



## Power through your high school courseload with a responsive Chromebook

Two Chromebooks with Intel Core i3-1125G4 and Intel Pentium Silver N6000 processors required less time to complete tasks in educational apps vs. two Chromebooks with MediaTek MT8183 and Qualcomm Snapdragon 7c processors

When your students are responsible for rigorous high school courses, a Chromebook™ that can complete tasks quickly is a serious asset.

At Principled Technologies, we hand-timed tasks in a variety of apps to compare the responsiveness of four Chromebooks for high school student use cases:

- Intel® Pentium® Silver N6000 processor-powered Chromebook
- Intel® Core™ i3-1125G4 processor-powered Chromebook
- MediaTek MT8183 processor-powered Chromebook
- Qualcomm Snapdragon 7c processor-powered Chromebook

In our tests, the Intel processor-powered Chromebooks saved time on tasks in apps such as Google Sheets™, Adobe® Lightroom®, and others. These Chromebooks also performed better on benchmarking apps WebXPRT 3 and Speedometer 2.0.



Up to **69%**

**less time**

opening, sharing, and creating files while on a Zoom call<sup>†Δ</sup>



Up to **60%**

**less time**

unzipping, importing, batch processing, and exporting photos<sup>†Δ</sup>



Up to **76%**

**less time**

rendering a model with TinkerCAD<sup>†Δ</sup>



<sup>†</sup>HP Chromebook x360 14ct-cc000 with an Intel Core i3-1125G4 processor (\$539.99<sup>1</sup>) and an Acer Spin 512 R853TA-P3R1 with an Intel Pentium Silver N6000 processor (\$529.99<sup>2</sup>) compared to an Acer Spin 513 CP513-1H-S60F with a Qualcomm Snapdragon 7c processor (\$429.99<sup>3</sup>) and a HP 11a-na0060nr with a MediaTek MT 8183 processor (\$299.99<sup>4</sup>).

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

In this report, text in the peach-colored sections represents fictional scenarios based on the results of PT testing. Though the people aren't real, the scenarios represent a lifelike picture of the benefits users may see in the real world.



## How we tested

### The devices under test

We compared Chromebooks with processors from Intel, MediaTek, and Qualcomm. To make performance comparisons as fair as possible, we aimed to use Chromebooks with similarly specced processors. On paper, the MediaTek MT8183 processor is less powerful than the others in our report; however, MediaTek's higher-bin processors are not currently available in Chromebooks as of this writing.

### Google Workspace and Adobe app scenarios

To test each Chromebook, we hand-timed common scenarios in a variety of apps that high school students use in the course of their work. We used scenarios to reflect 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 Zoom video call during the Google Workspace scenario. To minimize the effect of network on testing results, we performed testing on the same day, and each Chromebook was connected to the same Wi-Fi network.

### Other apps

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

### Benchmark tests

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

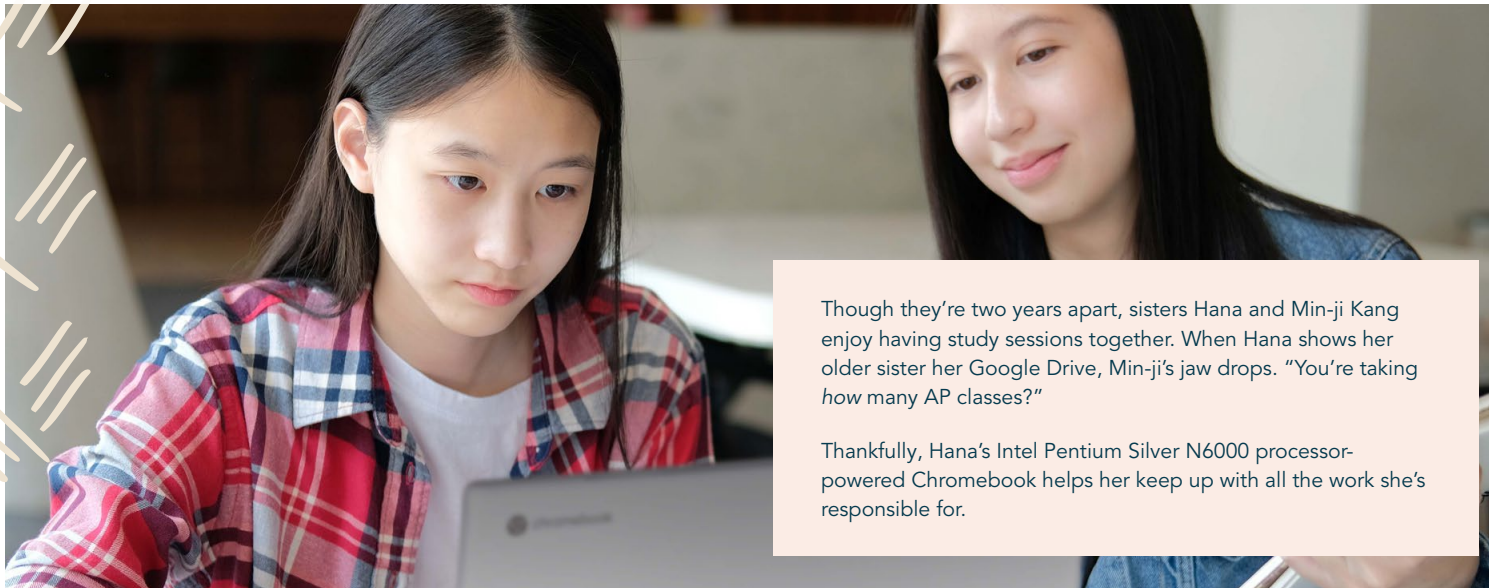


HP Chromebook x360 14ct-cc000 with an Intel Core i3-1125G4 processor



Acer Spin 512 R853TA-P3R1 with an Intel Pentium Silver N6000 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.



Though they're two years apart, sisters Hana and Min-ji Kang enjoy having study sessions together. When Hana shows her older sister her Google Drive, Min-ji's jaw drops. "You're taking how many AP classes?"

Thankfully, Hana's Intel Pentium Silver N6000 processor-powered Chromebook helps her keep up with all the work she's responsible for.

## Spend less time on tasks in Google Workspace apps

Figure 1 shows the results of our first scenario-based test, which used Zoom alongside several Google Workspace apps. As an example of just one task, when opening a shared Google Slides™ presentation:

- The Intel Core i3-1125G4 processor-powered Chromebook had the best performance of all, requiring 84.4 percent less time than the MediaTek MT8183 processor-powered Chromebook, and 71.4 percent less time than the Qualcomm Snapdragon 7c processor-powered Chromebook
- The Intel Pentium Silver N6000 processor-powered Chromebook came in second, requiring 52.5 percent less time than the MediaTek MT8183 processor-powered Chromebook, and 12.6 percent less time than the Qualcomm Snapdragon 7c processor-powered Chromebook

### Save up to 111.1 seconds working with documents, charts, and presentations during a Zoom meeting

with Google Drive, Google Sheets, Google Slides, and Zoom

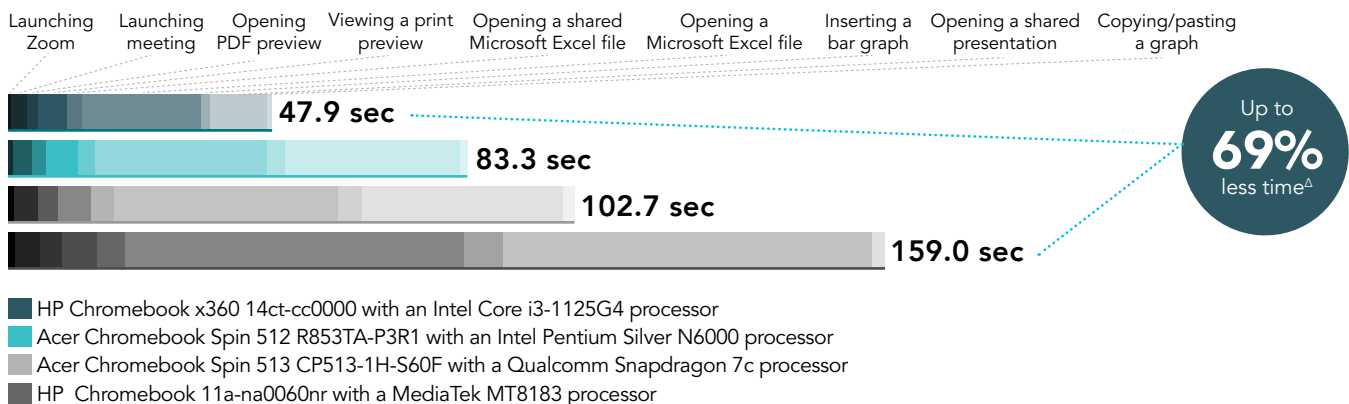


Figure 1: Time (in seconds) to complete tasks in Google Workspace apps while connected to a four-way Zoom meeting. Less time is better. Source: Principled Technologies.

#### 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>5</sup>

#### 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>6</sup>

<sup>5</sup>See [the science behind this report](#) for detailed system configurations and benchmark results.



While Hana starts doing research for a history paper, Min-ji is processing raw photo data from a physics experiment. Her Intel Core i3-1125G4 processor-powered Chromebook lets her import, edit, and export photos quickly using Adobe apps.

## Edit photos in less time

Figure 2 shows the results of our second scenario, which involved several photo-related tasks. When unzipping a set of 280 photos from the desktop:

- The Intel Core i3-1125G4 processor-powered Chromebook again had the best performance, taking 74.8 percent less time than the MediaTek MT8183 processor-powered Chromebook, and 69.7 percent less time than the Qualcomm Snapdragon 7c processor-powered Chromebook
- The Intel Pentium Silver N6000 processor-powered Chromebook required 59.4 percent less time than the MediaTek MT8183 processor-powered Chromebook, and 51.2 percent less time than the Qualcomm Snapdragon 7c processor-powered Chromebook

## Save up to 903.6 seconds working unzipping, importing, and editing photos with Adobe Lightroom

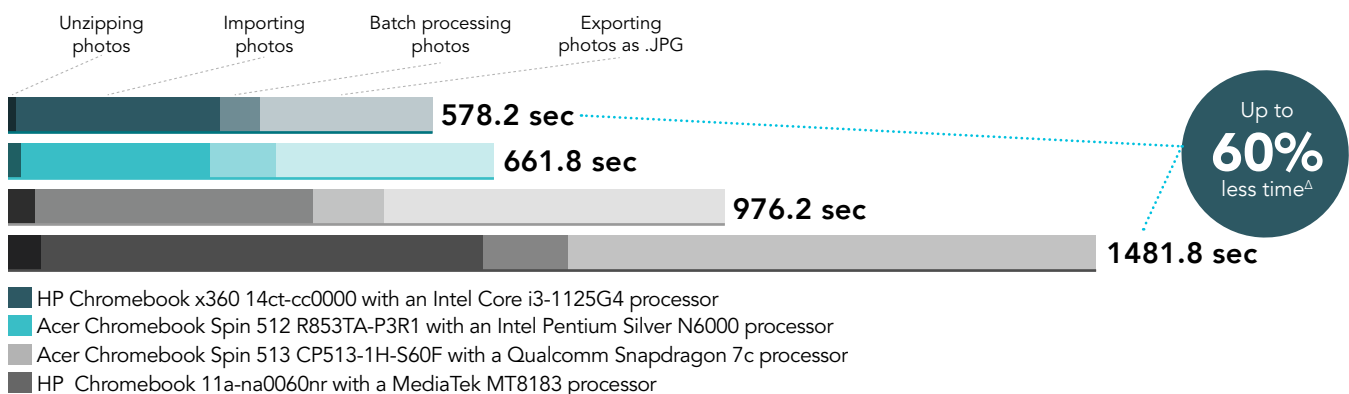
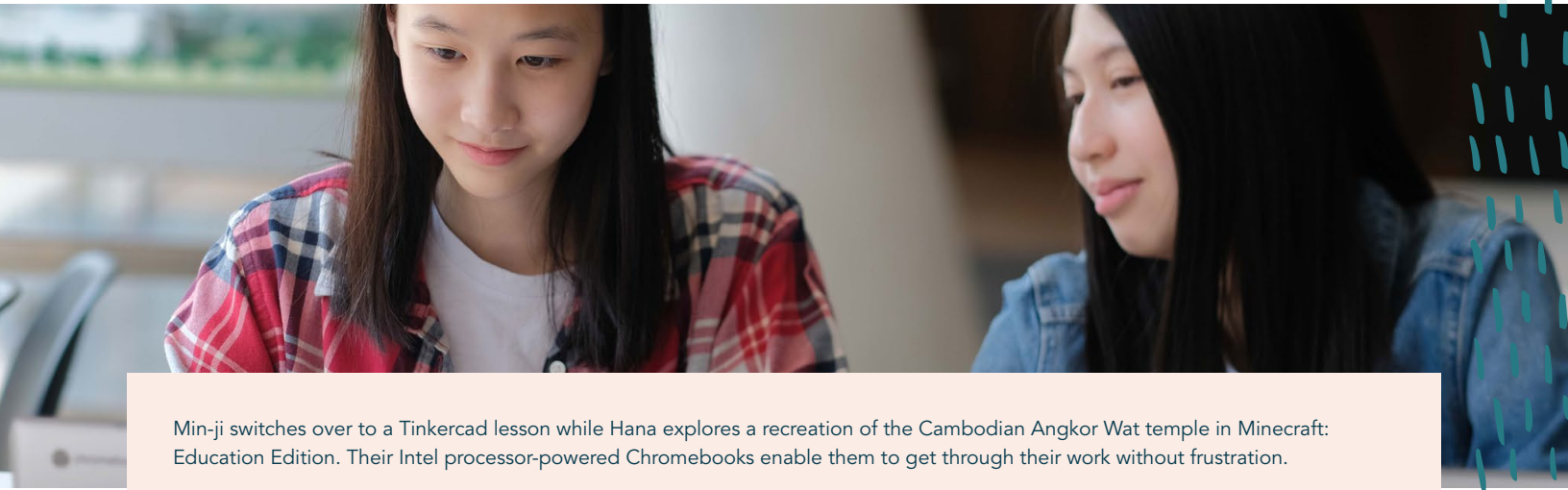


Figure 2: Figure 2: Time (in seconds) to complete tasks in Adobe apps. Less time is better. Source: Principled Technologies.

### 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>7</sup>

<sup>7</sup>See [the science behind this report](#) for detailed system configurations and benchmark results.



Min-ji switches over to a Tinkercad lesson while Hana explores a recreation of the Cambodian Angkor Wat temple in Minecraft: Education Edition. Their Intel processor-powered Chromebooks enable them to get through their work without frustration.

## Save time in Tinkercad and Minecraft: Education Edition

After performing scenario-based testing, we tested tasks in a few apps in isolation. Figure 3 shows the results of these tests. Notably, when using Tinkercad to render blocks from a model project:

- The Intel Core i3-1125G4 processor-powered Chromebook took 76.2 percent less time than the MediaTek MT8183 processor-powered Chromebook, and 59.6 percent less time than the Qualcomm Snapdragon 7c processor-powered Chromebook
- The Intel Pentium Silver N6000 processor-powered Chromebook took 65.5 percent less time than the MediaTek MT8183 processor-powered Chromebook, and took 41.3 percent less time than the Qualcomm Snapdragon 7c processor-powered Chromebook

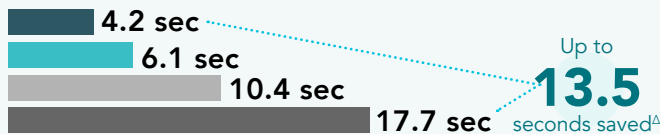
### Copying and tinkering

with Autodesk Tinkercad



### Render blocks from a model

with Autodesk Tinkercad



### Launching the application

with Minecraft: Education Edition



- HP Chromebook x360 14ct-cc0000 with an Intel Core i3-1125G4 processor
- Acer Chromebook Spin 512 R853TA-P3R1 with an Intel Pentium Silver N6000 processor
- Acer Chromebook Spin 513 CP513-1H-S60F with a Qualcomm Snapdragon 7c processor
- HP Chromebook 11a-na0060nr with a MediaTek MT8183 processor

Figure 3: Time (in seconds) to complete tasks in Autodesk Tinkercad and Minecraft: Education Edition. Less time is better. Source: Principled Technologies.

#### Autodesk Tinkercad

Tinkercad is a browser based program for computer aided design. Common Sense Education<sup>®</sup> gave Tinkercad a 5 out of 5 star rating, citing its pedagogical technique and level of engagement.<sup>8</sup>

#### Minecraft: Education Edition

The best selling video game of all time isn't just for having fun outside of school.<sup>9</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>10</sup>

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

## Web-based benchmark comparison

In addition to timing tasks in various apps, we also compared the results of two benchmark tests: 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.

Figures 4 and 5 show the results of WebXPRT 3 and Speedometer 2.0 benchmark testing respectively. Again, the two Intel processor-powered Chromebooks achieved markedly higher scores on each test, suggesting that they may be more responsive while web browsing and using web apps.

### WebXPRT 3 score

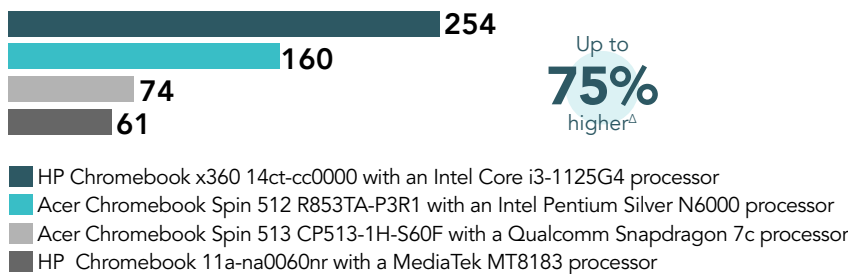


Figure 4: WebXPRT 3 scores. Higher is better. Source: Principled Technologies.

### Speedometer 2.0 score

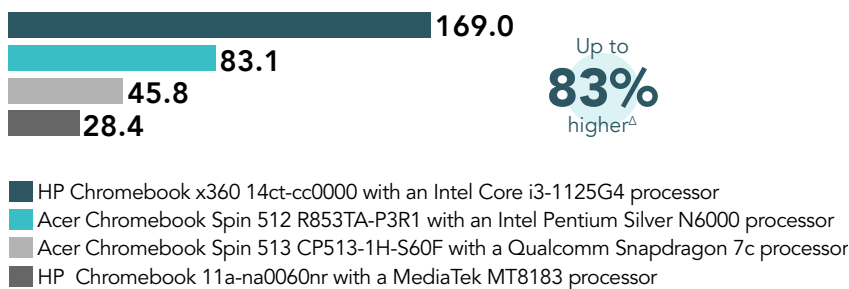


Figure 5: Speedometer 2.0 benchmark scores. Higher is better. Source: Principled Technologies.



After hours of research, Hana's head is about to burst—she's in desperate need of a break. She looks over to her sister's work and gets curious about how physics experiments work.

Min-ji shows her sister a few interactive physics websites to explain some basic concepts. It's a fascinating demo, but all the physics talk only makes Hana want an even longer break.

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



## Conclusion

With so many models of Chromebook available to purchase, knowing how these devices perform with commonly performed work can help you make a decision.

In our assessment and comparison of four Chromebooks' responsiveness, we found that two Chromebooks powered by Intel Core i3-1125G4 and Intel Pentium Silver N6000 processors enabled us to save time completing tasks in a variety of educational apps compared to two Chromebooks powered by MediaTek MT8183 and Qualcomm Snapdragon 7c processors. Some of our data points come from a scenario-based test where each Chromebook was connected to a four-way Zoom call as we performed tasks. The two Intel processor-powered Chromebooks also achieved higher scores on two web-based benchmarks, WebXPRT 3 and Speedometer 2.0.

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- 1 "HP Chromebook x360 Convertible Laptop - 14ct-cc000," accessed October 25, 2021, <https://www.hp.com/us-en/shop/pdp/hp-chromebook-x360-14ct-cc000-2e6x3av-1>.
  - 2 "Acer Chromebook Spin 512 (R853TA)," accessed October 25, 2021, <https://www.acer.com/ac/en/US/content/model/NX.A91AA.002>.
  - 3 "Acer Chromebook Spin 513," accessed October 25, 2021, <https://www.acer.com/ac/en/US/content/model/NX.HWYAA.001>.
  - 4 "HP Chromebook 11a 11a-na0060nr," accessed October 25, 2021, <https://www.hp.com/us-en/shop/pdp/hp-chromebook-11a-na0060nr>.
  - 5 "Video Conferencing, Cloud Phone, Webinars, Chat, Virtual Events | Zoom," accessed September 30, 2021, <https://zoom.us>.
  - 6 "Introducing Google Workspace and a new set of offerings to better meet your needs," accessed September 30, 2021, <https://workspaceupdates.googleblog.com/2020/10/introducing-google-workspace.html>.
  - 7 "Adobe Lightroom," accessed September 30, 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).
  - 8 Marianne Rogowski, "Tinkercad Review for Teachers," accessed September 30, 2021, <https://www.commonsense.org/education/website/tinkercad>.
  - 9 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>.
  - 10 "Minecraft Official Site | Minecraft Education Edition," accessed September 13, 2021, <https://education.minecraft.net>.

We concluded our hands-on testing on September 15, 2021. During testing, we determined the appropriate hardware and software configurations and applied updates as they became available. The results in this report reflect configurations that we finalized on September 7, 2021 or earlier. Unavoidably, these configurations may not represent the latest versions available when this report appears.

## Our results

To learn more about how we have calculated the wins in this report, go to <http://facts.pt/calculating-and-highlighting-wins>. Unless we state otherwise, we have followed the rules and principles we outline in that document.

Table 1: Results of our hand-timed testing.

Task	HP x360 Chromebook™ 14ct-cc000 with an Intel® Core™ i3-1125G4 processor	Acer Spin 512 Chromebook R853TA-P3R1 with an Intel Pentium® Silver N6000 processor	Acer Spin 513 Chromebook CP513-1H-S60F with a Qualcomm Snapdragon 7c processor	HP Chromebook 11a-na0060nr with a MediaTek MT8183 processor	Chromebook with Core i3 processor vs. Chromebook with Qualcomm processor	Chromebook with Core i3 processor vs. Chromebook with MediaTek processor	Chromebook with Pentium Silver processor vs. Chromebook with Qualcomm processor	Chromebook with Pentium Silver processor vs. Chromebook with MediaTek processor
<b>Scenario 1 (median sum of all tasks)</b>	<b>47.9</b>	<b>83.3</b>	<b>102.7</b>	<b>159.0</b>	<b>53%</b>	<b>69%</b>	<b>18%</b>	<b>47%</b>
<b>Zoom</b>								
Launching the application	0.6	0.9	1.1	1.3	45%	53%	18%	30%
Launching a meeting	2.9	3.5	4.5	4.6	35%	36%	22%	23%
<b>Google Drive™</b>								
Opening a PDF preview from Google Drive	1.9	2.5	3.5	3.9	45%	51%	28%	35%
Viewing a print preview of a PDF	5.4	5.8	6.0	6.3	10%	14%	3%	7%
<b>Google Sheets™</b>								
Opening a Microsoft Excel document from Google Drive	2.7	3.2	4.2	5.2	35%	48%	23%	38%
Opening a Microsoft Excel file with Google Sheets™	21.6	31.2	40.6	61.4	46%	64%	23%	49%
Inserting a bar graph in Google Sheets	1.6	3.1	4.3	7.0	62%	77%	27%	55%
<b>Google Slides</b>								
Opening Google Slides presentation	10.4	31.8	36.4	67.0	71%	84%	12%	52%
Copying and pasting a graph into Google Slides presentation	0.8	1.3	2.1	2.3	61%	65%	38%	43%



Task	HP x360 Chromebook™ 14ct-cc000 with an Intel® Core™ i3-1125G4 processor	Acer Spin 512 Chromebook R853TA-P3R1 with an Intel Pentium® Silver N6000 processor	Acer Spin 513 Chromebook CP513-1H-S60F with a Qualcomm Snapdragon 7c processor	HP Chromebook 11a-na0060nr with a MediaTek MT8183 processor	Chromebook with Core i3 processor vs. Chromebook with Qualcomm processor	Chromebook with Core i3 processor vs. Chromebook with MediaTek processor	Chromebook with Pentium Silver processor vs. Chromebook with Qualcomm processor	Chromebook with Pentium Silver processor vs. Chromebook with MediaTek processor
<b>Scenario 2 (median sum of all tasks)</b>								
Google desktop								
Unzipping 280 .JPG photos to desktop	11.3	18.2	37.3	44.9	69%	74%	51%	59%
Adobe® Lightroom®								
Importing 280 .JPG photos	277.3	256.9	378.0	601.5	26%	53%	32%	57%
Batch processing 280 .JPG photos	55.4	91.1	97.8	116.9	43%	52%	6%	22%
Exporting 280 .JPG photos	234.2	295.6	463.1	718.5	49%	67%	36%	58%
<b>Individually timed tasks in Chrome OS</b>								
TinkerCAD								
Copying and tinkering a project	11.1	12.8	19.6	27.6	43%	59%	34%	53%
Rendering blocks from the model	4.2	6.1	10.4	17.7	59%	76%	41%	65%
Minecraft: Education Edition								
Launching application	4.6	5.3	6.6	8.9	30%	48%	19%	40%

Table 2: WebXPRT 3 benchmark test results.

Task	HP x360 Chromebook 14ct-cc000 with an Intel Core i3-1125G4 processor	Acer Spin 512 Chromebook R853TA-P3R1 with an Intel Pentium Silver N6000 processor	Acer Spin 513 Chromebook CP513-1H-S60F with a Qualcomm Snapdragon 7c processor	HP Chromebook 11a-na0060nr with a MediaTek MT8183 processor	Chromebook with Core i3 processor vs. Chromebook with Qualcomm processor	Chromebook with Core i3 processor vs. Chromebook with MediaTek processor	Chromebook with Pentium Silver processor vs. Chromebook with Qualcomm processor	Chromebook with Pentium Silver processor vs. Chromebook with MediaTek processor
WebXPRT 3	254	160	74	61	70%	75%	53%	61%

Table 3: Speedometer 2.0 benchmark test results.

Task	HP x360 Chromebook 14ct-cc000 with an Intel Core i3-1125G4 processor	Acer Spin 512 Chromebook R853TA-P3R1 with an Intel Pentium Silver N6000 processor	Acer Spin 513 Chromebook CP513-1H-S60F with a Qualcomm Snapdragon 7c processor	HP Chromebook 11a-na0060nr with a MediaTek MT8183 processor	Chromebook with Core i3 processor vs. Chromebook with Qualcomm processor	Chromebook with Core i3 processor vs. Chromebook with MediaTek processor	Chromebook with Pentium Silver processor vs. Chromebook with Qualcomm processor	Chromebook with Pentium Silver processor vs. Chromebook with MediaTek processor
Speedometer 2.0	169.00	83.10	45.86	28.48	72%	83%	44%	65%

## System configuration information

Table 4: Detailed information on the system we tested. We obtained pricing information directly from each vendor's website: HP x360 Chromebook (<https://www.hp.com/us-en/shop/pdp/hp-chromebook-x360-14ct-cc000-2e6x3av-1>), Acer Spin 512 (<https://www.acer.com/ac/en/US/content/model/NX.A91AA.002.>), Acer Spin 513 (<https://www.acer.com/ac/en/US/content/model/NX.HWYAA.001>), HP Chromebook 11a (<https://www.hp.com/us-en/shop/pdp/hp-chromebook-11a-na0060nr>).

System	HP x360 Chromebook 14ct-cc000 with an Intel Core i3-1125G4 processor	Acer Spin 512 Chromebook R853TA-P3R1 with an Intel Pentium Silver N6000 processor	Acer Spin 513 Chromebook CP513-1H-S60F with a Qualcomm Snapdragon 7c processor	HP Chromebook 11a-na0060nr with a MediaTek MT8183 processor
Cost at time of writing	\$539.99	\$529.99	\$429.99	\$299.99
Processor	MediaTek MT8183	Qualcomm Snapdragon 7c	Intel Pentium Silver N6000	Intel Core i3-1125G4
Processor frequency (GHz)	2.00	2.40	3.30	3.70
Processor cores	8	8	4	4
Memory (GB)	4	4	8	8
Storage (GB)	32	64	64	128
USB	4.2	5	5	5
Battery type	1x USB 2.0 Type-C, 1x USB 2.0 Type-A	2x USB 3.1 Type-C, 1x USB 3.1 Type-A	2x USB 3.2 Type-C, 2x USB 3.2 Type-A	2x USB 3.1 Type-C, 2x USB 3.1 Type-A
Battery capacity (Wh)	Lithium-ion	Lithium-ion	Lithium-ion	Lithium-ion
Display (in.)	37	36	48	58
Display resolution	11.6" 1366x768	13.3" 1920x1080	12" 1366x912	14" 1920x1080
OS (version)	Chrome OS 93.0.4577.69 (32-bit)	Chrome OS 93.0.4577.69 (32-bit)	Chrome OS 91.0.4472.167 (64-bit)	Chrome OS 92.0.4515.162 (64-bit)
System weight (lbs.)	2.36	2.84	2.87	3.35

# How we tested

## Scenario-based testing

For our multitasking tests, we opened the Zoom Meeting application, and joined a four-participant video meeting. We tested each task for a given scenario sequentially.

### Scenario #1

#### Zoom

##### Launching Zoom

1. Simultaneously start the timer and launch the Zoom app from the shelf.
2. When the app fully loads and the webcam preview appears, stop the timer.

##### Launching a new Zoom Meeting

1. From the Zoom main screen, simultaneously start the timer and click New meeting.
2. When the meeting invite code appears and the webcam preview refreshes, stop the timer.
3. Minimize the app. We kept the Zoom meeting running in a four-way video chat session for the remainder of testing.

#### Google Drive

##### Opening a PDF preview from Google Drive

1. From the Zoom chat window, click the link to the test PDF.
2. Simultaneously start the timer and click Proceed.
3. When the PDF preview fully loads in the web browser, stop the timer.

##### Viewing a print preview of a PDF

1. From the Zoom chat window, click the link to the test PDF via Google Drive.
2. When the PDF loads, simultaneously start the timer and click the Print icon.
3. When the print preview fully loads, stop the timer.

#### Google Sheets

##### Opening a shared Excel file with Google Drive

1. From the Zoom chat window, click the link to the test .csv file on Google Drive.
2. Simultaneously start the timer and click Proceed.
3. When the document preview fully loads, stop the timer.

##### Opening an Excel file with Google Sheets

1. From the Google Drive .csv preview, click the drop-down menu named Open with.
2. Simultaneously start the timer and click Google Sheets.
3. When Google Sheets fully loads, stop the timer.

##### Inserting a bar graph into a Google Sheets spreadsheet

1. From Google Sheets, select the range of data, and click Insert.
2. Simultaneously start the timer and click Chart.
3. When the chart fully loads into the document, stop the timer.

#### Google Slides

##### Opening a shared Google Slides Presentation

1. From the Zoom chat window, click the link to the Google Slides test document on Google Drive.
2. Simultaneously start the timer and click Proceed.
3. When the Slides presentation fully loads, stop the timer.

### **Copying and pasting a graph from Google Sheets into a Google Slides presentation**

1. Navigate to the Google Sheets test document tab.
2. Select and copy the bar graph.
3. Navigate to the first slide of the Google Slides presentation.
4. Simultaneously start the timer and paste the bar graph into the first slide.
5. When the bar graph fully loads, stop the timer.

## **Scenario #2**

### **Google System: Unarchiving Photos**

#### **Unzipping 280 photos from the desktop**

1. From the Files application, navigate to the test archive location.
2. Double-click to open the test archive using the default system viewer.
3. Select the contents of the test archive. Click and drag the contents to an empty folder, but do not release the mouse button.
4. Simultaneously start the timer and unclick the dragged content.
5. When the copying files dialog completes, stop the timer.

### **Adobe Lightroom**

#### **Importing 280 photos**

1. From the app shelf, launch Adobe Lightroom from the Chrome.
2. From the Adobe Lightroom home page, click the blue import photos icon.
3. Sort by Device Folders. To select the unarchived test photos, click the checkbox next to the folder name.
4. Simultaneously start the timer and click Add.
5. When the import dialog completes, stop the timer.

#### **Batch-processing 280 photos with a filter preset**

1. From the Adobe Lightroom home page, click the collection containing the test photos.
2. Click the first image.
3. Click the Adjustments icon.
4. To apply auto-adjustments, click Auto.
5. Click the menu button in the top right, and select Copy Settings.
6. Leave the default Copy Settings, and click OK.
7. To return to the collection view, click the back arrow.
8. Long-click the first photo to select it.
9. Click the menu button in the top right, and select Select All.
10. Click the menu button in the top right again, and select Paste Settings.
11. Simultaneously start the timer and click Apply.
12. When the processing dialog closes, and "Changes applied to 280 photos" appears, stop the timer.

#### **Exporting 280 photos**

1. From the Adobe Lightroom home page, click the collection containing the test photos.
2. Long-click the first photo to select it.
3. From the drop-down menu, click to Select All images.
4. With all images selected, click the Share icon.
5. From the Share dialog box, click Export As...
6. Leave the default settings. Simultaneously start the timer and click the checkmark icon.
7. When the export dialog completes, stop the timer.

## Tasks in other apps

### Tinkercad

#### Using the Copy and Tinker function on a project

1. Navigate to <https://tinkercad.com>, and sign in with a test account.
2. Click Gallery.
3. Click to open the Lovell Telescope TinkerCAD project.
4. Simultaneously start the timer and click Copy and Tinker.
5. Stop the timer when the 3D model has fully loaded.

#### Rendering blocks from a model

1. With the Lovell Telescope project opened, simultaneously start the timer and click the pickaxe icon.
2. When the Block view has fully rendered, stop the timer.

### Minecraft: Education Edition

#### Launching the application

1. Simultaneously start the timer and launch the Minecraft: Education Edition app from the shelf.
2. When the app fully loads, stop the timer.

## Benchmark testing

### WebXPRT 3

#### Running WebXPRT 3

1. Power on the device, and log in.
2. To clear any background startup activity, allow the device to idle for 10 minutes.
3. Open the default web browser, and navigate to <https://www.principledtechnologies.com/benchmarkxprt/webxprt/>.
4. Click Run WebXPRT 3.
5. Click Continue.
6. Click Start.
7. When the test completes, record the score.

### Speedometer 2.0 - BrowserBench

#### Running Speedometer 2.0

1. Power on the device, and log in.
2. To clear any background startup activity, allow the device to idle for 10 minutes.
3. Open the default web browser, and navigate to <https://browserbench.org/Speedometer2.0/>.
4. Click Start Test.
5. When the test completes, record the score.

Intel contributes to the development of benchmarks by participating in, sponsoring, and/or contributing technical support to various benchmarking groups, including the BenchmarkXPRT Development Community administered by Principled Technologies.

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