
IDG

MICROSOFT IGNITE EVENT: 10 BIGGEST REVEALS

# TECH ADVISOR

IDG | February 2020

# CHROMEBOOKS VS

# WINDOWS LAPTOPS

## WHICH SHOULD YOU BUY?

## + PERSONALIZE YOUR WINDOWS 10 PC WITH OUR TOP TIPS

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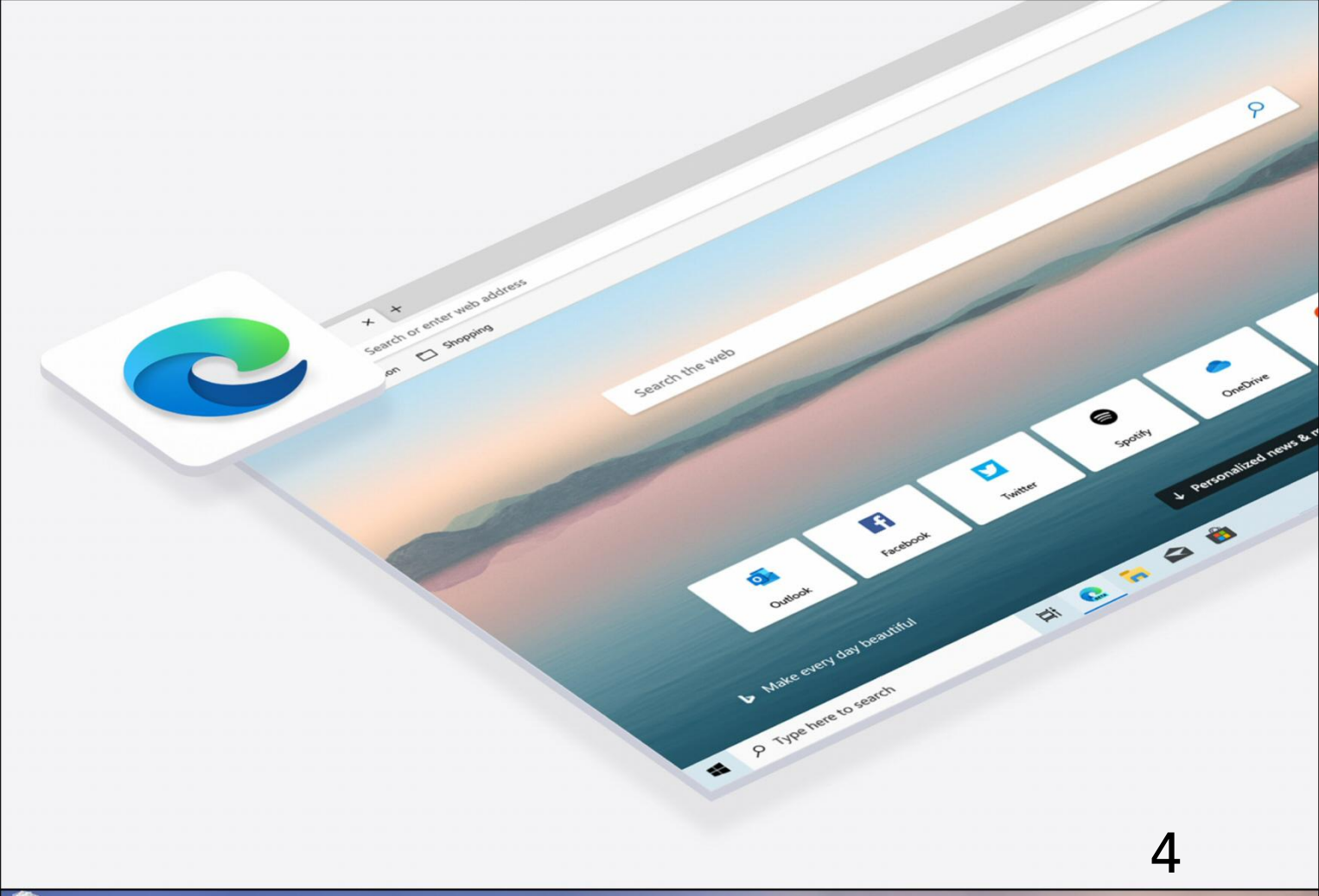
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Outlook
Make every day beautiful
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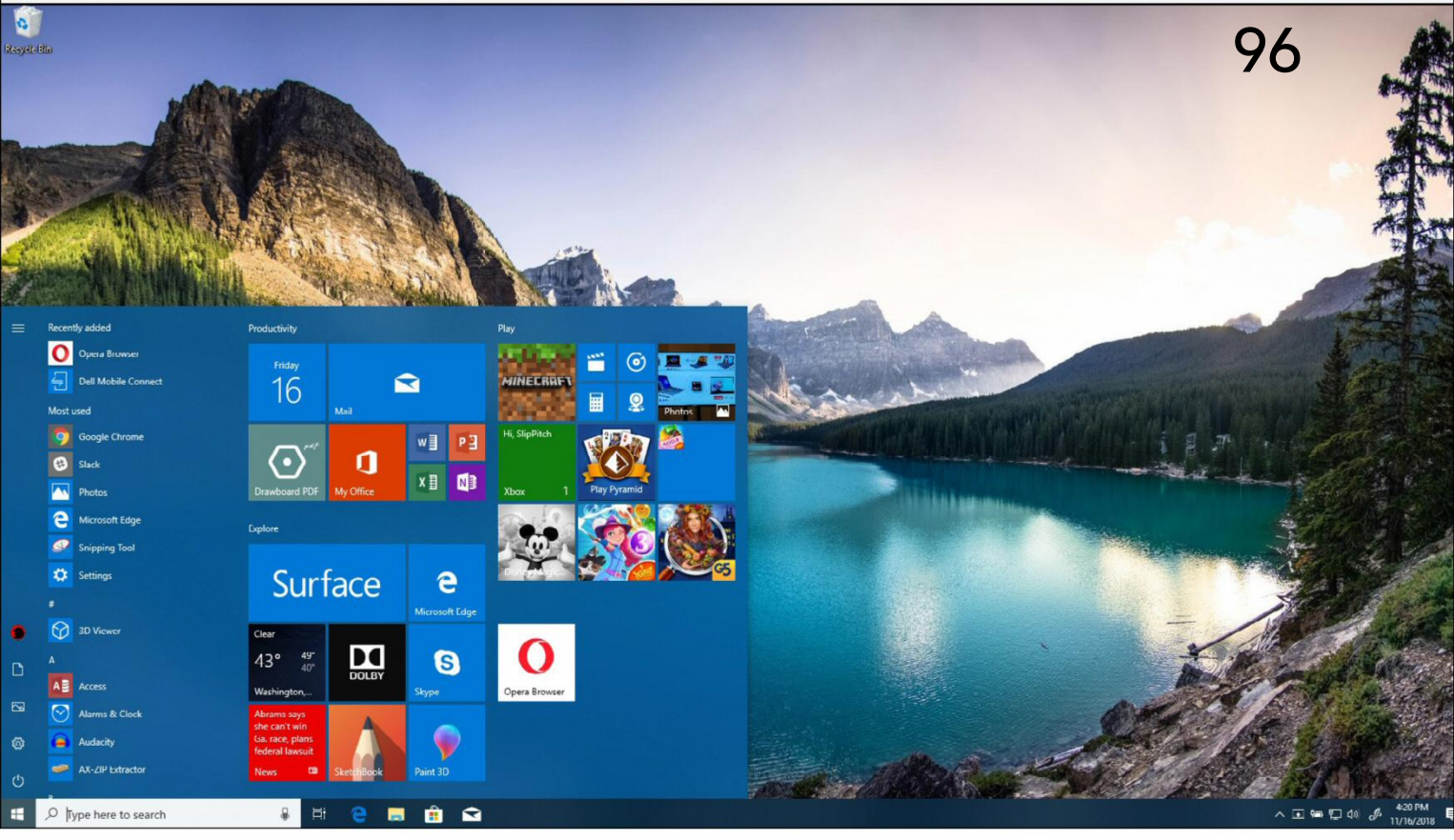
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Most used
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Slack
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Microsoft Edge
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3D Viewer
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My Office
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Surface
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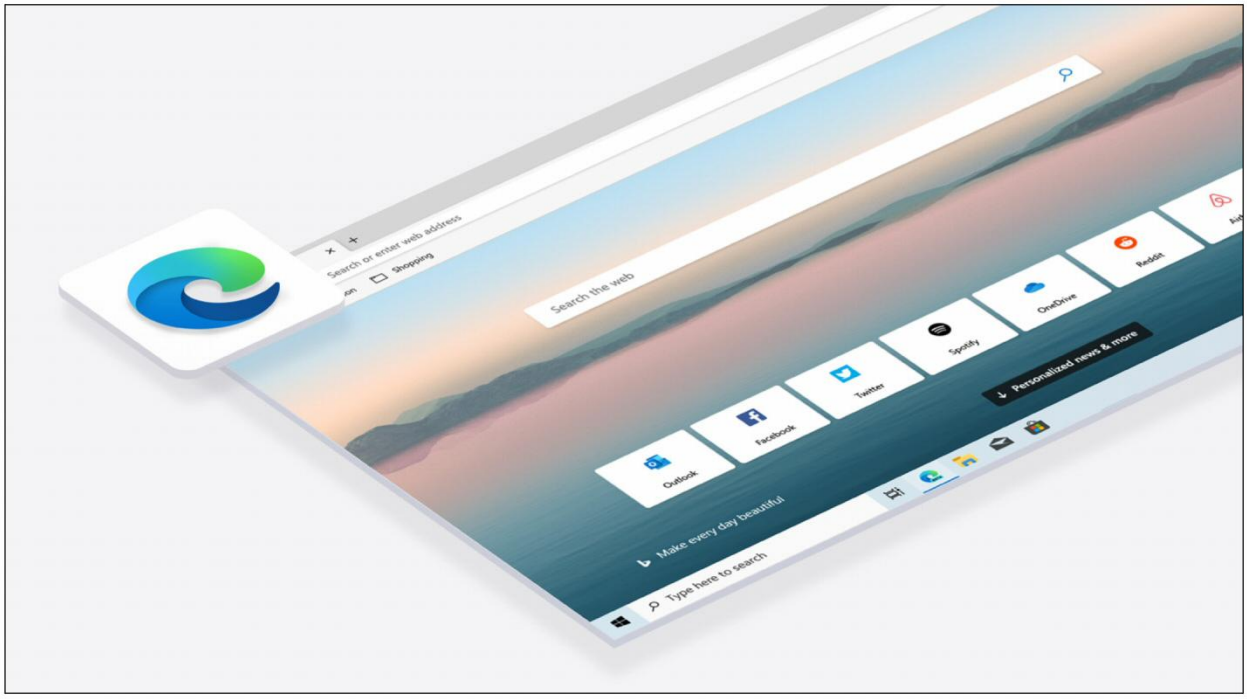



# 10 biggest Ignite reveals include more ways to tie Office to the web

Outlook gains new features, too. MARK HACHMAN reports

Microsoft plans to announce a boatload of new capabilities to Office, search, and Edge at its Ignite conference last month, including rollout plans for its Chromium-based Edge browser, a tool to read your email aloud in the Outlook app, corporate insights driven by Microsoft Search, and more. But subtle improvements such as natural-language queries in Excel may prove more significant.

Microsoft's new logo for Microsoft Edge will appear in your taskbar sometime soon

The firm has arguably struggled to align search and the web with its traditional Office silos of spreadsheets, presentations, and documents. Now, executives say they've cracked the problem.

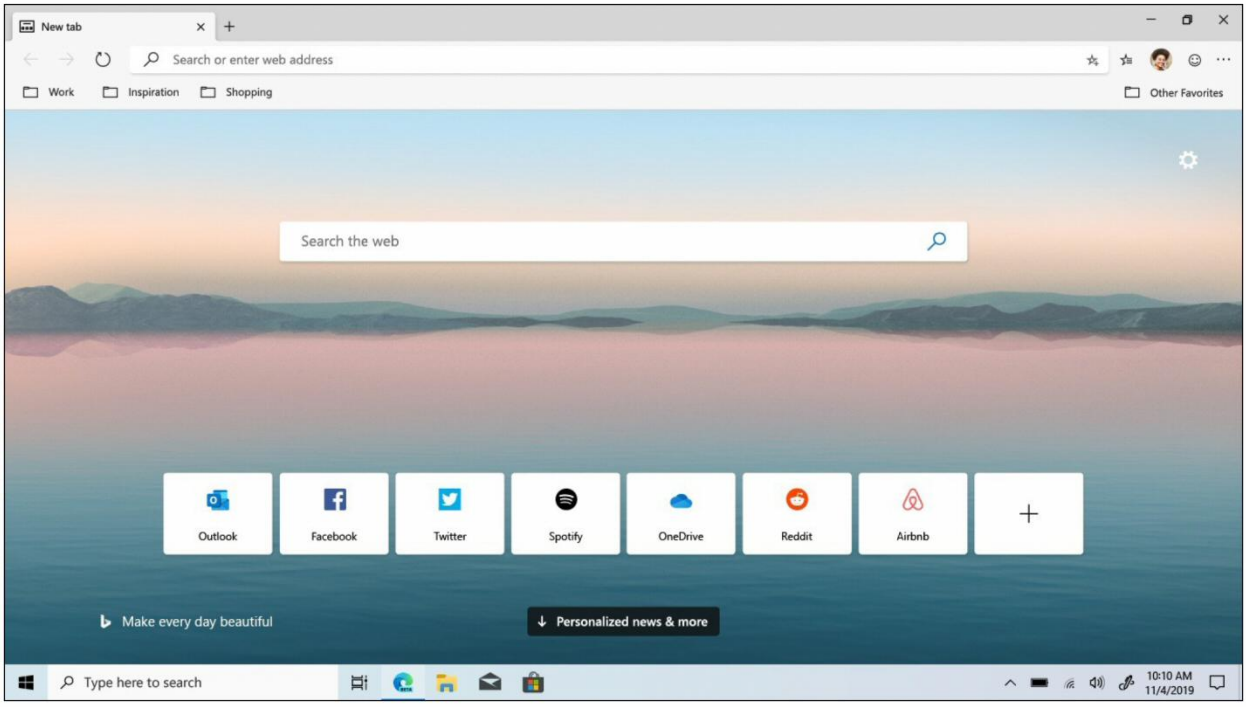
Microsoft hasn't lost its idealistic view of the Internet, dating back to Internet Explorer's 'beauty of the web' campaign. But today, the web provides more opportunities and more challenges to solve, said Yusuf Mehdi, corporate vice president in charge of Microsoft's Modern Life & Devices Group, in advance of Ignite. He recounted the problems Microsoft was trying to solve: how do you protect privacy and still maintain

personalization? How do businesses bring together the web and their own knowledge into a cohesive whole? How does the tech giant apply its own tools, like Edge and Bing, to those goals?

At its Ignite event, Microsoft laid out new features across Office, search and the cloud to do just that. We've had a look at them, then we whittled them down to the 10 new things we think you'll want to know about.

## 1. The new Microsoft Edge is official

The big addition is what Microsoft has dubbed the 'new' Edge, or the 'next' Edge: a Chromium-based version of its browser that has a new logo, too. Announced earlier this year, the new Edge browser feels fresh and fast. Mehdi said a release candidate will be published at Ignite, with a final version slated for 15

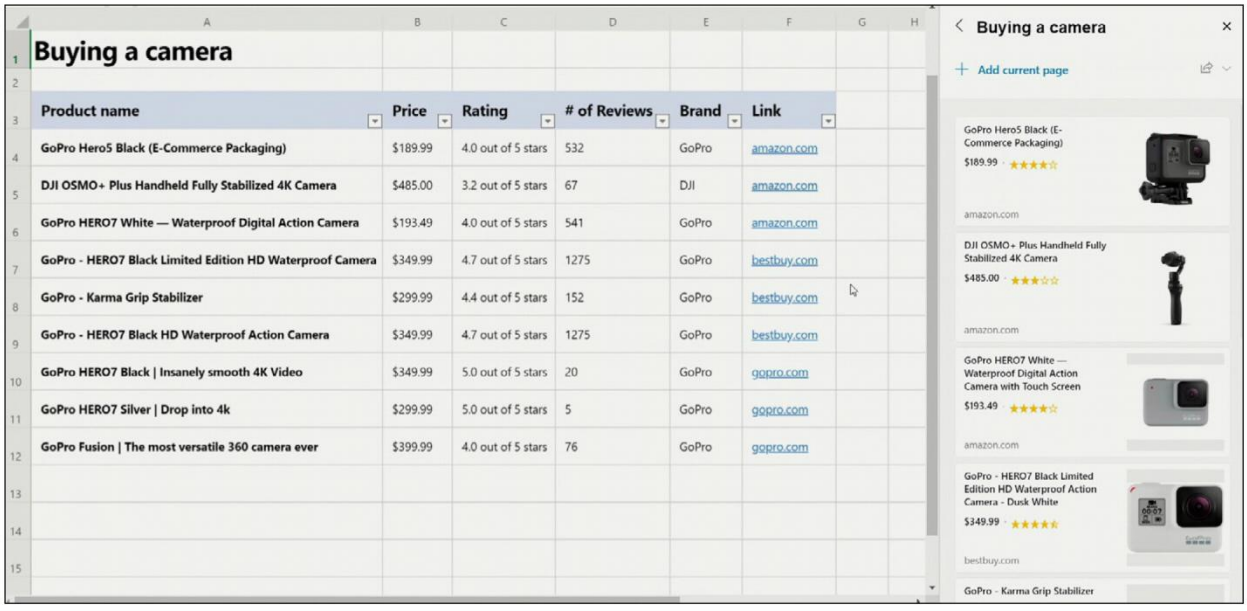



Microsoft's new Edge browser, showing off the new tab page

January 2020. Edge development is decoupled from Windows, so that new versions of Edge will be released on its own timetable. Microsoft's goal is to meet or even out-hustle Google, with new versions due every four to six weeks for "every platform that matters", Mehdi said: Android, iOS, MacOS, Windows 7 and Windows 10.

New PCs will, at some point, simply be preloaded with the new Edge. Microsoft hasn't quite specified how existing PCs will be handled, but it seems that one will simply replace the other.

"Between January and March, we're going to do a lot of testing to see if we can upgrade people's Edge on the desktop for existing PC builds," Mehdi revealed. "That's the plan. We're going to do some testing, and just like Windows updates, we're going to try and get that right."

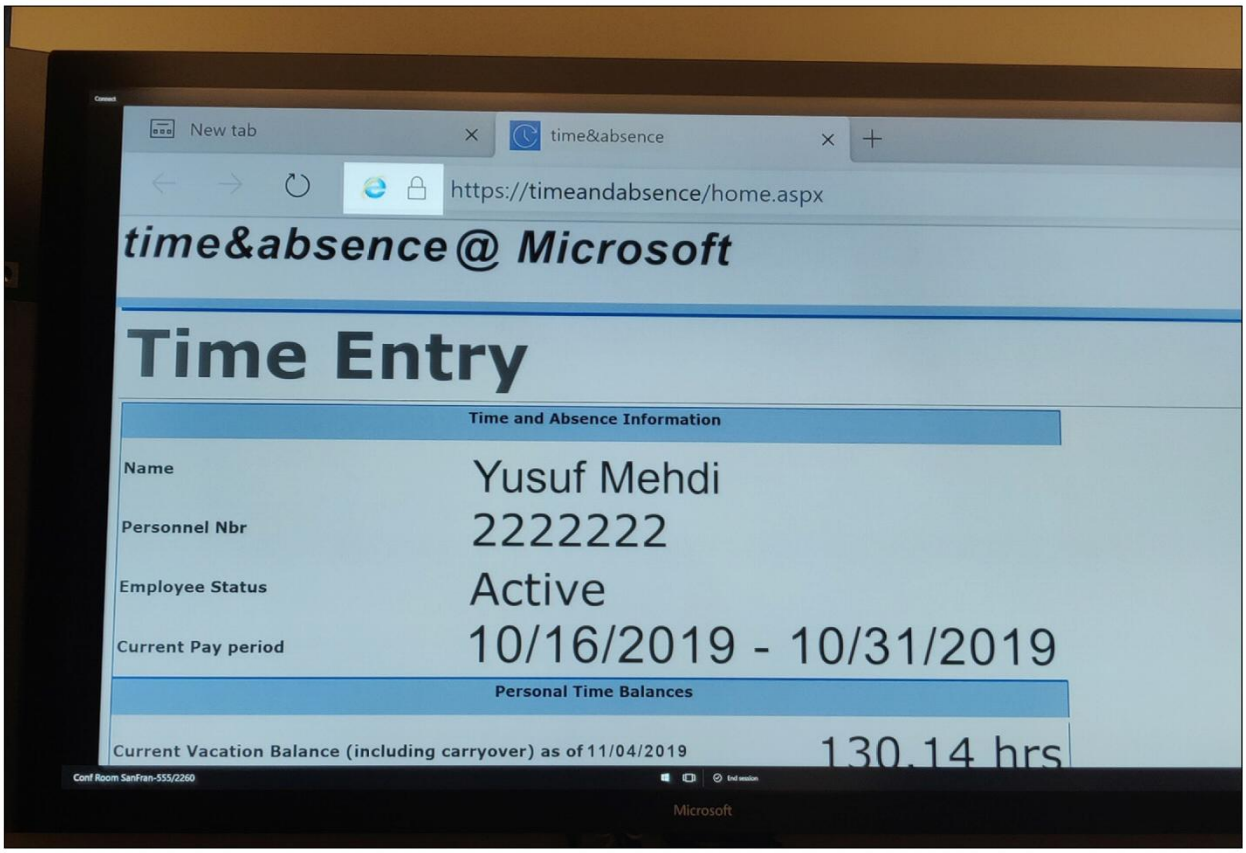


Buying a camera

| Product name | Price | Rating | # of Reviews | Brand | Link |
|---|---|---|---|---|---|
| GoPro Hero5 Black (E-Commerce Packaging) | $189.99 | 4.0 out of 5 stars | 532 | GoPro | amazon.com |
| DJI OSMO+ Plus Handheld Fully Stabilized 4K Camera | $485.00 | 3.2 out of 5 stars | 67 | DJI | amazon.com |
| GoPro HERO7 White — Waterproof Digital Action Camera | $193.49 | 4.0 out of 5 stars | 541 | GoPro | amazon.com |
| GoPro - HERO7 Black Limited Edition HD Waterproof Camera | $349.99 | 4.7 out of 5 stars | 1275 | GoPro | bestbuy.com |
| GoPro - Karma Grip Stabilizer | $299.99 | 4.4 out of 5 stars | 152 | GoPro | bestbuy.com |
| GoPro - HERO7 Black HD Waterproof Action Camera | $349.99 | 4.7 out of 5 stars | 1275 | GoPro | bestbuy.com |
| GoPro HERO7 Black \| Insanely smooth 4K Video | $349.99 | 5.0 out of 5 stars | 20 | GoPro | gopro.com |
| GoPro HERO7 Silver \| Drop into 4k | $299.99 | 5.0 out of 5 stars | 5 | GoPro | gopro.com |
| GoPro Fusion \| The most versatile 360 camera ever | $399.99 | 4.0 out of 5 stars | 76 | GoPro | gopro.com |



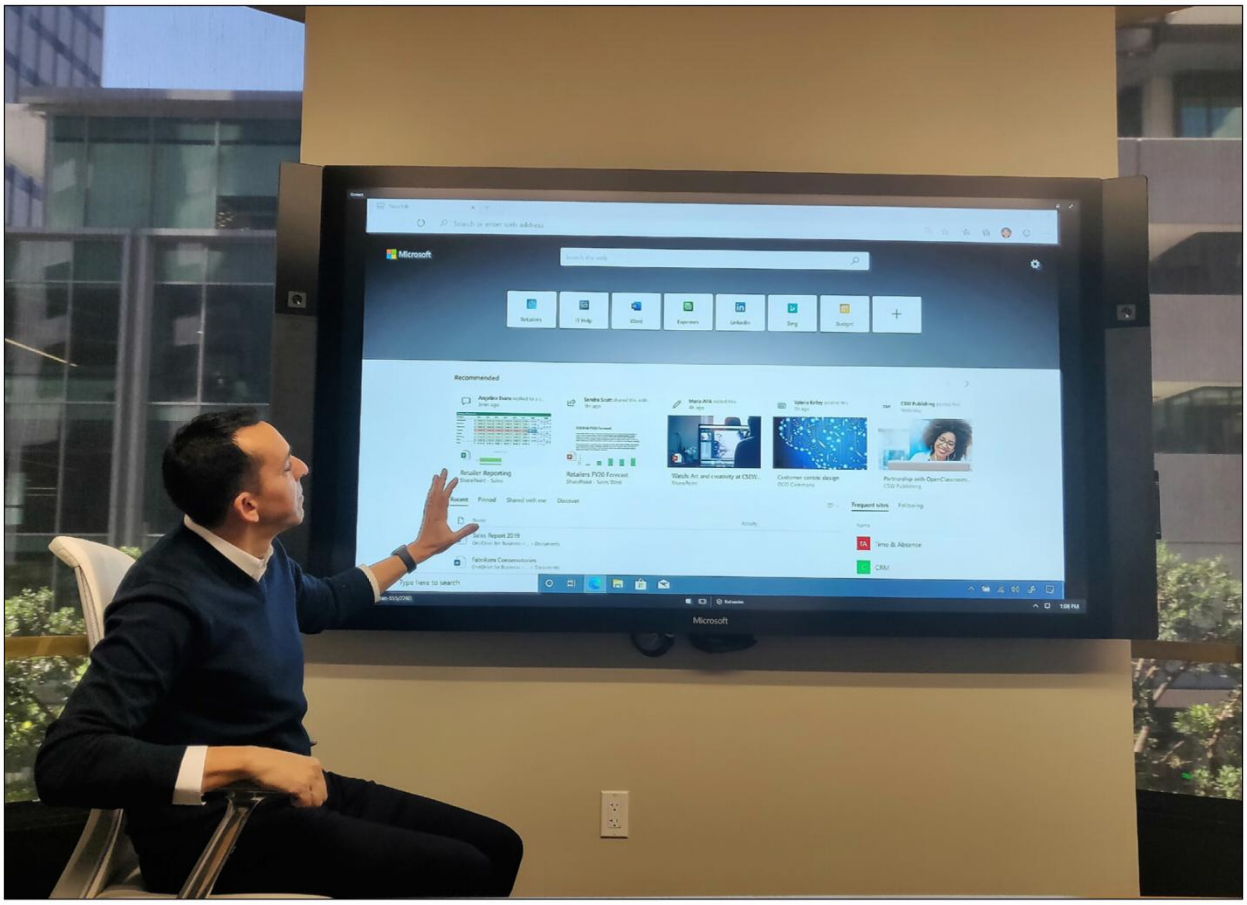
Collections will let you export product data to a spreadsheet, automatically pulling out and organizing the relevant metadata so that you don't have to




Though Microsoft is greatly encouraging consumers and businesses to move away from Internet Explorer, it's still there as part of the new Edge

At Ignite, Microsoft showed off Collections, which it showed off at Build earlier this year. Collections allows you to bookmark a series of web pages or text into a Collection. What's interesting about it, though, is if you export it using the ellipsis menu, the metadata (name, price, rating, and so on) can be automatically formatted into a spreadsheet for tracking or comparison purposes.

Like the current Microsoft Edge, legacy sites architected for Internet Explorer will be viewable in a tab.

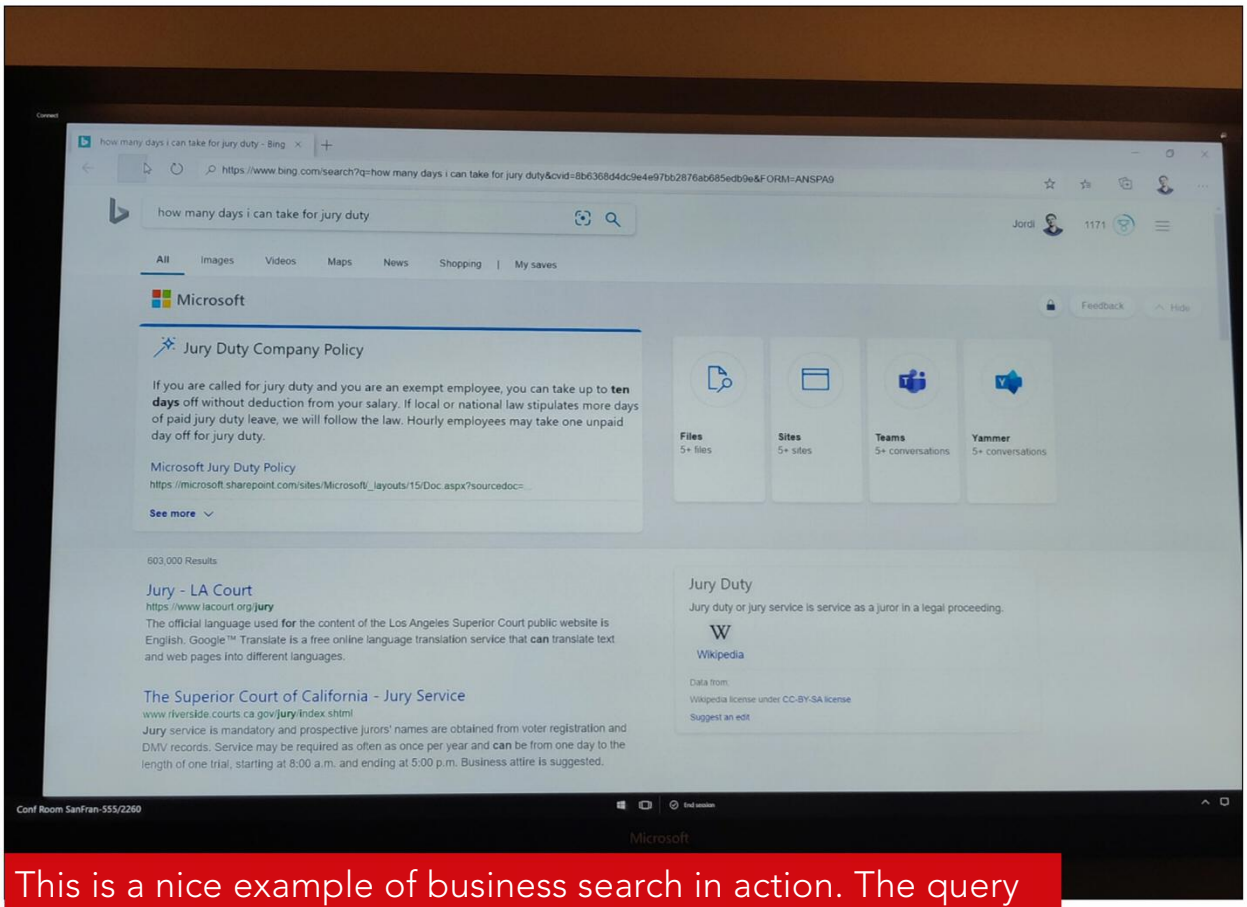



Microsoft's Yusuf Mehdi shows off Microsoft Search, essentially the Bing search engine in a business environment. Note the business-specific information at the bottom that is automatically surfaced

## 2. Microsoft Search: Bing for business, using 'Microsoft Cortex'

For years, Microsoft has cast about for the right way to offer insights into colleagues. Should it be Delve? Outlook Groups? Some combination of the two? Now, that information is accessible via Microsoft Search, the business 'look' of Microsoft Bing.

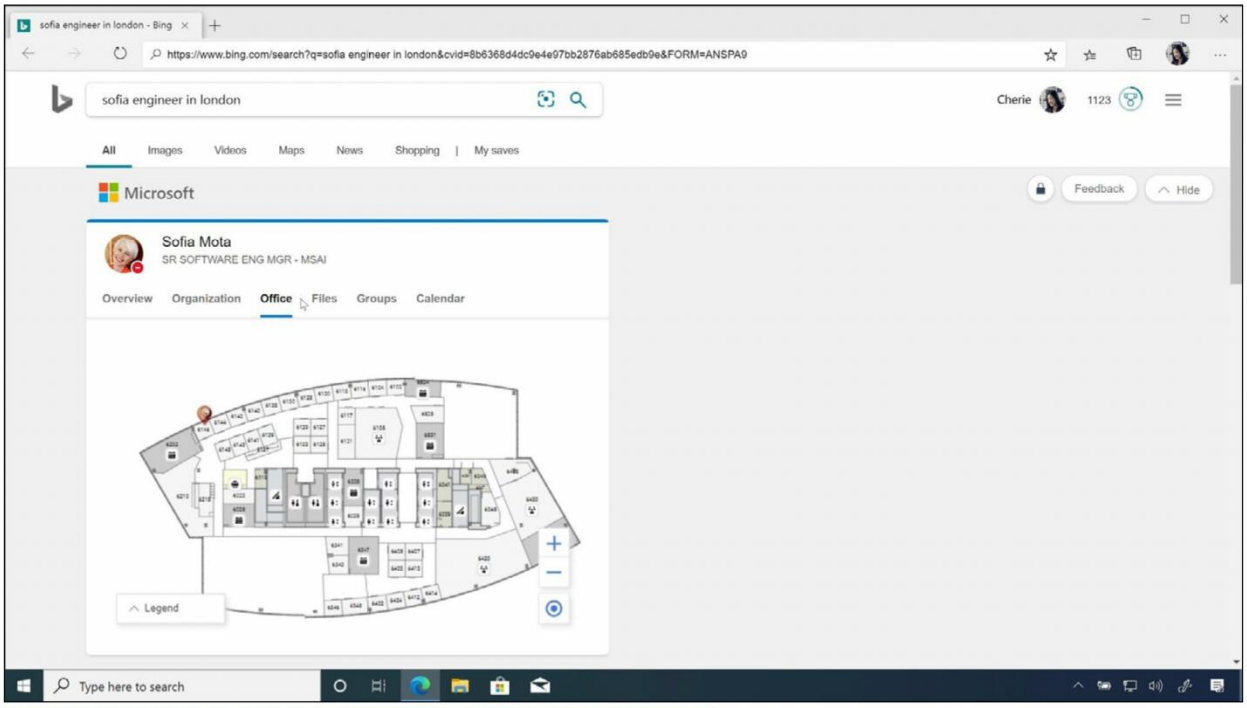
Microsoft Search makes available corporate information from your intranet in the same way Bing searches the Internet. Microsoft Search's new tab page




This is a nice example of business search in action. The query is obviously specific to the user's workplace, and Microsoft Search returns answers that are most relevant to that individual

will put your company's business resources at your fingertips, including corporate policies or the travel site no one can remember. If you're within the corporate network, you'll see Bing-powered Microsoft Search; outside it, you'll see Bing. Like Bing, you'll be able to use semantic search for natural-language queries. According to Mehdi, much of this information should still be in Delve, as well as in Microsoft Search; they serve distinct roles.

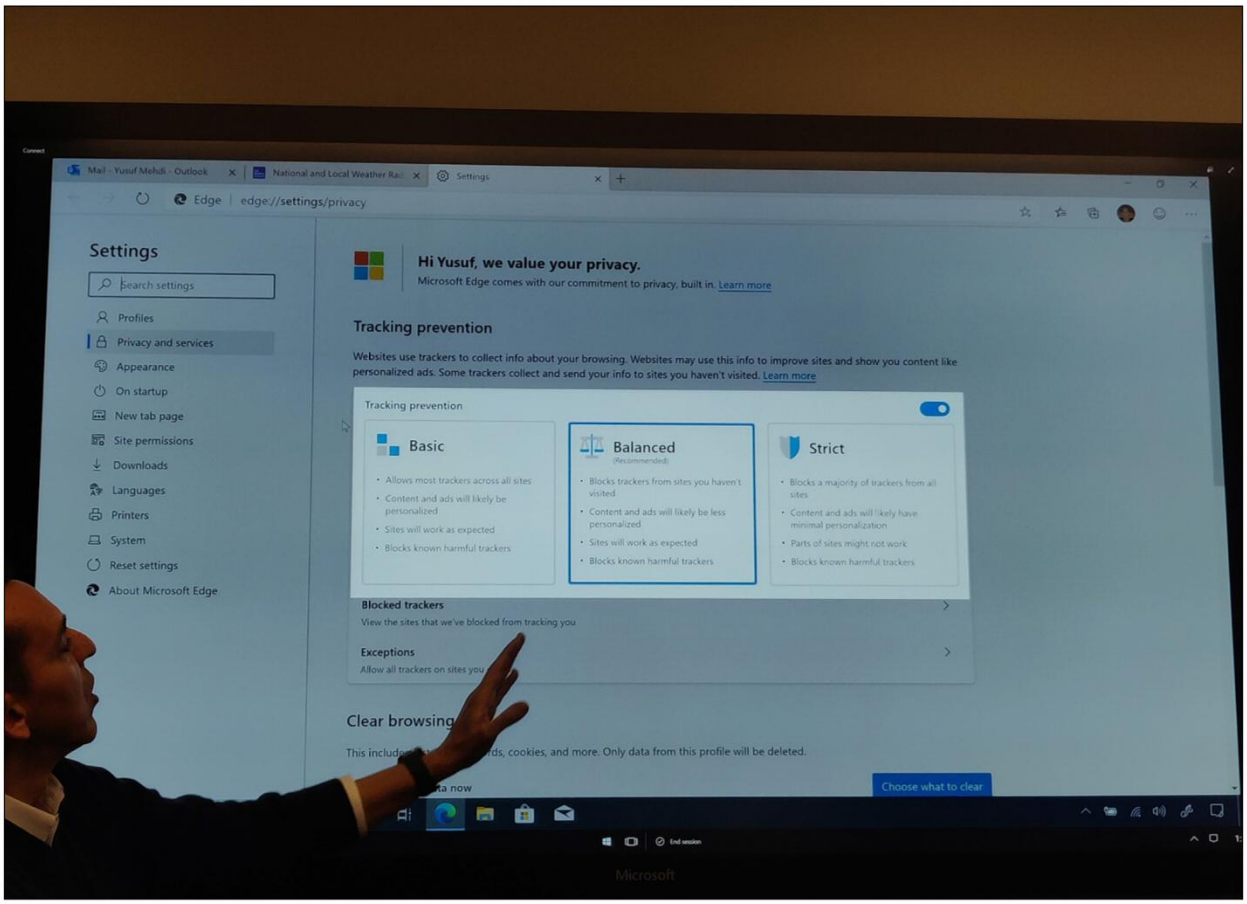
An entirely new service, which the tech giant is calling 'Project Cortex', goes a bit farther. Cortex




With Microsoft Search, you'll be able to research colleagues and where they sit – useful if you're revamping your corporate campus, as Microsoft is. Note the contextual query, no last name required

pulls information from unstructured content like legal contracts and employee agreements, and automatically adds metadata and classify topics into objects, allowing them to be more easily shared. All of these new 'Project Cortex' capabilities are available in private preview for now.

The message here? "We're able to make enterprise search as easy as searching the Web, and like Yusuf said earlier, we're uniting work and Web results together in a single experience," said Jordi Ribas, the corporate vice president of Bing and AI products at Microsoft, in an interview.




You'll have the option of configuring how severely Edge guards your privacy, as this configuration screen shows

## 3. InPrivate keeps Bing, Search really private

Microsoft has also decided that when a user wants to browse privately, they should be able to search privately, too. Windows Search now will disassociate itself from your account, so that your search and InPrivate search history won't be tied to your identity. (Other search providers don't do this, Microsoft claims.) Cookies won't be saved, and your history won't be logged. Everything is deleted once you close the InPrivate window, Mehdi said.

## 4. Natural language queries make Excel simpler

If simply making users aware of new features is one challenge, so is helping them take advantage of Microsoft's artificial intelligence. Excel used to feature 'Insights', which was supposed to extract meaning from your data. 'Ideas' (Home > Ideas) supposedly performs a similar function. Neither works especially well with the type of data I've used. (Ideas for Word, which Microsoft announced at Build, is rolling out now to commercial customers, with AI-powered grammar checking and inclusive language.)

Now, Microsoft is taking a different tack. The search bar at the top will work in a Bing-like, conversational manner – you should be able to ask natural-language queries and receive useful information in return. It's rolling out to Office Insiders at the moment. We'll see how this works in practice; as they say, your mileage may vary.

If that's not enough, you'll also be able to make natural language queries within Microsoft Search against PowerBI data that's also stored in your organization, according to Microsoft's Ribas. "The idea here is leveraging all the search algorithms of Microsoft for the web, and the Microsoft Graph – which is unique to us – we're able to make enterprise search as easy as searching the web," he said.

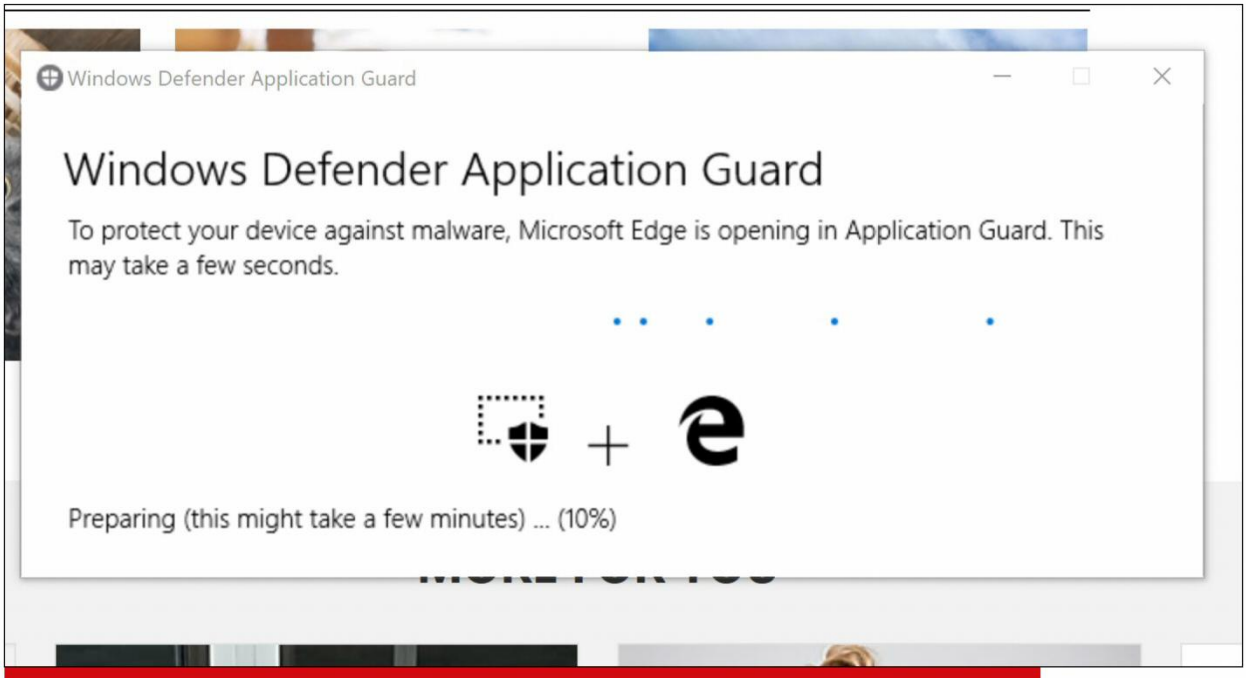
## 5. Office Scripts for Excel are just smart

You may be familiar with Format Painter for Excel: Once you've nailed down a few cells just so, you can 'paint' that format onto others, without really

knowing what you're doing. Office Scripts takes that to another level, in that you can essentially record a macro of your actions in a notebook and then apply them to others. Scripts can be stored in OneDrive, shared, and combined with up to 300 connections and actions, Microsoft said. It will be in public preview for the web by the end of the year.

## 6. Application Guard comes to Word, Excel and PowerPoint

Very few of you have probably used Windows Device Application Guard (WDAG), a protected browser within Windows that walls off your computer via virtualization. We've previously wondered whether virtualization could be used elsewhere within Windows. In Office 365 ProPlus, it will.




Application Guard takes the same virtualization technologies in WDAG and applies them to Office documents

O365 ProPlus will wall off untrusted Word, PowerPoint and Excel spreadsheets within a virtualized container. If the file hides malware, your PC will be protected automatically. (Labelling it as trusted will trigger an additional check against the Microsoft Defender Advanced Threat Protection threat cloud.) Application Guard shouldn't require any manual administration – and that's a good thing. Microsoft said this is in limited preview and should roll out in 2020.

## 7. A new Office app for iOS, Android

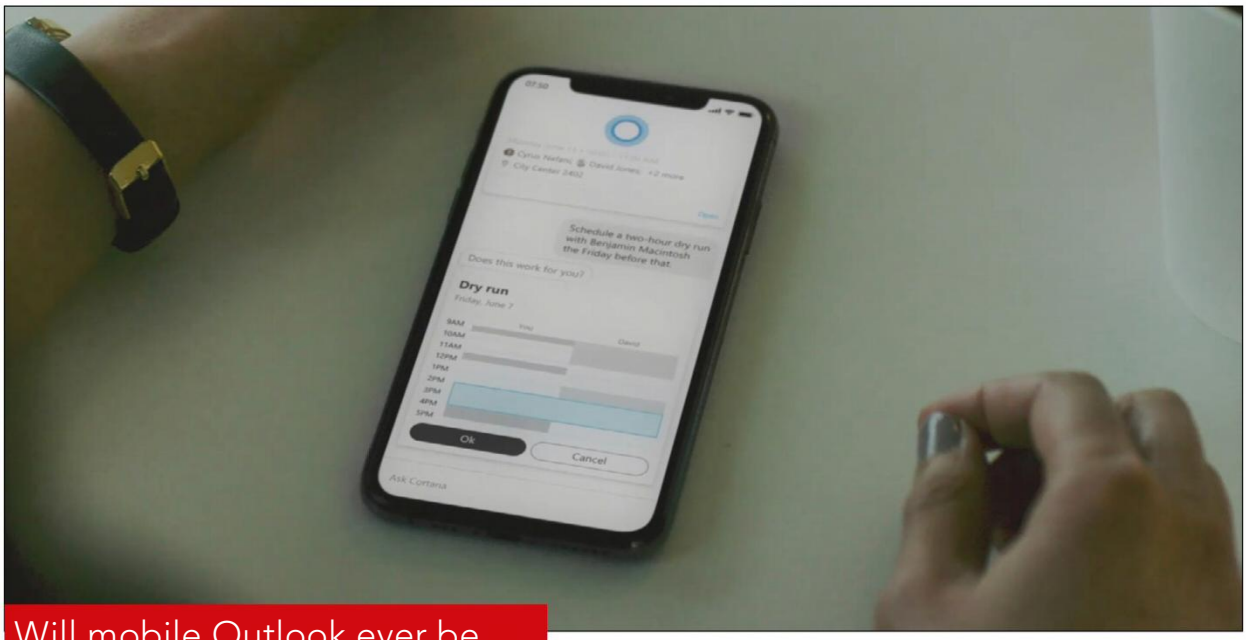
If you typically open those apps in the Office mobile app for Android or iOS, there's a new Office app that is designed to serve as the focal point for mobile document creation and editing, much as the mobile Outlook app houses both email and its calendaring application.

Today, the desktop Office app doesn't do much more than supply shortcuts to recent Office documents and apps, as well as account management. The mobile Office app sounds much more capable, though we haven't see it in person yet.

"Users will also be able to do a variety of common on-the-go tasks, such as converting images to text, creating and signing PDFs, and sharing files between devices," Microsoft revealed. The new mobile Office app entered public preview for iOS and Android on 4 November.

## 8. Outlook adds a load of useful features

Outlook's receiving a bunch of new features: Play My Emails, Meeting Insights, a new meetings scheduler,




Will mobile Outlook ever be as smart of Microsoft's Cortana demo made it out to be?

Cortana's daily briefing, and even improved Message Recall. What's significant is that many of those new features are coming to the Outlook mobile app, too.

One of the highlights of Microsoft's Inspire keynotes may be Play My Emails, reminiscent of the smarter, context-aware Cortana shown off in May. This new feature appears to be constrained to Outlook, however, specifically Outlook for iOS, and went live for iOS on 4 November.

Microsoft described Play My Emails as a "voice-forward feature that intelligently reads out your email and shares changes to your day – ideal for commuting or multitasking – helping you get time back so you can focus on other things". You'll be able to reply to emails with simple voice commands and easily navigate messages with new, larger tap targets optimized for

mobile use. Play My Emails also allows you to adjust Cortana with a new voice option that uses neural voice technology to sound more natural.

Separately, Microsoft is also cracking down on what mobile data can be accessed via a corporate and personal email account. Even Outlook lock screen notifications will be encrypted until unlocked, Microsoft told us.

On the desktop, Outlook is also adding support for Meeting Insights, a feature called 'Up Next', and inferred locations, all of which are designed to help manage your day. If you add a personal calendar, users will be able to see what time you've blocked out for a dentist appointment, for example, and not schedule over it. Travel times will also be accounted for (which Cortana did years ago). It sounds like relevant email conversations and files will automatically surface in anticipation of your next meeting. They'll all be available by the end of the year.

Cortana, now less a digital companion than an office assistant, now can automatically book your meetings with Scheduler, yet another tool for tracking down open times on shared calendars. Do you remember how Cortana used to be able to display your day, together with relevant information, when you clicked her icon within Windows? That's being replaced with a summary 'briefing email' from Cortana, which is now available in preview for Microsoft 365 subscribers.

Finally, Microsoft's touting Message Recall, the ability for "users... to recall messages they've already sent". Does this mean that a user using Outlook will actually be able to 'disappear' an email that was

previously sent, even if it lands in a public folder, or Gmail, or has already been opened? We'll see.

## 9. MyAnalytics handles your Out of Office messages

Heck, if you're a Microsoft 365 commercial customer already enrolled in MyAnalytics and Workplace Analytics, the service will automatically schedule an out-of-office notification if it knows you'll be unexpectedly delayed or otherwise occupied.

MyAnalytics, Microsoft's other personal productivity assistant – sorry, Cortana – will also automatically cancel meetings, schedule 'catch-up' time when you return, and check up on how well you're sticking to your agenda. No rest for the wicked!

## 10. OneNote 2016, Whiteboard, Yammer get new life

Microsoft also said that OneNote 2016 isn't quite dead yet. Mainstream support has been extended indefinitely, complementing the existing OneNote app already in Windows. Dark mode and '@mentions' will also arrive for OneNote users and Office 365 subscribers next year, Microsoft said. Whiteboard is now a web app, which can be easily downloaded.

Finally, Yammer is being overhauled, with a 'beautiful, intelligent experience' that connects to Teams, SharePoint, and Outlook. Select customers can see the new Yammer in a private preview scheduled for December, Microsoft said. It's due to roll out to all customers in 2020, part of what Microsoft hopes will be the 'Year of Yammer'.

# ‘Project Silica’ targets glass as the storage medium of the future

Project Silica glass can withstand microwaving, flooding, and other environmental hazards. MARK HACHMAN reports

In contrast to Microsoft’s new Edge browser, natural-language querying in Excel and other near-term innovations, one of the more interesting announcements you won’t see anytime soon is storing data within glass: Project Silica.

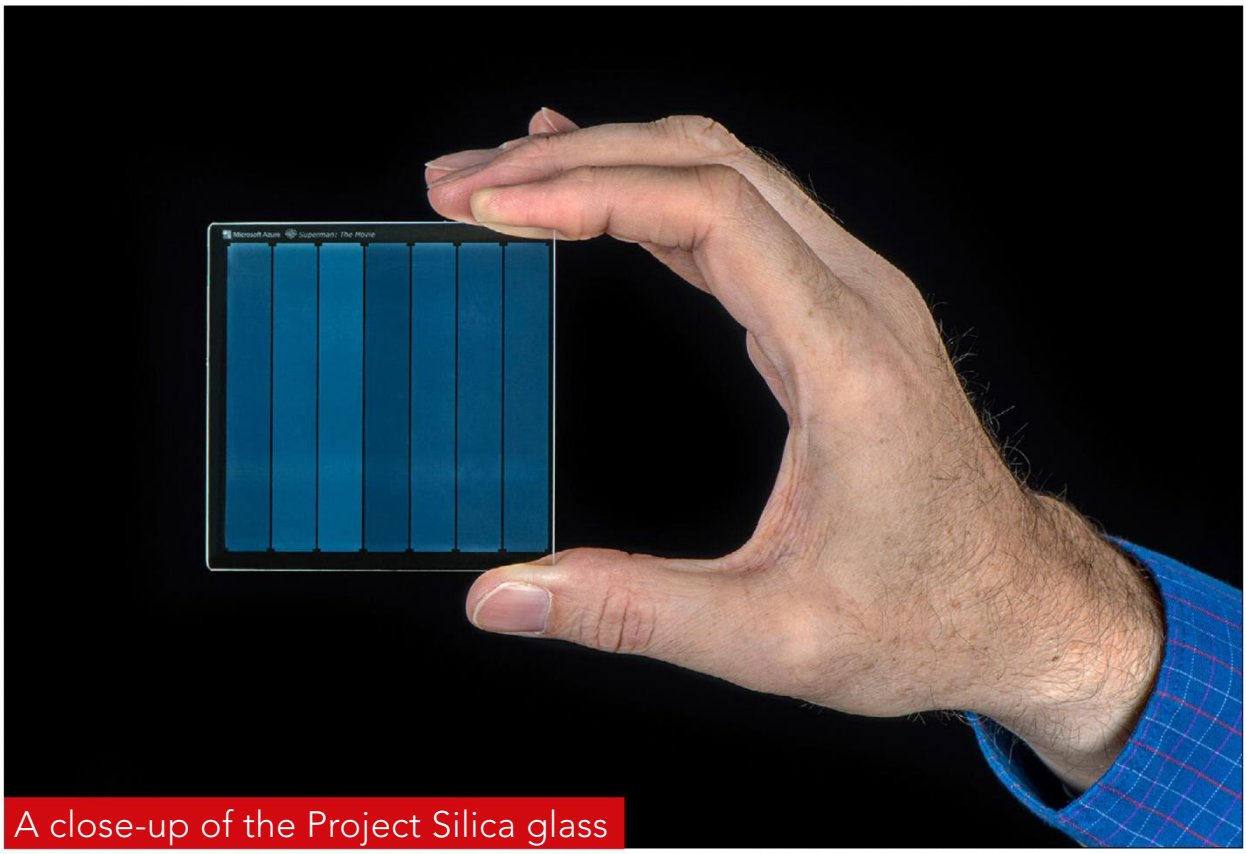
At Microsoft Ignite, the company showed off how it developed (with help from the Warner Bros film studio)

a three-dimensional recording system to store the movie Superman within a pane of glass. Using 'voxels', a three-dimensional version of the pixels that display images on a PC monitor, Microsoft was able to store the digital version of the movie inside a Project Silica glass. More than 100 layers of voxels can be stored on a sheet of glass 2mm thick.

In 2016, Microsoft began showing off how it could use DNA strands to store data, as a biological analogue to traditional disk- or flash-based storage. Glass storage is arguably more practical, as Microsoft tested it by boiling the glass, rubbing it with steel wool, and even microwaving it without any degradation of the data. Infrared layers distort the glass, somewhat like traditional DVD recording media, but do so inside the glass and away from the open air. The data is read back using lasers, Microsoft said in a blog post about Project Silica, and machine learning is used to decode the light as it reflects off of the glass.

As Microsoft's *Superman* demo indicates, the motion picture industry might be one customer interested in a storage technology like this. Analogue film is notoriously fragile, subject to rot and other decay. Many early films have been entirely lost because the original negatives deteriorated to the point of no return. Film studios store multiple copies in multiple locations, even separating the colour data and then reconstructing it if necessary, but that's a costly and laborious process.

While Microsoft's demonstration obviously puts this solution past the theoretical stage, it's not quite ready for production. *Variety*, which received an inside look at the technology, reports that Microsoft doesn't yet



A close-up of the Project Silica glass

have commercially available production equipment to read and write data. It's also not quite clear how much data can be stored per cubic millimetre, or how long the data can actually last, among other questions that have yet to be publicly answered.

Still, archival data is a problem that storage companies have quietly tried to solve, especially as factors like 'disc rot' quietly gnaw at CDs and DVDs from years ago. Can hard drives spin forever? No. Content providers have to balance the constant maintenance of a storage solution like a server with the cost of preserving data that may be touched once or twice in a dozen years. Glass may be the answer, but there's still work to be done.

# Google Pixelbook Go

**Price:** £829 from **fave.co/355hXTB** ★★★★½

Eight years into the Chromebook's existence, the category is still dominated by small, super-cheap laptops. Google has previously tried to inspire greater things with halo models – the super-premium Chromebook Pixel of 2013, and the stylish Pixelbook of 2017. But most users couldn't or wouldn't pay for them.

"We heard loud and clear that people loved the design and wanted a lower price," said Matt Vokoun,

Google's Senior Director of Product Management for Create Hardware. Enter the Pixelbook Go, a laptop with a careful balance of quality features and economical compromises. Its £629 starting price (via Google) is still somewhat high – and the top-end model will cost £1,329. Still, it could bolster a sparse 'middle class' of Chromebooks that's still struggling for traction. And it's a darn sight better than the typical bare-bones model. If you're committed to the Chromebook universe, this is a laptop worth buying.

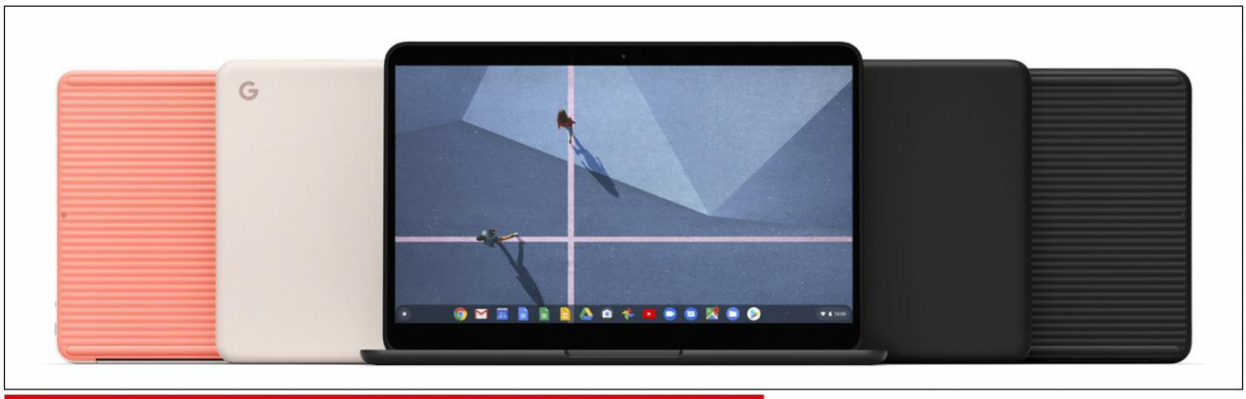
## Price

As befits a midrange laptop, the Pixelbook Go comes with good- or better-quality components in reasonable amounts. For instance, while many low-cost Chromebooks come with a measly 4GB of RAM, all versions of the Pixelbook Go come with at least 8GB.

Also, low-end Chromebooks tend to use inexpensive and slower eMMC storage, and not much of it, while the Pixelbook Go uses speedier SSDs, with capacities ranging from 64GB to a fat 256GB, so it's closer to a Windows laptop. We'll detail the different versions first, then list the specs common to all.

A note about the CPUs: these are Intel Amber Lake mobile processors, designed for thin-and-light laptops. Even though they sip a mere 5 watts of power, they use high boost clocks to deliver a jolt of extra speed. They're a noticeable improvement over the bargain-basement CPUs you'll find in many low-cost Chromebooks.

Note that in the UK, the Pixelbook Go isn't due to arrive until early 2020.



Google's Pixelbook Go will offer two colours: Just Black, and on some models, Not Pink

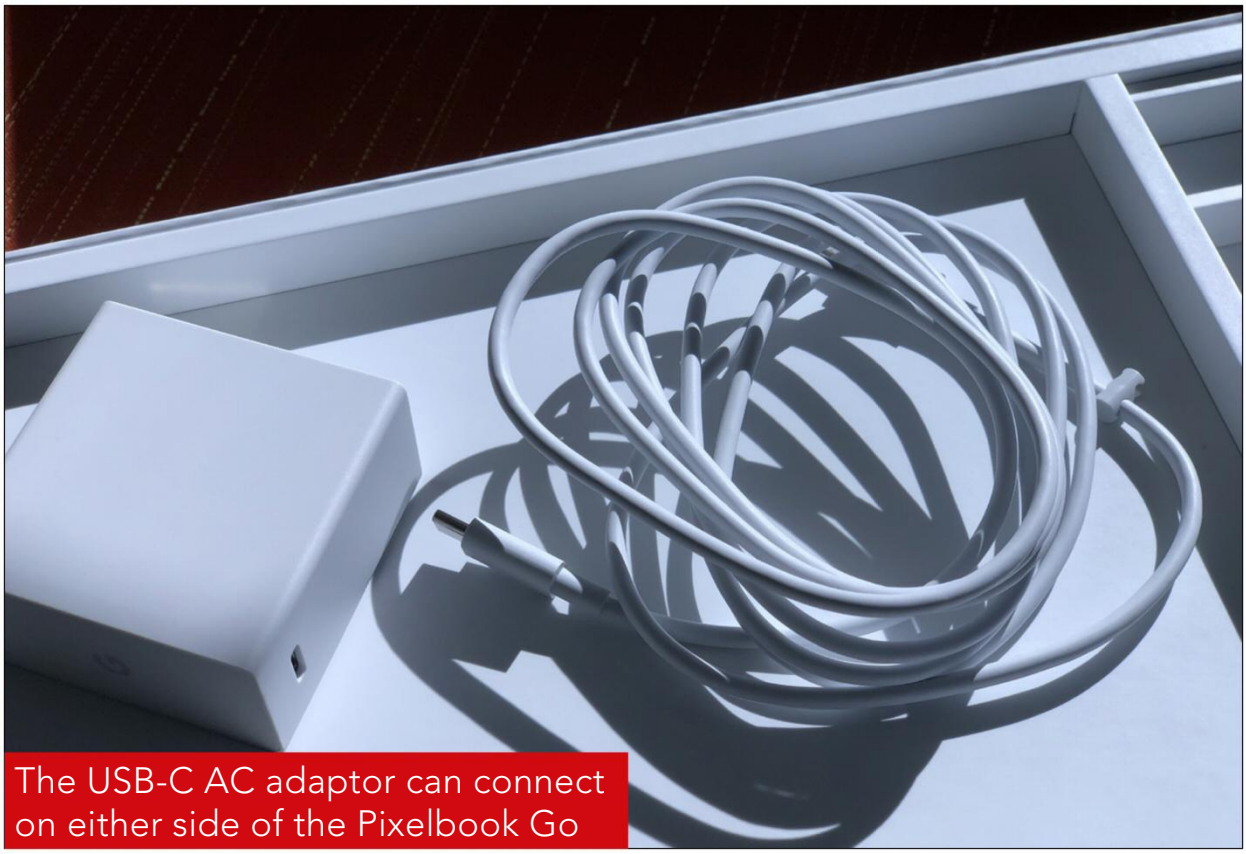
**£629:** Core m3-8100Y, 8GB RAM, 64GB SSD, Full HD display
**£829 (our review unit):** Core i5-8200Y, 8GB RAM, 128GB SSD, Full HD display
**£949:** Core i5-8200Y, 16GB RAM, 128GB SSD, Full HD display
**£1,329:** Core i7-8500Y, 16GB RAM, 256GB SSD, 4K display

For a complete list of specifications see **page 32**.

## Design

The Pixelbook Go is delightfully thin and light at just over 1kg. I can slide it into the document sleeve of my bag and still fit a laptop into the padded compartment next to it. The compact 45-watt AC adaptor, with foldout prongs and a USB-C cable, is easy to tuck into a side pocket.

The magnesium alloy chassis is extremely sturdy. The keyboard tray has no flex, and the display lid, just a slight amount. The matte finish fends off



The USB-C AC adaptor can connect on either side of the Pixelbook Go

fingerprints pretty well, looking at worst like faint smudges rather than smears.

Reasonable people can disagree about the ribbed texture and rounded corners of the bottom of the Pixelbook Go. As someone who struggles to grip smooth metal and plastic laptops, I'm all for the ribs. I also think the texture may add to the comfortable feel on my lap. The rounded corners mean the laptop isn't digging into my thighs.

Another reason the Pixelbook Go is so lap-able is because it stays pretty cool. I noticed a slight warmth in the upper underside of the keyboard tray, near the hinge, but nothing that made me want to move it to a tabletop.

Google designed the ribbed texture on the back of Pixelbook Go to make the laptop easier to grip

## Display

The 13.3in, 1,920x1,080 Full HD display available on all but the highest-end Pixelbook Go is a welcome upgrade from the 1,366x768 HD screens we see on too many other Chromebooks. Images and text look crisp, and colours look good (the display has a 72 percent NTSC colour gamut rating).

This resolution is also pretty easy on battery life. Of course, you'll use more juice if you crank the brightness all the way up – we measured a hearty 391 nits at the centre of the screen, a good range for working outside. We used the Pixelbook Go with the display set at about 200 nits, which is comfortably bright for indoor use.


The Hush Keys on the Pixelbook Go are indeed quiet, and the travel, while just 19mm, is surprisingly comfortable

The wide, 16:9 aspect ratio may frustrate some users, as it's better for watching movies than scrolling documents or spreadsheets. Google said users wanted this aspect ratio so they could view two documents side by side – fair enough.

However, Google also told me that this size and aspect ratio of display was readily available in quantity, helping with the overall cost of the Pixelbook Go.

## Keyboard and touchpad

Google didn't have to try too hard to make a better keyboard for Chromebooks. Most of the ones I've tried in low-end models have such harsh travel that it feels

like I'm typing on rocks. The ones in the midrange Chromebooks are generally better.

The Hush Keys on the Pixelbook Go are indeed very quiet. Their 19mm of travel isn't much, but it's gentle as it hits bottom. I wish the keys had a bit of a dimple to help with typing accuracy, but that's a low priority if you're trying to save money on the design.

I view touchpads as a necessary compromise in laptops, less easy than a mouse. The large, centred glass clickpad is still a good example of the breed. It responds readily to my touches and taps, and it registers clicks almost all the way up to the top.

## Accessories and connectivity

The Pixelbook Go comes with dual front microphones, dual speakers (on either side of the keyboard), and a 2Mp front camera that can record 1080p video at 60fps. While I didn't try recording video, I did use the camera for a video conference during testing.

Did I mention that video conferences drive me crazy, especially when the video's bad or the audio is choppy? This video conference didn't drive me crazy. The video quality was crisp, and the audio quality was fine too.

About the connectivity, note that you have just two USB-C ports, one on each side of the Pixelbook Go. Both may be used for charging, or connecting a display or a storage device. If you have legacy drives, it's time for a USB-C hub. There's also a combo audio jack.

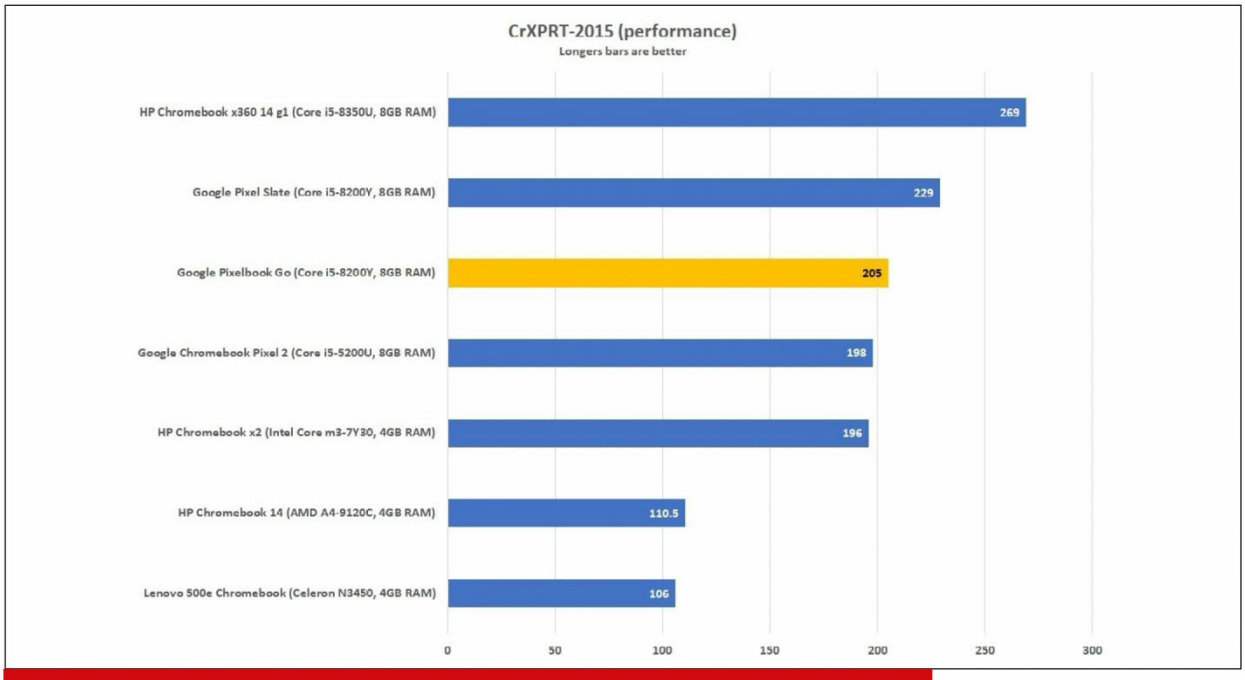
## Performance

The Pixelbook Go's Intel Core i5-8200Y processor on our review model may not be designed to burn barns,

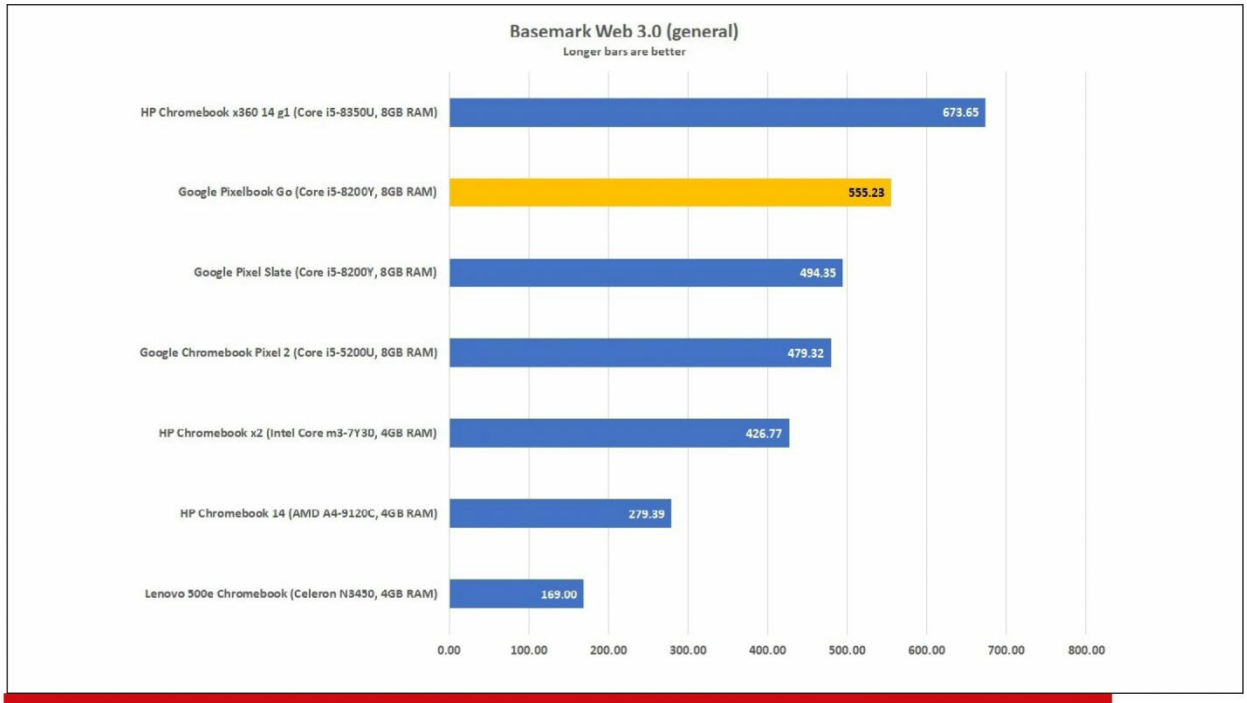
but compared to the chips in most other Chromebooks we've tested, it's a solid offering – certainly able to handle mainstream productivity tasks, if not graphics-intensive or gaming applications. The proof is in the performance charts below.

The Cr-XPRT performance test measures Chromebook performance in basic productivity tasks as well as more demanding activities, such as watching movies or playing games. The HP Chromebook x360 14 g1, which has a more powerful U-series Core chip, leads by a wide margin, but the Pixelbook Go heads up the middle of the pack.

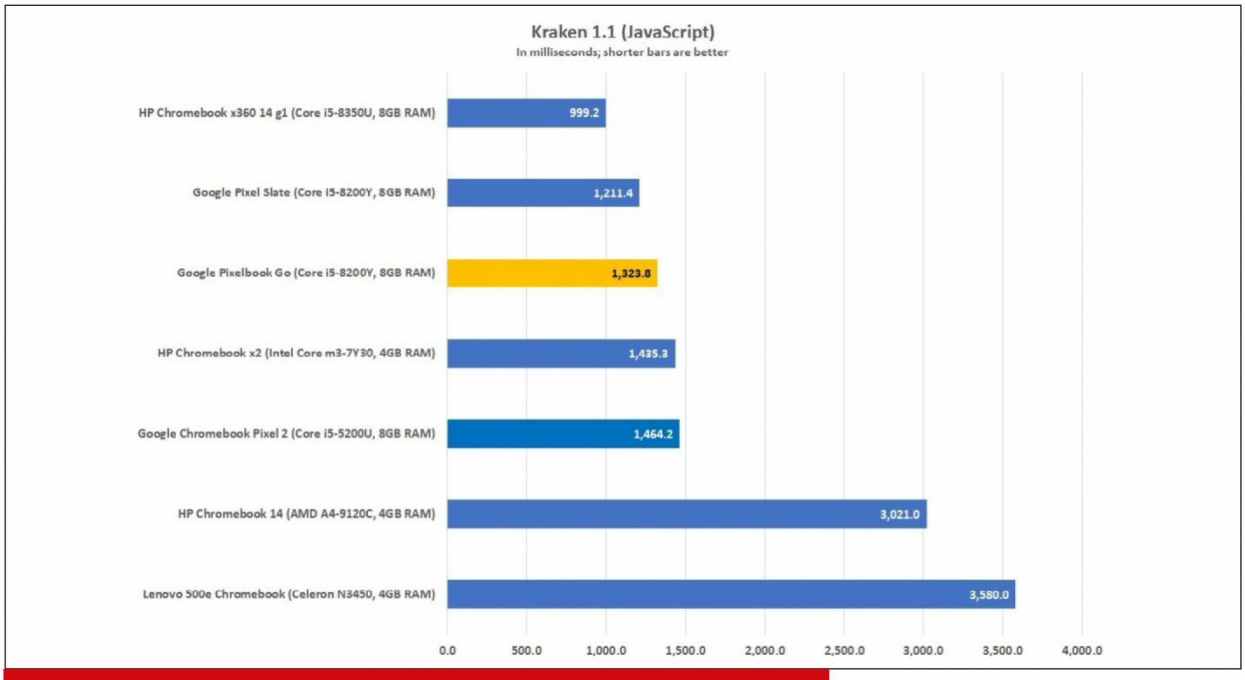
Basemark is another broad-based benchmark, incorporating web real-time graphics using WebGL and JavaScript frameworks. The Pixelbook Go does even better in this test, creating its own place between the




The Pixelbook Go posted a good score in Cr-XPRT, not far behind the leaders in this broad-based test suite




The Pixelbook Go jumps ahead of the pack in the Basemark test suite, led only by a Chromebook with a much more powerful CPU




In Mozilla's real-world Kraken JavaScript test, the Pixelbook Go posted one of the faster scores

middle of the pack and the leader. Mozilla developed the Kraken JavaScript benchmark to measure browser speed using real-world applications and libraries. Shorter bars are better here, and the Pixelbook Go once again does better than most other recent Chromebooks we've tested.

We aren't showing a comparison chart for battery life. A minor bug in Chrome 77, the current OS version, prevented the Cr-XPRT test we normally use from running properly. We tested battery life manually instead, setting the Chromebook display to 200 nits and connecting earbuds, with the volume set to 50 percent.

We ran the Cr-XPRT performance benchmark a dozen times, then streamed an hour-long YouTube video over and over until the battery was nearly depleted. In all, we got a little over eight hours of battery life. Your mileage will vary, but this is a decent duration, though short of Google's estimate of up to 12 hours.

## Verdict

When Google vice president of hardware design Ivy Ross introduced the Pixelbook Go on 15 October, she said they set out to make a laptop that would be "fast, last all day, and look and feel beautiful", but with a more attainable price point. The Pixelbook Go achieves that with very few compromises.

We don't yet know whether users will flock to the Pixelbook Go in a way they haven't for Google's high-end Chromebooks, or other Chromebooks in its same price range. But Google has once again made a standard that may be hard to beat. Melissa Riofrio

## Specifications

- 13.3in Full HD (1,920x1,080; 166ppi) LCD touchscreen display
- Chrome OS
- Intel Core i5 processor
- 128GB SSD
- 8GB RAM
- 1x USB-C charging and display output, 3.5mm headphone jack
- 802.11ac Wi-Fi
- Bluetooth 4.2
- Duo Cam: 2Mp, *ƒ*/2.0 aperture, 1.4µm pixel size
- Dual front-firing speakers for better surround sound
- 47Wh battery
- 311x206.3x13.4mm
- 1090g

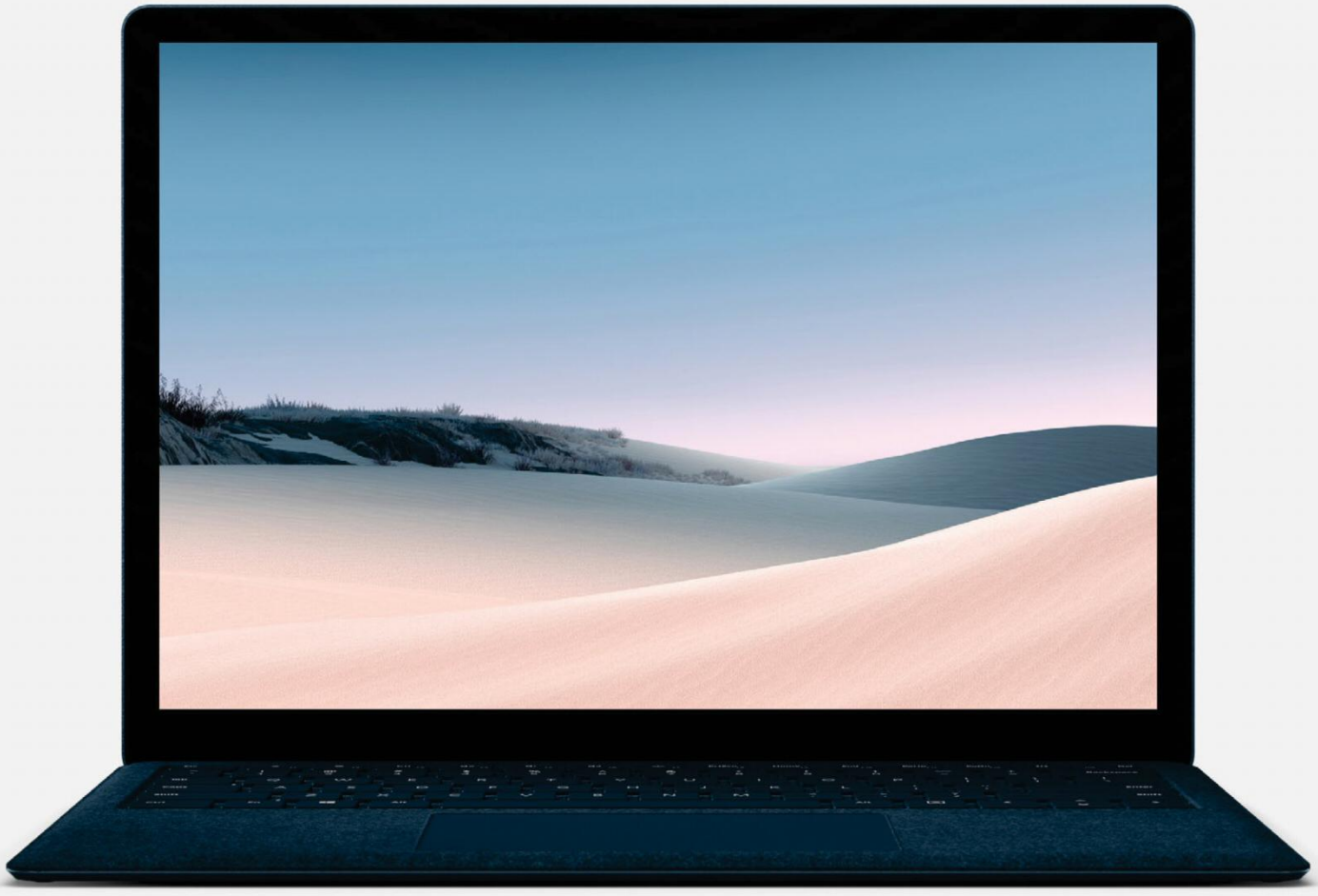
**REVIEW:** WINDOWS 10 NOVEMBER UPDATE

# TECH ADVISOR

IDG | JANUARY 2020

# MEET THE SURFACE 2020 LINE-UP

## MICROSOFT'S LATEST HARDWARE REVEALED




# REVEALED:

## BEST SMARTPHONES

# Google Pixel 4 XL

**Price:** £829 from **fave.co/2JOkrO4** ★★★½☆

The Google Pixel 4 XL can lay claim to the only real smartphone breakthrough of the year: a shrunken radar chip that's so advanced it can detect when you reach for your phone so you'll never have to stare at a blank screen again.

It's a delightful feature that makes phones with ambient or always-on displays feel like they're stuck in the past. Combined with Face unlock, the Pixel 4 XL's Motion Sense technology makes me feel like the phone anticipates all my moves, and this truly saves time by

limiting how often I need to tap the screen. Before you even unlock it, the Pixel 4 XL exudes futurity and sets you up for an experience unlike anything you'll find on a Galaxy or iPhone.

Unfortunately, the rest of the phone's innovations are still several software updates away. Once you get past the lock screen, the Pixel 4 XL is basically an iterative upgrade over the Pixel 3 – which is still for sale, and for hundreds of pounds less. The new model introduces features that need more time to bake, a few shortcomings that should have been fixed before launch, and a camera that isn't impressive when compared to the competition. Google may have delivered its most ambitious phone with the Pixel 4 XL, but it falls well short of nailing a top-tier phone experience.

## Design

Like the Google and Nexus phones that came before it, the Pixel 4 XL is a bland, perfunctory handset that looks downright ugly next to the Galaxy Note 10+ or iPhone 11 Pro. While other phone makers are racing to be the first with a 100 percent screen-to-body ratio, the phone is nearly 20 percent bezel and extremely top-heavy to boot.

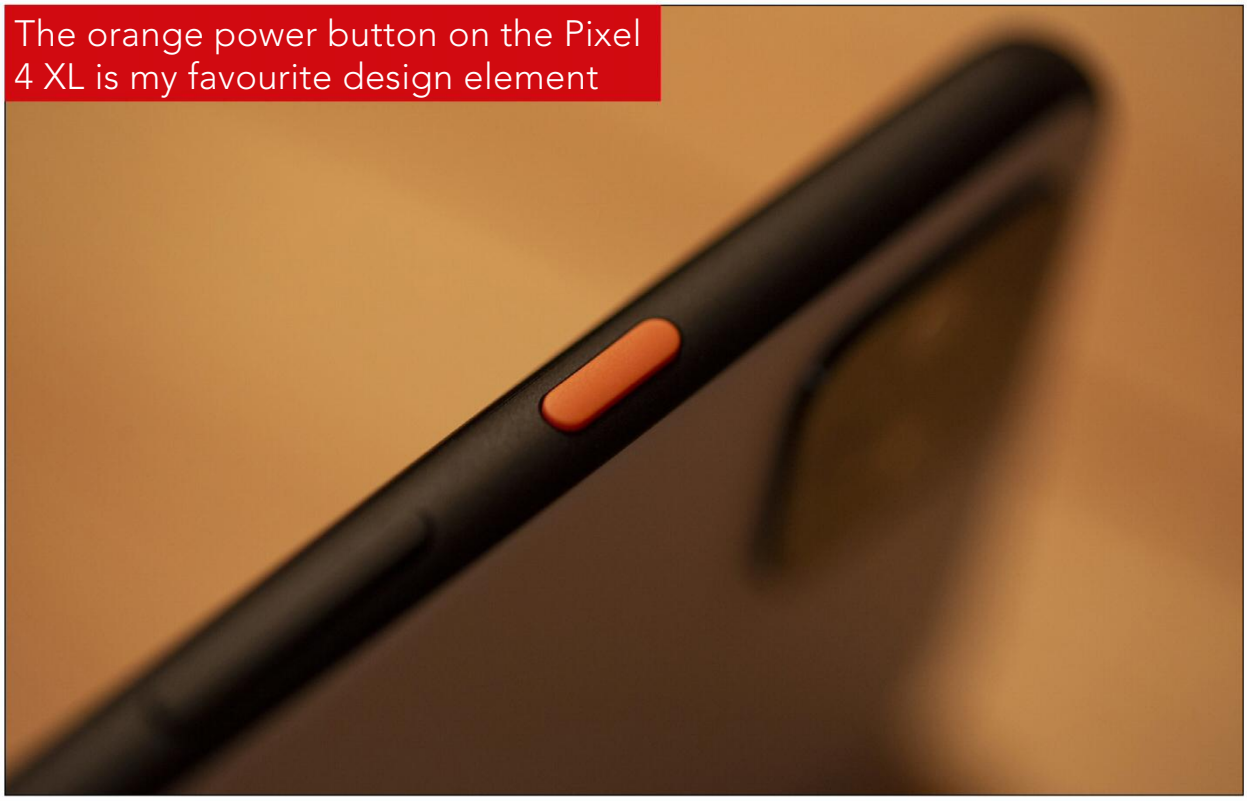
Gone is the Pixel 3's laughably large notch, but in its place is a bezel that's straight out of 2016. No fewer than seven sensors and a speaker occupy the space above the screen, but all you'll see is an unsightly strip of black glass. The sizable top bezel extends to the sides and the bottom, where there's no balance or symmetry. It's small enough to push the speaker to the


There's no notch on the Pixel 4 XL (front), but the bezel is very much still there

bottom edge, and from afar, the Pixel 4 XL will look more like a budget phone than a premium one. And even up close, there's nothing about it that looks like it should cost £900.

Around the back you'll find the phone's most obvious upgrade: a dual camera. Like the iPhone 11, the Pixel 4 XL has a giant square camera array in the top left corner that's designed to stand out, particularly in white or orange. However, while the camera array is very much a fluid part of the iPhone 11 despite its size, the Pixel 4 XL's camera bump feels like an afterthought that was tacked on after the phone's design was already finished.

That said, Google's handset has the nicest hand feel of any phone I've ever used. From the frosted



The orange power button on the Pixel 4 XL is my favourite design element

glass back to the polished aluminium sides, there isn't a speck of gloss apart from the front and the 'G' logo, and the visual and tactile contrast is palpable. The back is silky to the touch, giving the 4 XL an even more luxurious feel than the iPhone 11 Pro, and it's remarkably resistant to scuffs, smudges, and scratches. But my favourite design element continues to be the coloured power button, which is orange on the white model I tested. It's subtle, but it adds a bit of whimsy to an otherwise staid and, ahem, buttoned-up design.

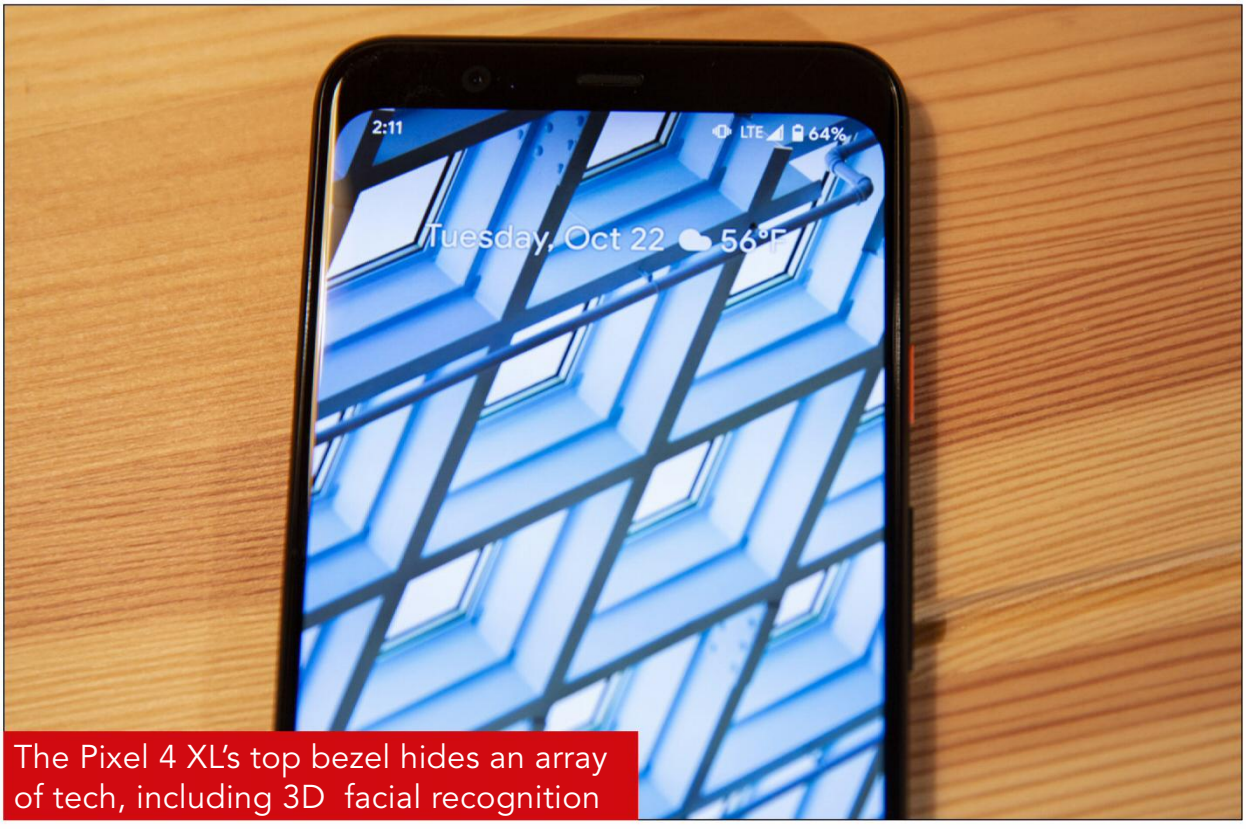
The Pixel 4 XL doesn't include a headphone jack, which isn't a surprise, but it also doesn't come with a pair of USB-C earbuds or a 3.5mm adaptor, which is a bit shocking. The Pixel 3, Galaxy S10, and iPhone 11 all come with an audio contingency plan, so I really

don't understand the decision here. It makes it feel like Google is shortchanging its customers, and coupled with a not-great design, it gives the Pixel a cheap vibe.

## Face unlock

The Pixel 4 XL brings a handful of new features that set it apart from both the Pixel 3 and Google's 2019 competitors, and they're all designed to enhance your daily smartphone routine without much adjustment or relearning.

Let's start with Face unlock. Where virtually every other Android phone relies on a fingerprint sensor to keep your phone locked from prying eyes, the Pixel 4 XL has a 3D camera for secure facial recognition. It's something no other US-designed Android phone




The Pixel 4 XL's top bezel hides an array of tech, including 3D facial recognition

has, and only the LG G8 with its time-of-flight sensor has something similar. That means after more than two years there's finally an Android Phone that can rival Apple's TrueDepth camera and Face ID, an overdue milestone that will hopefully spur other phone makers to follow suit.

And it works really well. While Face unlock on the Pixel 4 XL requires more precise positioning than Face ID on the iPhone 11, for a first-gen feature, I was impressed. It works on the first try better than 95 percent of the time, and it offers some subtle improvements over Apple's method. For one, there's a small bit of haptic feedback to let you know it works, so you can stop holding your phone up. And there's an option to let you skip right to the home screen once it recognizes your face, saving a swipe and making the whole system feel far quicker and more integrated.

However, there's a big caveat to Face unlock: it's less secure than Apple's Face ID, at least for now. That's because Face unlock doesn't track your eyes, so someone could conceivably hold your Pixel 4 XL up to your face while you're sleeping and unlock it. That's not as big of a vulnerability as a third-party screen protector giving you access to the Galaxy S10, but it should raise some eyebrows.

Granted, this probably won't be a concern for most people, but as the phone's only biometric-based unlocking method, one would think Google would have made it as foolproof as possible. As it stands, Google has issued a vague promise to update it 'in the coming months'. Attention awareness is something Face ID had from day one, and in an age

of privacy and security, it's a glaring omission in an otherwise welcome feature.

Equally frustrating is Face unlock's lack of app support. Since Google has taken away the fingerprint sensor, you're going to be typing your password a lot because only a small handful of apps (including Chrome and Google Pay, naturally) have signed on to support the Pixel 4 XL's new biometric. Thankfully, most password managers aside from LastPass will hook into Face unlock, but after you've logged in, any repeated authentication will require a passcode. That's a major step backward, and given Android's history, we're not convinced those app updates will arrive in a timely fashion.

## Motion Sense

The Pixel 4 XL's most unique feature is a miniaturized radar chip that powers the gesture-based Motion Sense. It works far better than similar features in other phones, but just like Face unlock, it's an update or two away from being truly useful.

In a vacuum, Motion Sense is the first real breakthrough for a smartphone in years. It works without an app or any real instructions, and the learning curve is easy enough to be mastered in seconds. Basically, you're interacting with your phone's screen the way Tony Stark uses a virtual screen to create the Iron Man suit: swipes and waves rather than taps and pinches.

In a practical sense, however, Motion Sense on the Pixel 4 XL is nowhere near superhero status. Here's what it can do:


Even without a notch, the Pixel 4 XL (right) is essentially the size as the Pixel 3 XL. But the new phone has some futuristic tech in the top bezel

- Detect when you reach for your phone and light up the lock screen
- Skip to the next or previous track
- Snooze an alarm
- Dismiss a timer
- Silence the ringtone on an incoming call

That's it. You can't raise the volume, pause a song, hang up on an incoming call, dismiss a notification, launch an app, flip the camera, take a picture, or anything else you could conceivably want to do without touching your phone. Some of those things are surely

coming down the pike, but as it stands, Motion Sense is extremely limited and not very useful – a neat trick in search of a party.

Still, Google deserves points for developing a system that actually works. Where Air Motion on the LG G8 is a finicky experience that requires more precision and patience than most people would be willing to extend, Motion Sense works the first time (nearly) every time. So there's definitely a solid foundation to work with.

## New Assistant

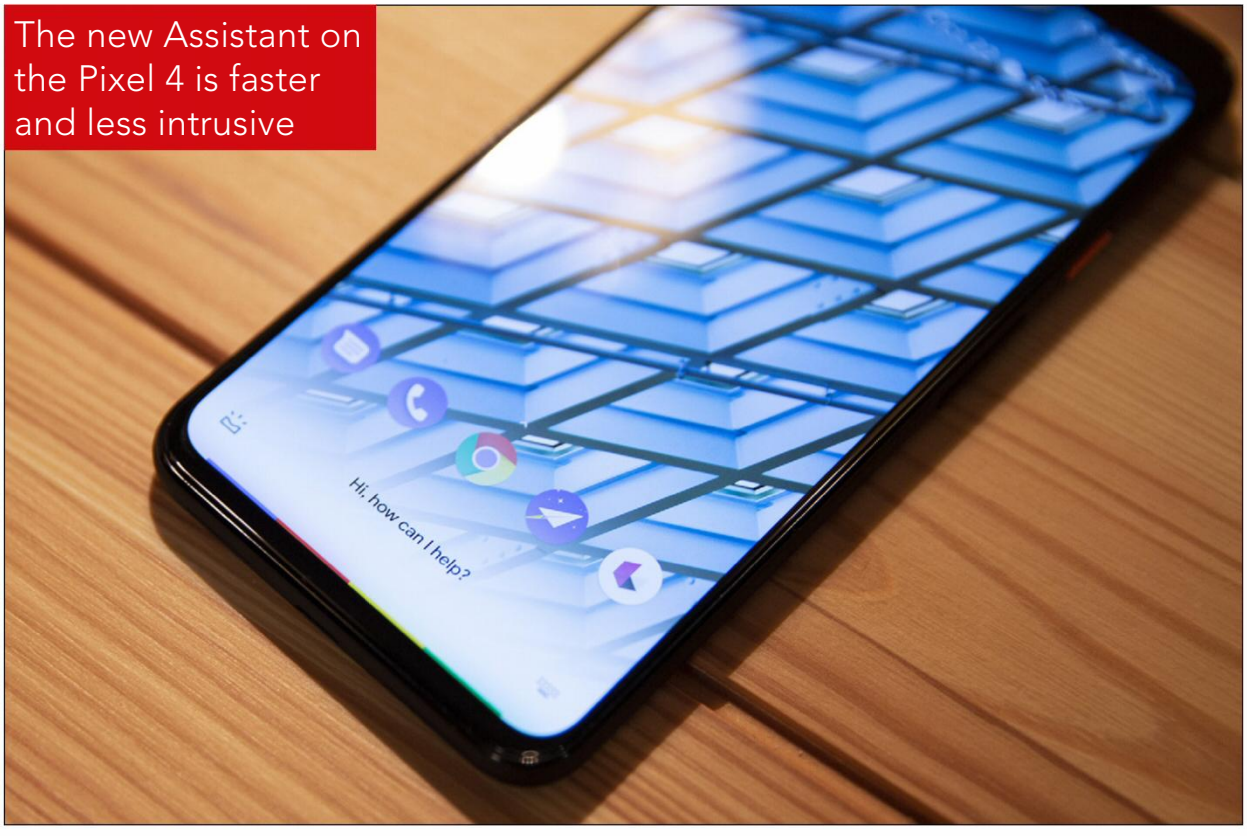
The Pixel 4 XL is also the showcase for the 'new' Google Assistant (currently US-only), which is a streamlined interface and a faster response time. I didn't get anywhere near the rapid-fire speed that was demoed at Google I/O, but it's definitely improved.

The new Assistant interface is the bigger story, and it's vastly better than any other AI chatbot, including Assistant on other devices. Instead of a window that takes over part (or all) of your screen, Assistant occupies a tiny space at the bottom of the display that will only expand to show you what you need to see. With Continued Conversation enabled, you'll be able to ask follow-up questions in quick succession, and I didn't experience any issues with it understanding me (though issues are rare with the old Assistant too).

Google hasn't indicated when or if the new Assistant will be arriving in the UK, though we're hoping it won't be too long. Before that happens, however, a few things will need to be cleared up. For one, the new Assistant only works if you have gesture navigation

enabled. If you don't, it will revert to the old interface. I assume that's due to the navigation bar getting in the way of Assistant's new home, but that's a weird requirement since Android 10 is keeping the old method around.

Even more confounding is the new Assistant's inability to play nicely with G Suite for Business accounts that are separate from whatever Google account you set for the phone's main profile. Even if there's a dormant secondary G Suite account on your phone, it will block the new Assistant from showing up for some reason, and it won't appear unless the second account is completely removed. And in true Google fashion, there isn't any warning or explanation, so G Suite users might not even realize they're missing



The new Assistant on the Pixel 4 is faster and less intrusive

anything. That's simply unacceptable for a major feature on a thousand-pound phone.

Elsewhere, the Pixel 4 XL serves as a showcase for Android 10's newest features, most notably dark mode and gesture navigation. Pixel users will be somewhat familiar with Android's gestures, but it's a bit different here, with the pill and back buttons replaced with an iOS-style action bar. It's a little and clunky and not nearly as intuitive as it is on the iPhone, particularly when it comes to the back gesture. You're supposed to be able to swipe from the left or right edge to go back a screen, but sometimes menus get in the way. All in all, it still needs work. Dark mode, on the other hand, is far more refined, with nearly every Google app and system screen supporting it.

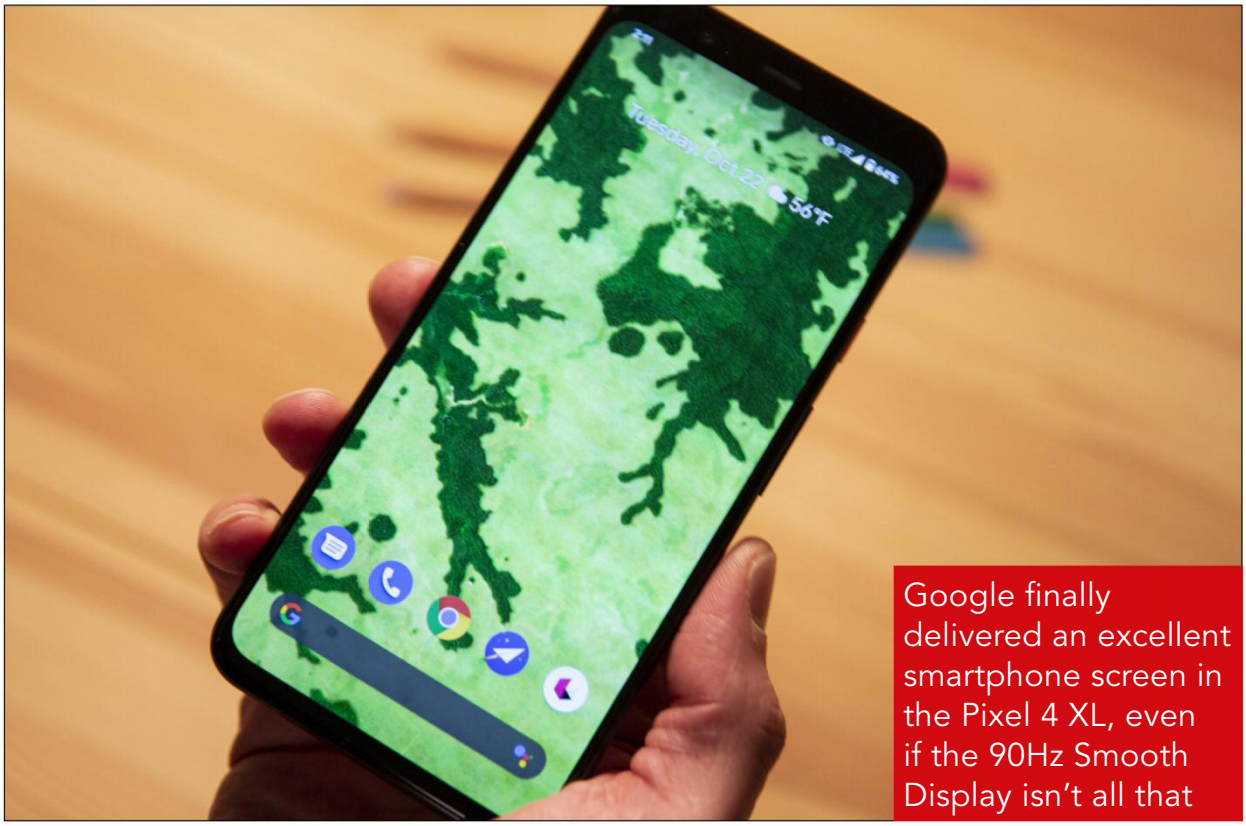
But my favourite feature is Live Caption. When it's turned on, any video from any source will automatically transcribe captions based on what's playing, and it's surprisingly spot on most of the time. The same goes for the excellent new Recorder app, which will record and transcribe the words it hears. Neither is perfect, but they're both incredibly useful and sure to improve quickly thanks to a healthy dose of machine learning and AI smarts. I assume both of these features will eventually be available on other Pixel and Android phones, but for now they're exclusive to the Pixel 4 XL.

## Performance

Strip away the new features, and the Pixel 4 XL trails its peer a bit on the spec sheet, with the RAM, storage, and battery all on the skimpy side:

**Display:** 6.3in QHD+ OLED, 537ppi
**Processor:** Snapdragon 855
**RAM:** 6GB
**Storage:** 64GB/128GB
**Battery:** 3,700mAh

The Pixel 4 XL is plenty fast (though I found the Settings app hung a second or two before loading), but a phone launching so late in 2019 really should be using the 855+ chip. And while Google has finally admitted that 4GB of RAM just doesn't cut it for a high-end Android phone anymore, 6GB isn't so great either. Compared to the Pixel 3, my Pixel 4 XL kept a few more apps in its Recents carousel, but neither holds a candle to the dozens that were visible on the




Google finally delivered an excellent smartphone screen in the Pixel 4 XL, even if the 90Hz Smooth Display isn't all that

S10+. And while we're at it, why is Google still charging £100 for an extra 64GB of storage? Even Apple charges half that.

Somewhat surprisingly, Google shines in its new display game. Pixel phones have had long-standing issues with their screens, from OLED burn-in to flat colours, but the Pixel 4 XL is the first to get it right. It's still not quite as bright as the Note 10+ or as vibrant as the iPhone 11 Pro, but the display on the Pixel 4 XL is easily the best Google has delivered. The blacks are deeper and the colours are more vibrant than the Pixel 3, and the oleophobic smudges that plagued earlier models are nowhere to be seen (so far, anyway). And I really liked the new Ambient EQ feature that adjusts the white balance based on the light in the room. Similar to Apple's True Tone display, it makes the screen much easier on the eyes without the often jarring auto brightness adjustments.

Google's handset also introduces Smooth Display, which ups the refresh rate to 90Hz for smoother and speedier scrolling and swiping. It's one of only a few devices to boast such a feature, but the difference here isn't as immediately obvious over the Pixel 3 or even switching between 60- or 90Hz in the settings. That's somewhat due to the Pixel's natural hardware-software integration, but it's also because it actually only turn on if your brightness is set to greater than 75 percent, another limitation that Google fails to advertise. Still, there were times when I honestly couldn't tell whether Smooth Display was on or off, even when the phone was at max brightness. Google says it will be updating Smooth Display "in the coming weeks". For now it's just

another feature that looks good on paper but not so much in practice.

With all of the bells and whistles on, the Pixel 4 XL has extremely average battery life for a phone in this price range. Benchmarks pegged the phone at around nine hours, and I was able to get through most days with Smooth Display and Motion Sense switched on. However, the battery was more of a constant concern than with the iPhone 11, Galaxy Note 10+, or OnePlus 7T, and I was acutely aware of how much I had left. I did a little better with Smooth Display and Motion Sense switched off, but it wasn't a dramatic improvement – and besides, that kind of defeats the purpose of buying a 4 XL in the first place. With the kind of battery advancements Apple and Samsung are

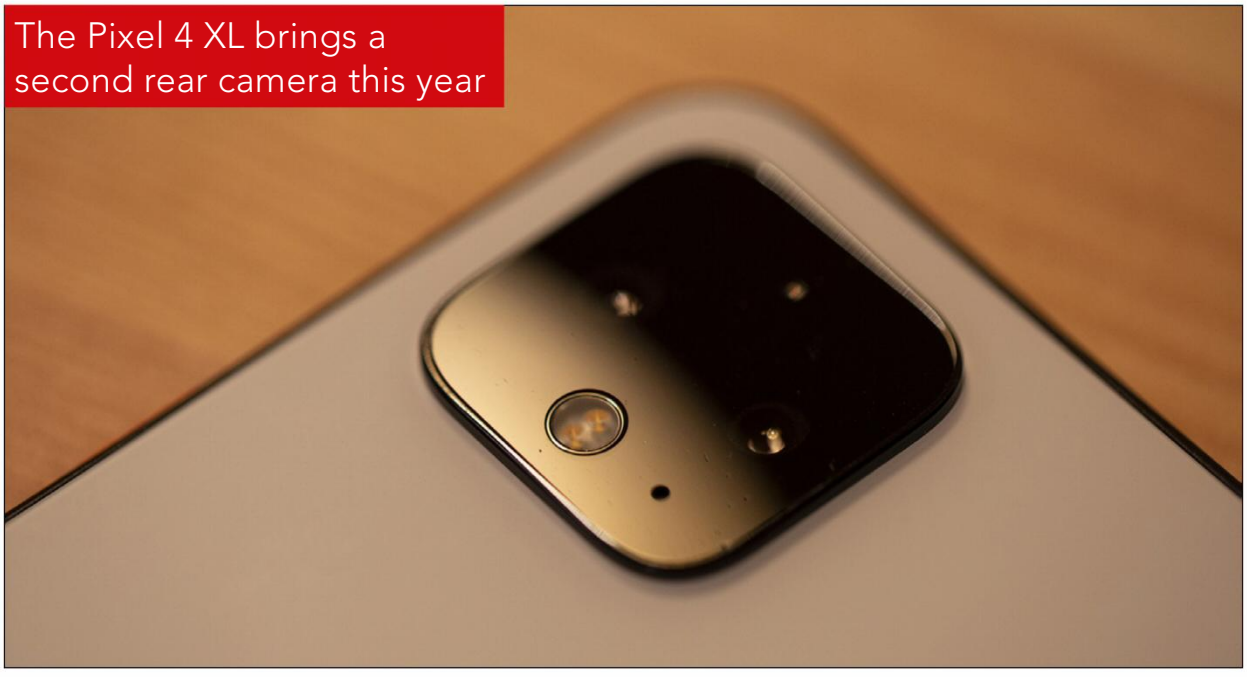
Wireless charging on the Pixel 4 XL has been greatly enhanced.

making with their phones, Google's Pixel optimizations are woefully behind the times.

Thankfully, Google seems to be acutely aware of the phone's battery issues, so it's amped up its wireless charging capabilities. While Google basically forced you to buy a Pixel Stand to get fast wireless charging on the Pixel 3, the Pixel 4 XL delivers 11-watt charging with any compatible charger. That's not as fast as the Galaxy S10's 15-watt wireless capabilities, but it's a huge step up from the Pixel 3's lame 5-watt offering.

## Camera

If you're in the market for a new Pixel, the camera is likely the number one reason why. Google built the Pixel name on the strength of its camera, and the fourth version only drives that point home. After telling us for years that a single camera was all you needed, Google has added a second camera to the rear of the phone,



The Pixel 4 XL brings a second rear camera this year

marrying a 16Mp telephoto lens with the 12.2Mp standard wide lens.

And perhaps Google was right all along. Since previous Pixels have been able to achieve such incredible results with just one lens, the addition of a second lens brings expected rather than exceptional results. Maybe it's because of the pressure Google has put on the rest of the industry, but the Pixel 4 XL's camera improvements are largely incremental and not nearly as impressive as previous models. New features such as astral photography mode and dual exposure are fun to experiment with, but ultimately won't be used all that often, and live HDR is more overdue than revolutionary.

That's not to say it doesn't take great pics. But so did the Pixel 3. And so do the Galaxy S10 and the iPhone 11. In some tests, the Pixel 4 XL bested its

In this image of a rainbow-tinted knife, the Pixel 4 (left) mutes the colours of both the floor and the blade, while the iPhone 11 (centre) and Pixel 3 XL (right) handle them properly

The Pixel 4 XL (left) was the only camera that wasn't tricked into shifting the colour on the wall, but it also didn't capture the vividness of the skull like the iPhone 11 (centre) and Pixel 3 XL (right)

competition and in others, it performed on par. In some, it missed the mark. Take the photo of the knife above. The Pixel 3 XL got the floor colour right, while the iPhone excelled at capturing the rainbow pattern in the blade. The Pixel 4 XL's shot is on the dull side, muting the colours throughout and stripping away the character. The same is true of the skull below, though the Pixel 4 XL was the only one of the three to maintain the proper colour of the wall.

In other photos, the Pixel 4 XL was too aggressive with white balance. In the shot of the Halloween wreath below, only the iPhone was able to capture the true colour of the wall without dulling the orange and gold balls. Both the Pixel 3 XL and the Pixel 4 XL shifted the balance to purer white, with the Pixel 4 XL dulling the colour and the sheen as a result.

The Pixel 4 XL (left) shifted the white balance, which dulled the colours a bit, while the Pixel 3 XL (right) was a little closer but still too blue. The iPhone 11 (centre) was the most accurate

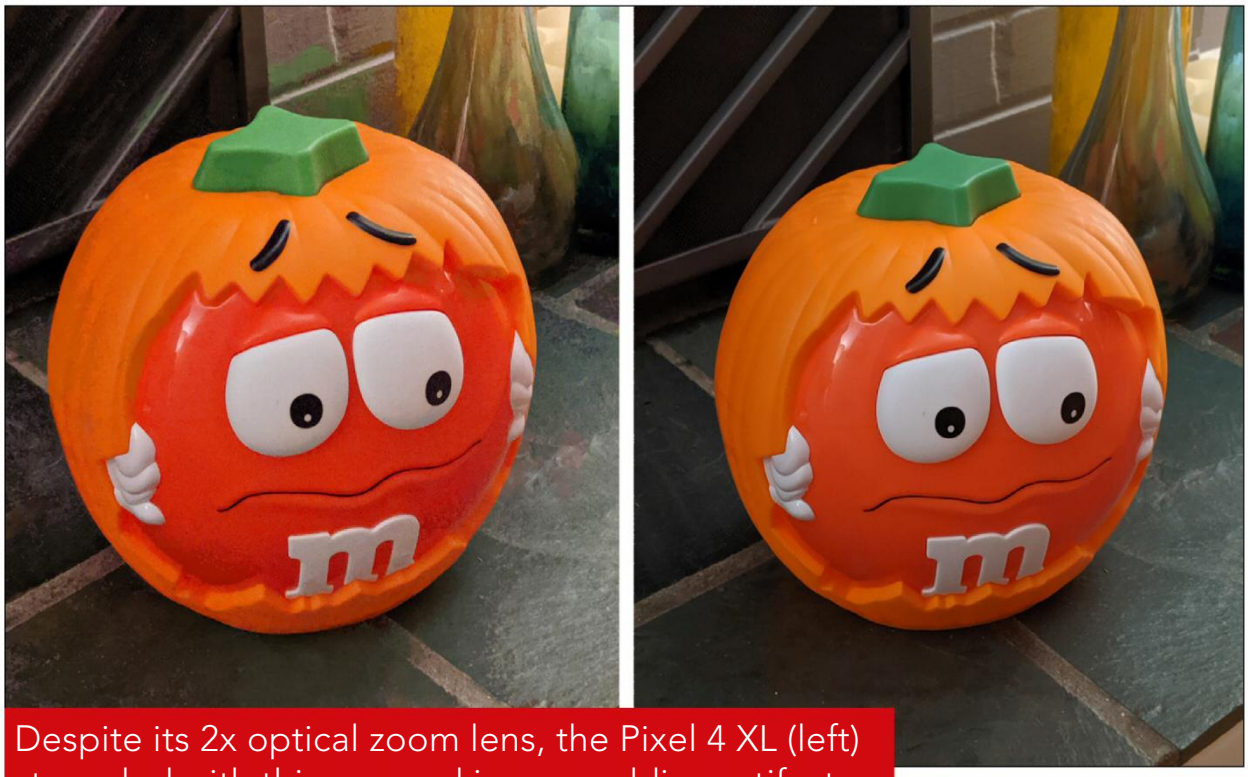
Most surprising, however, is the telephoto's lens lack of an impact on either zooming or portraits. I thought that the addition of a second telephoto lens would make a huge difference over the Pixel 3 XL, especially after Google's proclamation that it was more important than an ultra-wide lens. But in straight comparisons, I didn't see much of a difference. In the portrait photo overleaf, it's impossible to see the difference between the Pixel 3 XL and the Pixel 4 XL, even if you zoom in. If anything, the Pixel 3 does a slightly better job with handling skin tones and colour.

And in the photo on **page 52**, the Pixel 3 XL's digital zoom is basically just as good as the Pixel 4 XL's 2x optical zoom. In fact, if you inspect the Pixel 4 XL image, you can see some weird colours and graininess

These portraits taken with the Pixel 4 XL (left) and the Pixel 3 XL (right) are extremely similar

on the back wall and the mantle that don't appear in the Pixel 3 XL's shot.

The Pixel 3 XL wowed us with Night Sight last year, but Google's competitors have caught up fast and exposed its weaknesses. The iPhone 11's Night mode bests the Pixel 4 XL in just about every situation. The biggest problem is the Pixel's tendency to brighten everything, which often undermines the nuance and integrity of the scene. Apple's method consistently preserved shadows and low lights that were lost or washed out by the Pixel. The both did an admirable job, but the iPhone was consistently just a little better, as you can plainly see in the photo on **page 54**.



Despite its 2x optical zoom lens, the Pixel 4 XL (left) struggled with this zoomed image, adding artifacts to the mantle and some noise to the back wall, while the Pixel 3 XL's digital zoom handled it correctly

And that's kind of the story with the Pixel 4 XL. While the 3 XL's camera put the rest of the smartphone industry on notice, the Pixel 4 XL shows that Google might not have been prepared for Samsung and Apple to catch up so quickly. (And that's not to say anything about its inability to record 4K video at 60fps.)

I might be picking nits here and sharing photos that specifically highlight the Pixel 4 XL's shortcomings, but the fact remains that Google's competitors have all but closed the gap with their own computational photography systems, and Google's improvements over the Pixel 3 XL are slight. And I have to assume that anyone who buys a Pixel 4 XL cares about such

Both the Pixel 4 (left) and iPhone 11 (right) brightened this super-dark nighttime scene, but Apple retains the shadows and spookiness while Google blows out the ambiance a bit

subtleties. So while you'll surely be able to take excellent, gallery-worthy photos with very little effort with the Pixel 4 XL, if you're looking for another generational leap, you're going to be disappointed.

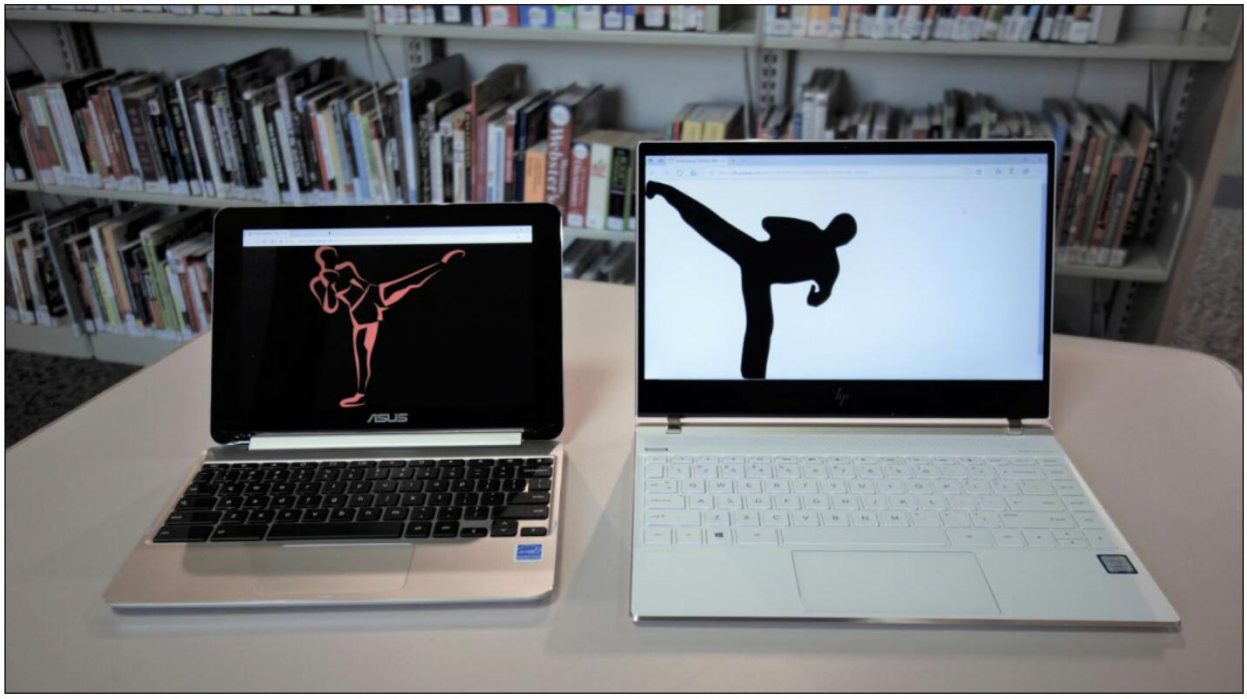
## Verdict

The latest Pixel phone is usually an easy recommendation, but this year's phone is a bit of a conundrum. So here's my recommendation: now is not the time to buy a Pixel 4 XL. The Face unlock and Google Assistant bugs are too glaring to overlook, and Motion Sense is in need of new features. The camera

is still one of the best, but the gap between it and its peers is practically nonexistent, and its tricks aren't nearly as impressive with a second lens. And the specs are downright blah for a £829 phone. Even the Pixel launcher and the promise of three years of Android updates are less of a reason to buy, as Samsung ups its game with One UI. The Pixel 4 XL has more untapped potential than any other phone I've used, but it fails at its most important job: being a phone that lives up to its own hype – and price. Michael Simon

## Specifications

- 6.3in (3,040x1,440, 537ppi) P-OLED capacitive touchscreen
- Android 10
- Qualcomm SDM855 Snapdragon 855 (7nm) CPU
- 6GB RAM
- 64/128GB storage
- Dual rear-facing cameras: 12.2Mp, f/1.7, 28mm (wide), 1/2.55in, 1.4µm, dual pixel PDAF, OIS; 16Mp, f/2.4, 45mm (telephoto), 1.0µm, PDAF, OIS, 2x optical zoom
- Dual front-facing cameras: 8Mp, f/2.0, 22mm (wide), 1.22µm, no AF, TOF 3D camera
- 802.11ac Wi-Fi
- Bluetooth 5.0 with atpX HD
- GPS with A-GPS, GLONASS, BDS, GALILEO
- NFC
- USB 3.1, Type-C 1.0 reversible connector
- Face ID
- Non-removable lithium-polymer 3,700mAh battery
- 160.4x75.1x8.2mm
- 193g



# Chromebooks versus Windows laptops: Which should you buy?

In the fight between a Chromebook and a Windows PC, it boils down to cost versus convenience. MARK HACHMAN reports

Should I buy a Chromebook or a Windows laptop? Whether you're seeking out the best computer for your child or just weighing which inexpensive computer would make a great Christmas gift, weighing a Chrome OS-powered Chromebook versus a PC can be a tough choice – and we can help you choose the right one.

## Who should buy a Windows PC?

A notebook PC powered by Microsoft Windows offers several advantages: Windows offers the most flexibility to run just about any app, as well as the choice of any browser you choose. You can tweak and configure your laptop as you choose.

That convenience demands more computing horsepower, and often a higher price compared to most Chromebooks. Prices can soar into the thousands of pounds, and if you need a powerful PC for gaming or video editing, Chromebooks really don't offer that much competition.

## Who should buy a Chromebook?

A Chromebook powered by Google's Chrome OS is a simpler, more optimized affair, a locked-down PC that's little more than the Chrome browser – but it can be hundreds of pounds cheaper than a comparable Windows PC, too.

Updates occur behind the scenes, so you can just open the lid and go. Google handles all the security, too. The Internet offers much of what you'll need, whether it be working within web apps or Chrome plug-ins. But it's the workarounds and little inconveniences that you may find annoying in the end.

There's one more wrinkle: for years, there were Chromebooks and... not much else. Now there are Chrome OS-powered convertibles like the Chromebook Flip, as well as Chrome OS-powered tablets like the Google Pixel Slate. (Chromeboxes are a separate, niche class of standalone Chrome OS-powered boxes that lack a display.) Besides the obvious physical differences,

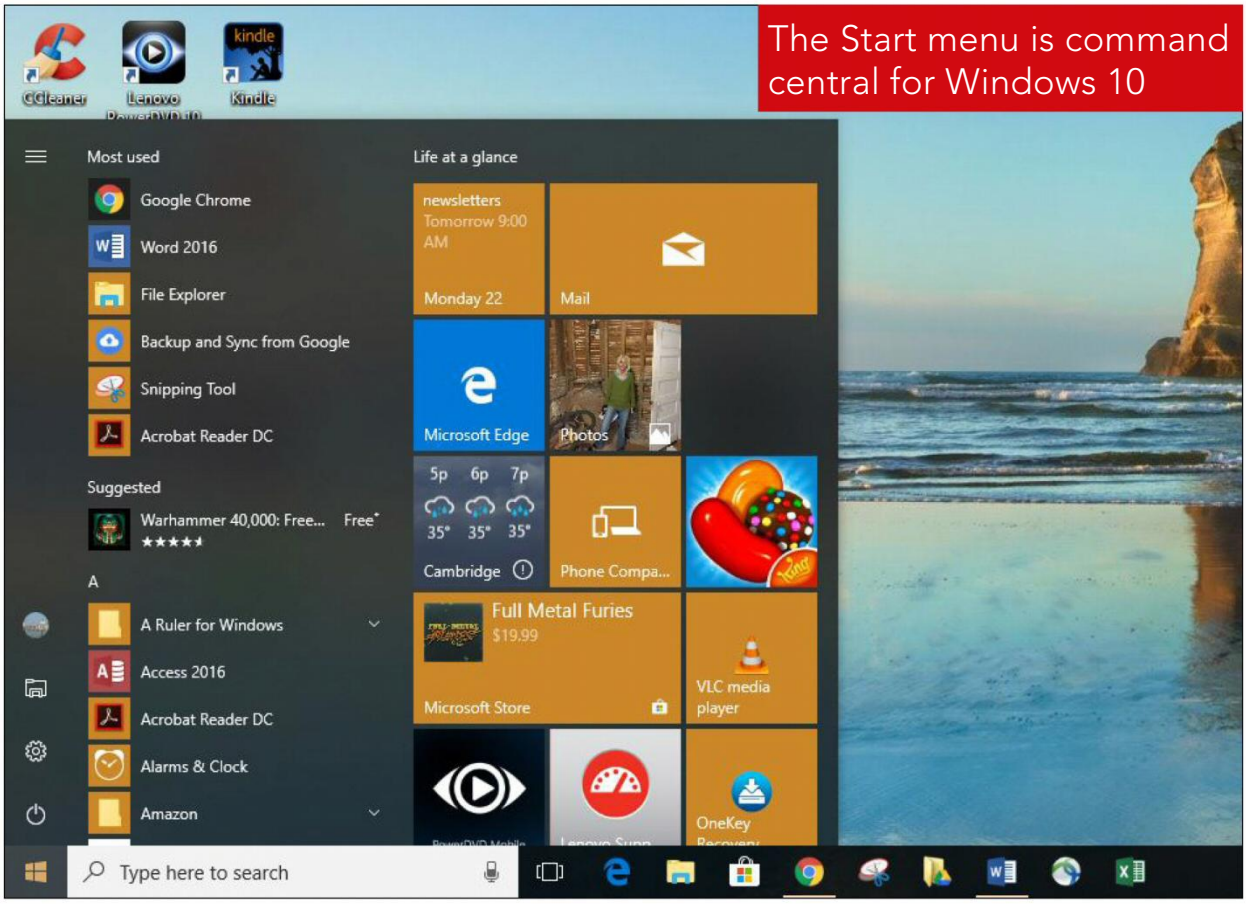
a Chromebook is no different than a Chrome tablet. Google recently swung back into the laptop form factor, launching the Google Pixelbook Go (see **page 22**). It's available in various configurations from £629 all the way to up to £1,329, the new clamshell Chromebooks boast up to a Core i7 and a 4K screen.

Read on for a deeper dive into the differences between the Chrome OS and Windows platforms, as well as some recommendations on what to buy. Just be aware that the conversation will focus on inexpensive machines that can accomplish basic tasks. Chromebooks can't hold a candle to £2,000 gaming PCs, though some cloud gaming services might allow them to eventually.

## What's the difference between a Chromebook and a Windows PC?

Though you probably already know what differentiates a Windows PC from a Chromebook, here's a brief refresher: Windows PCs run Microsoft Windows 10, the dominant operating system for traditional PCs for more than 25 years. They run Windows applications, from Microsoft titles to a raft of third-party software. Windows PCs are available in desktop and laptop forms, and can be configured in infinite ways to accommodate needs from basic productivity to resource-intensive workstations.

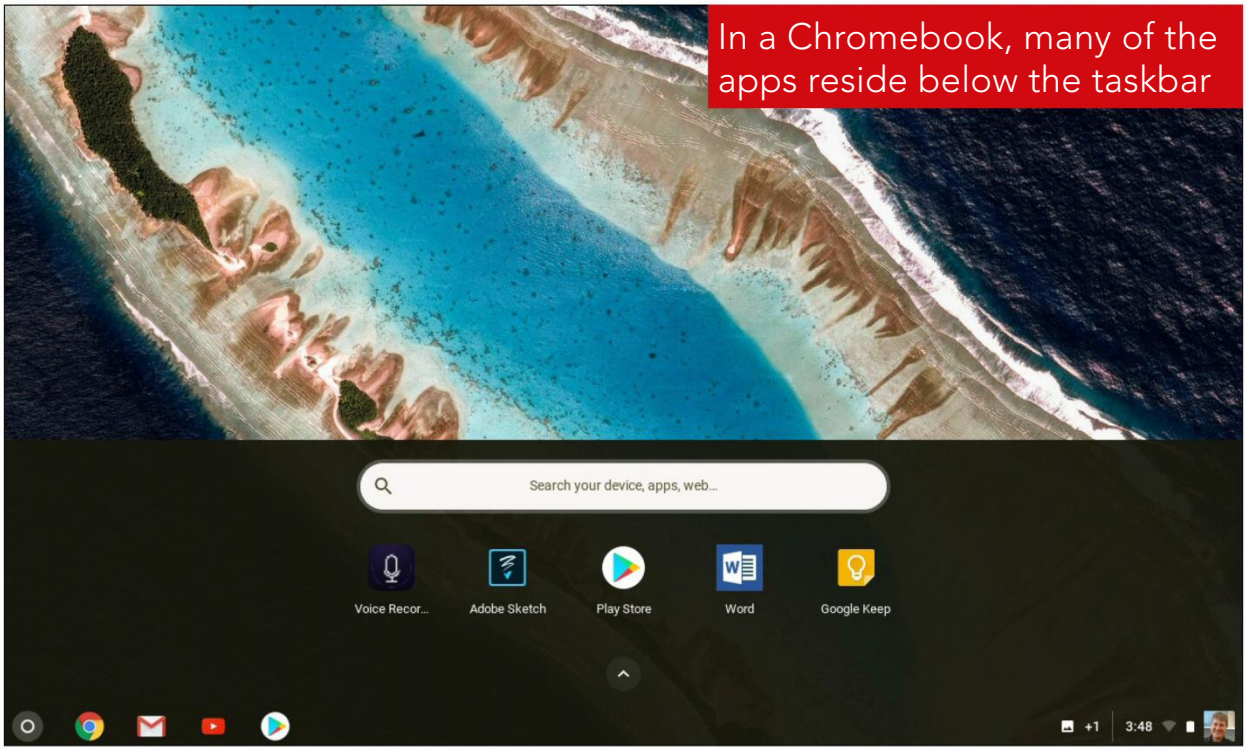
Chromebooks are much simpler. They run Chrome OS, essentially a Chrome web browser vehicle, and are often priced several hundred pounds less than a Windows PC. The newest Chromebooks contain a bonus, however: the ability to run some Android




The Start menu is command central for Windows 10

apps (more on this later). Another perk is on its way: the ability to run Linux – not something that most users will care about, but a useful niche addition. (To be fair, Windows 10 users can run Linux as well.)

Physically, a Chromebook looks much like a Windows-powered notebook, with a keyboard, a display, a front-facing camera for videoconferencing, and so on. But there are a few key differences: Chromebooks typically include a dedicated search keyboard key, while Windows emphasizes the Windows key, and Cortana. (Google's latest Pixelbook Go includes a Google Assistant key instead.) With Windows, you'll have many hardware choices,

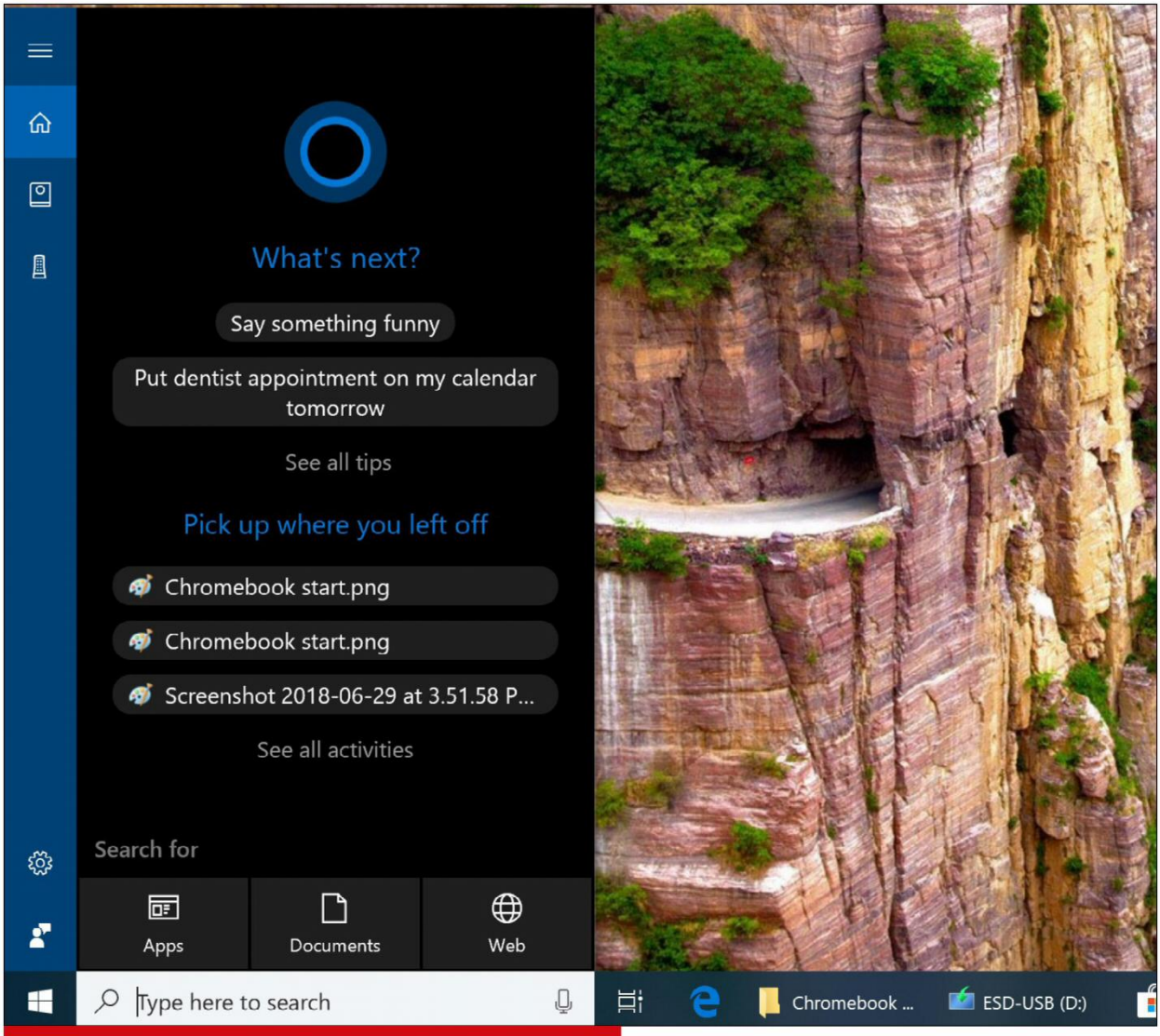



In a Chromebook, many of the apps reside below the taskbar

including a typical clamshell notebook, convertibles with 360-degree hinges; 2-in-1 Windows tablets with detachable keyboards, or pure Windows tablets.

Chromebooks generally assume the clamshell form factor, though we've seen some Chromebooks designed as convertibles. And in 2018, we saw the evolution of the Chromebook into a full-fledged tablet. Because Chrome OS and Android are now conjoined, a key reason to buy a Chrome OS tablet (as opposed to a clamshell), in our view, is how often you'll use Android apps. Android apps run acceptably in a laptop form factor, but they're arguably more convenient when used as a tablet, and held in your hand.

Inside, the only real differences are the processor. While a small crop of Windows laptops are being powered by Qualcomm Snapdragon processors,

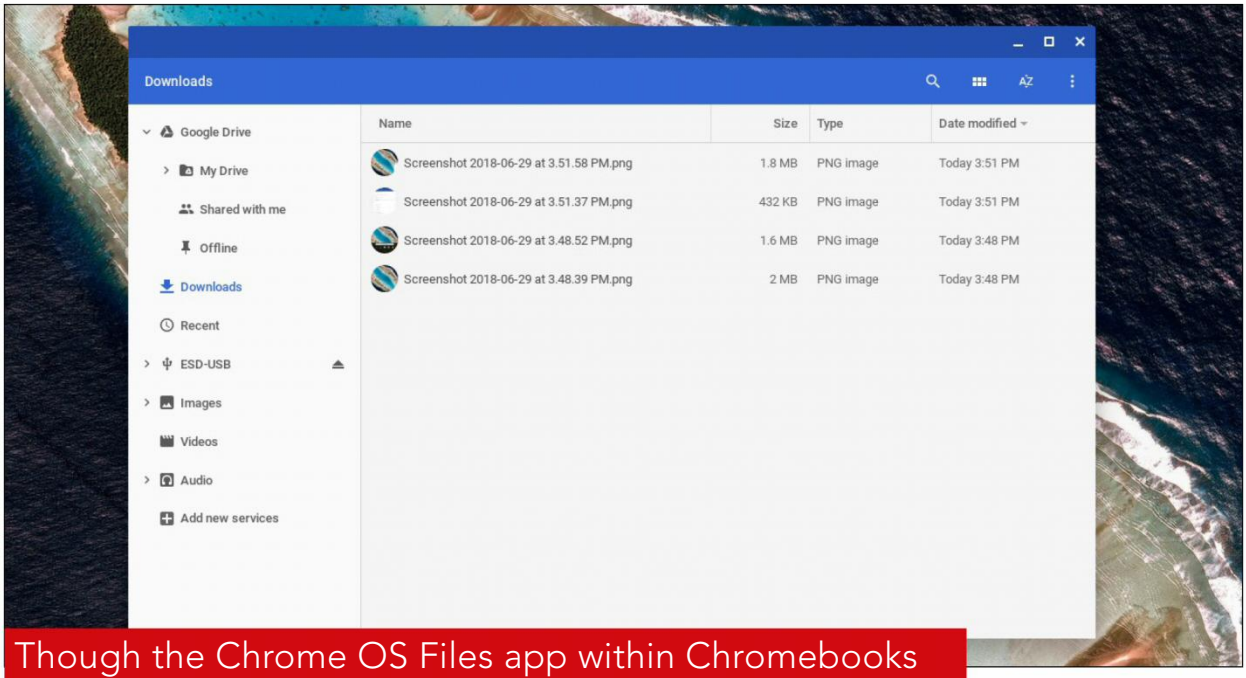



Microsoft Cortana is all over Windows, but the Google Assistant is only in Google's own Pixelbook devices

Chromebooks generally favour lower-performance Intel Atom chips (branded as Pentium or Celeron) that are suited to the lesser demands of Chrome OS. Pricier versions, such as Google's own hardware, often include Core chips. Windows PCs have a wide range of microprocessors powering them.

Chromebook and Windows PCs features have a lot of overlap, too. Though you'll find that many Chromebooks and inexpensive laptops share a similar HD (1,366x768) or Full HD (1,920x1,080) display, Windows usually requires a bit more in terms of memory and storage. Both a Chromebook and a laptop can run acceptably on 4GB of memory, but 8GB is usually preferred where Windows notebooks are concerned. Windows notebooks, too, typically include more local storage for the Windows OS and associated apps: 128GB or 256GB is acceptable, though there's really no upper limit. Chromebooks, meanwhile, don't need much more than 16GB or so, even if Android apps are being stored on an SD card.

Speaking of storage, it's less of an issue. Both Chromebooks and Windows tablets allow external




Though the Chrome OS Files app within Chromebooks is a little rougher than Windows, it's been designed with cloud storage (in Google Drive) from the beginning

storage to be used, though Google would prefer you to store your apps and files in the cloud. A Windows PC typically includes a USB-C or USB-A slot that can connect to an external hard drive. (Some Chromebooks do too, or use an SD card.) You'll find less need for local storage on a Chromebook than on a Windows PC, which helps lower the price and simplifies the experience. Weirdly, while both Google and Microsoft have developed their own digital assistants, the first Chromebook with Google Assistant support was the Google Pixelbook. Microsoft Cortana fans will find 'her' on all Windows PCs that include a mic – which is virtually all of them. Now, however, Amazon's Alexa has also been added as a Cortana partner application or 'skill', which means Windows users get two assistants for the price of one.

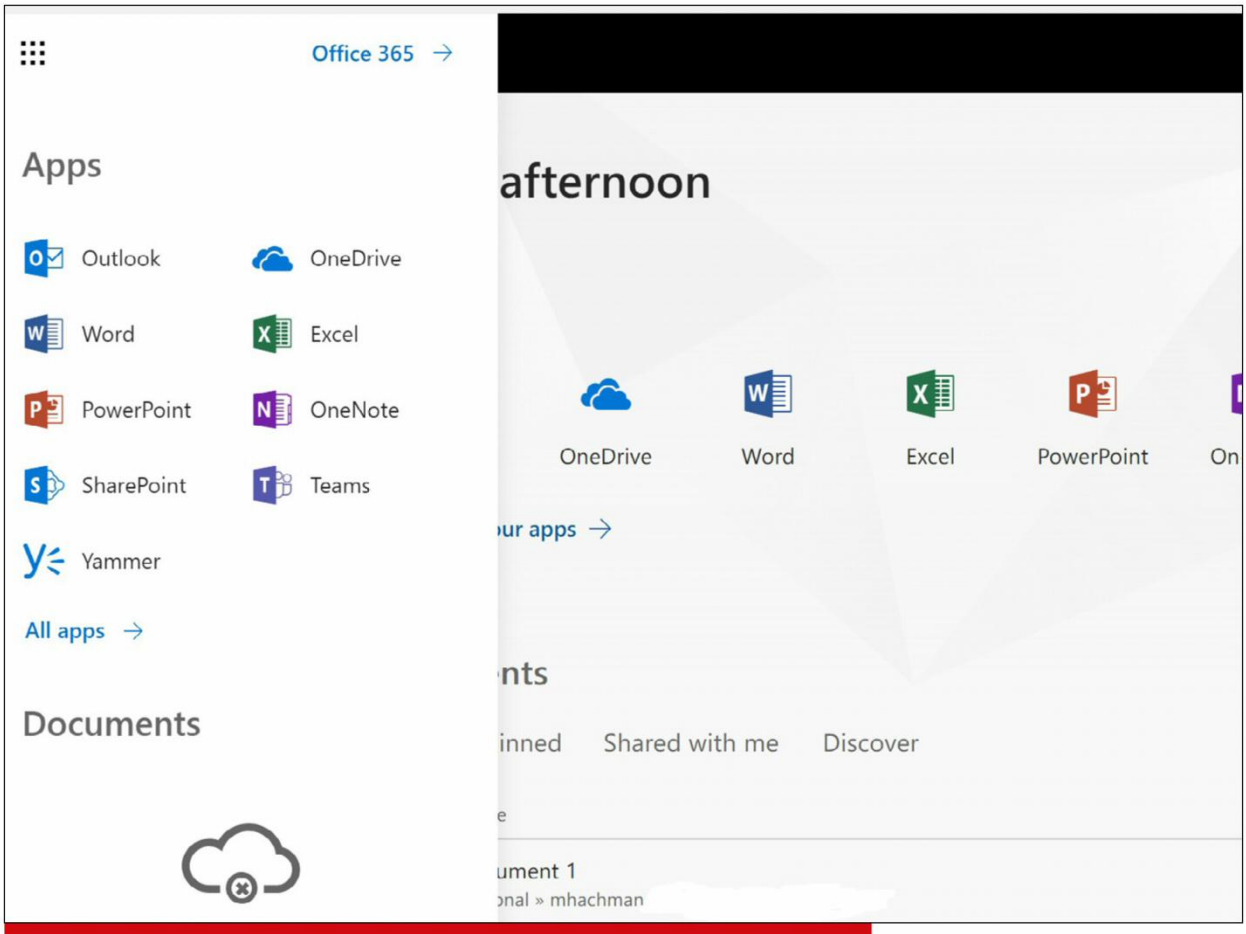
## Is a Chromebook or a laptop better for office work?

Productivity apps – word processing, spreadsheets, and the like – represent the majority of the working day. Here, both Windows and Chromebook users alike have several choices, the most popular being the Google Apps suite of office apps and Microsoft's own Office.

You might think that Office would be restricted to Windows, but that's not true either: Office.com, AKA Office Online, runs in a web browser, and – assuming you have a subscription to Office 365 – offers nearly all the functionality that the Office 365 suite does. (Microsoft Office apps are also available as Android apps, but it's simpler to run them within the browser.) In fact, given that it's powered by the cloud, you'll

find that Office Online sometimes gets updated with new features before they arrive on Office 365. Office is typically used by most enterprises, and if your company administrator allows it, even shared corporate resources may be accessible via a Chromebook.

The Google Apps suite also runs online, though its focused on the essentials, with fewer features than Office. I spent over a year exclusively working on a Chromebox (the nearly defunct desktop version of a Chromebook) and found Google's simple interface and instantaneous autosaves superior to the Windows




Office Online (Office.com) is accessible via a browser from either a Chromebook or Windows PC

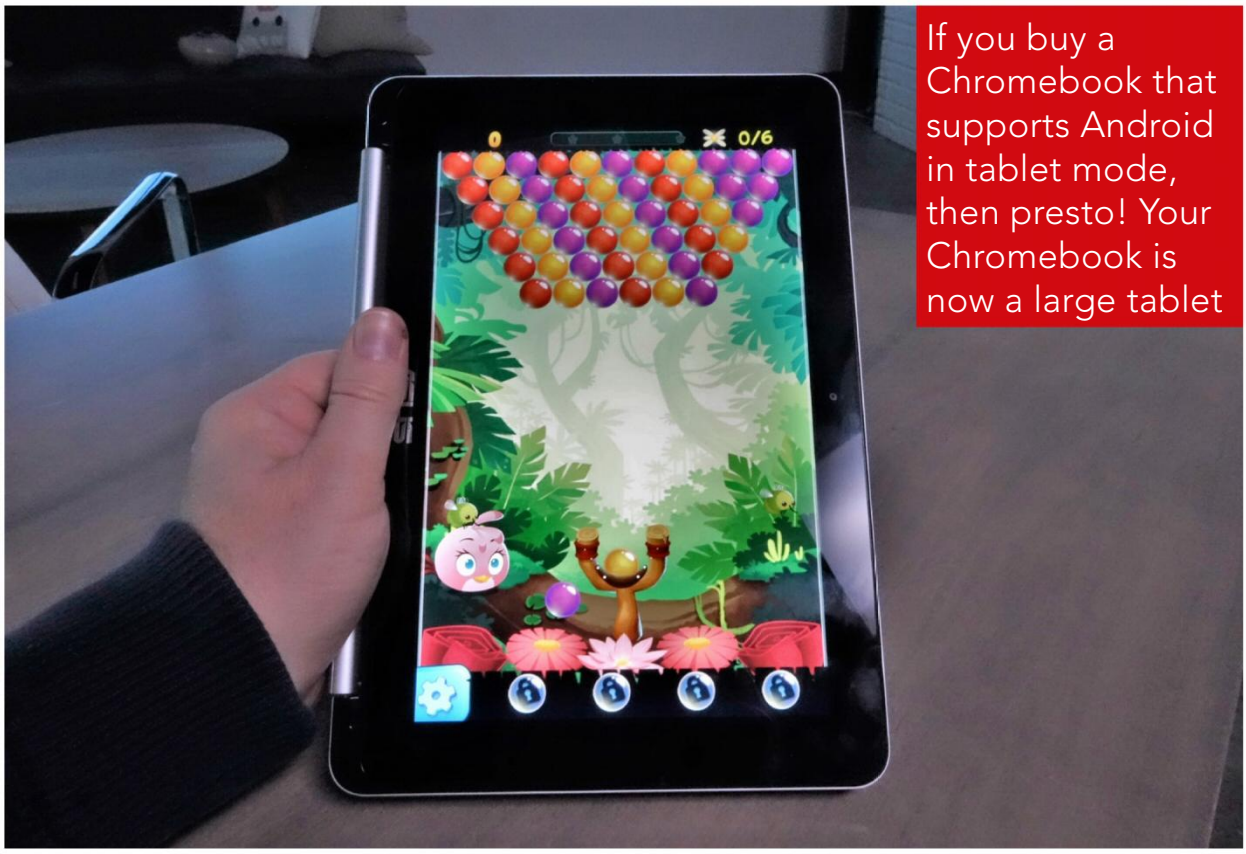
version of Office at the time. (Office apps like Word now autosave, too.) For our purposes, both Google Docs and Office Online will run on either a plain Chromebook or Windows PC; however, if you need access to a local copy of Office, only a PC will suffice.

The gist is that productivity is possible on either a Chromebook or Windows PC with a minimal amount of effort, though you'll probably need to pay for a subscription. From a hardware perspective, it's our view that a laptop form factor is more convenient than an add-on keyboard, or external Bluetooth keyboard option. Take the keyboard on the Google Pixel Slate, for example: Google chose an arty, circular-key design. While tablets make Android apps more convenient, the trade-off is less productivity when in laptop mode.

## Which is better for web browsing, a Chromebook or Windows PC?

It's not quite true to say that Chromebooks and a Windows PC are equivalent in web browsing, but this is probably the closest point of intersection. Browsing the web using Chrome on a Chrome OS device is virtually identical to using Chrome on a PC. A Windows PC will allow other browser options, however, including Microsoft Edge, Opera and Firefox.

Because of the simplicity of Chrome OS, some complex sites simply feel more responsive within a Chromebook. On a Chromebook, with the same ad blockers, the site can actually be more responsive. Be aware, though, that the reduced memory footprint of a Chromebook may restrict you to fewer tabs than you would normally use on a PC.

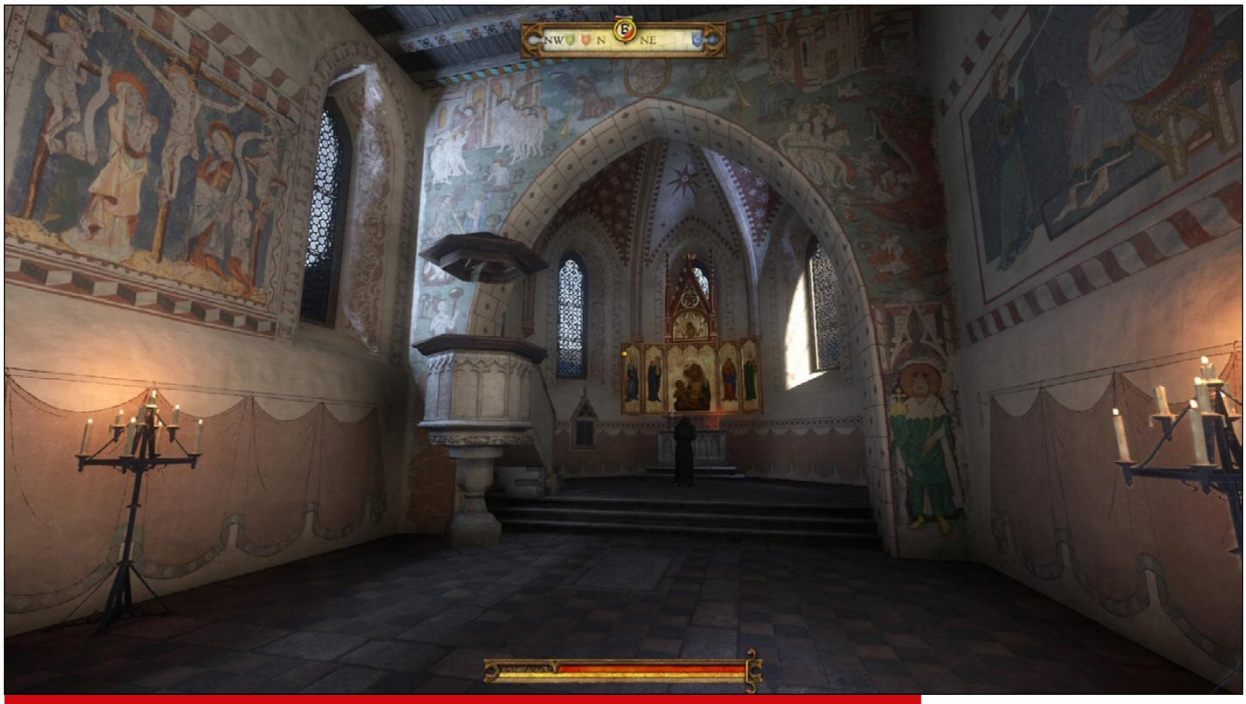



If you buy a Chromebook that supports Android in tablet mode, then presto! Your Chromebook is now a large tablet

## Can a Chromebook play games as well as a Windows PC?

With the vast history of classic PC games available to Windows machines, the PC is clearly dominant as far as gaming is concerned. But there are still thousands of games that are 'exclusive' to Chromebooks, thanks to 2016's Chrome OS 53, and its ability to run Android apps and games. Dozens, though not all, of Chromebooks have this capability.

Chances are if you have an Android phone you're already aware of what games are available on Android – here are some older suggestions. In any case, don't expect to play the latest Battlefield game on a Chromebook, at least as a native app. Some 'cloud



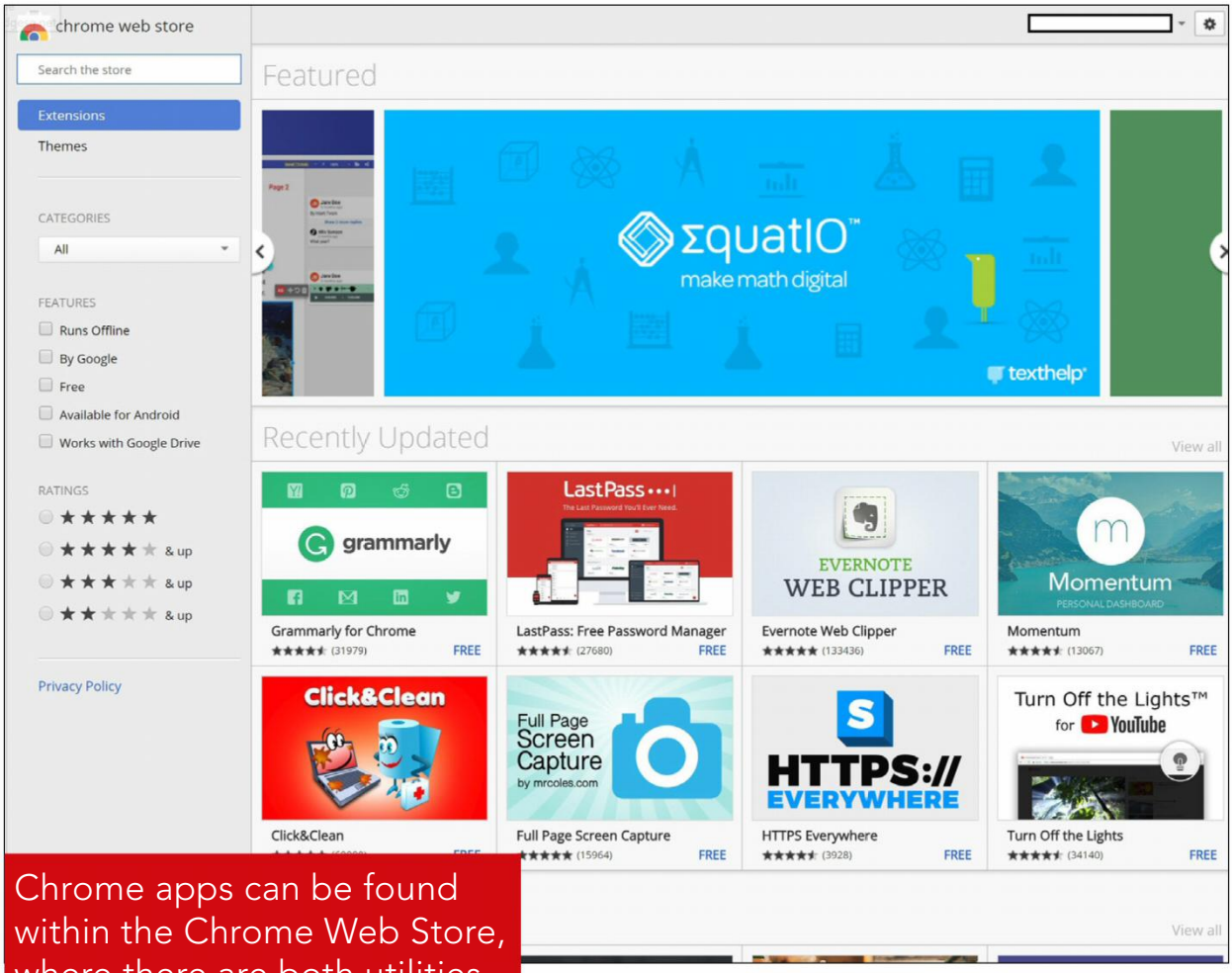

You'll never reach PC levels of graphics quality, like 2018's Kingdom Come, without a cloud-gaming assist

gaming' services such as Parsec allow you to download an Android client, then 'subscribe' to a virtual PC that exists in the cloud, upon which you can play ordinary PC games. It's not cheap, as you'll need to essentially sign up for a computer in the cloud, but it does allow you to play PC games on a Chromebook.

Again, however, if you're trying to decide between a low-cost Windows PC and a Chromebook on the basis of games, don't. Though the PC is superior, the best low-cost 'PC' for gaming is an Xbox One game console.

## Which offers more apps, Chromebooks or Windows PCs?

Games certainly fall into the category of local apps, but so do the numerous apps and utilities that can make




Chrome apps can be found within the Chrome Web Store, where there are both utilities, educational tools, and more

everyday tasks a little easier. Here, it's also a mixed bag. Android apps can include both games as well as mobile productivity apps. At press time, there were about 2.7 million total in the Google Play app store in June 2019, though Microsoft has stopped publicizing the number of Windows apps. That number says nothing about the quality of apps in either store, obviously, but does probably signify that Android has many more.

It also doesn't mean that every Android app will run on a Chromebook. Chromebooks don't include GPS

chips, so location-specific apps won't work. Ditto for those who rely on rear cameras that the Chromebook may or may not have – Pokémon Go, for instance.

One of the strengths of Windows, though, lies within its historical archive of bits of code, utilities, and other apps that have collected in dusty old hard-drive folders, FTP sites, and elsewhere. Batch resizing apps for images, custom calendar apps, macro managers – everybody has their favourites, and Chrome OS simply can't compete. On the flip side – and this is important – Chrome OS doesn't include the type of crapware Windows PCs also sometimes ship with, requiring apps like CCleaner to tidy up.

## What's it like using a Chromebook versus a Windows PC?

While it's easy to focus on what you're going to do with either a Chromebook or a Windows PC – web browsing, games – it's easy to lose sight of the little things.

One of the best features of a Chromebook that's easily overlooked is Google's approach to updates and security. Everything takes place behind the scenes. Windows downloads updates for antivirus and other programs in the background, but others require reboots. If you don't have Windows properly configured, those reboots can even occur while you're using the PC, which can be hugely annoying. While Chromebooks occasionally need to be rebooted to apply updates, the process is quicker and less intrusive, as Google reloads the pages you were on quite quickly.

In fact, 'quick' is one of the best features of a Chromebook. While they're less full-featured than

a Windows PC, booting and resuming them just generally feels more efficient than Windows. Part of that is the simplicity: Google takes care of most of the mundane tasks of powering a PC, like security and driver updates. 'Blue screens of death' occur on Windows; Chromebooks rarely crash – a fact Google emphasizes in commercials.

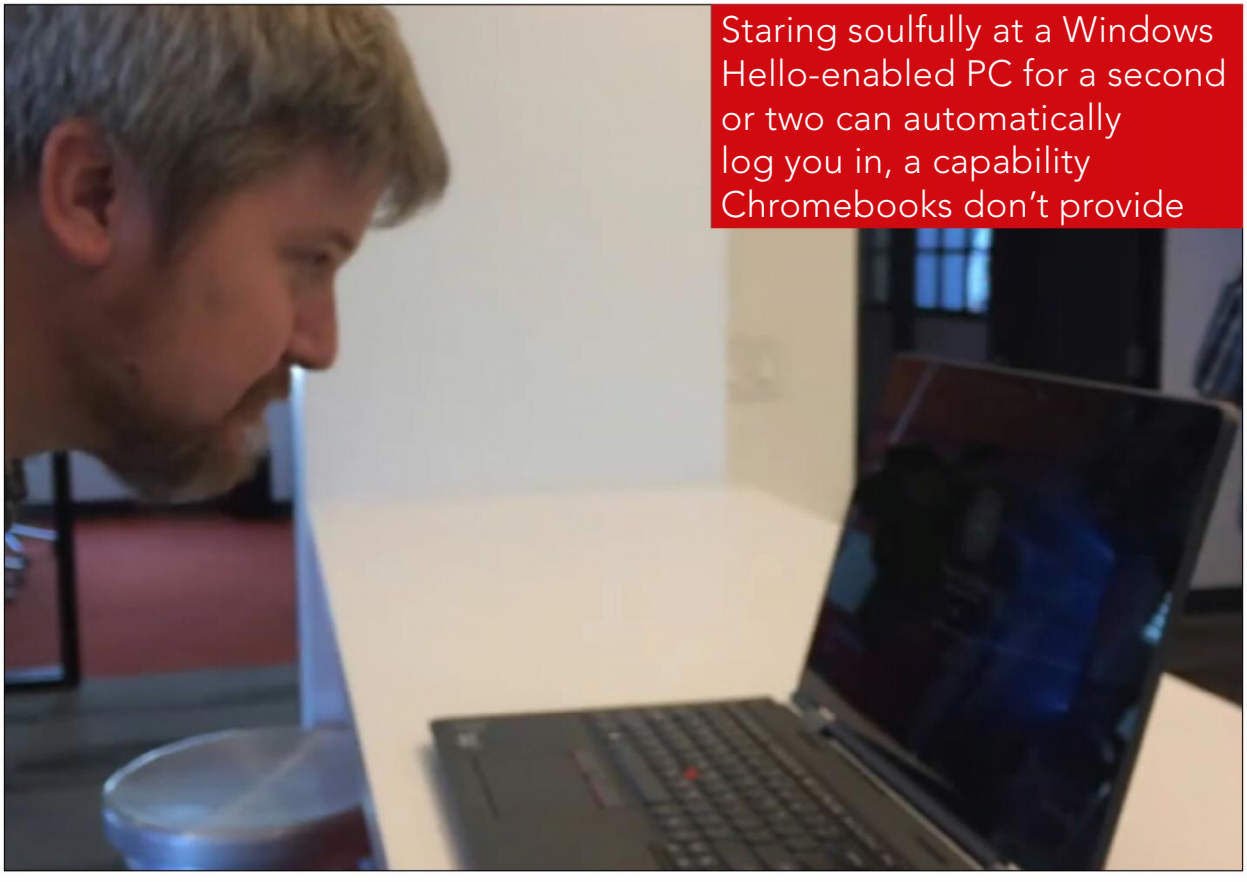
Still, some of those more mundane tasks can be irritating to Chromebook users, too, such as printing, file management and utilities. These small, minute-to-minute tasks can be where differences between the two platforms can become abrasive, especially if you're used to doing things in a certain way.

Take printing, for example. The world's printers were designed from the ground up for Windows and Macs, and can print either over a wireless network or from a USB cable. Chromebooks, on the other hand, can struggle with direct printing or using the more advanced features of certain printers, and prefer that you set up a 'cloud printer' to print documents over a wireless network. The latter's not especially difficult, but does require that you own a Wi-Fi enabled printer and understand how to set it up. (Ironically, 'cloud' printing using a traditional wired printer requires it to be connected to a PC or laptop running Chrome.)

Certain tasks also require a different way of doing things on a Chromebook versus a Windows PC. Sure, there's the Chrome OS keyboard shortcuts, where taking a screenshot or a portion of one requires knowing to press the Ctrl + 'switcher' key. When you take that screenshot, you'll see it saved inside a folder – but you won't be able to rename that file without

opening it. Windows allows you to right-click a file and perform any number of operations on it; Chrome OS does not. Even accessing those files on Chrome OS requires clicking the 'home' circle in the lower left corner, then either swiping or clicking the exposed up arrow to access the Chrome OS apps, some of which can be stored in the taskbar dock for easy access.

The same goes for alternative input modalities. While Chromebooks allow for inking – you'll generally need to supply your own stylus or use your finger – and can record audio, don't expect a Chromebook to include speech dictation or pen input that's translatable into text. These are both capabilities that, for now, Windows exclusively provides.



Staring soulfully at a Windows Hello-enabled PC for a second or two can automatically log you in, a capability Chromebooks don't provide

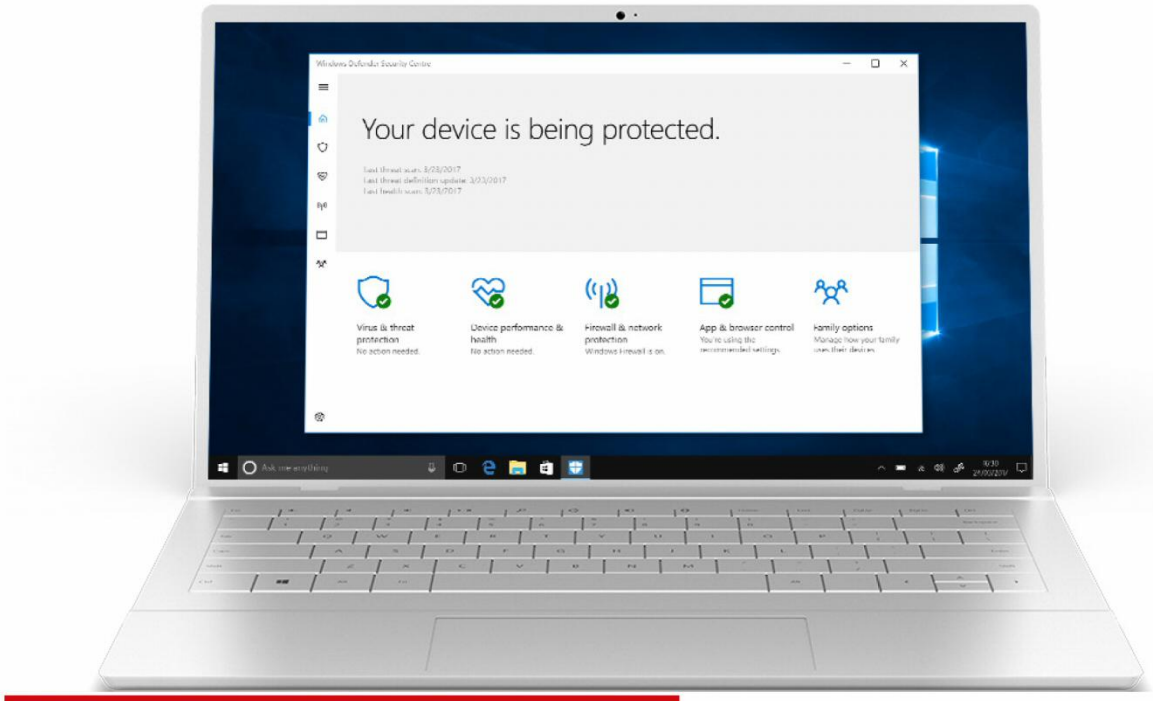
## Which is more secure, a Chromebook or a Windows PC?

Security isn't a question that can be answered absolutely, but Chromebooks and Windows PCs differ fundamentally here. The relative simplicity of a Chromebook offers a far smaller 'attack surface' than a Windows PC does. The complexity of Windows PCs, including the software Windows supports, provides hackers many more opportunities to attack.

Google developed Chromebooks with security as a priority, using everything from isolated, 'sandboxed' processes to verified boot to help protect your system. For people who worry about websites that hijack your browser or download malware, a Chromebook's defences protect you without making you think about it much.

Keeping a Windows PC safe is a much more complicated business. Security starts as soon as you begin setting up a new PC. Regular maintenance is required for both your antivirus software and the Windows operating system, though most happens automatically. Still, holes are constantly being discovered, such as the Meltdown/Spectre vulnerabilities revealed in January 2019, as well as the more recent Foreshadow/L1TF exploit. You have to be vigilant, or at least not too lazy, to protect your Windows PC. Fortunately, Windows' built-in Windows Defender software is far better than it used to be, enough that Windows can basically take care of itself.

Login security works about the same on both platforms. Logging into a Chromebook requires a Google account and its password. While U2F hardware




Windows' built-in Windows Defender software is far better than it used to be

keys for logging in can be used, a typical home user probably wouldn't. Windows PCs also prefer a Microsoft account and password (though you can log into the PC locally without one). Authentication options include Windows Hello (either via a fingerprint reader or depth camera, or else with a short PIN), which provides a casual level of security that also lets you resume work quickly and easily. It's a cross between ease of access and security that Microsoft has invested heavily in, and it's a convenience that most Windows users appreciate.

## Which last longer, a Chromebook or PC?

The longevity of a PC is basically determined by how demanding Windows is, compared to the hardware powering it. The willingness of the PC maker and

component makers to provide drivers also plays a role. Hardware failures will eventually occur. Every processor that Intel launches is often accompanied by statements comparing the new chip to a five-year old PC, with performance improvements in the 30- to 40 percent range. Otherwise, a PC's lifespan can go on for years, even decades.

A Chromebook lasts as long as Google is willing to support it, and that's much easier to determine: Google tells you. In general, Google supports Chromebooks for five years after the original production date.

## Which Chromebook or laptop should I buy?

Of the Chromebooks we've reviewed, we'd recommend two: the Asus Chromebook C101 Flip, a 10in tablet for just under £299 (from **fave.co/37cDyM7**) with decent performance and a convertible form factor that emphasizes its Android aspect. Since Chromebooks have a decent (and fixed) support cycle, don't be afraid to buy a slightly older Chromebook at a discount.

We'd also suggest you check out Google's Pixelbook Go (**page 22**), for a more premium approach. If a tablet's your thing, check out the HP Chromebook x2. Given the relative simplicity of Chrome OS, buying the latest hardware isn't as much of a concern.

As far as notebooks are concerned, we have a number of preferred laptops from which to choose. Our best budget convertible, the Asus ZenBook Flip, is a great two-in-one for under £900 from **fave.co/3752kh6** – decidedly more expensive than the Chromebook offerings, but not so much that it will break the bank.


## Which is better, a Chromebook or laptop?

While we can't say for certain which platform you'll prefer, here's a suggestion: if you think that a Chromebook could be right for you, take a Windows PC, download the Google Chrome browser, and then work exclusively within it for a day or so. A Chromebook will also be more attractive if you own or are familiar with Android apps. Granted, the Chrome browser within Windows isn't directly comparable

to the Chrome OS experience (especially where file management and printing is concerned) and you'll need to find online (or Android-based) alternatives for apps like Windows' Photos app within the browser. The keyboard isn't quite the same, either. If you don't mind spending a little more for a PC, you can approximate the Chrome OS experience. But you can't really run Android apps on your PC without a separate app serving as the middleman.

It's fair to say that Windows offers a more comprehensive experience, but Chrome OS is a significantly simpler, cheaper alternative. The buying decision usually works out to something like: 'I can do almost everything in Windows with a Chromebook, but...' It's that last little bit – printing, file management, and so on – that will guide your decision.


# Hands-on with Microsoft's Project xCloud

Microsoft's Project xCloud will never surpass a local console or a PC. But for passing time, it's not bad. MARK HACHMAN reports

When Microsoft began calling for people to test its Project xCloud cloud gaming service, I was sceptical of how it would perform over the toughest stress test you can throw at it: a cellular connection. That's why I was surprised at how well it works.

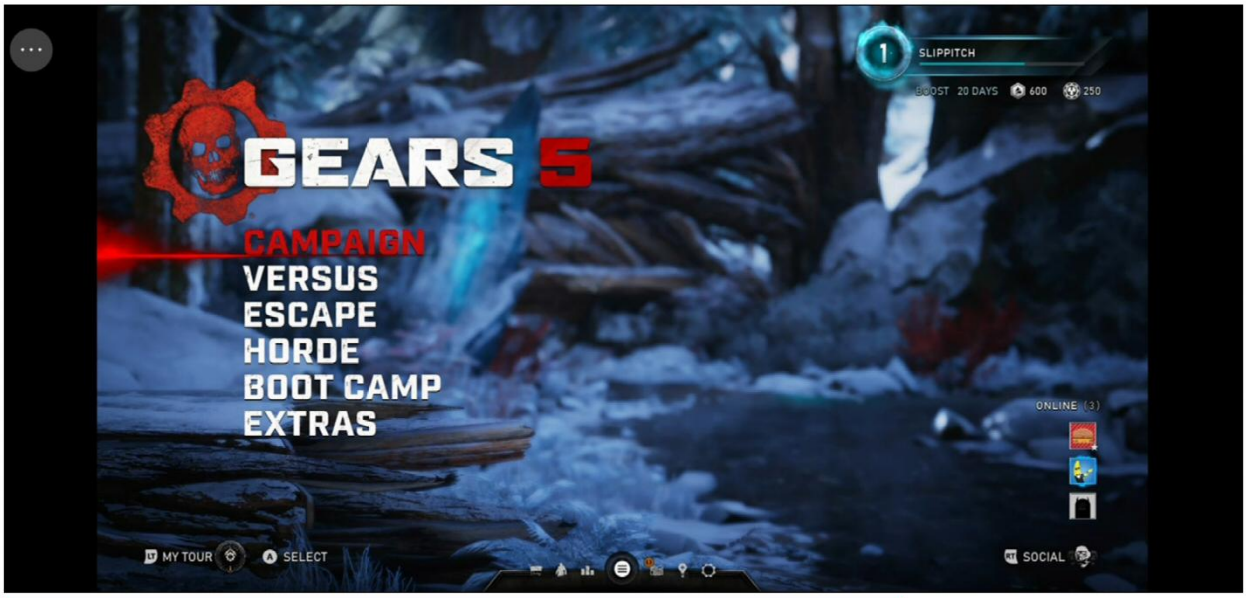
I've been trying the Project xCloud beta off and on for more than a week now. Keep in mind that Microsoft is actually testing two betas at the moment: Xbox Console Streaming, where you're streaming games you own from your Xbox to a mobile phone or tablet; and Project xCloud, which takes a pre-selected batch of four games and allows you to play them over a wireless connection. I've tested only the latter, though the former is now live for Xbox Insiders.

## Let's pause to talk about lag

In both cases, a pleasurable gaming experience boils down to one factor: latency, or the time it takes for you to react to a given scene and input a controller movement or button press, and for the game to respond accordingly.

On a 'local' console or PC, that latency or lag is almost nothing. Though some professional gamers will use wired mice to minimize the lag that can occur between the wireless connections on a PC, lag is rarely noticeable on single-player games if you're running on an up-to-date machine. It becomes somewhat worse if you're playing a multiplayer match online, even if you're on a high-speed wired connection. OnLive, which pioneered cloud gaming before flaming out, succeeded technically but failed as a business operation.

It becomes even more pronounced if you're playing games remotely, over a wireless connection. Microsoft implemented game streaming on Windows 10 in 2015, where you could take a Windows PC and play games streamed to it from a console elsewhere in your home, over a wireless connection. (Xbox Console Streaming is




Project xCloud is Xbox: if there was anything different about what I saw on my phone's screen versus on my console, I didn't notice it. But keep in mind that you'll need to squint at some of the tiny bits of type, too

essentially an extension of this.) Over a wireless LAN, lag increases even further.

Remember that playing games over Project xCloud is going to be an entirely subjective experience, dependent upon your location, proximity to a cellular tower, your carrier, network congestion, and other factors. Based on my experience, here's what I saw.

## Playing games on xCloud: not bad at all

Project xCloud gives you access to four games: Killer Instinct, Gears (of War) 5, Halo 5: Guardians, and Sea of Thieves. Organized like this, the games range in pace from KI, which is quite 'twitchy', down to the relatively moderate Sea of Thieves. My oldest son and I played all four, though I spent less time with Sea

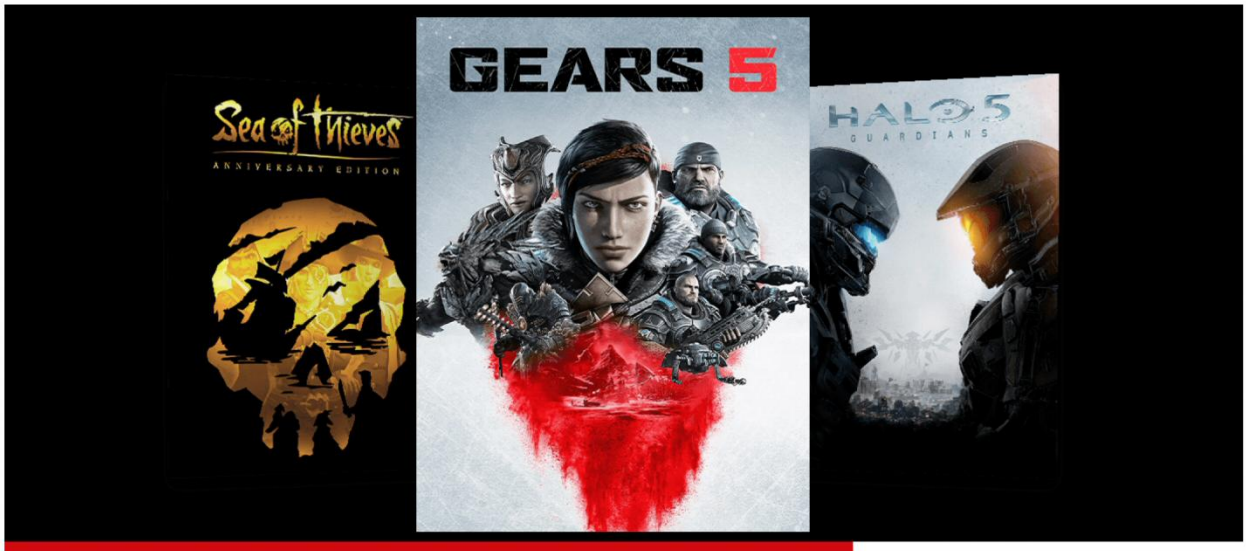
of Thieves because I wanted to see how the service accommodated faster games.

My test bed was a OnePlus 6T smartphone running Microsoft's Game Streaming Android app over an unlimited T-Mobile connection, and a standard Xbox controller. Just for fun, I tested xCloud not only while connected via Bluetooth, but also separately with a USB-C dongle. Both worked well.

I was surprised by how reasonably three out of the four games played. Killer Instinct was a challenge, in part because of how unfamiliar I was with the game's controls. Unquestionably, xCloud introduced lag into simple moves and punches, though not as much as I expected over a cellular connection. Even on a local connection, I probably would have tended toward button-mashing. On xCloud, I found that to be the most effective strategy regardless.

With Gears and Halo, though, I was truly surprised. While Halo is a first-person shooter, and Gears tends to be played in third person, I was able to play Gears 5 fairly well in multiplayer Horde mode throughout the first few levels – contributing to my teammates, shooting accurately, and so on. My son played about fifteen minutes of Halo and did just fine, without complaining of any lag. Peering over his shoulder, he didn't seem to have any issues taking on the Covenant in the opening mission.

The strength of my cellular connection, though, did make a significant difference. Testing during my son's soccer practice, I experienced decent 'ping' times (milliseconds of latency) in the 50s and 60s, as reported by Gears 5. At home, on the periphery of a couple



Some of the games available to stream on xCloud

of cell towers, pings stretched to 90 milliseconds, and loading times also climbed. Playing over Wi-Fi at home reduced the latency down to the 40s and 50s in milliseconds once again.

Sea of Thieves (SoT), a large multiplayer fantasy pirate simulation, is somewhat slower-paced to begin with, and I didn't spend much time poking about its gorgeously rendered seas. I will say that, perhaps due to the slower pace, SoT felt a little laggier than I remembered, playing on the Xbox console itself.

All of this sidesteps my problem with Project xCloud at the moment, though, and that has nothing to do with lag. It's the challenge of compressing games that could be, and usually are, played on large displays in the family room, into a tiny fraction of that screen space. Microsoft sells a phone clip that attaches to your Xbox controller, though my smartphone car mount did just fine. A phone can be balanced against everything from a laptop screen to a couch cushion. Over time,

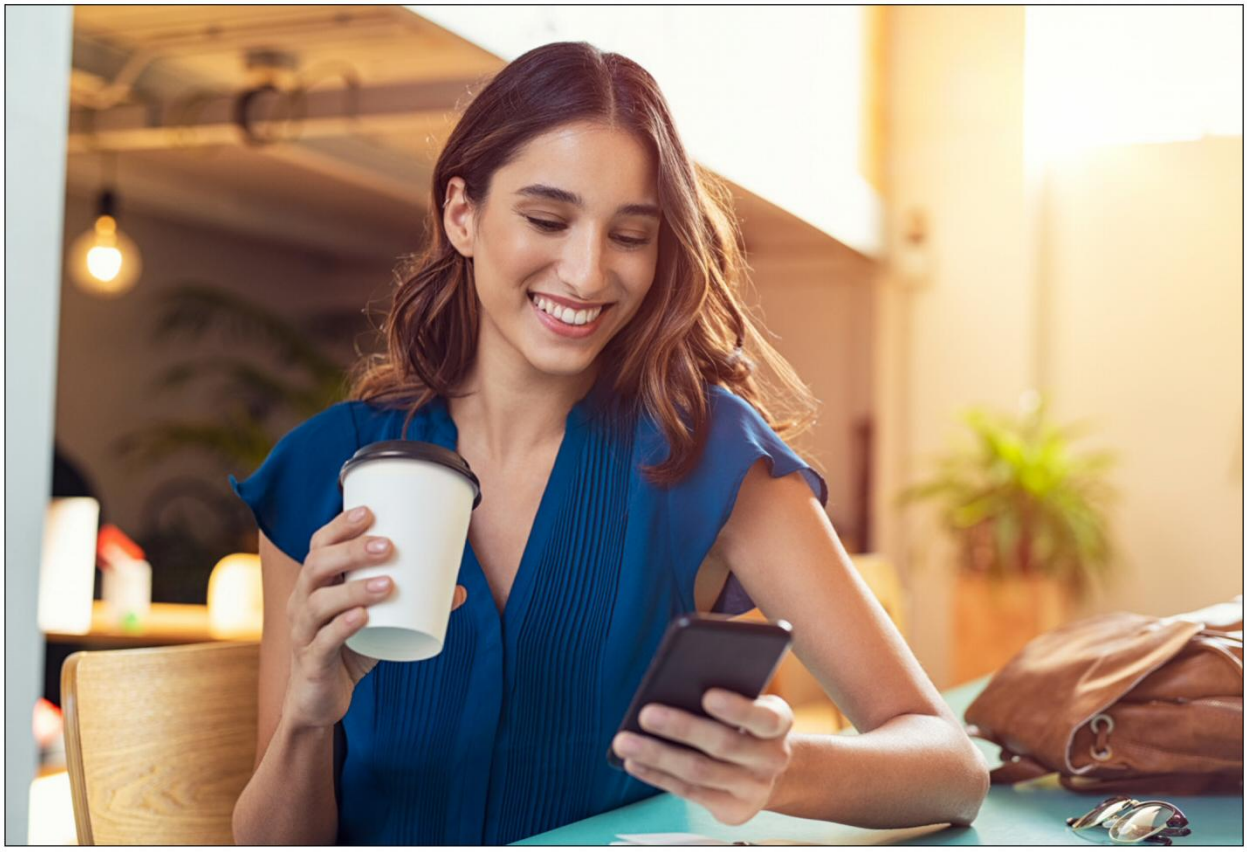
though, simply squinting at games wore down my eyes quickly, to the point where it became a chore rather than a pleasure to play them.

That, of course, begs the question: if a phone is too small to enjoy playing games, what other options are there? Tablets, of course, would be a natural choice, and there is an Android app, but nothing for iOS. I have a suspicion that Microsoft sees xCloud as perhaps the killer application for foldable phones like Microsoft's Surface Duo.

There's still the question of data. I didn't track how much data xCloud uses, but I have an unlimited connection. Not everyone does. Microsoft also has not enabled Project xCloud to stream to a remote Windows PC via Wi-Fi or cellular.

It's not entirely clear how Microsoft will price xCloud, or how it will be deployed. Making it part of Game Pass Ultimate seems to be a popular guess. Let's hope that it's a 'try before you buy' scenario, or that Project xCloud is bundled with Game Pass, eliminating the 'do I really want to pay for this?' question.

Since I've tested OnLive before, some of the 'magic' has gone out of cloud gaming. Playing over cellular, though, has put some of it right back. Being able to toss a controller into a backpack and play in a few spare moments is kind of amazing. Maybe this is the future, after all.

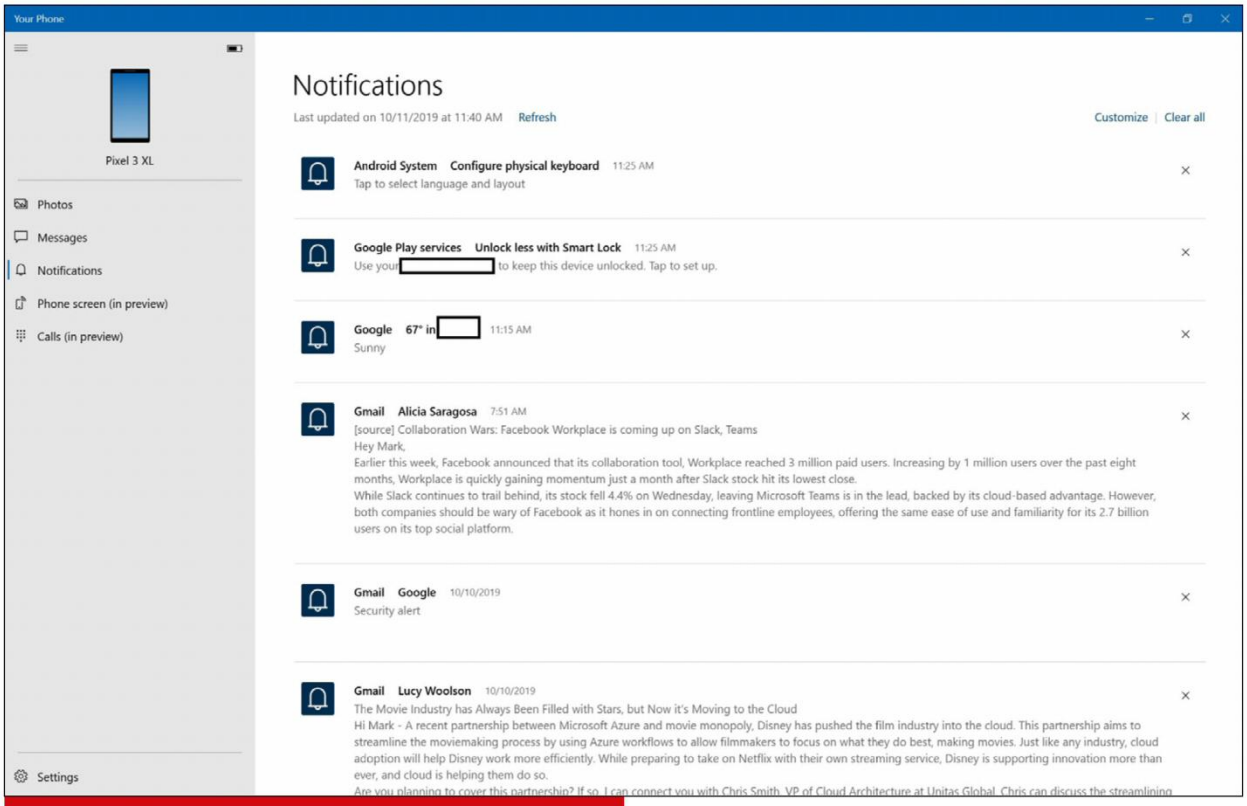


Credit: Getty Images/VRidofranz

# How to: Use Windows' Your Phone app to connect to your PC

Your Phone's most useful basic functions are in place, with the flashier features on the way. MARK HACHMAN reports

Why does Microsoft think you need the Windows 10 Your Phone app? Because it preserves the most important functions of a phone: access to your photos, messages, notifications,




Your Phone can send these Android notifications right to your PC

calls, and even your phone's home screen – without the need to remove your phone from your pocket.

That might sound ridiculous, but think again: once you pull your phone from your pocket, you're instantly lost in messages, email, Instagram – all of these distracting from your focus and flow while working on your PC. Theoretically, you could refuse to open Outlook on your PC and use your phone instead. But you don't, right? Because the PC is much more convenient – and, in certain situations, playing with your phone is also quite rude.

Your Phone's functionality is essentially complete, but the landing's been a little rough. You'll need to mix

and match the right PC and phone hardware to get the most of Your Phone, but the most useful basic features are already available to the world at large. We can also show you how what the final vision looks like, and what you'll need to get there. Your Phone is surprisingly simple and effective, and it's much further along than during our first look at the Your Phone experience.

## Setup: What you'll need

Because of the 'walled garden' approach Apple takes with iOS, Your Phone is essentially tied to Android. (Though Your Phone technically supports iPhones, Microsoft has stopped listing them among supported phones.) Even then, not every phone supports every Your Phone function right now. You'll get the best experience right now with a Samsung Galaxy or OnePlus phone.

Any recent Android phone should be able to connect to Your Phone and receive Your Phone's basic functions: photos, SMS texts, and notifications. The newer, more advanced functions – placing calls and interacting with the phone's home screen – are limited to a smaller subset of devices (Galaxy Phones and recent OnePlus phones, basically). Unfortunately, Your Phone can link only to a single phone at the moment.

Here's a detailed list of the hardware and software requirements for each Your Phone function, at present:

### Photos, messages, and notifications:

A Windows 10 PC running the Windows 10 April 2018 Update or later, and an Android phone running Android 7.0 or later.

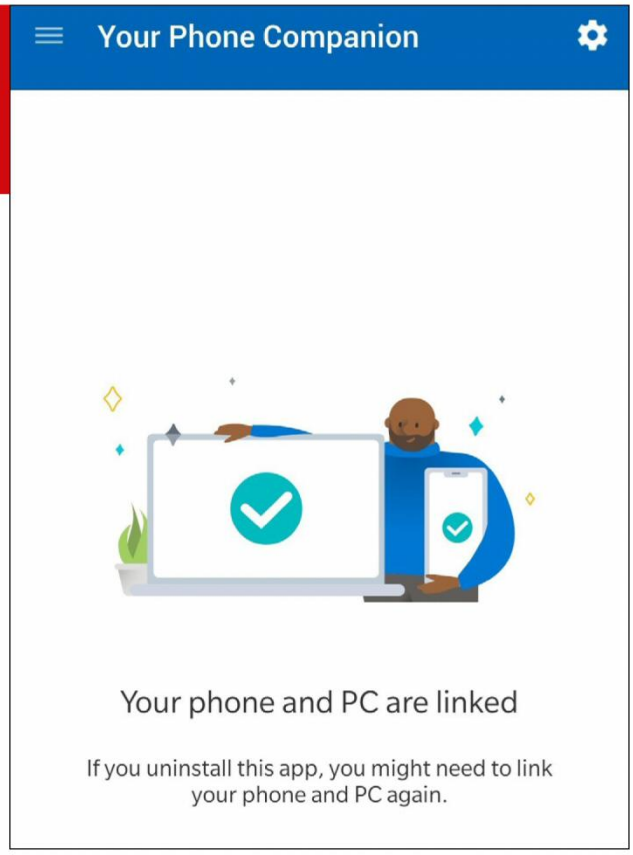
Though we used a OnePlus 6T to test, dozens of different Samsung Galaxy phone models are also supported by Your Phone


**Phone calls (Calls) from your PC:**
A Windows 10 PC with build 18362.356 or newer, and an Android phone running Android 7.0 or later.

**Interacting with your phone's screen (Phone screen) from your PC:**
A Windows 10 Insider PC supporting Low Energy Peripheral Mode, including Surface Laptop 2, Surface Pro 4 to 6, Surface Book 1-2, and Surface Go. A list of supported phones is here (**fave.co/2CKM7PY**), with most Samsung Galaxy and recent OnePlus devices supported.

In general, I've had the best luck with Calls and Phone Screen while running the latest Windows 10 Insider Fast Ring previews, which are optimized for the latest iteration of Your Phone. But the basic functions (texts, photos, and notifications) should work fine with a regularly-updated Windows 10 PC. Remember, this should all open up to a wider subset of devices over time.

While Your Phone should already be on your Windows 10 PC, you'll need to download the Your Phone Companion app for Android




## How to set up Your Phone on your smartphone

While the Your Phone app should be pre-loaded or automatically downloaded on most PCs, you'll need to download the companion app for your phone, known as the Your Phone Companion. The Your Phone Companion for Android can either be downloaded here (**fave.co/2QkNRYe**), or you can enter your phone number into the Your Phone app on Windows. Microsoft will send a text to your phone with the download link inside of it.

Note that you'll need to set up Your Phone Companion on the phone as well as Your Phone on the PC at essentially the same time, making sure your phone and PC are up to date, turning on Bluetooth on both devices, and launching both apps. You'll quickly move through a short series of steps that will enable your phone and your PC to connect.

Setup requires a decent amount of back and forth, and that there can be some fiddling that needs to

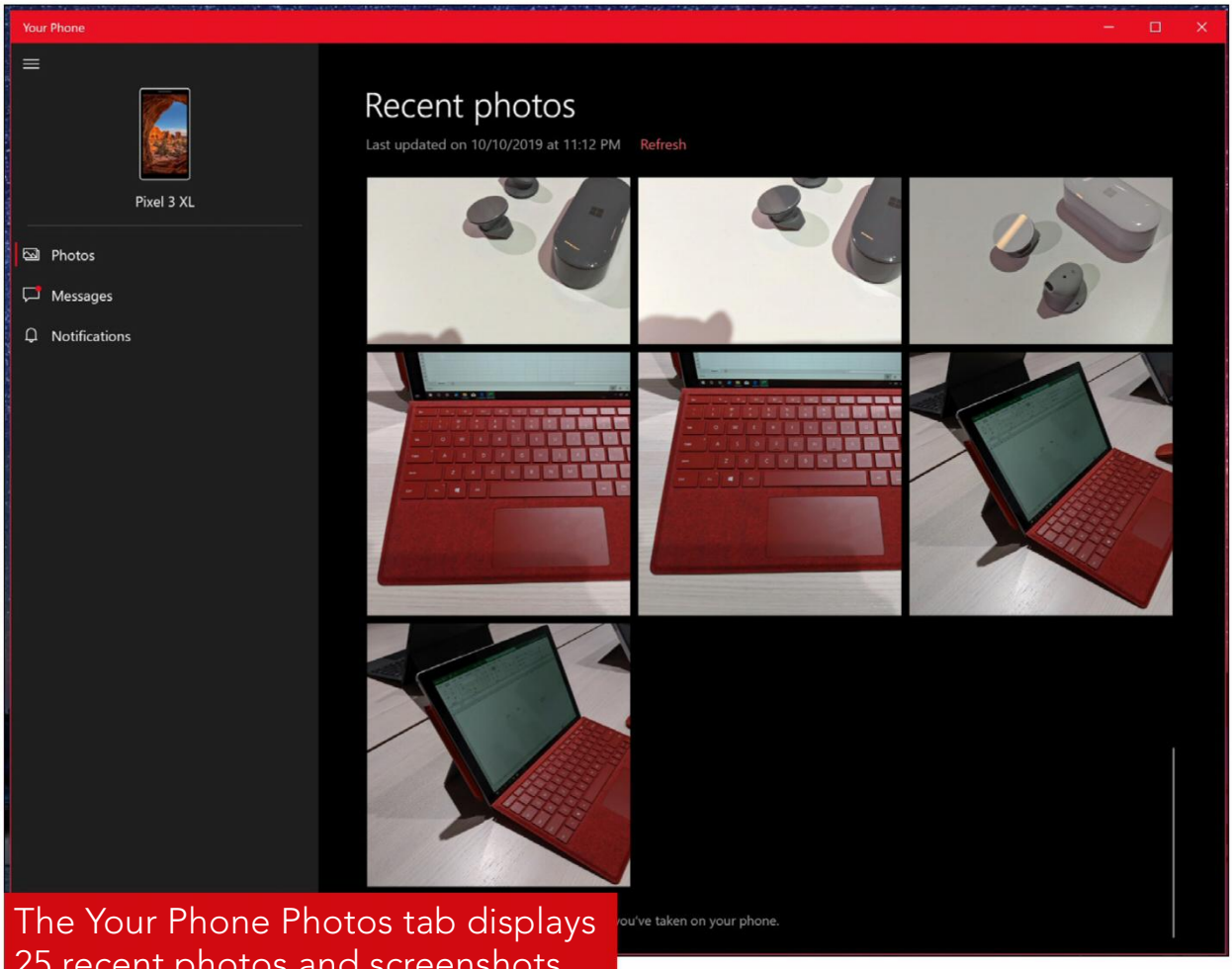
be done. Setup will likely ensure that Bluetooth is on both devices, but not always. The setup process will also probably pair both devices for you, but when I switched test phones I had to perform these steps manually. Make sure both devices are on the same Wi-Fi network for easier communication. And when it's finally up and running, you'll probably need to approve separate Your Phone Companion permissions for texting, then calls, then notifications, and so on. It's a hassle, but the permissions are there to make sure apps don't abuse your privacy.

Don't be turned off by the apparent complexity. We've detailed a lot of the steps that Windows should take care of behind the scenes, and some of this is just stepping through the normal privacy approvals.

## How to use Your Phone

Once setup is completed, it's time to actually use Your Phone. Here's a quick guide to the ins and outs of each of the apps.

One potential problem has to do with your smartphone's on-screen keyboard. Your Phone is designed to let you access your phone from your PC, using your physical keyboard to connect to it and respond to messages. I was shocked to discover that when I picked up my phone (by habit) to respond to a text, that the on-screen keyboard had disappeared. If that happens, try searching for the 'keyboard' in the Android Settings menu on your phone, and then be sure that there's an option to enable the on-screen keyboard even if your PC is doing the typing. That will allow you the freedom to use your phone as you'd




The Your Phone Photos tab displays 25 recent photos and screenshots

like, even when it's connected to the PC. Remember to check the Your Phone app's Settings gear at the bottom left-hand corner, where there are options, for example, to allow SMS texts but not MMS pictures.

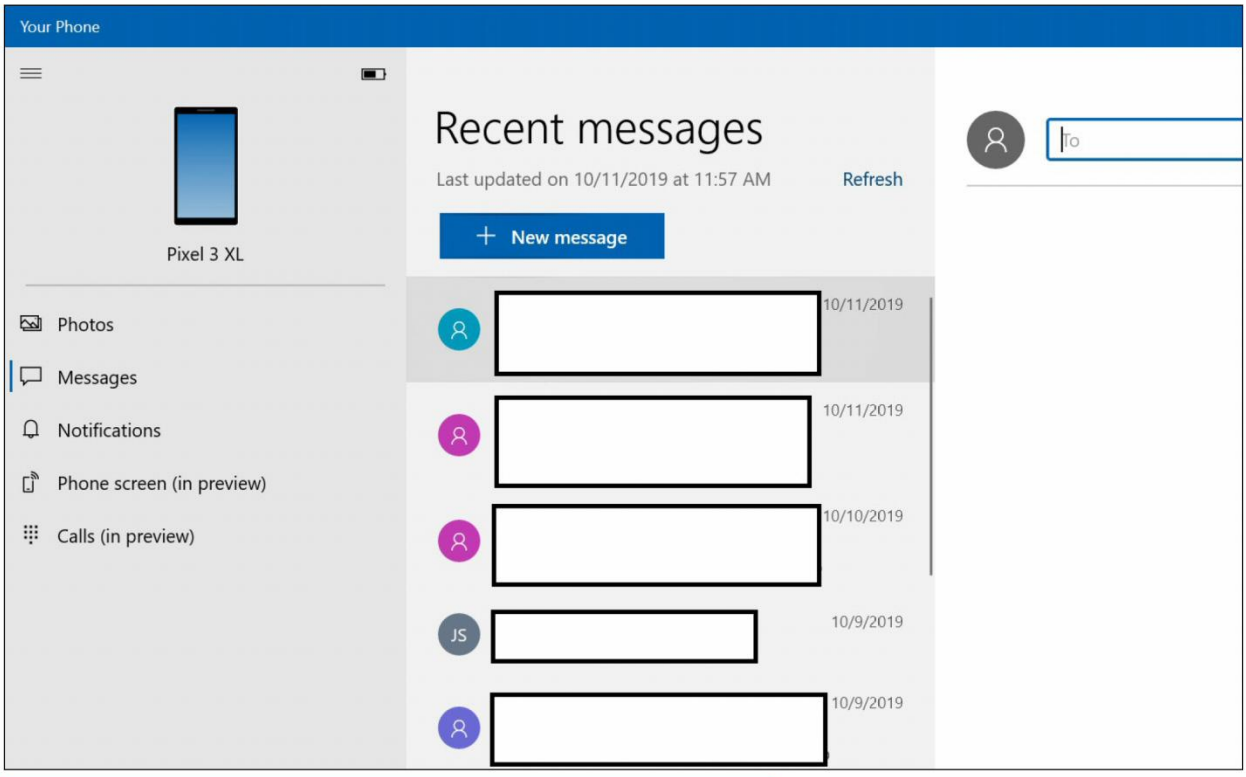
## Photos

Your Phone's Photos tab is similar to the Photos app within Windows: if you take a photo with your phone, Your Phone's Photos makes it available to you for sharing or editing. You'll see a matrix of up to 25 photos and screenshots within the Your Phone Photos

tab, which you can copy, share, or save from within the tab. Frustratingly, you can't directly edit them using Photos unless you save them to your hard drive, then edit them with Photos.

## Messages

In this context, 'Messages' is merely shorthand for SMS/MMS text messages, not any specific app on Android or anywhere else. As a result, it's a bare-bones summary of the text messages you and your contacts have exchanged, nothing more. Most messaging apps, including Skype, offer a 'call' option, and usually a video-chat option as well. Messages does neither,




Messages displays both SMS and MMS messages, though without the additional calling options offered by native phone apps

although you could argue again that the bare-bones approach is necessary to maintain flow.

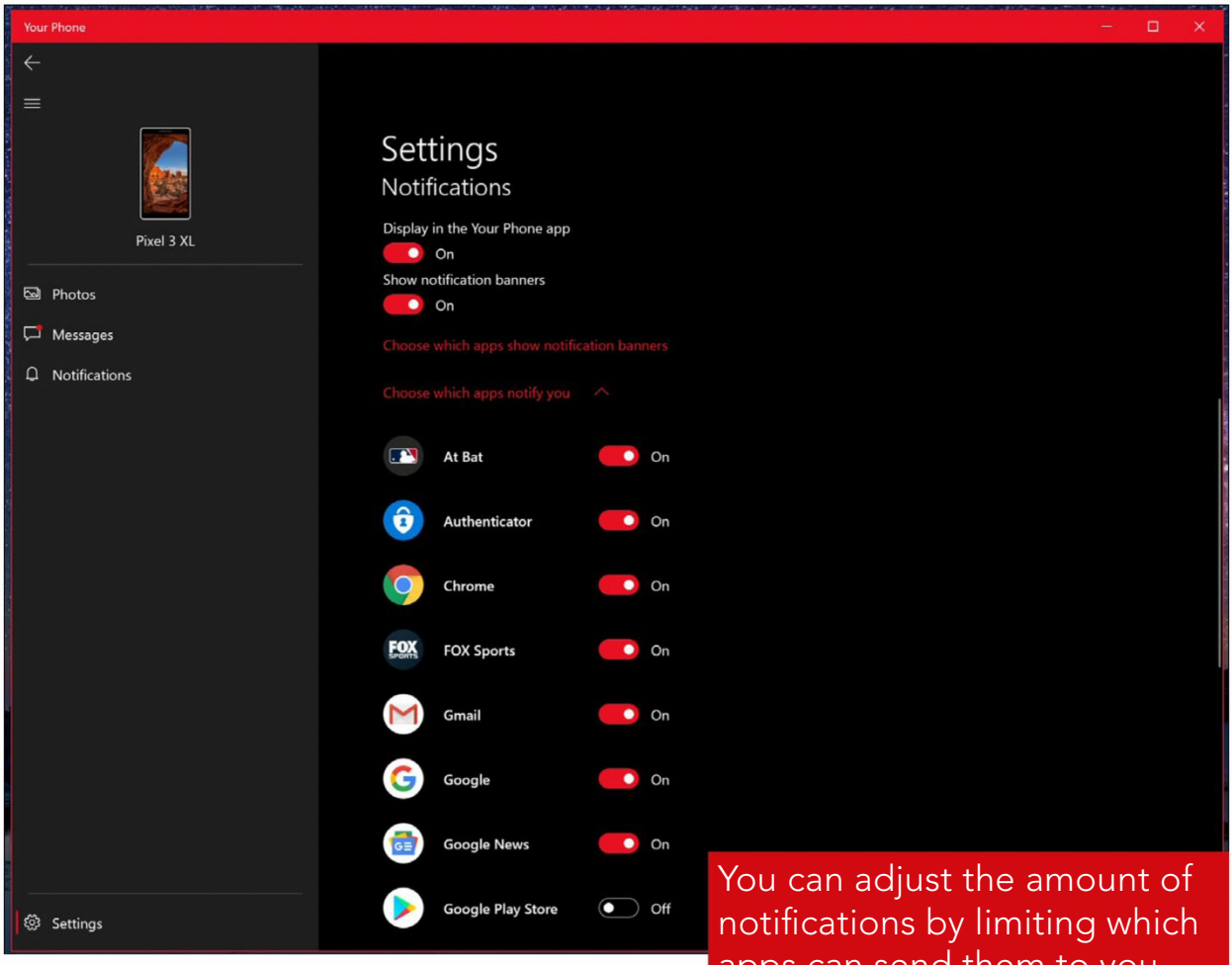
The Settings option to download images sent via MMS texts automatically needs some clarity. For one, when I specifically toggled it on, a test photo sent to me via text didn't save to my PC – though my phone isn't configured to automatically save photos sent to my phone. (The photo appeared inline as a text message, though, as it should have.) It would also be helpful to know exactly where MMS images are saved, and if they're automatically backed up to OneDrive. This is why people use Snapchat, after all.

Unfortunately, Messages still shows any message threads that you've archived on your phone, including automated texts of one-time passwords that a web service may send you for two-factor authentication. (Keep in mind that it's more secure to use an authenticator app for 2FA instead.)

## Notifications

Likewise, Notifications represent nothing more than the Android notifications that apps already send to the home screen of your phone. There's not much to do here, although you do have the option of filtering those notifications so that only a subset gets passed along to your PC.

Like notifications of new email, those slide in from the bottom right and reside in your Action Centre. That's reason enough to consider the filtering options, as right now you can see one notification slide in for a new email on your phone, and another from the Mail or Outlook app on your PC.

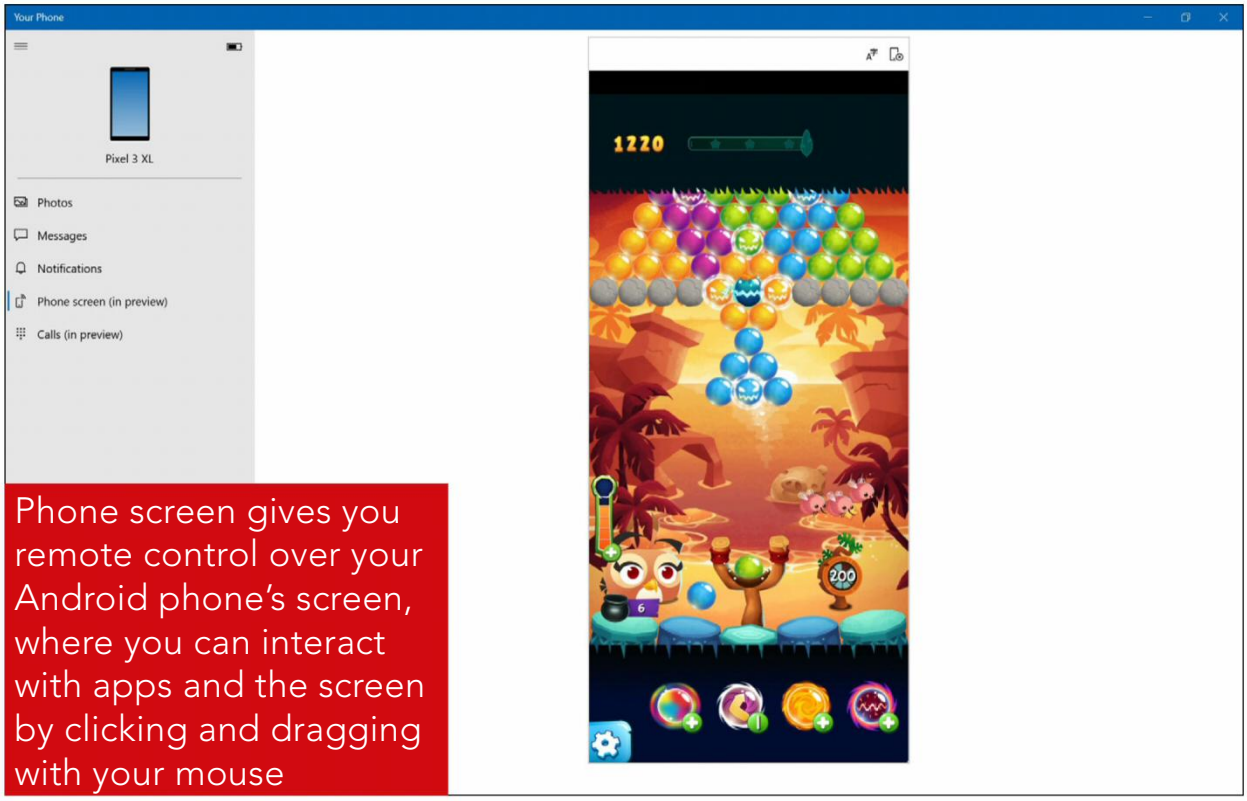



You can adjust the amount of notifications by limiting which apps can send them to you

## Phone screen

This is one of the more interesting value-added features of Your Phone: the ability to access your phone's home screen, and by proxy, access any Android apps that may be on it. Overall, it might be more convenient just to simply haul out your phone. On the other hand, if doing so would be rude, Your Phone is a convenient way to access it surreptitiously.

Because you're interacting with your phone over a Bluetooth connection, you'll notice some lag. (As a test, I tried a couple of games over the Your Phone



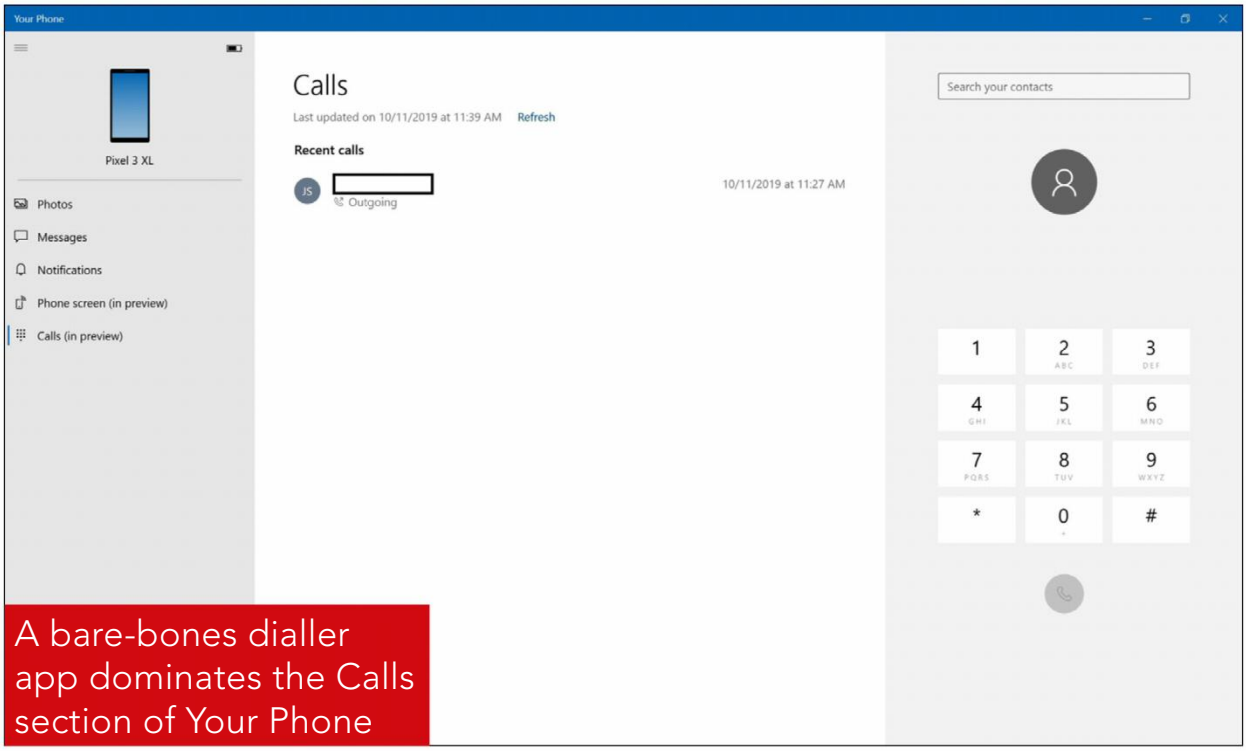

Phone screen gives you remote control over your Android phone's screen, where you can interact with apps and the screen by clicking and dragging with your mouse

connection; something like Angry Birds is playable, but an action game is not.) Remember that you can't easily lower your phone's volume without physically interacting with it, so you'll have to dive into the phone's settings menu to adjust it.

If there's an Android app that you need to access surreptitiously, with no Windows or web counterpart available, the phone screen feature can be handy.

## Calls

With the recently announced Calls, Your Phone finally becomes... a phone. Make sure that you enable your phone to share its contact list with Windows. Calls doesn't appear to access the Windows 10 People app or Outlook, which is where Windows would store




A bare-bones dialler app dominates the Calls section of Your Phone

that contact information. Calls allows you to use your laptop's speaker and mic to talk to callers, which of course is anything but discreet. On the other hand, if you're working in a private office, you don't need to unearth your phone to answer or place a call.

Assuming you've never used Skype before, it can be rather fun to place and respond to a call from your PC. I did notice a bit of an echo or 'tunnel' effect when responding to callers, though that may be patched out over time.

So is Your Phone ultimately useful? It can be, in the sense that an Android watch or Apple Watch allows you to surreptitiously glance at your wrist – or in this case, your screen – to see what your phone is reporting. A wearable does much more – but that's an additional device and an additional cost.

Fortunately, the most basic functions are probably the most useful: the ability to see and respond to texts and notifications, as well as to grab a photo from your phone and use it quickly within a Windows application. Those Your Phone features are available now, via a broad range of phones and PCs. They're definitely worth trying out.


# How to: Personalize a Windows 10 PC

Your PC isn't merely a tool; it should feel like an extension of who you are. MARK HACHMAN reports

What makes your house your home? Is it the furniture? The art? A few favourite collectibles arranged on the shelves? The same goes for your PC. If you're new to Windows 10, we'll show you how to personalize your PC to make it feel, well, yours.

From the moment you first power on your PC, you'll be asked to choose how to manage your privacy and security. But once you complete that short process, the

Personalization begins with entering your name

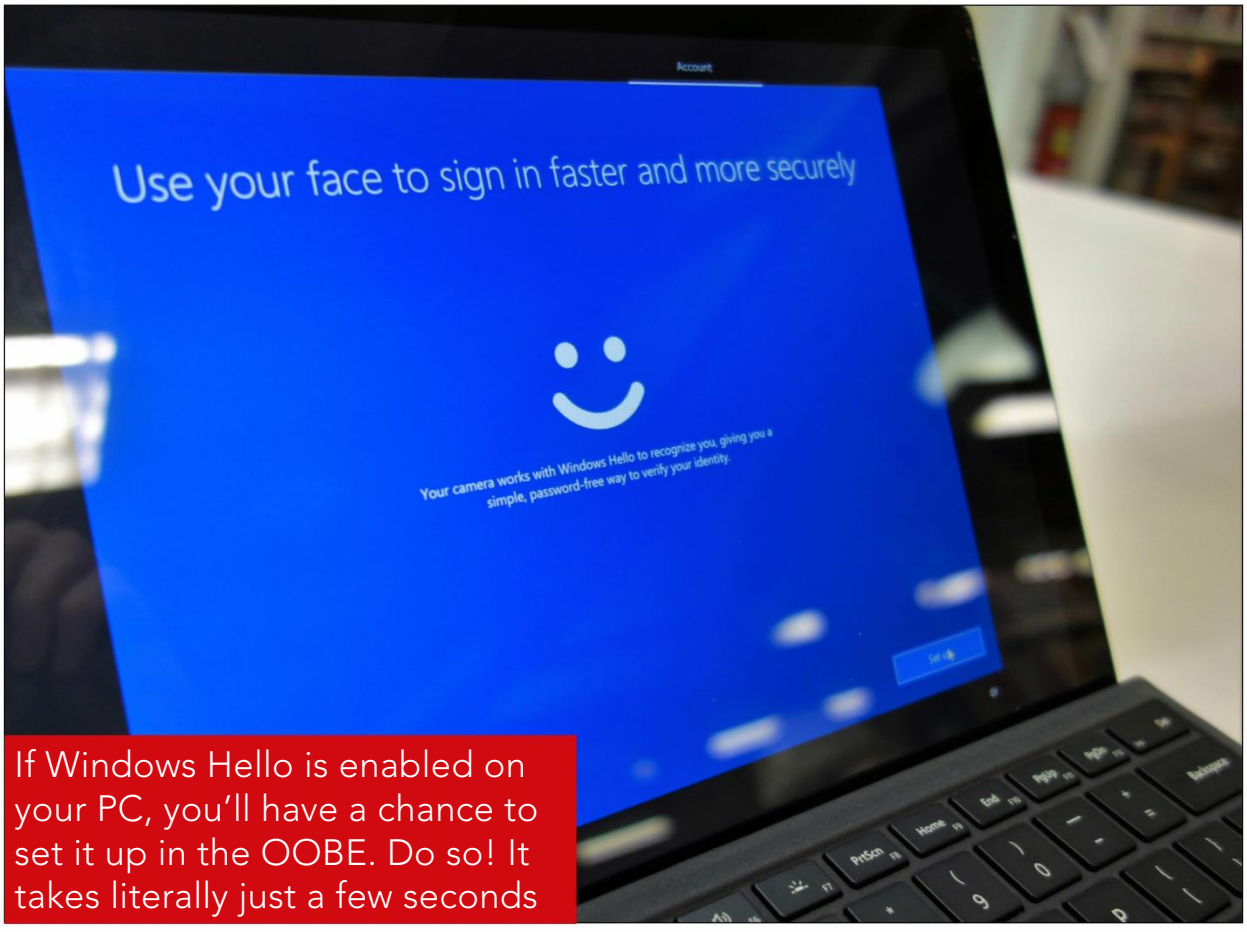
fun begins: you can select backgrounds, configure your Start menu, and choose apps and shortcuts. Think of this story as a complement to our tutorial on how to set up your new PC efficiently and effectively. This is the fun stuff.

## The Windows 10 out-of-the-box experience

Any time you buy a new PC, you're almost certainly going to walk through what Microsoft calls the 'Out of Box Experience', or OOBE. While the OOBE is simply a series of setup screens narrated by the voice of

Cortana, Jen Taylor, it could differ a bit from PC to PC, and be determined by your choices. Generally, you'll be able to handle most questions without any hand-holding; you'll be asked for your preferred language and keyboard layout, to connect to Wi-Fi, and so on.

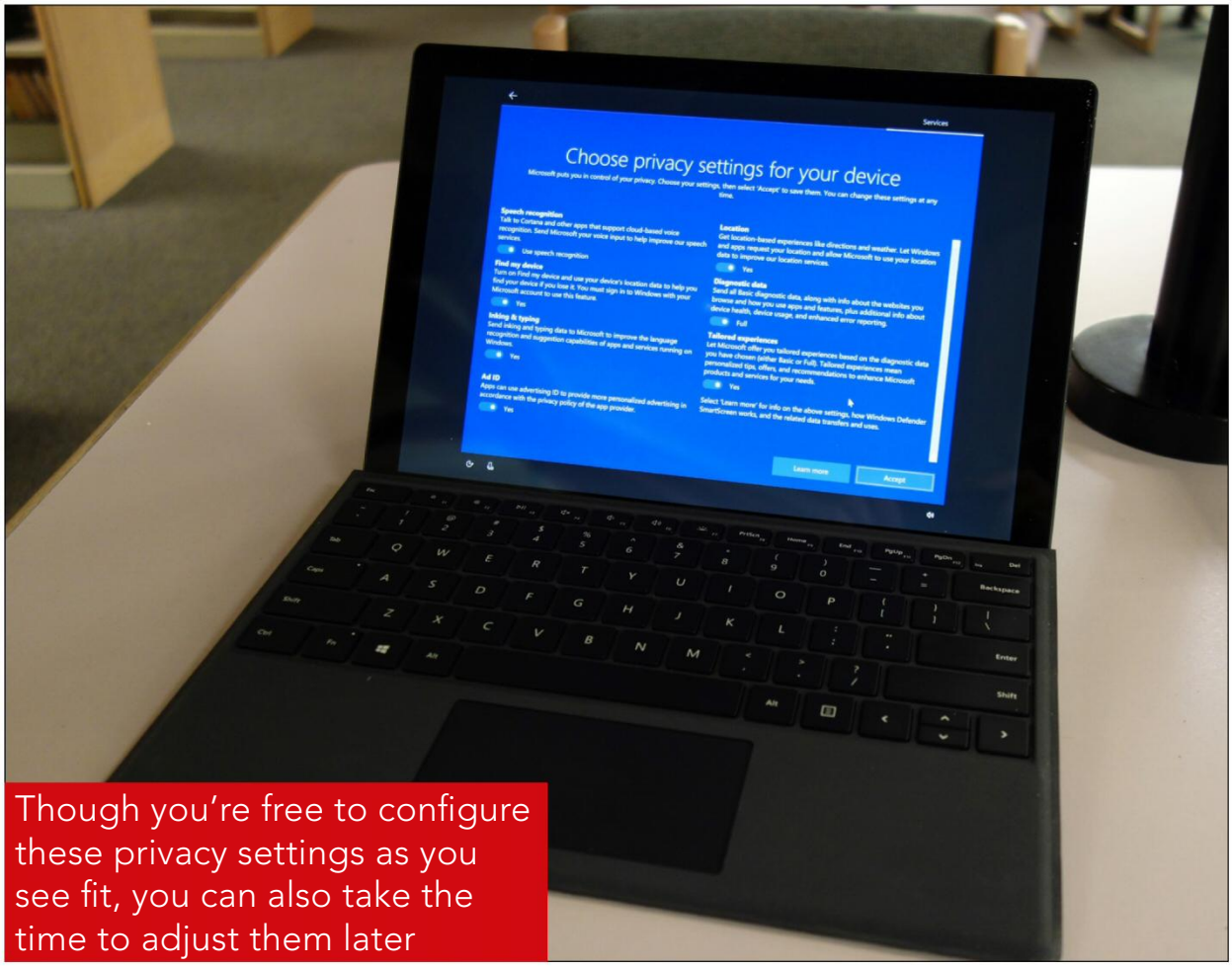
Your major choices boil down to these: whether to enter or create a Microsoft password, whether to enable Cortana, and choosing your privacy settings. Entering (or creating) a Microsoft account allows your preferences to 'follow' you from PC to PC, create a OneDrive cloud-storage account, and more. Creating an account is recommended, though you can use a local account and password instead.




If Windows Hello is enabled on your PC, you'll have a chance to set it up in the OOBE. Do so! It takes literally just a few seconds

Microsoft has made it harder to enable local accounts, however. The language and the UI to do so appears to change somewhat randomly. If a local account is what you want, however, disconnecting from the Internet seems to help immensely.

Likewise, it's up to you whether you want to enable Cortana. Cortana and Windows Search are now separate, and Cortana is far less important than she once was. But here's a reason to keep Cortana around: you can actually launch Amazon's Alexa via Cortana. You're also free to fiddle with the privacy settings (of course, you change these in Windows proper, as well).



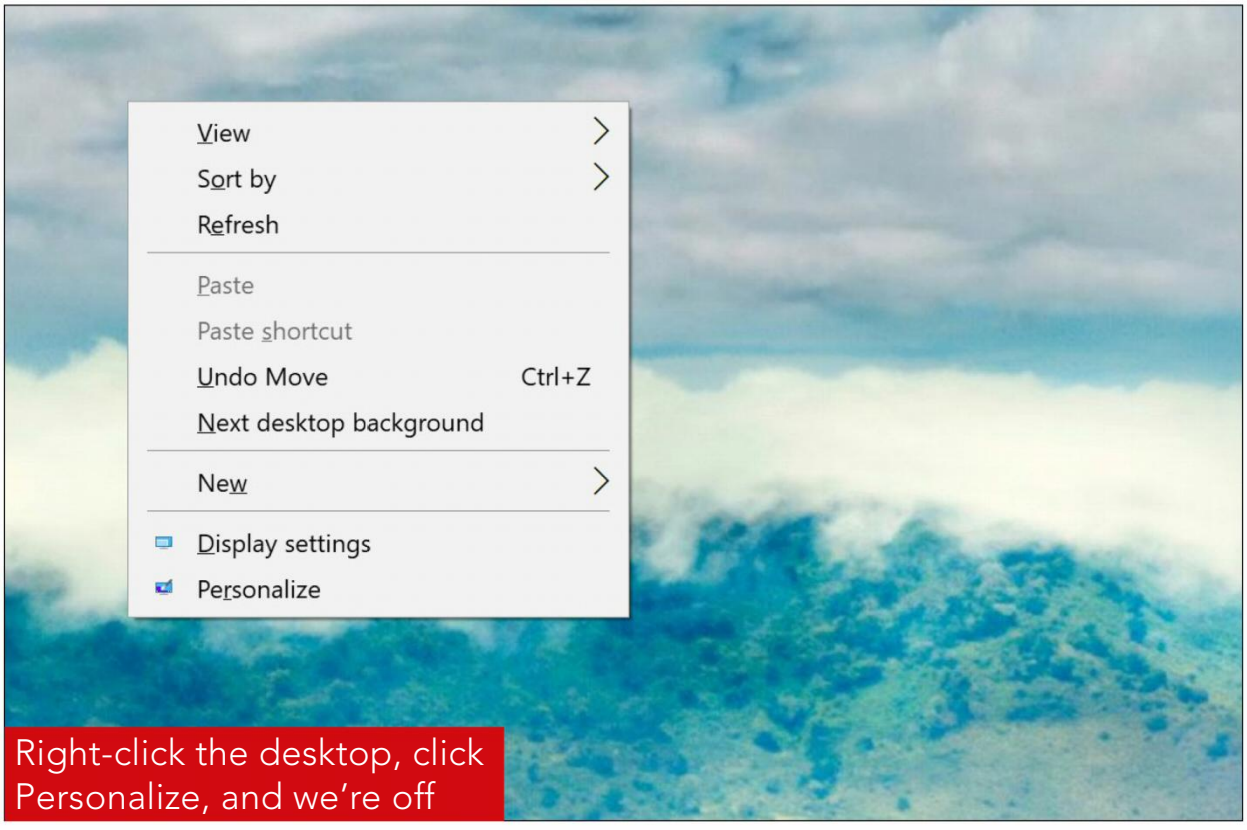

Though you're free to configure these privacy settings as you see fit, you can also take the time to adjust them later

After a few minutes the setup process will complete, and you'll see the Windows 10 desktop.

## Begin personalizing your PC with Themes

Assuming you've never logged in with a Microsoft account, you'll see the default desktop wallpaper. It's time to start making this PC yours! And the easiest way to do this is to right-click anywhere on the desktop, and then select Personalize.

Doing so will open up the Windows 10 Settings menu, specifically Settings > Personalization > Background. You'll see a list of backgrounds to choose from – either a picture, a solid colour or a slideshow, as well as an example of how it will look. If you select Picture, click Browse to find the folder

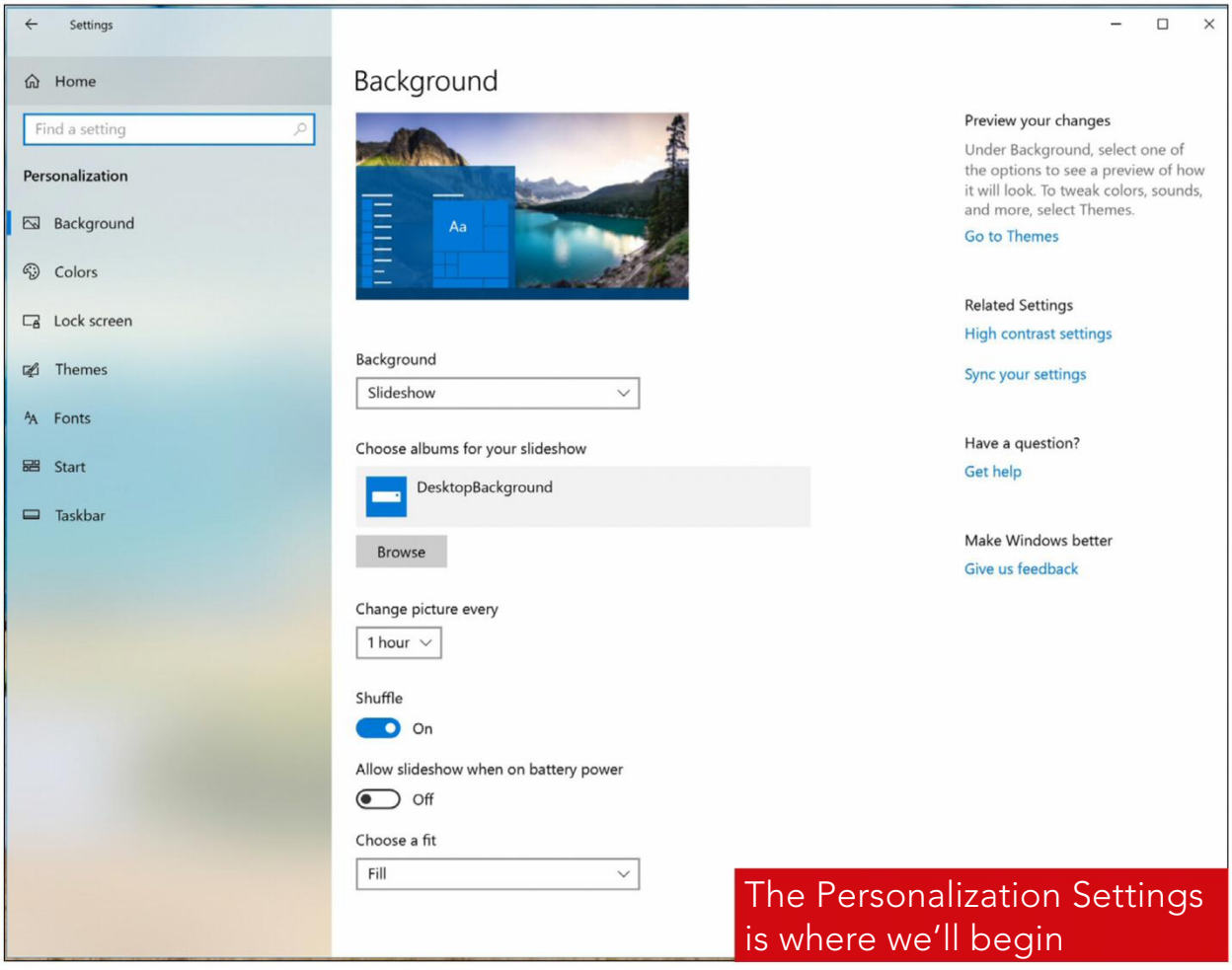



Right-click the desktop, click Personalize, and we're off

in which your picture is located. (If you want to use a picture that's on your phone, try emailing it to yourself, opening the file within your email program, and saving it to a folder on your PC.)

You can also select from a slideshow of pictures, which uses the Windows 10 Pictures folder as a default. It's probably a better bet to create a subfolder of pictures that you've vetted and pull from there.

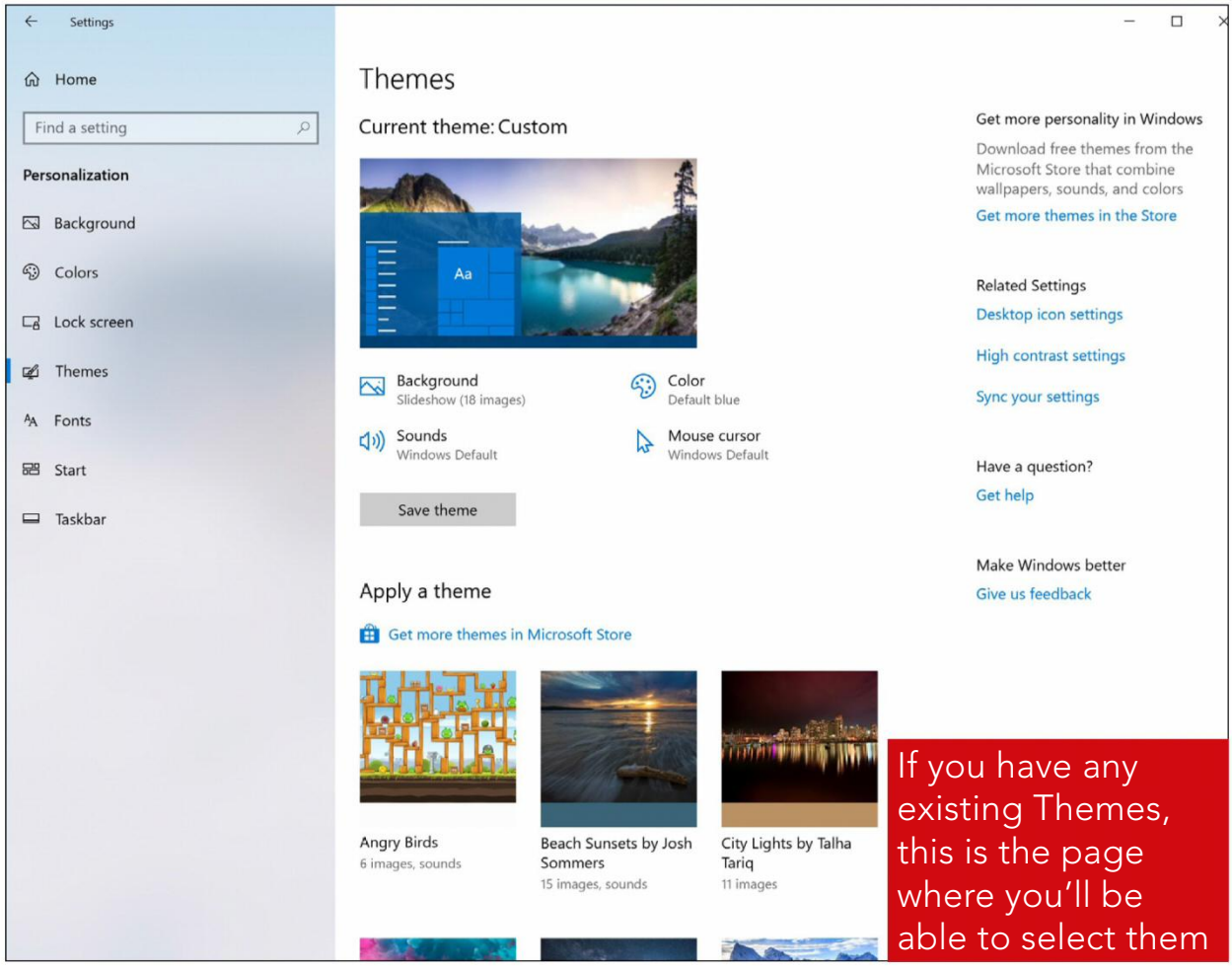
If you want to take your personalization a bit further, scroll down the menu options on the left-hand rail to Themes. Windows 10 Themes are collections of background images, sounds, colours and mouse




The Personalization Settings is where we'll begin

cursor. There are several to choose from that ship with Windows. But we recommend clicking the link to Get more themes in Microsoft Store.

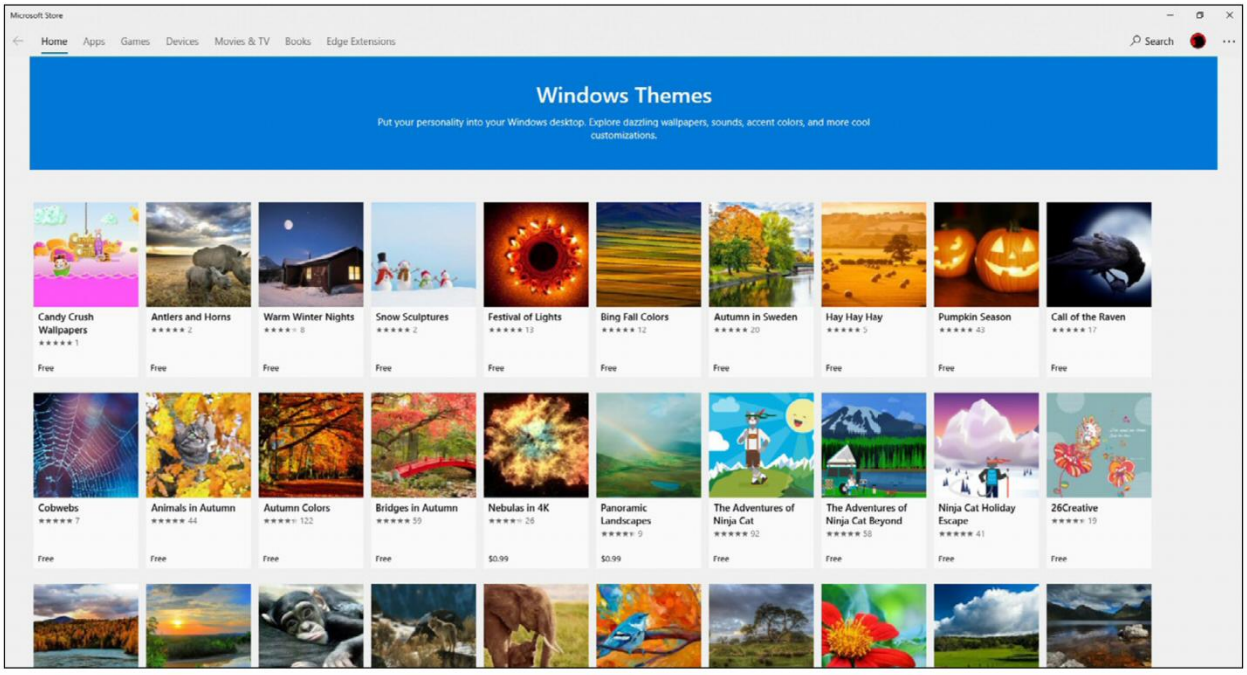
Clicking the link opens the Store, and displays literally dozens of Themes, most of which are free. There's an enormous emphasis on architecture, animals, and nature photography, and a distinct lack of (copyrighted) sports and pop art. Oddly enough, some of Microsoft's computer game Themes aren't published to the Store, but appear in this list of Themes that come with custom sounds, such as Halo:Reach, Angry Birds, Eerie Autumn, or the French Riviera.



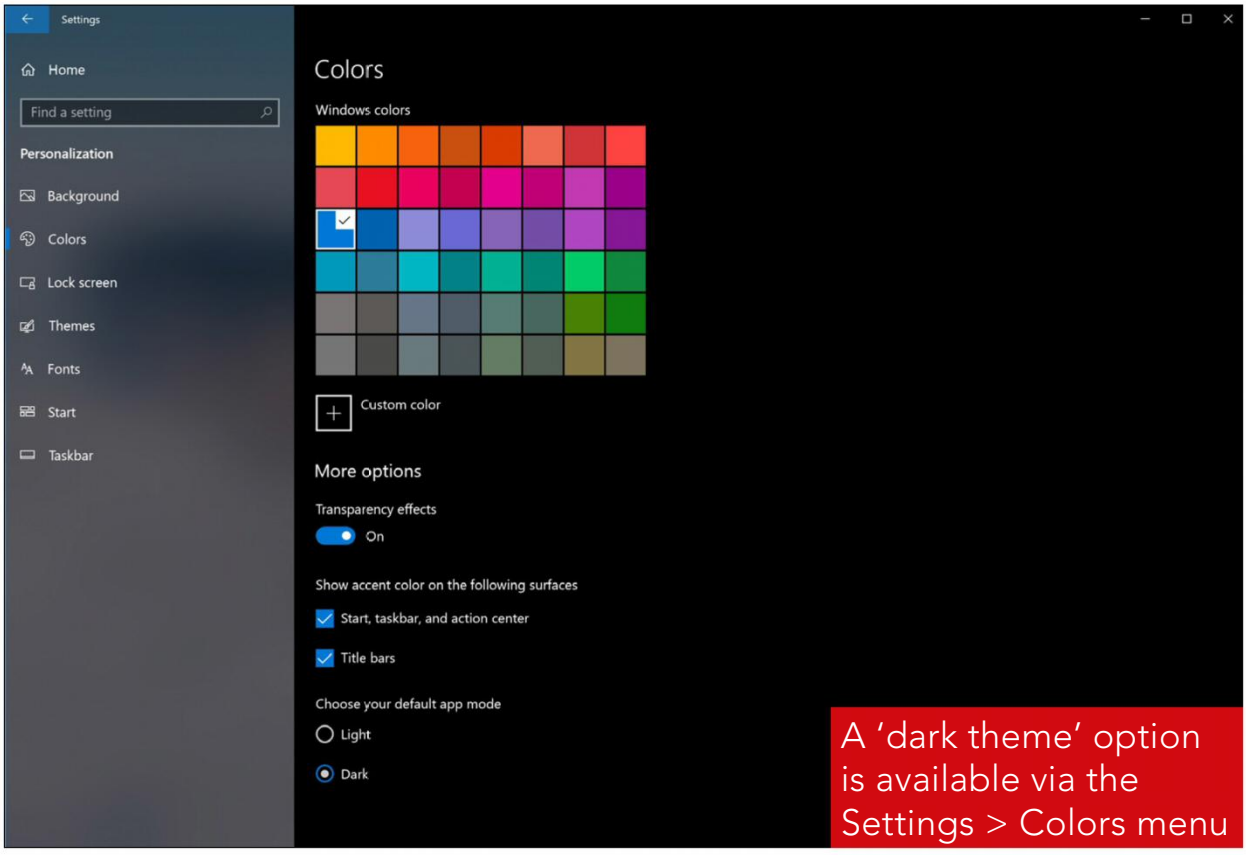

If you have any existing Themes, this is the page where you'll be able to select them

Downloading Themes from the Store places them in your list of Themes; downloading the Themes with custom sounds from the second link requires downloading the file to install it. Note that on the Themes page of the Settings menus, you can click the Sounds icon, which will open up the Control Panel. That's handy if you tire of the custom sounds of a Theme and just want to revert to the traditional Windows sounds.

Feel free to download as many Themes as you want, then select which Theme to use in the Settings > Themes menu. Under Settings > Background, you can select how frequently the individual backgrounds in the Themes cycle through. I prefer one per day, but you can refresh them as frequently as one per minute.



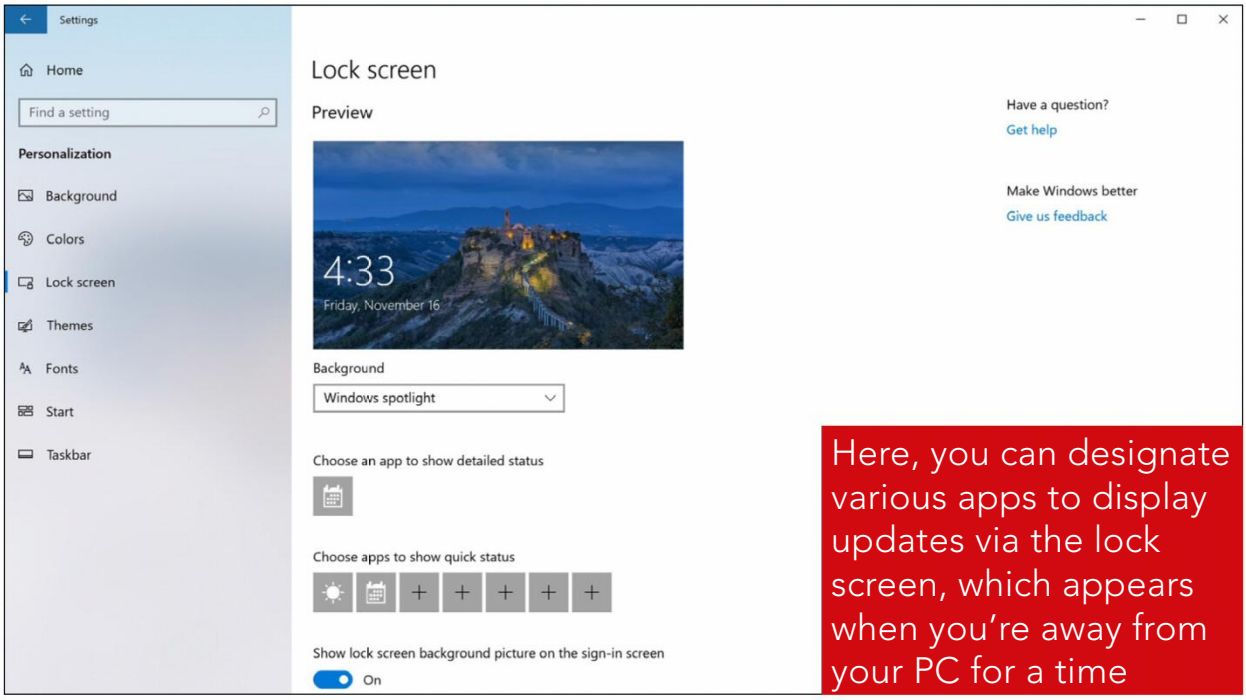

If you're a photography fan, there's a wealth of free backgrounds to choose from in the Themes portion of the Microsoft Store. One quirk: you have to access these Themes from the Settings menu. They're not accessible via the main Store app at present




A 'dark theme' option is available via the Settings > Colors menu

Your next stop should be the Settings > Colours setting, which looks like an option to select accent colours. Boring, right? Well, no – the reason to explore is down at the bottom, where you can select either a dark or light theme. Try them both. Some people really prefer less light blasting from their monitor. Unfortunately, it's not universal: you'll have to set a dark mode separately within Google Chrome, for example. But it's a start.

While the Fonts setting within Personalization doesn't offer much, it's worth taking a moment to configure the Lock Screen, the screen that appears when your PC locks itself after being away for a while. Adding your Calendar data to the lock screen, for




Here, you can designate various apps to display updates via the lock screen, which appears when you're away from your PC for a time

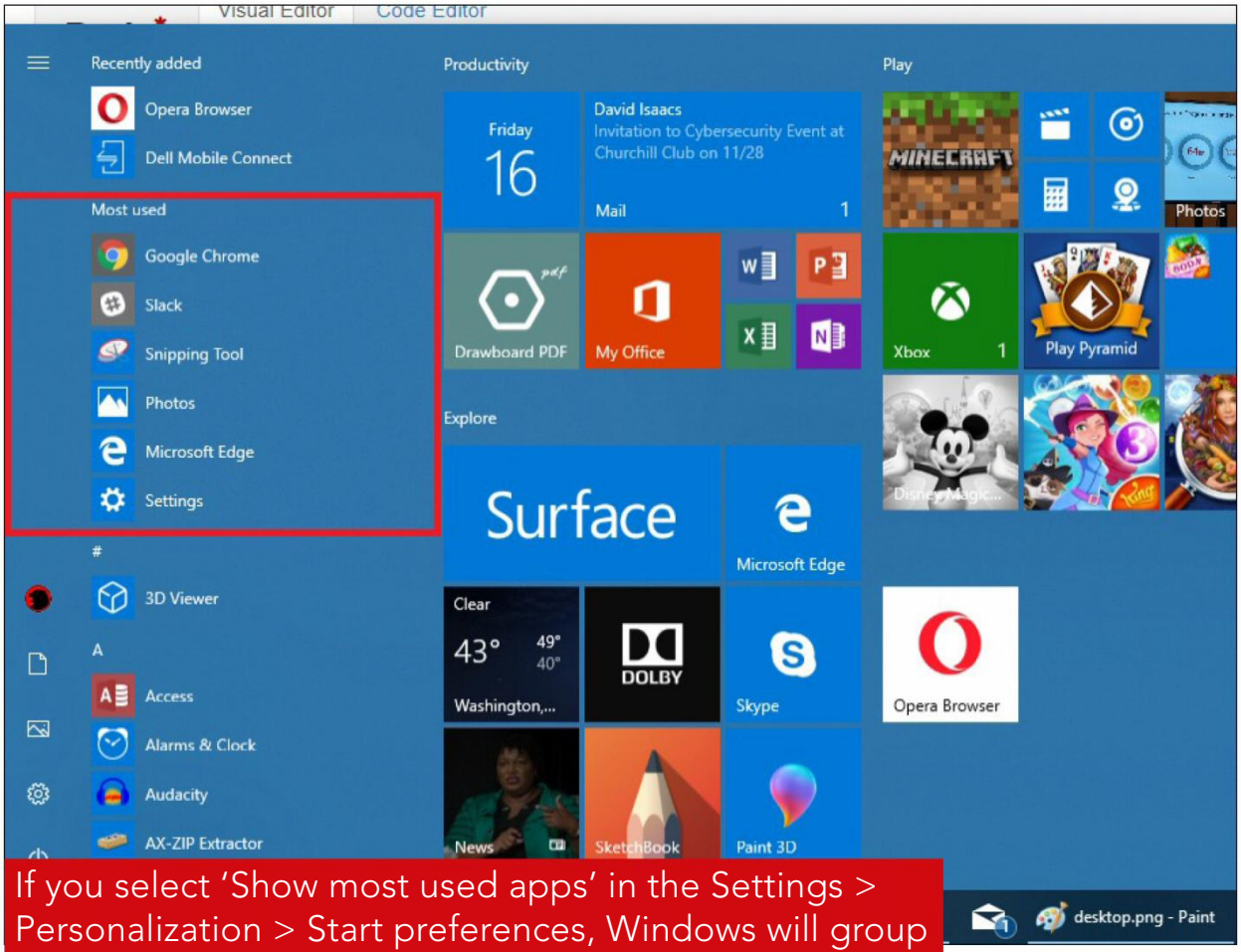
example, allows Windows to display your next calendar appointment when you return to your PC. It's a great way to mentally reset and plan your next move.

## How to organize the Start menu and Taskbar

Windows offers many different ways to do the same thing – in this case, launch apps. The Windows 10 Start menu (accessed by clicking the Windows icon in the bottom-left corner) is an amalgamation of Windows 7's list of apps and the tiled interface of Windows 8. Right next to it is the Search box, where you can type an app name to launch it. And right next to that is the Taskbar, where you can pin frequently used apps for easy access. (Your currently active windows will also show up in the Taskbar.) How you organize things will be a matter of preference. But consider a few suggestions to help you get started:


The Start menu in the lower left houses all of your apps

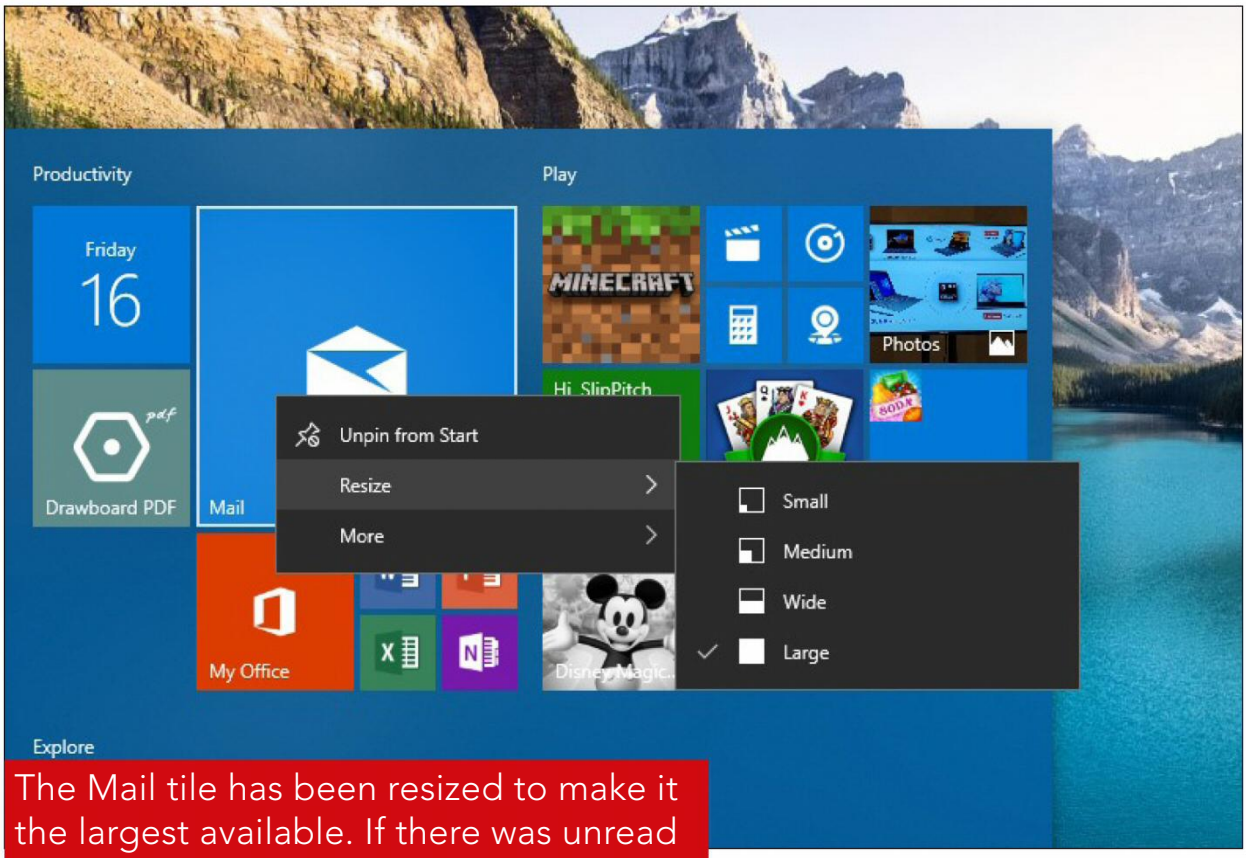
- If you prefer a list of apps, navigate to Settings > Personalization > Start, then toggle on Show most used apps. That will place your most frequently used apps at the top of the list, eliminating the need to scroll through them.
- If you right-click a tile or app and go to More > Pin to Taskbar, you can create a shortcut icon that will live on the row of icons on your Taskbar at the bottom of the screen. That will save you from opening Start. Remember, the more icons you pin, the less space you'll have for shortcuts to active windows. If you




If you select 'Show most used apps' in the Settings > Personalization > Start preferences, Windows will group your most frequently used apps at the top of the stack

hover over the Taskbar icons, you'll see a popup thumbnail of each active windows within that app.

- If you don't use the list of apps, just the tiles, you can toggle off the list entirely from the same menu. You can even open the Start menu in full-screen mode for a 'Windows 8.1-like' experience.
- Each of the tiles appears in one of three folders (Create, Play, and Explore, by default), which you can right-click to rename and move around. Right-clicking a tile lets you adjust its size. That's useful for apps that update information, like Mail, Calendar, or News.

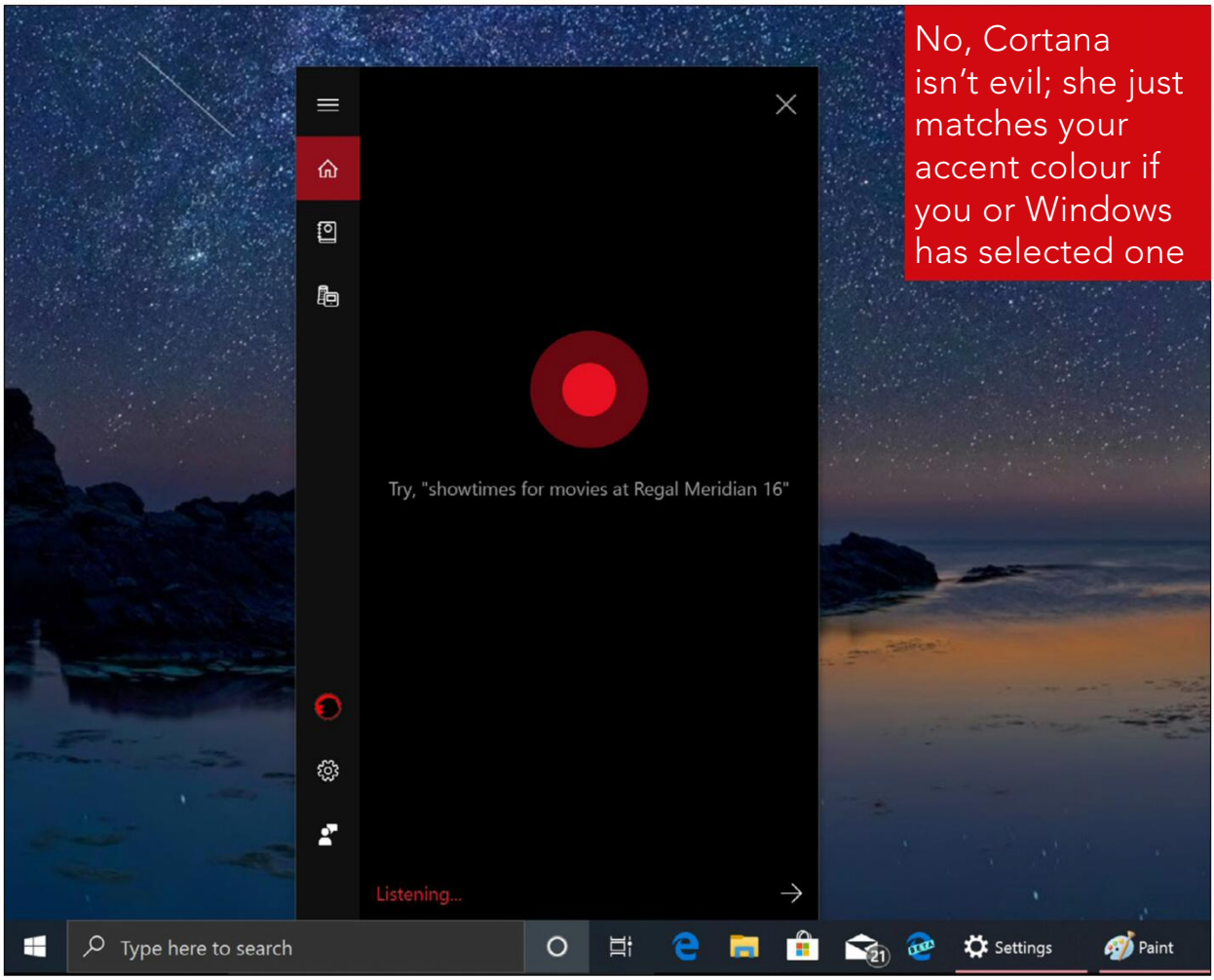



The Mail tile has been resized to make it the largest available. If there was unread mail, the tile would show the latest entry

- If you hate the tiled interface, you can manually 'unpin' each tile to get rid of them altogether. You can also uninstall some apps from this interface.
- The Taskbar can be turned off entirely (Settings > Personalization > Taskbar) or moved around your screen – on the top or side, for example. You can also create more room by turning off little-used options like People via the toggle switches.

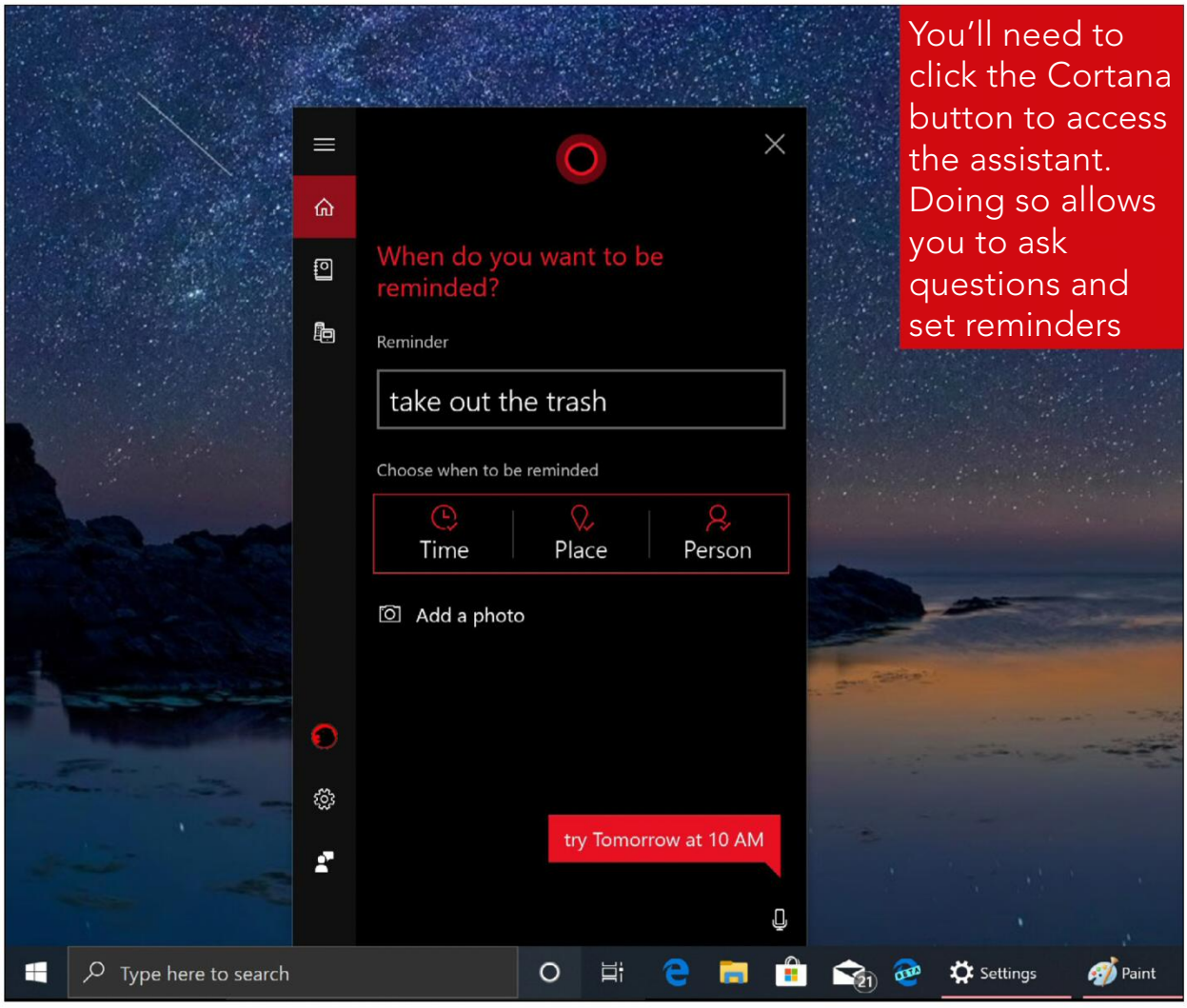
## The Search box, and Cortana

Unless you've toggled it off, you should see a Search box next to the Start icon. Cortana used to be fused with Windows Search; now she's a separate entity.



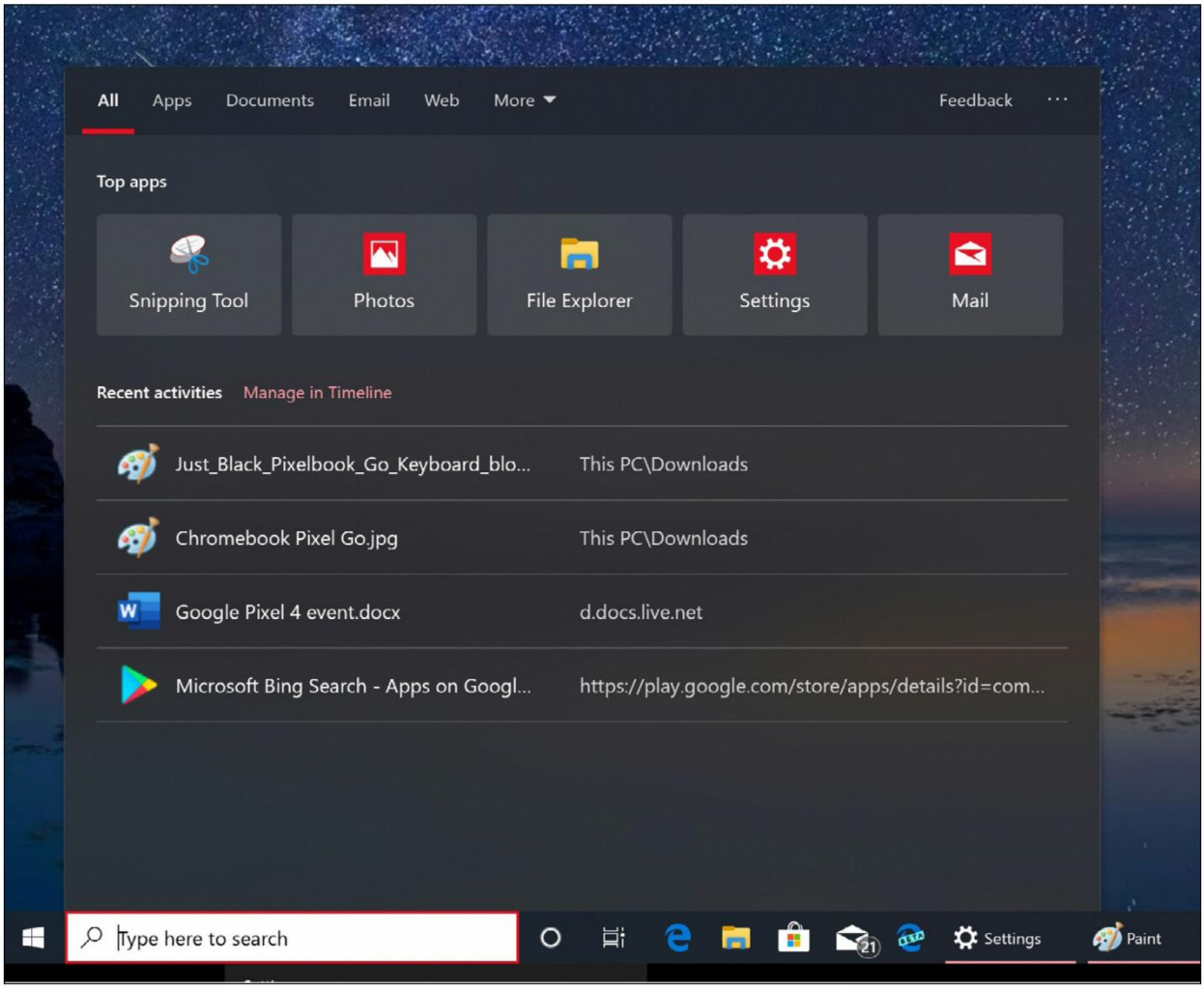

No, Cortana isn't evil; she just matches your accent colour if you or Windows has selected one

At one time, Cortana would monitor all of your interests and surface news and relevant bits of information. Today, she serves three purposes: as an assistant to answer questions, set reminders, and create lists. If you click in the search box, you can ask a query ("How tall is the Eiffel Tower?") and Bing will report the result. But it's easier to go to Settings > Cortana and enable the 'Hey Cortana' trigger word. If your PC has a microphone built in, you can then ask these questions of Cortana, even when the PC is locked. You can also set reminders ("Remind me to




You'll need to click the Cortana button to access the assistant. Doing so allows you to ask questions and set reminders

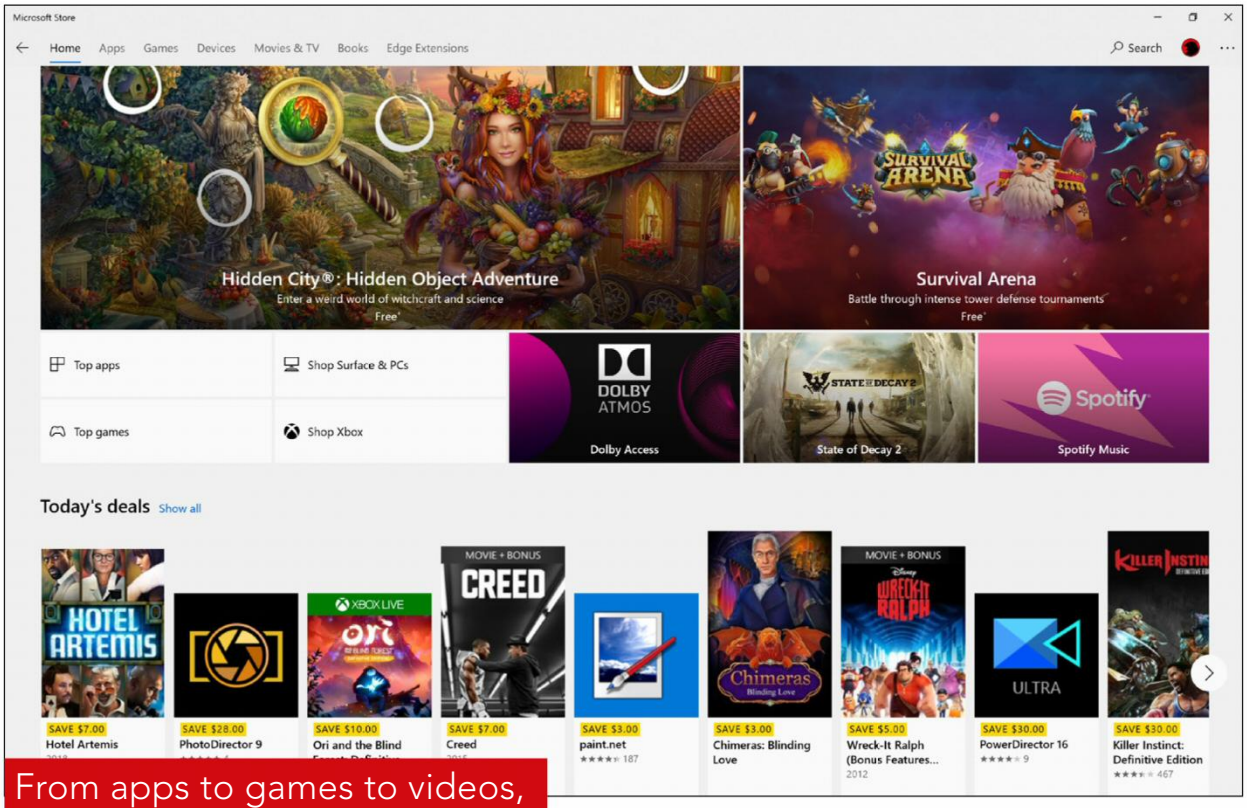
call Dad at 8pm") or create a shopping list. To better understand you, though, Cortana needs to know your information. In Settings > Cortana > Permissions & History, if you toggle on permission to allow access to your search history across the cloud and various devices, it will be easier to find a document or other file from the search box. You can use the File Explorer (the little folder icon on the taskbar) to hunt down a file. But you can also search for it from the Search box, and receive a list of suggestions.




The Windows Search bar shows you a suggested list of documents even before you begin typing

## The Microsoft Store app

As you may know already, one of the easiest ways to configure your PC is to download the apps that you want to use, and a convenient resource for this is the Microsoft Store. You can access the Store from the Start menu, or simply type the app you're looking for into the Search bar, and look for the corresponding Store entry in the results. Try it with something like 'Facebook'.




From apps to games to videos, the Microsoft Store app is the iTunes of Microsoft

Which apps you download are up to you – and not all apps are available via the Microsoft Store.

## The Action Centre

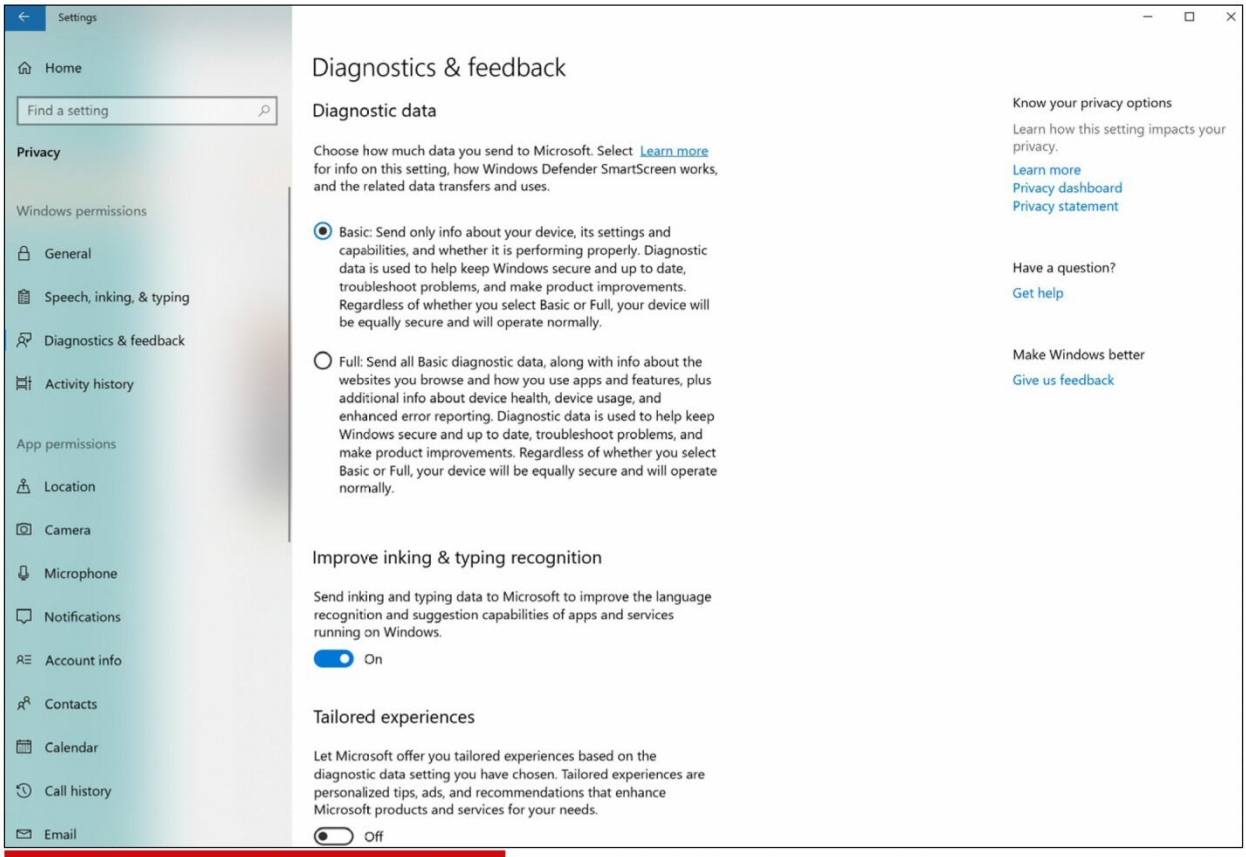
Despite its name, the Action Centre, tucked way down into the bottom right-hand corner of the screen, can be a quiet corner of your PC's operations. The Action Centre archives any notifications you receive (new email, calendar reminders, and so on) and, when clicked, pops them out from the right side of the screen. But note the Quick Actions down at the bottom of the pop-out, where you can tweak things to your liking: adjust the brightness of your screen, turn on

In the early days of Windows 10, Cortana would make an appearance in the Action Centre, providing information. It's much more spartan these days

Nearby Sharing, toggle Wi-Fi on and off, and more. Notifications are useful, but if you find them distracting, toggle on Focus Assist for a reprieve. Just make sure to toggle it off, afterward. You can always make these adjustments in the Settings menu (or sometimes even via your laptop keyboard), but here they are readily accessible. In the October 2018 Update of Windows 10, you had the option to drag these little Action Centre icons around and organize them as you see fit. Not any more, unfortunately.

## A quick note about privacy

Remember how we encouraged you to click through the OOBE and push past the privacy defaults? Now



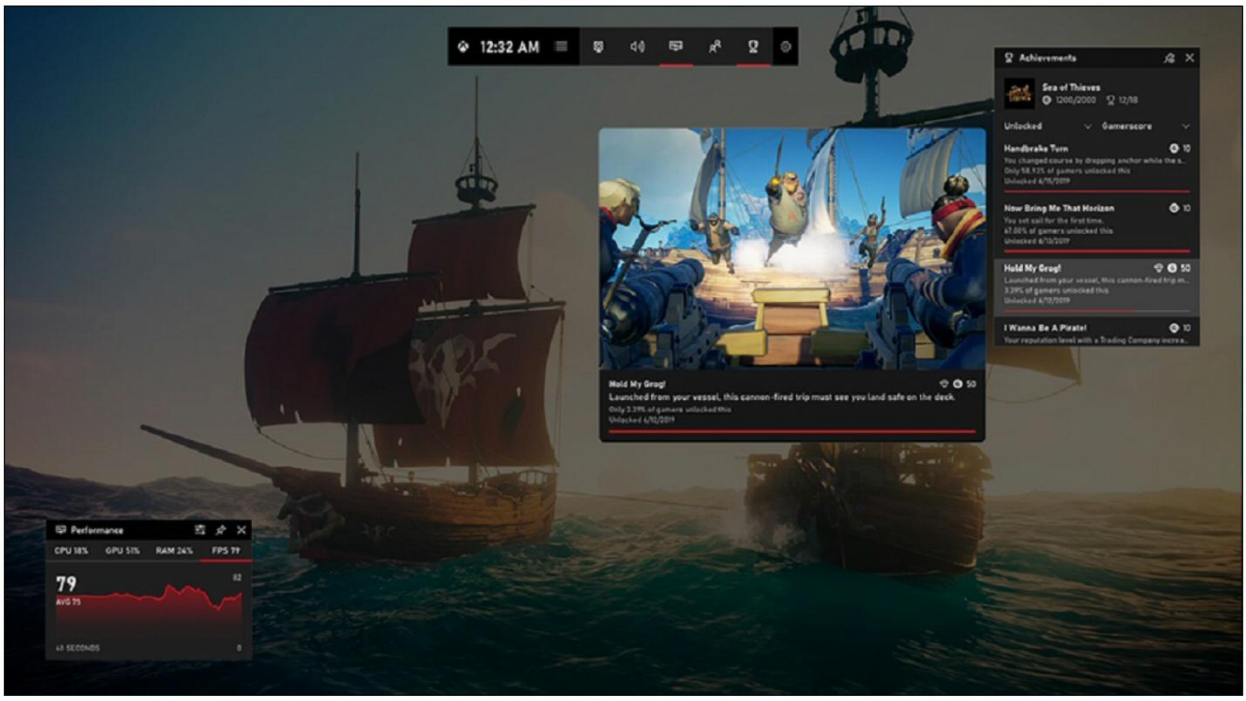

Allowing Microsoft access to your data has some benefits, but provide just the basics

might be a good time to go back and think about which data to provide to Microsoft, via the Settings > Privacy menu.

You're free to decide what data Microsoft learns about you, but the trade-off is this: Microsoft would like you to believe that the more data you provide, the better your experience will be. There's some truth to that. If you allow access to your search history and cloud documents, for example, your searches should be more effective. But you'll still see ads, so there's really no need to create a 'unique advertising

ID', so we suggest you should toggle off that switch in Settings > Privacy > Options. You can also set the Privacy > Diagnostics & Feedback data to Basic, without any consequences.

There are certainly other touches you could make to customize your PC: adding a second monitor to increase your virtual workspace, uninstalling bloatware like Candy Crush, or simply adding a trusty old keyboard and mouse. Remember, it's all about making your PC... your PC.




# Windows 10's Game Bar adds a fps frame rate counter for your games

You can now keep an eye on how your PC is handling the latest games. MARK HACHMAN reports

At long last, Microsoft's Game Bar overlay for Windows finally shows how many frames per second (fps) your game is running at, as well as the ability to track Xbox Achievements.

As part of what Microsoft now calls the October 2019 Game Bar Update, the frame rate counter has now been added to the CPU and GPU monitoring

tools, which can be triggered as a pop-up overlay by hitting the Win+G key combination. Although the new Game Bar experience will automatically download as an update over time, you can also download the update manually as well.

Game Bar allows you to open up several small windows on your screen as an overlay or sidebar of sorts, including the Performance meter as well as the new Achievements box. The new Achievements overlay replaces the Xbox Console Companion app somewhat, so that any achievements will pop up on Game Bar instead. According to a blog post from Microsoft, you'll be able to pin your progress on new achievements to your screen.

Note that the new Game Bar frame rate update requires you not only to agree to additional permissions from Windows, but also reboot your PC. You'll then need to launch a game before it kicks in, while the CPU/GPU meter runs in normal Windows mode. By default, it tracks the last 60 seconds of gameplay with a scrolling FPS meter. There's a setting to adjust the transparency of the 'backplate' of the window, but in general you'll still see performance data in the small box in your screen.

Although FPS tracking was available in Steam's overlay, Nvidia and AMD's graphics card software, and other utilities, it's nice to see this capability come to Windows. Microsoft has also promised a "ton of things" in store for the coming months. We'll have to wait and see what all that means.