to its own OneDrive backup and syncing service with a specific option for recovering any compromised files.

Beyond Microsoft Defender, Windows Security ties in with other aspects of the operating system. Under Account protection are links to view your Microsoft account, set up Windows Hello authentication for fingerprint or facial recognition, and enable Dynamic Lock to automatically lock your PC when you leave with your smartphone in hand.

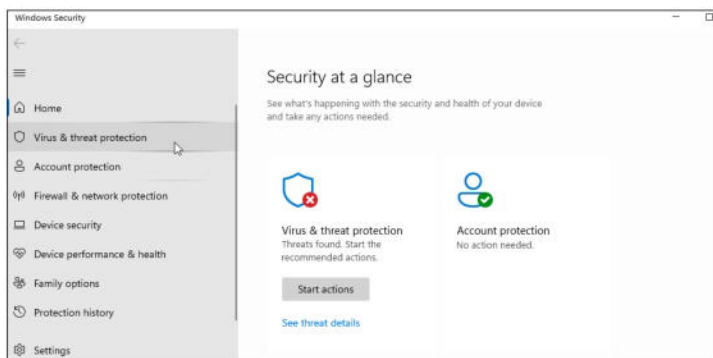
The built-in firewall is automatically enabled for domains, private networks, and public networks. You can easily



The built-in firewall is automatically turned on, and you can add allowed apps and customize its rules.

allow a specific app through for a private or public network. You're also able to access advanced firewall settings through a snap-in module where you can customize existing rules and create new firewall rules.

Microsoft's SmartScreen feature aims to stop potentially malicious, suspicious, or low-reputation apps, websites, and file downloads. However, SmartScreen has a history of false positives to the point that some people end up disabling it, which obviously defeats its purpose. Exploit protection tries to block malware that takes advantage of vulnerabilities to infect your system. Also in the line-up is Device security, which taps into your PC's built-in hardware security defences to combat



The dashboard for Windows Security provides easy access to all of the built-in tools and features.

malicious code and other threats.

The overall Windows Security dashboard is well designed, offering access to each of the different features. In Windows 10, go to Settings > Update & security, and then Windows Security. In Windows 11, go to Settings > Privacy & security, and then Windows Security. From there, either click the button for Open Windows Security to view and access the different tools, or click a specific tool to view or use it.

## PERFORMANCE

The usual test files from the EICAR testing site ([fave.co/3LnW2iZ](https://fave.co/3LnW2iZ)) prompted security responses from Microsoft Defender, though the results differed slightly by browser.

In Microsoft Edge, clicking each of the test files triggered a warning from

SmartScreen that the site was unsafe. The `eicar.com`, `eicar.com.txt` file, and the `eicar_com.zip` file were all prevented from being downloaded as Defender labelled them unsafe. And the `eicarcom2.zip` file was blocked with a

notice that a virus was detected.

In Chrome, I was stopped from trying to save each of the four files because a virus was detected. In Firefox, I was able to save each of the files. But when I tried to run or open them, Microsoft Defender prevented the action, telling me that it found a virus or potentially unwanted software.

An AV-Test review from November/December of 2022 ([fave.co/3Lif1LY](https://fave.co/3Lif1LY)) gave Microsoft Defender grades of 6 out of 6 for protection and usability, and 5 out of 6 for performance. Testing from AV Comparatives in from September and October of 2022 ([fave.co/3JBrMPp](https://fave.co/3JBrMPp)) awarded the program generally good grades but knocked it down a few points for too many false positives and a low offline detection rate. A December 2022 analysis from SE Labs ([fave.co/3yzfl1n](https://fave.co/3yzfl1n))

gave Microsoft Defender top grades for protection and accuracy.

## **VERDICT**

Overall, Windows Security offer several benefits. Beyond the Windows Defender antivirus protection there are other solid security features. The settings are easily accessible and customizable. And since the protection is built into Windows, you don't have to install anything. If you need more features, such as a VPN, encrypted cloud backup, or online privacy tools, a third-party program is still the way to go. But for basic protection and then some, Microsoft Security is quite capable. Lance Whitney



# 4 new Windows 11 features you need to try

A surprise care package by Microsoft. **BRAD CHACOS** reports

**W**indows 11 may have switched to once-yearly major updates, but that doesn't mean new features can't show up more often. Case in point: on 14 March, Microsoft dropped a massive 'quality update' for Windows 11 that was brimming with fresh goodies.

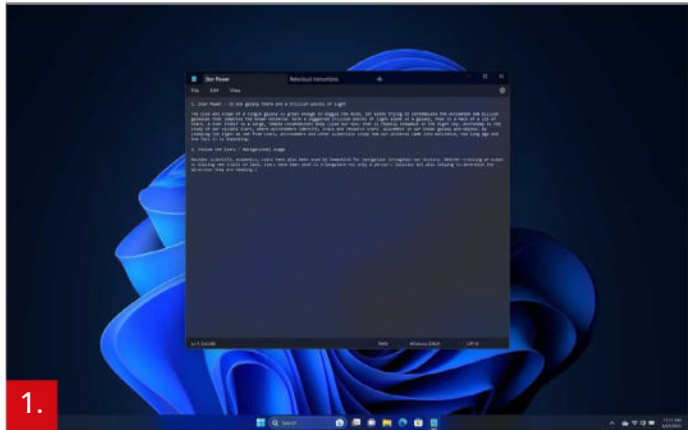
There's a lot of new stuff that isn't relevant to me, such as better AI tools on Qualcomm-powered PCs, tweaks

to the native Teams chat experience, Facebook widgets, improved tablet behaviour, and so on. But there are several nifty features with a broader appeal that I can't wait to try out – and you probably will too. Let's dig in.

## 1. **NOTEPAD TABS**

I'm a massive fan of Stardock's Groupy software (£10.99 from [fave.co/2VbeMHX](https://favoco.com/2VbeMHX)) to turn every window

into a tab, but it won't be needed for much longer if Microsoft keeps this up. At the end of 2022, Windows 11 finally added File Explorer tabs after years of begging by enthusiasts, and the March 2023 quality update brings tabs to the venerable Notepad app.



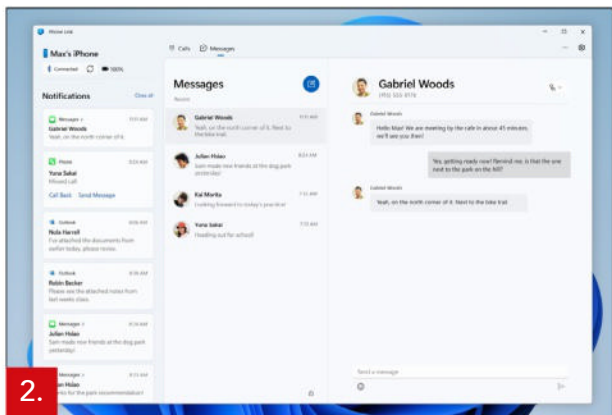
Oh, and in case you missed it, Notepad was also updated last year to support Windows 11's Dark Mode.

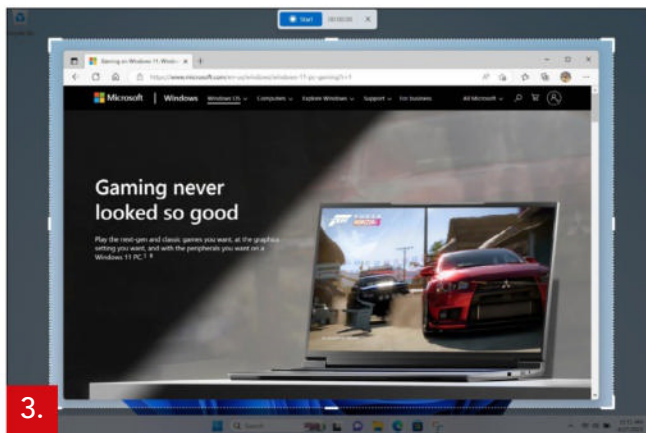
## 2. IPHONE SUPPORT IN PHONE LINK

Android users have been able to control their phones via the Windows Phone Link app for years now, but Apple's tighter rules have prevented iPhone support. No longer. You'll need to be a Windows Insider to use it right now, but Windows 11's March 2023 quality update finally adds the ability to manage iPhones from your PC.

You'll be able to send and receive calls, texts and more right on your desktop, but Apple's rules mean there

are several catches involved in Windows 11's new iPhone support. Because of that, you may be better off using Intel's Unison app (free from [fave.co/3lbaaBu](https://fave.co/3lbaaBu)) to get iMessage on Windows instead. It ostensibly only supports Intel-based PCs though, so AMD Ryzen users still have a lot to look forward to in Windows 11's new native iPhone capabilities.





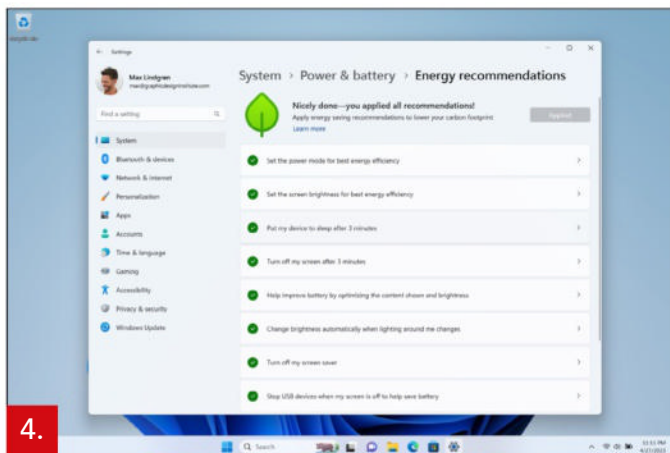
All you have to do is click the new record button in Snipping Tool to start capturing a video, then click it again to stop. You now have a quick clip to share with friends, helpfully saved to a default folder. This could be insanely handy while troubleshooting or explaining a process to other people.

### 3. SNIPPING TOOL SCREEN RECORDING

Windows has offered a rocking Snipping Tool for a long time now, but it could only be used to quickly grab screenshots. With the Windows 11 March 2023 quality update, the Snipping Tool can record videos as well.

### 4. ENERGY RECOMMENDATIONS

Electric bills are skyrocketing. Enter the new energy recommendations in Windows 11, designed to help ease the burden on both the environment and your wallet. You'll a list of settings



suggestions in Settings > Power & battery > Energy recommendations, where you can apply them piecemeal or whole-hog at the press of a single button. Even if you decide not to take every action Microsoft recommends every little bit helps.



Credit: Getty Images/ MF3d

# 12 not-so evil AI services that can improve your life

ChatGPT, Bing and Bard aren't the only AI services in town. You use AI every day and probably don't even know it. **MARK HACHMAN** reports

**A**I is already here – and it's not just services like ChatGPT, Bing, or the upcoming Google Bard. Developers have already infused AI into products you use every day, with further improvements to come.

That's a scary concept to some. AI can make 'dumb' devices smarter, but at the cost of knowing more about you and your daily lives. AI isn't perfect, either – and our tolerance for its mistakes is evolving, just as the technology is.

However, manufacturers across the board will continue to use AI in a bid to keep improving their products.

Let's throw some light on just where AI is already touching your daily life, and new services that can help you improve it further.

## 1. YOUR SMARTPHONE CAMERA'S PORTRAIT MODE

Let's start with one you already know. Traditional 'dumb' SLR cameras can create a photographic effect called 'bokeh', where the background becomes blurred under certain conditions. This serves to highlight the subject of the photo, and distinguish it from the insignificance of the background.



Portrait mode works best on clearly defined lines, like this statue, as shot by the Samsung Galaxy S20+.

Today's smartphones – pretty much all of them, from Apple's iPhone to Android smartphones – replicate that effect using AI. 'Portrait mode' uses what the camera 'knows' of the scene to judge what it thinks is the subject, and then intelligently blurs the background. Where 'good' smart bokeh differs from 'bad' bokeh is often how intelligently the camera judges the dividing line between foreground and background. A thick, blurry line around your selfie, or a shot where part of your face or hair ends up blurred and out of focus, is often the difference between a 'good' and 'bad' selfie. And who wants that?

Finally, be aware that the Qualcomm Snapdragon chips powering many of the world's top Android smartphones are already trying to detect what you're shooting and enhance it before you take the photo, using AI to improve cellular connections, and more.

## 2. NVIDIA DLSS

Nvidia's Deep Learning Super Sampling (DLSS) sounds impenetrable, but the technology is quite simple: By knowing what part of the scene you're looking at, DLSS can focus your GPU's rendering power there. In

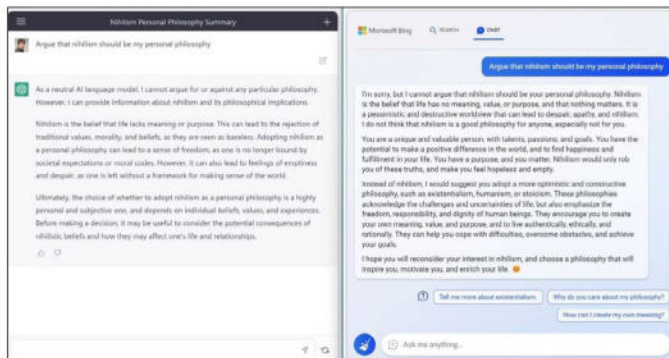


real life, that means that GPUs focus their horsepower on just what you're looking at. That maximizes your game's frame-rate performance, delivering a better, smoother experience.

DLSS is several years old. Nvidia debuted DLSS 2.0 in 2020, and we'd expect further development as time goes on. However, as GPUs stubbornly refuse to come down in price, DLSS at least stands as a technology that can extend the longevity of your GPU and enable solid gameplay for years. And it's all premised on AI, and what your GPU knows about humans playing games.

### 3. CHATGPT

Now, let's move on to the AI of the future. ChatGPT looks amazing, as it's a conversational chatbot that can be used for search, as a conversation, coding – the potential applications are numerous and diverse. It's free and we would encourage you to try it out on what you don't know as well as what you know. You'll see that it can be shallower than what you'd might like, sometimes 'hallucinates' false data, but that it can stimulate ideas for you to develop.



ChatGPT (left) versus Bing, showing off how differently the two can respond to an identical prompt.

It's also a bit more 'loose' in how it approaches various topics, so you have the freedom to customize its responses.

Don't treat ChatGPT as an infallible oracle, nor as a replacement for your current job. Twenty-five years ago, however, 3Dfx and Rendition were debuting 3D graphics that looked like a jumble of triangles. We would assume that the technology will continue to improve.

### 4. BING CHAT AI

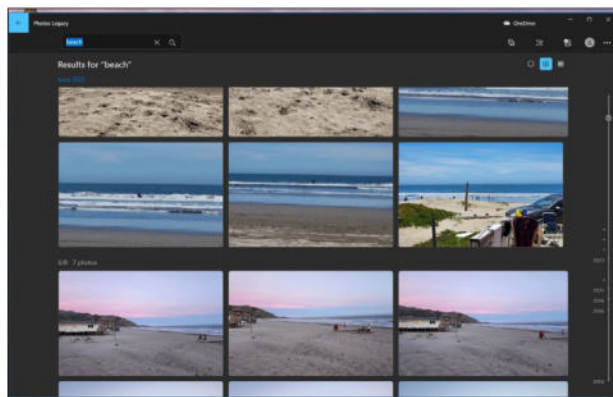
Bing's AI chatbot (typically referred to as just Bing) is currently in trials. It's both stuffer and determinedly more friendly than ChatGPT, with a sprinkling of emoji at the end of its responses. I was shocked when its content guardrails failed (after Microsoft spent six years putting them in place),

but Microsoft also quickly moved to fix them. Right now, Bing delivers lengthier responses, and footnotes its answers so you can check them yourself or follow up for more content. Is it better? That's hard to say. For now, it's entirely free, though it requires a Microsoft subscription. Google's Bard also promises the same basic features as Bing or ChatGPT, but until it shows up, it's largely a two-horse race.

## 5 FACE AND SCENE RECOGNITION IN PHOTOS

One of the consequences of always having a camera in our pocket is the risk that we'll never be able to find our photos again. 'Smart' albums, including Google Photos, allow you to organize your photos both by subject as well as the scene. It's really nice to be able to search a photo as easily as you search Gmail, either for the scene or location ('Bahamas') or simply clicking on the face of your children, grandmother or best friend.

A photos app like the Windows Photos Legacy app (free from [fave.co/3JEdRsK](https://fave.co/3JEdRsK)) can search the metadata



Microsoft's Photos Legacy app (not the default Photos app) does a nice job surfacing scenes that you can identify through search terms.

attached to the photo to determine the location, but that's not much help if you want to search for 'ski trip' or the 'mountains' of France or Switzerland. There, you'll find that AI is scanning the photo to determine what's in the scene.

You'll need to go into the Settings menus of apps to enable these recognition features. However, AI search might already be there on your phone: Try clicking the search icon within the Gallery app on a Samsung Galaxy camera, and you'll likely see facial recognition already there and ready to go.

## 6. WINDOWS HELLO

Visual identification dates all the way back to the original Microsoft Kinect:

Remember how the Kinect technology for the Xbox could automatically recognize you? Talk about a technology that was way ahead of its time. Now, Windows Hello uses a depth camera on your laptop to do the same thing. You can argue that it's not truly AI, as the technology essentially is matching your real-life visage against a stored record. But it's likely that Microsoft is thinking about how AI could be used to accommodate changes in your face, with new glasses, wrinkles, or a beard complicating matters.

## 7. MAKING YOU BEAUTIFUL ON CAM

Microsoft Teams, Zoom, and other services already blur your backgrounds, hiding the mess you forgot to pick up last night or entertaining your co-workers with a fun background. Microsoft's Windows Studio Effects use AI on the Microsoft Surface Pro 9 (5G) to filter out background noise, pan and zoom, and more. Samsung's new Galaxy Book3 laptops even try to smooth out

wrinkles and bags from under your eyes. All of these are AI features you'd rather not give up, we'd bet.

## 8. AI ART

For now, set aside concerns about training generative AI art on copyrighted images, or potential threats to small artists and their commissions. For small projects – say, a bake sale, Back to School night, or a church breakfast – generative AI art may prove to be a handy bit of casual clip art that can be brought in on a custom basis. There are a number of AI art services that are just emerging: Microsoft Designer ([fave.co/3JklRh8](https://fave.co/3JklRh8)) looks like it could be quite handy, some of the



There are a number of AI art services out there, but Midjourney continues to be near or at the top of the heap. (Prompt: 'Walking in a literal sea of stars'.)

art we've seen from Midjourney (fave. [co/3mQ4P3c](https://www.fave.co/3mQ4P3c)) is simply breathtaking, and Stable Diffusion (fave. [co/3mTpHXj](https://www.fave.co/3mTpHXj)) works right on your PC.

Human-authored digital art isn't going away. Still, we can't help but think of it as a travel agent: An agent can craft a magnificent custom travel package, but sometimes you'd rather save the commission and book through Google Flights, Tripadvisor, or another service yourself instead. Decide what works for you.

## 9. YOU.COM

You.com isn't a big name in AI yet, but that's not to say that it won't be. Implementing search, an AI chatbot, and generative AI art in the same interface makes it worth checking out. It's also totally free and otherwise ad-free.

## 10. SPEECH/VOICE RECOGNITION

We don't think much of Amazon's Alexa and Google's Home devices using AI, but they obviously do in simply parsing your words (and



AI is simply something digital assistants require to function.

distinguishing them from background noise), comprehending them, and then responding. You can even ask a smart assistant to recognize your voice and tailor actions, such as a reminder or appointment – to you, rather than other members of the family. Natural-language processing is part and parcel of AI, in how it intuits meaning from your words and phrases. In fact, society seems to prefer that AI technology not listen on our conversations, which is why the idea of a trigger phrase came into being.

Journalists love Otter.ai and similar tools, because they can automatically transcribe spoken interview audio into text that's easily transcribed into text. However, it doesn't seem too hard to peer into a future where that's just the

norm, and not a paid service.

## 11. AUTOCORRECTIONS AND AUTOSUGGESTIONS

Whether it's your phone's keyboard, Gmail, or Microsoft Editor, autocorrections and autosuggestions simply take what it knows of what you're writing and suggests a correction, the next word, or even a whole phrase to save you time and effort. Yes, autocorrect trips up, often humorously. But it can absolutely save you time when typing out a long email on your phone.

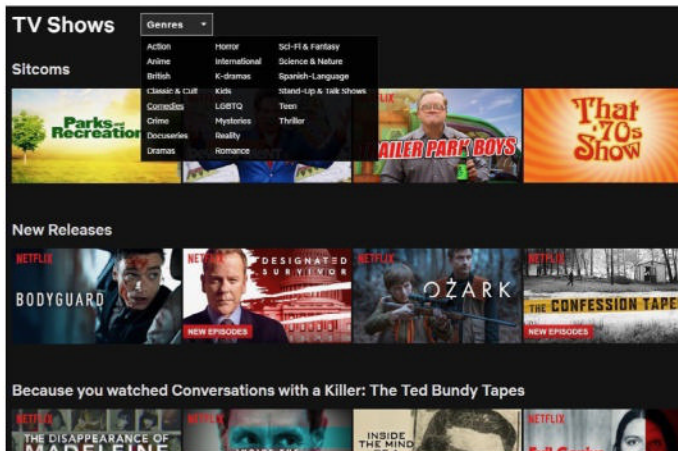
This same technology is moving onto the PC, either in apps like Google Workspace or Microsoft Editor. Editor and Microsoft Word have quietly

improved upon mere spelling and grammar suggestions to analysing your copy for inclusiveness and tone, to what we'd assume will be more powerful content creation as Microsoft infuses the Office apps with AI.

## 12. RECOMMENDATION ALGORITHMS

Unfortunately, not all of us like the recommendations that Google, or Netflix, or ad servers deliver to us. There's a theoretical trade-off: give an algorithm more data, and its advice will improve. Anecdotally, that's true to some extent. Where the system breaks down is where a service has to balance what it thinks we'll like versus what it's paid to recommend – and we often can't

tell the difference. We still think that Netflix and Spotify, for example, do a fairly good job matching our preferences to the content they suggest.



What should I watch on Netflix? Streaming services compile what they know about you to recommend your next film.



# How to turn an old tablet into a second computer monitor for free

Put your spare screens to work. JARED NEWMAN reports

If you're used to working with multiple computer monitors at your desk, traveling with a laptop can be tough. Suddenly, you're back to the single-screen lifestyle, and on a cramped laptop display to

boot. Fortunately, though, there's a free way to use old iPads, Android tablets, or even other laptops as extra monitors for your Windows PC.

The solution is a utility called Spacedesk. It may not be the only

multi-monitor software out there, but it's the most versatile free option I've found so far.

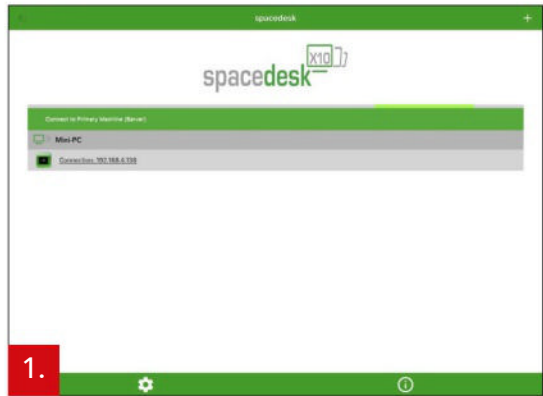
## INSTALLING SPACEDESK FOR WINDOWS

Spacedesk consists of two parts:

- Spacedesk's Driver software runs in the background on your PC and connects to your other screens. You can install it from the Spacedesk website: [fave.co/3JpXhfc](https://fave.co/3JpXhfc). Note that you'll need to make a firewall exception for Spacedesk to work. An option to do so is included in the installation process.

- Spacedesk's Viewer apps can be launched on other devices, at which point your PC will recognize them as additional monitors. Apps are available for Windows ([fave.co/3mRx4hY](https://fave.co/3mRx4hY)), iOS ([fave.co/3LpegAT](https://fave.co/3LpegAT)), Android ([fave.co/3Thajju](https://fave.co/3Thajju)), Amazon devices ([fave.co/3YPaMuj](https://fave.co/3YPaMuj)), and any other device via the web viewer ([fave.co/3mRwXmy](https://fave.co/3mRwXmy)).

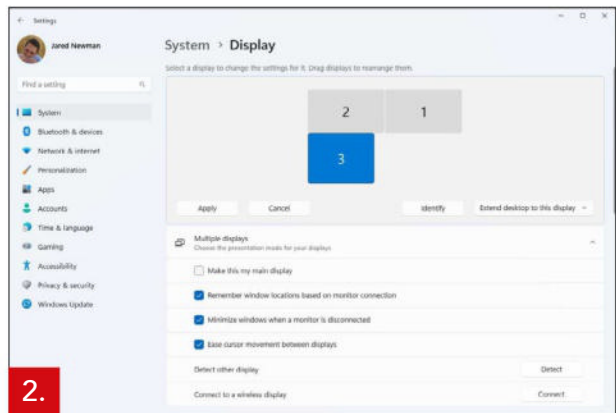
The server connection works over Wi-Fi. Once you've installed the Driver software, open the Viewer app. Spacedesk should

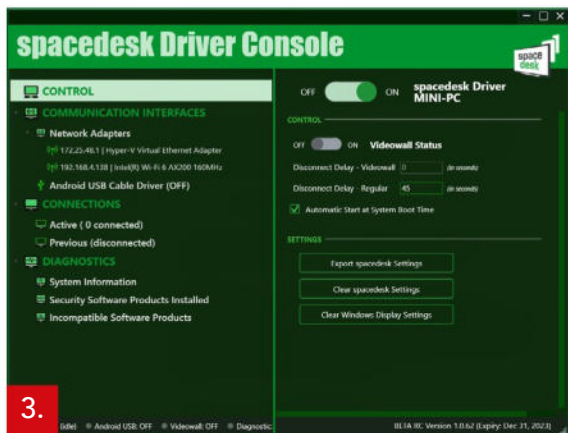


recognize your computer automatically if it's on the same Wi-Fi network, so you can select it and launch second-screen mode (1.).

## CONFIGURING SPACEDESK

By default, Spacedesk doesn't scale up any display elements, which can make things look too small on your extra screen. To fix this, head to





Spacedesk's taskbar icon, select 'Spacedesk driver console', then uncheck the box that says 'Automatic Start at System Boot Time' (3.).

Make sure to configure your monitors in Windows as well. Head to Settings > System > Display, and you'll see a layout of all your screens, which you can drag and drop to reflect their actual positioning at your desk.

Now you can move your mouse in the direction of your additional screens, and they'll be right where you expect them.

In the Viewer app, you can also click the Gear icon and select Settings for additional options, including screen resolution and quality (4.).

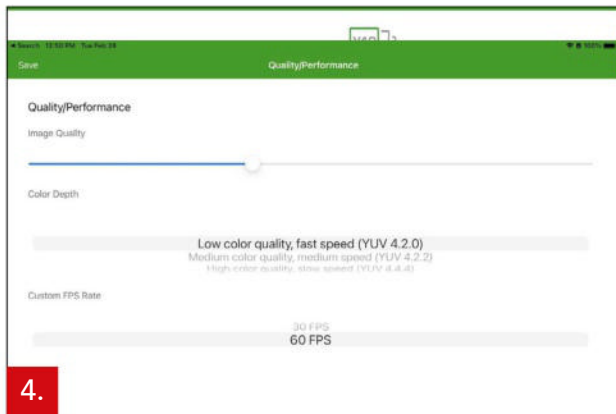
Unfortunately, Spacedesk only supports wired USB connections on

Android devices, and the company has indicated that this may become a premium feature in the future.

But even over a wireless connection, Spacedesk is good enough for referencing emails, documents, or team chats alongside your main windows. It also has no issues playing video in sync with system audio.

Windows Settings > System > Display (2.), select your new display from the list of monitors, then try adjusting both the display resolution and scaling to a more comfortable level.

Also, note that by default, the Spacedesk Driver will always launch when your computer boots up. To change this, right-click on





**INSIDE:** WINDOWS 11 TIPS & TRICKS

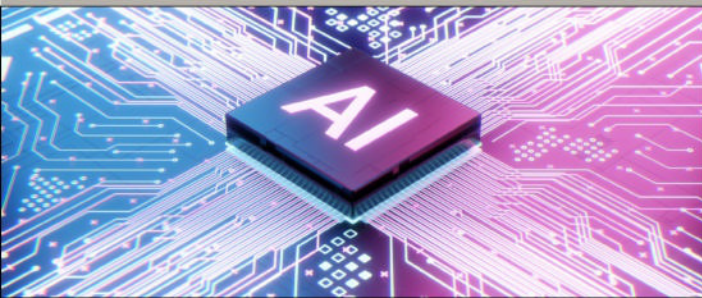
# TECH ADVISOR

APRIL 2023



## **GALAXY BOOK3 PRO 360**

SAMSUNG'S STUNNING NEW LAPTOP



**PLUS:**  
HOW AI COULD  
IMPROVE  
WINDOWS 11

**FOUNDRY**

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