



## Educators and students: Get a responsive Chromebook to help assess student work, plan lectures, communicate remotely, and more

Two Intel Core processor-powered Chromebooks took less time to complete tasks in certain apps than a Chromebook powered by an AMD Ryzen 7 3700C processor

### Executive summary

At Principled Technologies, we compared the responsiveness of the following three Chromebooks™ for tasks in a variety of apps that educators and students might use for work:

- Intel® Core™ i7-1185G7 processor-powered Chromebook
- Intel Core i5-1145G7 processor-powered Chromebook
- AMD Ryzen™ 7 3700C processor-powered Chromebook

We found that the Chromebooks powered by Intel Core processors saved time on tasks in apps such as Google Drive™ and Adobe® Lightroom®. We also found that the Corel® virtualization app Parallels Desktop® ran well on the Intel Core processor-powered Chromebooks, meaning that teachers and students can migrate from their old Windows 10 device to a Chromebook without losing familiar workflows.

Today's educators must be prepared for days when the dining room table has to serve as a classroom or lecture hall. Having a Chromebook that gives quick access to cloud-based documents and files can help support teachers' and professors' work.

†HP Pro c640 G2 Chromebook with an Intel Core i7-1185G7 processor compared to a Lenovo® C13 Yoga® Gen 1 Chromebook with an AMD Ryzen 7 3700C processor.

‡See [the science behind this report](#) for detailed system configurations and benchmark results.

**30%**  
less time  
working with  
documents, charts, and  
presentations while on a  
Google Meet call<sup>‡</sup>

**25%**  
less time  
unzipping, creating, and  
more with photos during  
a Google Meet call<sup>‡</sup>

## How we tested

### Google Workspace and Adobe app scenarios

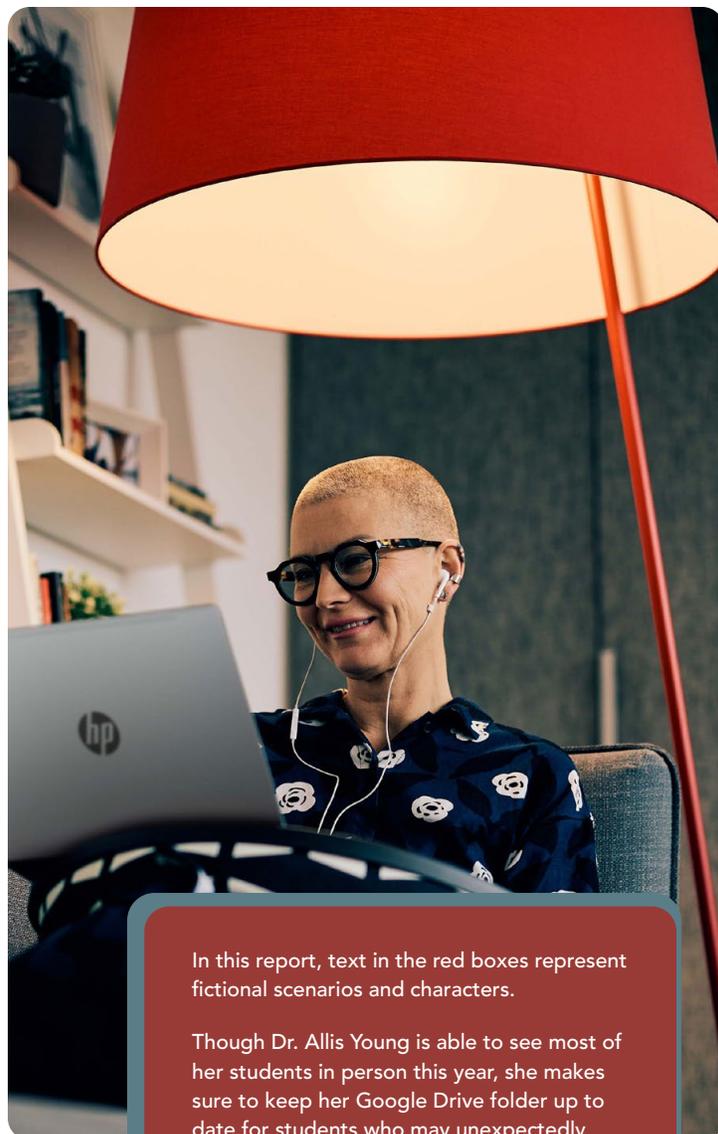
We tested each Chromebook by hand-timing common scenarios in a variety of apps that educators and students use in the course of their work. This reflects how, in the real world, users rarely perform single tasks in isolation. To portray a remote learning experience, we connected the Chromebooks to a four-way video call via Google Meet for each scenario.

### Other apps

In addition to our scenario-based testing, we hand-timed tasks in individual educational apps.

### Benchmark tests

Finally, we ran two benchmark tests (WebXPRT 3 and Speedometer 2.0) on each Chromebook that measured web-app responsiveness.



In this report, text in the red boxes represent fictional scenarios and characters.

Though Dr. Allis Young is able to see most of her students in person this year, she makes sure to keep her Google Drive folder up to date for students who may unexpectedly need to be remote during the semester. Her Intel Core i7-1185G7 processor-powered Chromebook makes teaching, communicating with students, and editing lesson plans a breeze.

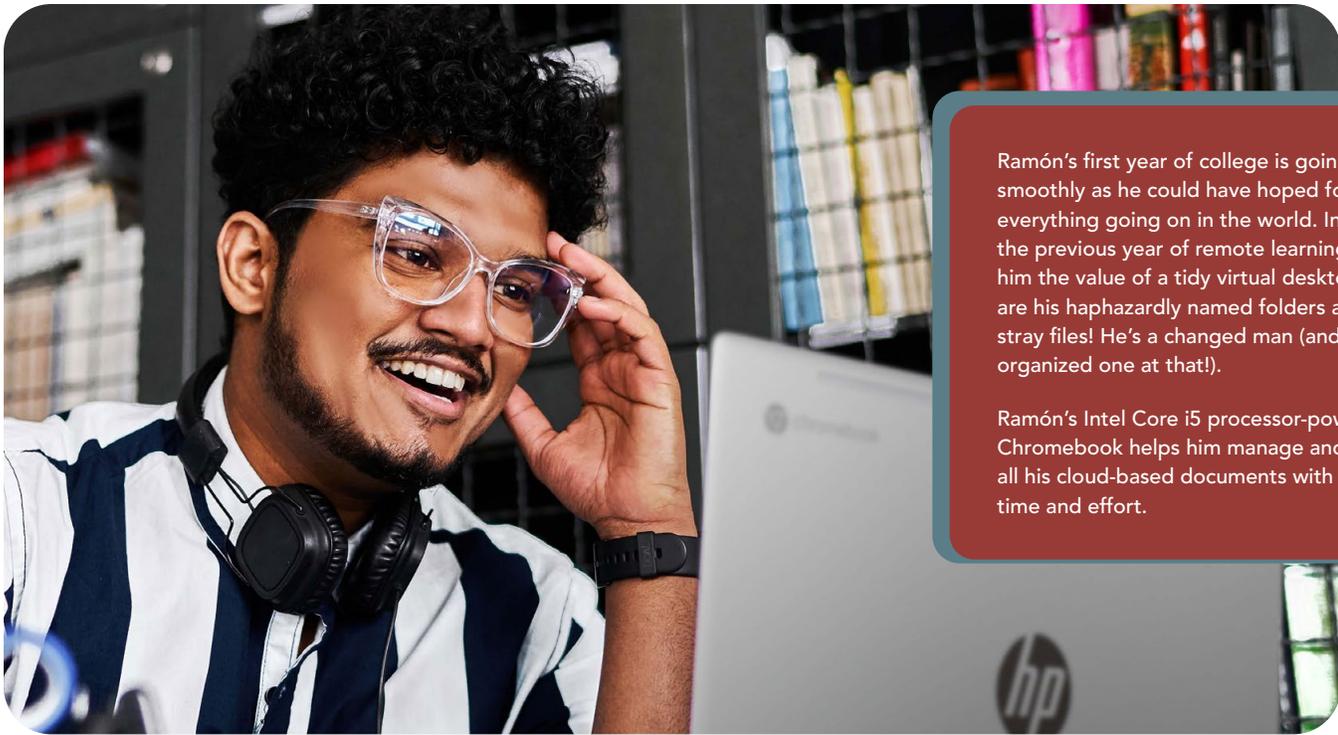


HP Pro c640 G2 with an Intel Core i7-1185G7 processor



HP Pro c640 G2 with an Intel Core i5-1145G7 processor

Note: Each of the graphs in this report uses a different x-axis in order to keep to a consistent size. Please be mindful of each graph's data range as you compare.



Ramón's first year of college is going as smoothly as he could have hoped for given everything going on in the world. In fact, the previous year of remote learning taught him the value of a tidy virtual desktop: Gone are his haphazardly named folders and stray files! He's a changed man (and a well organized one at that!).

Ramón's Intel Core i5 processor-powered Chromebook helps him manage and edit all his cloud-based documents with little time and effort.

## Save time managing and editing files in Google Workspace apps

Figure 1 shows the timed multi-tasking results for our Google Workspace™ scenario. During these tests, each Chromebook completed tasks while connected to a four-way video call via Google Meet.

As an example of one specific task, the AMD Ryzen 7 3700C processor-powered Chromebook took 20.8 seconds to open a presentation in Google Slides™, while the Core i5 and Core i7 processor-powered Chromebooks took 13.4 and 12.7 seconds respectively.

### Save up to 15.6 seconds working with documents, charts, and presentations during a Google Meet call

with Google Meet, Google Drive, Google Sheets, and Google Slides

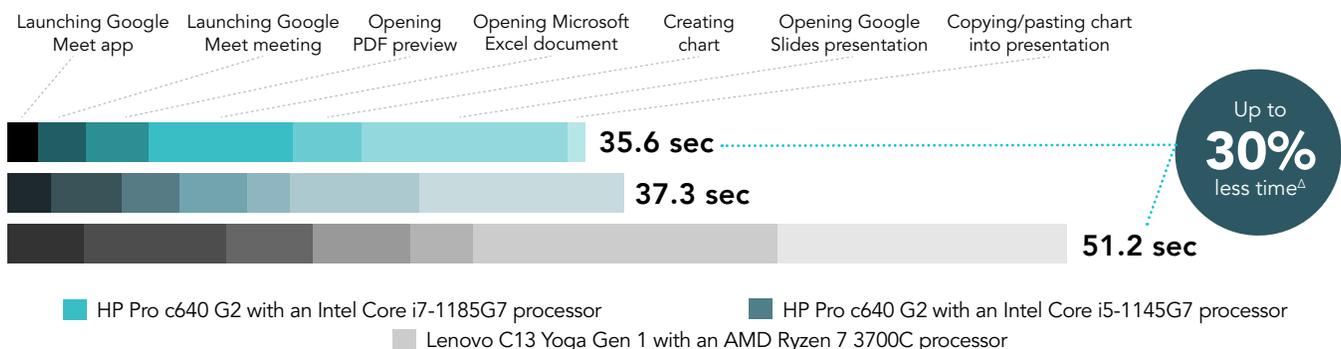


Figure 1: Time (in seconds) to complete tasks in Google Workspace apps while connected to a four-way Google Meet call. Less time is better. Source: Principled Technologies.

#### Google Workspace

Last year, Google rebranded its G Suite app offerings as Google Workspace—but you'll still get the same productivity and collaboration tools you've used in the past, including Google Docs™, Google Slides, Google Meet, Google Drive, and more.<sup>1</sup>

<sup>A</sup>See [the science behind this report](#) for detailed system configurations and benchmark results.

After her trusty old laptop had a catastrophic accident last year (an awkward-fitting pair of shoes, a balcony—she doesn't want to talk about it), Luna switched to using an Intel Core i7 processor-powered Chromebook for her school assignments. Her Chromebook helps her quickly manage and edit large batches of photos.



## Save time editing photos in Adobe apps

Figure 2 shows the timed multi-tasking results for our photo-editing scenario. During these tests, each Chromebook completed tasks while connected to a four-way video call via Google Meet.

Notably, the AMD Ryzen processor-powered Chromebook required 3 minutes and 56 seconds to export a set of 280 .JPG photos from Adobe Lightroom. However, the Intel Core i5-1145G7 processor-powered Chromebook shaved 36 seconds from that time (taking 3 minutes and 20 seconds), and the Intel Core i7-1185G7 processor-powered Chromebook saved 59 seconds (taking 2 minutes and 57 seconds).

## Save up to 2 minutes and 35 seconds unzipping, creating, and more with photos during a Google Meet call

with Adobe Lightroom, Adobe Photoshop®, and Google Meet

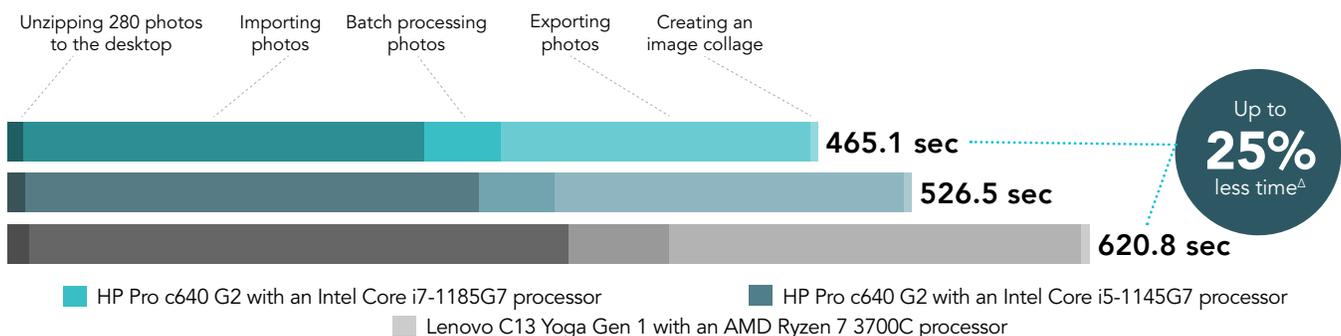


Figure 2: Time (in seconds) to complete photo-editing tasks in Adobe Lightroom and Adobe Photoshop® Express while connected to a four-way Google Meet call. Less time is better. Source: Principled Technologies.

### Adobe Lightroom

Adobe Lightroom is a free photo editing and camera app that enables you to use customizable filters and other options to create your next photography project.<sup>2</sup>

### Adobe Photoshop Express

Photoshop Express is a free photo editing app for Android™ devices. The integrations in Photoshop Express enable you to pull photos from Google Photos™ and other image hosting apps and websites.<sup>3</sup>

<sup>Δ</sup>See [the science behind this report](#) for detailed system configurations and benchmark results.



Kelly has been using Windows ever since he was a kid doing assignments in the school computer lab. But as he heads off to grad school, he wonders if it might be time for something new?

The issue is, Kelly's worried about having to learn a new OS when he'll have so much else on his plate. Luckily, Parallels software makes it easy to use Windows apps from a Chromebook—problem solved!

## Switch between Chrome OS and Windows 10 on your device without missing a beat

For the past 15 years, the Parallels virtual desktop app has enabled users to run Windows operating systems and apps on Apple® macOS® systems.<sup>4</sup> But earlier this year, Parallels brought Windows functionality to Chromebooks with the release of Parallels Desktop for Chrome OS.

We were able to run Parallels Desktop on each of the Intel Core processor-powered Chromebooks we tested. The Chromebooks performed similarly in most tasks we tested, though the Intel Core i7-1185G7 processor-powered Chromebook managed to save 17 percent of the time the Intel Core i5-1145G7 processor-powered Chromebook required to run a macro in Microsoft Excel.

Because the Lenovo device from our tests is not a Chrome Enterprise device, it was unable to run Parallels. Chrome Enterprise status does not affect performance, but it does affect compatibility with certain software.

### Save up to 13.3 seconds using Microsoft Office applications through Windows using Parallels Desktop for Chrome OS

with Parallels, Microsoft Excel, and Microsoft PowerPoint

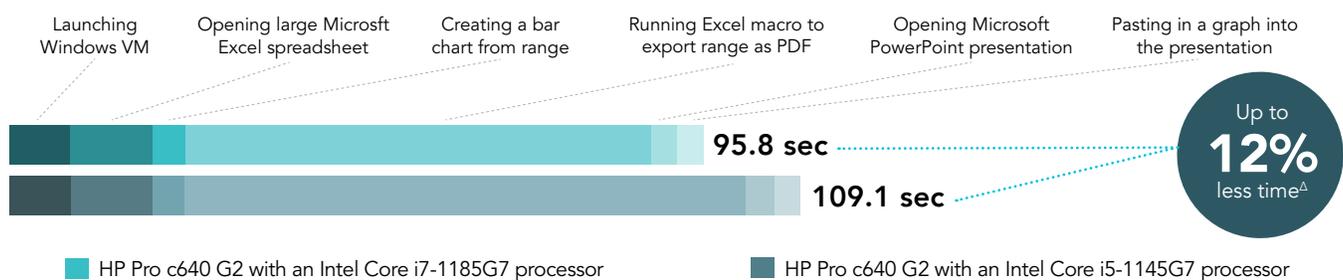


Figure 3: Time (in seconds) to complete tasks in Windows applications via Parallels Desktop for Chrome OS. Less time is better. Source: Principled Technologies.

#### Microsoft 365

Microsoft 365 is a cloud-based productivity suite that enables users to work in Microsoft Office apps on up to five devices concurrently. Apps include Word, Excel, PowerPoint, OneNote, Outlook, and Skype.<sup>5</sup>

<sup>A</sup>See [the science behind this report](#) for detailed system configurations and benchmark results.

Martin's a regular face to see around campus—not just one spot, either. If you can't find him at the library, he might be in the gardens, or the basement of the gym, or on the bench beside the school's mascot in the quad.

Wherever he goes, his Intel Core i5 processor-powered Chromebook helps him finish assignments, keep in touch with family, and even play games.



## Work, chat, and game wherever you are with a fast Chromebook

Figure 7 shows the hand-timed results for four application tasks: sharing a Google Sheets spreadsheet with Zoom, using the Copy and Tinker function on an Autodesk® Tinkercad project, and launching the app and loading a code project in Minecraft: Education Edition. The Chromebooks powered by the Intel Core i7-1185G7 and Intel Core i5-1145G7 processors saved time on each task compared to the Chromebook with the AMD Ryzen 7 3700C processor.

### Sharing a spreadsheet from Google Drive during a Zoom call

with Google Sheets, Google Drive, and Zoom



- HP Pro c640 G2 with an Intel Core i7-1185G7 processor
- HP Pro c640 G2 with an Intel Core i5-1145G7 processor
- Lenovo C13 Yoga Gen 1 with an AMD Ryzen 7 3700C processor

Figure 4: Time (in seconds) to share a spreadsheet from Google Drive during a Zoom call. Less time is better. Source: Principled Technologies.

### Copying and tinkering with a project with Autodesk Tinkercad



- HP Pro c640 G2 with an Intel Core i7-1185G7 processor
- HP Pro c640 G2 with an Intel Core i5-1145G7 processor
- Lenovo C13 Yoga Gen 1 with an AMD Ryzen 7 3700C processor

Figure 5: Time (in seconds) to use the Copy and Tinker function on a Tinkercad project. Less time is better. Source: Principled Technologies.

### Launching the application

with Minecraft: Education Edition



- HP Pro c640 G2 with an Intel Core i7-1185G7 processor
- HP Pro c640 G2 with an Intel Core i5-1145G7 processor
- Lenovo C13 Yoga Gen 1 with an AMD Ryzen 7 3700C processor

Figure 6: Time (in seconds) to launch Minecraft: Education Edition. Less time is better. Source: Principled Technologies.

### Loading the demo

with Minecraft: Education Edition



- HP Pro c640 G2 with an Intel Core i7-1185G7 processor
- HP Pro c640 G2 with an Intel Core i5-1145G7 processor
- Lenovo C13 Yoga Gen 1 with an AMD Ryzen 7 3700C processor

Figure 7: Time (in seconds) to load a demo for Minecraft: Education Edition. Less time is better. Source: Principled Technologies.

#### Zoom

Zoom is a teleconferencing and video chat app that enables users to connect, share ideas, and participate in remote events, seminars, and more. Individuals and companies around the world use Zoom as an integral part of their day-to-day operations.<sup>6</sup>

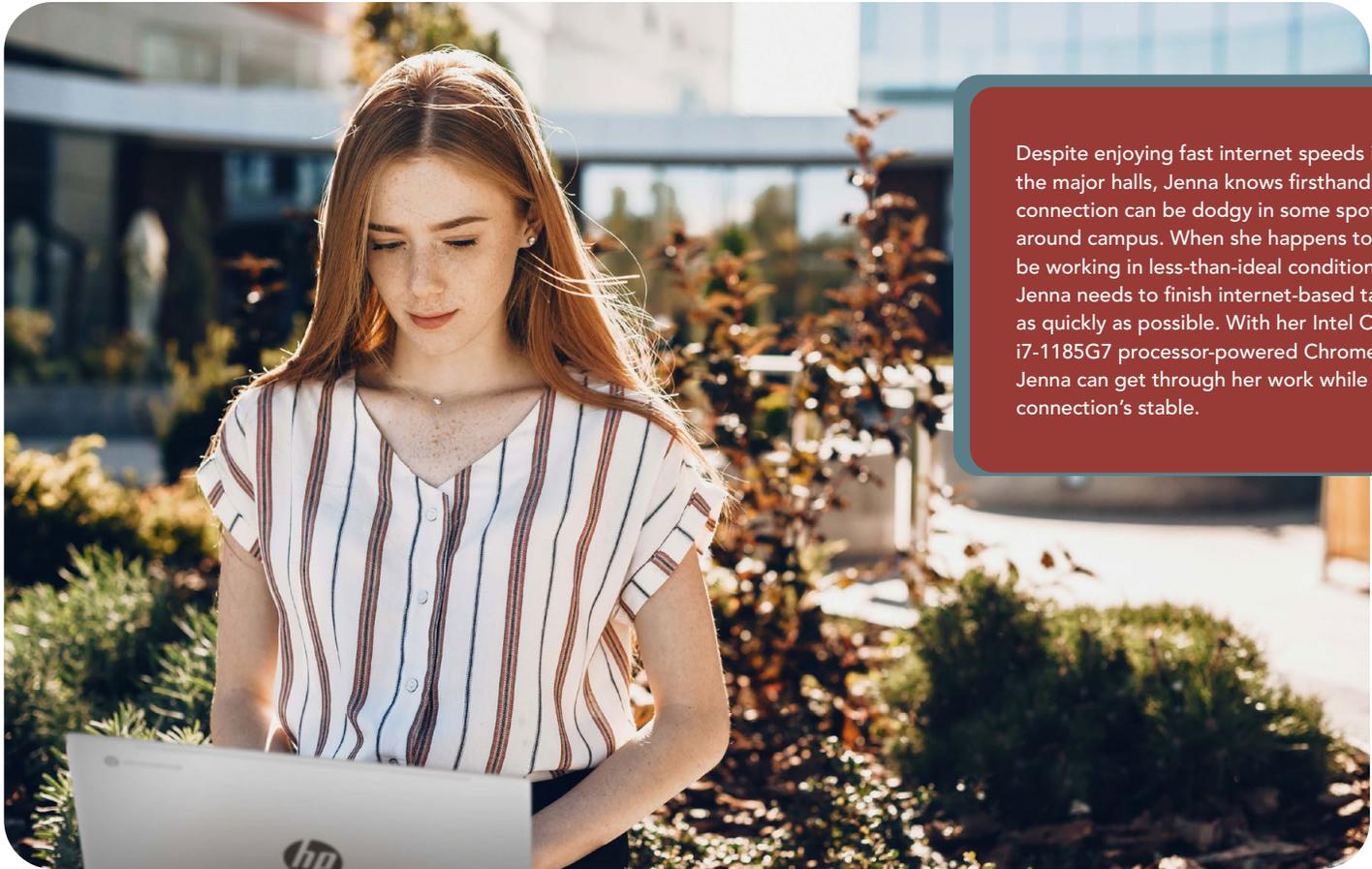
#### Minecraft: Education Edition

The best selling video game of all time isn't just for having fun outside of school.<sup>8</sup> Minecraft has an education edition that features classroom management tools and pre-made lesson plans on everything from code to history to social emotional learning (SEL).<sup>9</sup>

<sup>A</sup>See [the science behind this report](#) for detailed system configurations and benchmark results.

#### Autodesk Tinkercad

Tinkercad is a browser based program for computer aided design. Common Sense Education® gave Tinkercad a 4 out of 5 star rating, citing its pedagogical applications.<sup>7</sup>



Despite enjoying fast internet speeds in the major halls, Jenna knows firsthand that connection can be dodgy in some spots around campus. When she happens to be working in less-than-ideal conditions, Jenna needs to finish internet-based tasks as quickly as possible. With her Intel Core i7-1185G7 processor-powered Chromebook, Jenna can get through her work while her connection's stable.

## Benchmark performance comparison

To further compare these Chromebooks, we ran two benchmarks that measure web app performance: WebXPRT 3, a browser-based benchmark that uses HTML5 and JavaScript to assess a device's ability to handle tasks in online apps and websites, and Speedometer 2.0, which simulates users on a device and measures the time required for those users to complete web-based tasks. To ensure that network bandwidth did not affect performance differences, we tested each Chromebook on the same Wi-Fi network at the same time of day and in the same location.

Figures 8 and 9 show our results for the benchmark tests. Both Intel Core processor-powered Chromebooks we tested achieved higher scores than the AMD Ryzen 7 3700C processor-powered Chromebook, with the Intel Core i7-1185G7 processor-powered Chromebook obtaining the highest score of the three.

### WebXPRT 3 score

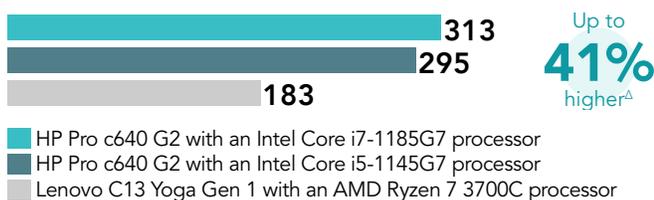


Figure 8: WebXPRT 3 scores. Higher scores are better. Source: Principled Technologies.

### Speedometer 2.0 score

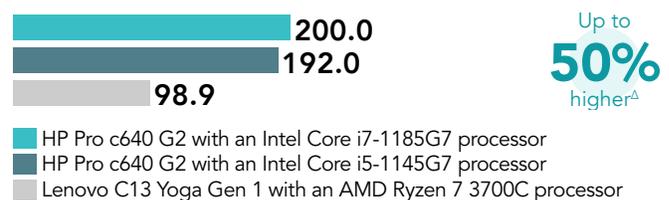


Figure 9: Speedometer 2.0 scores. Higher scores are better. Source: Principled Technologies.

<sup>A</sup>See [the science behind this report](#) for detailed system configurations and benchmark results.



## Conclusion

It's important for educators and students alike to have a responsive work device that can keep up with hectic lives, heavy courseloads, and unexpected changes of plan.

In our tests comparing the responsiveness of three Chromebooks, we found that Intel Core i5-1145G7 and Intel Core i7-1185G7 processor-powered Chromebooks enabled us to save time completing tasks in several educational apps vs. an AMD Ryzen 7 3700C processor-powered Chromebook. Many of our tests involved completing tasks while each Chromebook was part of a four-way Google Meet call. In addition to displaying stronger app performance, the Intel Core processor-powered Chromebooks we tested also achieved higher scores on the web-based benchmarks WebXPRT 3 and Speedometer 2.0, which suggests that these Chromebooks may have stronger performance with web apps and sites.

- 1 "Introducing Google Workspaces and a new set of offerings to better meet your needs," accessed September 13, 2021, <https://workspaceupdates.googleblog.com/2020/10/introducing-google-workspace.html>.
- 2 "Adobe Lightroom," accessed September 13, 2021, [https://play.google.com/store/apps/details?id=com.adobe.lrmobile&hl=en\\_US](https://play.google.com/store/apps/details?id=com.adobe.lrmobile&hl=en_US).
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- 4 "Parallels Celebrates 14 Years of Innovations with Limited-Time Discount Offer on Parallels Desktop 15 for Mac," accessed September 13, 2021, <https://www.parallels.com/au/news/press-releases/show/200623-14-years-of-innovations/>.
- 5 Microsoft 365 for home use," accessed September 13, 2021, <https://www.microsoft.com/en-us/microsoft-365/explore-microsoft-365-for-home>.
- 6 "Video Conferencing, Cloud Phone, Webinars, Chat, Virtual Events | Zoom," accessed July 20, 2021, <https://zoom.us>.
- 7 Marianne Rogowski, "Tinkercad Review for Teachers," accessed September 13, 2021, <https://www.commonsense.org/education/website/tinkercad>.
- 8 Tom Warren, "Minecraft still incredibly popular as sales top 200 million 126 play monthly," accessed September 13, 2021, <https://www.theverge.com/2020/5/18/21262045/minecraft-sales-monthly-players-statistics-youtube>.
- 9 "Homepage | Minecraft Education Edition," accessed September 13, 2021, <https://education.minecraft.net>.

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