



The science behind the report:

Provide your students and faculty with faster Chromebooks

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 [Provide your students and faculty with faster Chromebooks](#).

We concluded our hands-on testing on June 10, 2019. 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 May 29, 2019 or earlier. Unavoidably, these configurations may not represent the latest versions available when this report appears.

Our results

The table below presents our findings in detail.

Task	Dell Chromebook 3100 with an Intel Celeron N4000 processor	HP Chromebook 11A G6 EE with an AMD A4-9120C processor	Lenovo Chromebook (2nd Gen) 11A G6 EE with a MediaTek 8173C processor	Percentage win
Explain Everything				
Open presentation	1.9	3.7	3.0	up to 48%
Export presentation video	47.5	125.4	93.6	up to 62%
Trinket				
Open a lesson	5.2	6.6	6.3	up to 21%
Open the Switch Case Challenge	4.0	5.5	6.5	up to 26%
Repl.it				
Open the Java editor	4.9	6.7	6.5	up to 27%
VidCode				
Render a video	2.5	3.7	4.2	up to 40%

Task	Dell Chromebook 3100 with an Intel Celeron N4000 processor	HP Chromebook 11A G6 EE with an AMD A4-9120C processor	Lenovo Chromebook (2nd Gen) 11A G6 EE with a MediaTek 8173C processor	Percentage win
WeVideo				
View a project from the gallery	50.0	83.2	219.6	up to 77%
Tinkercad				
Load the design gallery	3.8	8.5	5.9	up to 55%
Open the city model	33.5	56.8	46.5	up to 41%
Soundtrap				
Merge tracks	30.7	57.6	39.3	up to 47%

Battery life results

Devices	Time	Percentage win
Dell Chromebook 3100 with an Intel Celeron N4000 processor	12:30	N/A
HP Chromebook 11A G6 EE with an AMD A4-9120C processor	7:08	43%
Lenovo Chromebook (2nd Gen) 11A G6 EE with a MediaTek8173C processor	9:04	27%

System configuration information

The table below presents detailed information on the systems we tested.

Device configuration information	Dell Chromebook 3100 with an Intel Celeron N4000 processor	HP Chromebook 11A G6 EE with an AMD A4-9120C processor	Lenovo Chromebook (2nd Gen) 11A G6 EE with a MediaTek 8173C processor
Operating system			
OS name and version/build number	Chrome OS 74.0.3729.159	Chrome OS 74.0.3729.159	Chrome OS 74.0.3729.159
Build/firmware version	Google_Fleex.11297.29.0	Google_Grunt.11031.44.0	Google_Hana.8438.170.0
Processor			
Vendor and model	Intel Celeron N4000	AMD A4-9120C	MediaTek 8173C
Core count (per processor)	2	2	4
Core frequency (GHz)	2.6	1.6	2.1
Miscellaneous			
Memory (GB)	4	4	4
Storage (GB)	16	16	32
Bluetooth	5.0	4.2	4.1
USB	2x USB 3.1 Gen1, 2x USB Type C	2x USB 2.0, 2x USB Type C	1x USB 3.0, 1x USB Type C
Battery type	Lithium-Ion	Lithium-Ion	Lithium-Ion
Battery capacity (Wh)	42	47	42
Display	11.6" 1366x768	11.6" 1366x768	11.6" 1366x768
System Weight (lbs.)	2.85	2.80	2.68

How we tested

Creating the background workload

To simulate typical Chromebook 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.

1. From the shelf, open Chromebook settings.
2. Navigate to the On Startup section of the settings.
3. Select Open a specific page or set of pages.
4. Insert the following URLs, and click OK.
 - Forbes.com
 - Markets.ft.com/data
 - Arstechnica.com
 - mail.google.com
 - slack.com (logged into Slack chat, #general channel)
 - drive.google.com
 - docs.google.com (viewing document)
 - youtube.com/feed/music
 - drive.google.com (viewing document)
 - sheets.google.com (viewing spreadsheet)
 - twitter.com
 - facebook.com
5. Restart the Chromebook. Before testing, navigate through each tab to ensure that both devices have fully loaded the same content.

Application testing

Explain Everything

Opening a local presentation

1. From the Google Play store, install Explain Everything. Pin the app to the shelf.
2. Launch the Explain Everything app from the shelf.
3. Simultaneously start the timer and click the test project.
4. When the test project fully loads, stop the timer.
5. Exporting a presentation as a project
6. From the shelf, launch the Explain Everything app.
7. Click the test project.
8. Click Share, then click Export.
9. On the Export project screen, select Project.
10. For the source, click Local storage.
11. Simultaneously start the timer and click Export.
12. When the Export successful message appears, stop the timer.

Trinket

Opening the "From Block to Code" lesson

1. From the Chrome browser, navigate to <https://trinket.io>.
2. Sign in with your Google account.
3. Click Learn.
4. Simultaneously start the timer and click Let's Go under From Blocks to Code.
5. When the project editor fully loads, stop the timer.

Opening the Switch Case Challenge

1. From the Chrome browser, navigate to <https://trinket.io>.
2. Sign in with your Google account.
3. Click Learn.
4. Simultaneously start the timer and click Switch Case Challenge.
5. When the project editor fully loads, stop the timer.

Repl.it

Opening the Java editor

1. From the Chrome browser, navigate to <https://repl.it>.
2. Sign in with your Google account.
3. Click the red plus icon, and select All languages.
4. Simultaneously start the timer and click Java.
5. When the project editor fully loads, stop the timer.

VidCode

Viewing a project from the gallery

1. From the Chrome browser, navigate to <https://app.vidcode.io>.
2. Click Gallery.
3. Simultaneously start the timer and click the Eclipse 2017 project.
4. When video playback begins, stop the timer.

WeVideo Video Editor

Rendering 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. Simultaneously start the timer and click Save with watermark.
11. When the video fully renders, stop the timer.

Tinkercad

Loading the design gallery

1. From the Chrome browser, navigate to tinkercad.com.
2. Simultaneously start the timer and click Gallery.
3. When the page fully loads, stop the timer.

Opening the City model

1. From the Chrome browser, navigate to tinkercad.com.
2. Click Gallery.
3. Click the City design.
4. Simultaneously start the timer and click Duplicate and Tinker.
5. When the model fully loads, stop the timer.

SoundTrap

Merging two 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. Stop the timer when merging completes.

Battery Life Testing

We used Google's power_LoadTest Chrome extension to estimate battery life. After installing the extension, we charged each device to 100% battery, and clicked the extension icon to begin the test. After an hour passed and the test completed, we recorded the battery life. To calculate the estimated battery life, we used the following formula: $100 / (\text{battery_}\%_{\text{start}} - \text{battery_}\%_{\text{end}})$. We performed the following steps to complete testing:

1. Download the power_LoadTest extension and untar the package to a folder on the Chromebook: https://chromium.googlesource.com/chromiumos/third_party/autotest/+refs/heads/master/client/site_tests/power_LoadTest/README.md
2. Navigate to chrome://extensions and enable Developer mode.
3. Click Load unpacked extension.
4. Choose the power_LoadTest extension folder.
5. Restart each device.
6. Wait until each device is fully charged. Before testing, unplug the devices.
7. Open a Chrome browser, and click the power_LoadTest extension icon to start the test.
8. When the test completes, note the percent charge remaining.

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

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