



## The science behind the report:

# Improve virtual classroom performance with a Dell Chromebook 3100

This document describes what we tested, how we tested, and what we found. To learn how these facts translate into real-world benefits, read the report [Improve virtual classroom performance with a Dell Chromebook 3100](#).

We concluded our hands-on testing on October 6, 2020. 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 28, 2020 or earlier. Unavoidably, these configurations may not represent the latest versions available when this report appears.

## Our results

Table 1: Results of our testing

	Dell™ Chromebook 3100 with an Intel® Celeron® N4020 processor	HP Chromebook 11 G8 EE with an AMD A4-9120C processor	Dell Chromebook percentage difference	Dell Chromebook numeral difference
BrowserBench.org score (higher is better)				
Speedometer (score)	56.0	37.2	<b>34%</b>	<b>18</b>
Battery life (higher is better)				
CrXPRT 2 benchmark (hr:mm)	15:00	10:30	<b>30%</b>	<b>4:30</b>
Zoom call statistics				
Supported video send resolution (frames per second)	19.0	9.0	<b>53%</b>	<b>10.0</b>
Explain Everything™				
Open local presentation (seconds)	2.6	8.7	<b>70%</b>	<b>6.1</b>
Export presentation video (seconds)	4.6	6.5	<b>29%</b>	<b>1.9</b>

	Dell™ Chromebook 3100 with an Intel® Celeron® N4020 processor	HP Chromebook 11 G8 EE with an AMD A4-9120C processor	Dell Chromebook percentage difference	Dell Chromebook numeral difference
<b>WeVideo</b>				
Render a video (seconds)	85.0	131.4	<b>35%</b>	<b>46.4</b>
<b>Tinkercad®</b>				
Loading the design gallery (seconds)	3.2	3.9	<b>17%</b>	<b>0.7</b>
Opening the Retail Row model (seconds)	20.5	24.9	<b>18%</b>	<b>4.4</b>
<b>Soundtrap®</b>				
Merging tracks (seconds)	41.8	54.7	<b>24%</b>	<b>12.9</b>
<b>Multitasking: Background Zoom meeting</b>				
Preview large PDF from Google Drive (seconds)	7.8	9.8	<b>21%</b>	<b>2.0</b>
Print preview a PDF (seconds)	21.3	18.3	<b>-16%</b>	<b>-3.0</b>
Open a large .csv file in Google Sheets (seconds)	42.9	68.8	<b>38%</b>	<b>25.9</b>
Open a large .docx file in Google Docs (seconds)	10.1	17.3	<b>41%</b>	<b>7.2</b>
Open and save a .docx file in Google Doc (seconds)	11.6	16.9	<b>32%</b>	<b>5.3</b>
Open shared Google Slide project (seconds)	13.8	19.9	<b>31%</b>	<b>6.1</b>

# System configuration information

Table 2: Detailed information on the systems we tested.

System configuration information	Dell Chromebook 3100 with an Intel Celeron N4020 processor	HP Chromebook 11 G8 EE with an AMD A4-9120C processor
Processor	Intel Celeron N4020	AMD A4-9120C
Processor frequency (GHz)	1.1	1.6
Processor cores	2	2
Memory (GB)	4	4
Storage (GB)	32	16
Bluetooth	5.0	5.0
USB	2x USB 3.1 Type-C, 2x USB 3.1 Gen 1	2x USB 3.1 Type-C, 2x USB 3.1 Gen 1
Battery type	Lithium ion	Lithium ion
Battery capacity (Wh)	42	47
Display	11.6" 1366x768	11.6" 1366x768
OS (version)	85.0.4183.133	85.0.4183.133
System weight (lbs.)	2.85	2.91

# How we tested

## Creating the background workload

To simulate typical use, we ran a combination of news, email, chat, music, document viewing, and social media websites in the background. For websites that required accounts, we created test profiles and logged in the users on each device.

We opened a Chrome browser with the following tabs:

- [forbes.com](https://forbes.com)
- [markets.ft.com/data](https://markets.ft.com/data)
- [arstechnica.com](https://arstechnica.com)
- [mail.google.com](https://mail.google.com)
- [slack.com](https://slack.com) (logged into Slack chat, #general channel)
- [drive.google.com](https://drive.google.com)
- [docs.google.com](https://docs.google.com) (viewing document)
- [youtube.com/feed/music](https://youtube.com/feed/music)
- [drive.google.com](https://drive.google.com) (viewing document)
- [sheets.google.com](https://sheets.google.com) (viewing spreadsheet)
- [twitter.com](https://twitter.com)
- [facebook.com](https://facebook.com)

## Testing the applications

### Explain Everything

#### Open local presentation

1. From the Google Play store or Apple App Store, install Explain Everything.
2. Launch the Explain Everything app.
3. Simultaneously start the timer and click the test project.
4. When the test project fully loads, stop the timer.

#### Exporting a presentation as a video

1. From the shelf, launch the Explain Everything app.
2. Click the test project.
3. Click Share, then click Export.
4. On the Export project screen, select Video.
5. For the source, click Local storage.
6. Simultaneously start the timer and click Export.
7. When the Export successful message appears, stop the timer.

### WeVideo Video Editor

#### Render a 720p video

1. From the Google Play store, install WeVideo. Pin the app to the shelf.
2. Launch the WeVideo app from the shelf.
3. Click the green plus icon.
4. Delete the six-second title text.
5. Click the blue plus icon.
6. Click Gallery.
7. Click Allow to enable access to device media storage.
8. From the folder browser, select the test footage, and click the green checkmark icon.
9. Click the paper airplane icon.
10. When the video has finished rendering, stop the timer.

## Tinkercad

### Loading the design gallery

1. From the Chrome browser, navigate to [tinkercad.com](https://tinkercad.com).
2. Simultaneously start the timer and click Gallery.
3. When the page fully loads, stop the timer.

### Opening the Retail Row model

1. From the Chrome browser, navigate to [tinkercad.com](https://tinkercad.com).
2. Click Gallery.
3. Click the Retail Row design.
4. Simultaneously start the timer and click Copy and Tinker.
5. When the model fully loads, stop the timer.

## Soundtrap

### Merge tracks

1. From the Google Play store, install Soundtrap. Pin the app to the shelf.
2. Launch the Soundtrap app from the shelf.
3. From the template selection screen, click Dubstep DEMO.
4. From the horizontal dropdown menu, click Settings, and click Merge Tracks...
5. Select all of the instrument tracks.
6. Simultaneously start the timer and click Merge.
7. When merging completes, stop the timer.

## BrowserBench.org

### Speedometer

1. Open the Chrome web browser, and navigate to <https://browserbench.org/Speedometer2.0/>.
2. Click Start Test.
3. When the test completes, record the results.

## Multitasking with Zoom

To conduct our multitasking tests, we downloaded and installed the Zoom Chrome Web Store extension, and joined a four-participant video meeting. We left the Zoom meeting running in the background to complete the following scenarios.

### Previewing a large PDF from Google Drive

1. From the Chrome browser, navigate to [drive.google.com](https://drive.google.com).
2. Right-click the test document and simultaneously start the timer and click Preview.
3. When the preview has fully loaded, stop the timer.

### Print previewing a PDF from Google Drive

1. From the Chrome browser, navigate to [drive.google.com](https://drive.google.com).
2. To preview the PDF test document, double-click its icon.
3. Simultaneously start the timer and click the Print icon.
4. When the print preview has fully loaded, stop the timer.

### Opening a large CSV In Google Sheets

1. From the Chrome browser, navigate to [drive.google.com](https://drive.google.com).
2. To preview the CSV test document, double-click its icon.
3. Simultaneously start the timer and click Open with Google Sheets.
4. When the new document has fully loaded, stop the timer.

### Opening a large DOCX file In Google Docs

1. From the Chrome browser, navigate to [drive.google.com](https://drive.google.com).
2. To preview the DOCX test document, double-click its icon.
3. Simultaneously start the timer and click Open with Google Docs.
4. When the document has fully loaded, stop the timer.

## Saving and opening a DOCX to Google Docs

1. From the Chrome browser, navigate to [drive.google.com](https://drive.google.com).
2. To preview the DOCX test document, double-click its icon.
3. Click Open with Google Docs.
4. Click File.
5. Simultaneously start the timer and click Save as Google Docs.
6. When the new document has fully loaded, stop the timer.

## Open shared Google Slides project

1. From the Chrome browser, navigate to [drive.google.com](https://drive.google.com).
2. To preview the DOCX test document, double-click its icon.
3. Click Open with Google Docs.
4. Click File.
5. Simultaneously start the timer and click Save as Google Docs.
6. When the new document has fully loaded, stop the timer.

## Zoom call statistics

### Determining average outgoing frame rate

1. While connected to the Zoom test meeting, click the Settings icon in the Zoom app.
2. Click the Statistics tab, and select the Video subtab.
3. Start a timer for a minute, and begin recording the reported Frame Per Second.
4. At the end of a minute, take the median Frame Per Second, and complete two more runs.

## Battery life testing

Before starting our battery life testing, we used a photometer to set each device's display to as close to 70 nits as possible. We connected headphones to the devices and set the volume at 50%. Before conducting a full battery test, we ensured the devices were fully charged.

### CrXPRT 2

1. From the Google Play store, install CrXPRT 2. Pin the app to the shelf.
2. Launch the CrXPRT 2 app from the shelf.
3. From the CrXPRT 2 main menu, select Battery life test, and click Next.
4. Ensure the device is charged to 100%, the brightness is set as close to 200 nits as possible, and that the device's volume is set to 50%.
5. Disconnect the test system from AC power, and click Start. Record the results after the full battery run-down is complete.

Read the report at <http://facts.pt/AcHkxTF>

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