



The science behind the report:

# Empower your business collaborators with a fast Intel Core processor-powered Chromebook

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 [Empower your business collaborators with a fast Intel Core processor-powered Chromebook](#).

We concluded our hands-on testing on November 4, 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 October 26, 2020 or earlier. Unavoidably, these configurations may not represent the latest versions available when this report appears.

## Our results

Table 1: Time in seconds to complete tasks in various apps.

	Configuration A	Configuration B	Configuration C	Configuration D	Percentage win
Task	Acer Chromebook CB-315-3H with Intel Celeron N4020	Acer Chromebook Spin CP713-2W-38P1 with Intel Core i3-10110U	Acer Chromebook Spin CP713-2W-5874 with Intel Core i5-10210U	Acer Chromebook Spin CP713-2W-79H3 with Intel Core i7-10510U	Configuration D vs. Configuration A
<b>Scenario 1</b>					
<b>Median sum of all tasks for Scenario 1</b>	<b>79.8</b>	<b>57.2</b>	<b>55.0</b>	<b>50.7</b>	<b>36%</b>
<b>Google Meet</b>					
Launch Google Meet	2.0	1.5	1.6	1.3	35%
Launch new meeting	2.7	2.1	1.8	2.0	25%
<b>Google Drive</b>					
Open PDF preview from Google Drive	7.3	7.1	6.6	5.7	21%
Print Preview PDF	35.9	25.4	27.2	25.2	29%
<b>Google Docs</b>					
Open shared .docx file in Google Docs	14.07	8.74	7.18	6.97	50%
Convert .docx file to Google Docs document	14.97	9.91	7.90	6.70	55%
Downloaded converted doc to .docx	3.01	2.55	2.84	2.93	3%

	Configuration A	Configuration B	Configuration C	Configuration D	Percentage win
Task	Acer Chromebook CB-315-3H with Intel Celeron N4020	Acer Chromebook Spin CP713-2W-38P1 with Intel Core i3-10110U	Acer Chromebook Spin CP713-2W-5874 with Intel Core i5-10210U	Acer Chromebook Spin CP713-2W-79H3 with Intel Core i7-10510U	<b>Configuration D vs. Configuration A</b>
<b>Scenario 2</b>					
<b>Median sum of all tasks for Scenario 2</b>	<b>1,388.4</b>	<b>655.0</b>	<b>530.0</b>	<b>470.7</b>	<b>66%</b>
Unarchiving photos					
Transfer 140 photo .zip archive from USB	59.2	28.6	28.1	28.4	<b>52%</b>
Unzip 140 photos to desktop	127.9	54.3	49.9	44.7	<b>65%</b>
Adobe Lightroom					
Launch Adobe Lightroom	5.2	3.3	3.1	3.0	<b>42%</b>
Import 140 photos	361.1	174.9	143.3	135.2	<b>62%</b>
Batch process 140 photos with filter preset	84.3	28.2	15.4	13.1	<b>84%</b>
Export 140 photos	620.5	259.6	187.1	146.7	<b>76%</b>
Kinemaster					
Time to export 1080p video	177.2	123.8	121.1	116.4	<b>34%</b>
Google Tour Creator					
Open Google Tour Creator template	5.4	4.5	4.6	4.7	<b>13%</b>
Publish Google Tour Creator tour	6.8	6.4	5.5	6.9	<b>-1%</b>
<b>Scenario 3</b>					
<b>Median sum of all tasks for Scenario 3</b>	<b>48.5</b>	<b>33.5</b>	<b>27.2</b>	<b>24.4</b>	<b>49%</b>
Google Slides					
Open shared Google Slides presentation	13.3	7.7	6.8	6.4	<b>51%</b>
Print Preview Google Slides presentation	10.6	10.8	9.3	8.0	<b>24%</b>
Begin Google Slides Presentation	7.7	6.7	3.7	3.1	<b>59%</b>
Screencastify					
Open Recording in Project Editor	16.91	8.30	7.4	6.9	<b>59%</b>

## System configuration information

Table 2: The table below presents detailed information on the systems we tested.

System	Acer Chromebook CB-315-3H	Acer Chromebook Spin CP713-2W-38P1	Acer Chromebook Spin CP713-2W-5874	Acer Chromebook Spin CP713-2W-79H3
Processor	Intel Celeron N4020	Intel Core i3-10110U	Intel Core i5-10210U	Intel Core i7-10510U
Processor frequency (GHz)	1.10	2.10	1.60	1.80
Processor cores	2	2	4	4
Memory (GB)	4	8	8	16
Storage (GB)	64	256	128	128
Bluetooth	5	5	5	5
USB	2x USB 3.1 Type-C 2x USB 3.1 Gen 1	2x USB 3.1 Type-C 1x USB 3.1 Gen 1	2x USB 3.1 Type-C 1x USB 3.1 Gen 1	2x USB 3.1 Type-C 1x USB 3.1 Gen 1
Battery type	Lithium-Ion	Lithium-Ion	Lithium-Ion	Lithium-Ion
Battery capacity (Wh)	48	48	48	48
Display	15.6" 1366x768	13.5" 2256x1504	13.5" 2256x1054	13.5" 2256x1054
OS (version)	86.0.4240.112	86.0.4240.112	86.0.4240.112	86.0.4240.112
System Weight (lbs.)	4.19	3.02	3.02	3.02

# 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](https://forbes.com)
  - [Markets.ft.com/data](https://markets.ft.com/data)
  - [Arstechnica.com](https://arstechnica.com)
  - [mail.google.com](mailto: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)
5. Restart the Chromebook. Before testing, navigate through each tab to ensure that both devices have fully loaded the same content.

## Testing the applications

For each scenario, we downloaded, installed, and pinned the requisite apps to the Chrome shelf. For applications that required accounts or Google Authentication, we created test profiles and logged in the users on each device. We tested each task for a given scenario sequentially. After one run of a given scenario, we reset the Chromebook and performed two additional runs for a total of three.

### Scenario one

#### Google Meet

##### Launching Google Meet

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

##### Launching a new Google Meet meeting

1. From the Meet 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. Join a four-way video call, and minimize the app for the remainder of the Scenario One tasks.

#### Google Drive

##### Open PDF preview from Google Drive

1. From the Google Meet chat window, simultaneously start the timer, and click the link to the test PDF.
2. Stop the timer when the PDF preview fully loads in the web browser.

##### Print Preview PDF

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

## Google Docs

### Open shared .docx file In Google Docs

1. From the Google Meet chat window, click the link to the test .docx file shared via Google Drive.
2. When the .docx file preview loads, simultaneously start the timer, and click the Open with Google Docs button from the top menu.
3. Stop the timer when the Google Docs editor fully loads.

### Convert .docx file to Google Docs document

1. From the Google Meet chat window, click the link to the test .docx file shared via Google Drive.
2. When the .docx file preview loads, click the Open with Google Docs button from the top menu.
3. From the Google Docs editor, click the File dropdown menu.
4. Simultaneously start the timer, and click Save as Google Docs.
5. Stop the timer when the newly opened Google Doc fully loads.

### Downloaded converted Google Doc to .docx

1. From the Google Meet chat window, click the link to the test .docx file shared via Google Drive.
2. When the .docx file preview loads, click the Open with Google Docs button from the top menu.
3. From the Google Docs editor, click the File dropdown menu, and select Save as Google Docs.
4. When the newly opened Google Doc fully loads, click the File dropdown menu, and hover over Download.
5. Simultaneously start the timer, and click Microsoft Word (.docx) from the Download menu.
6. Stop the timer when the download notification completes.

## Scenario Two

### Unarchiving Photos

#### Transfer 140 photo .zip archive from USB

1. Prepare a flash drive with the test .zip archive.
2. Connect the flash drive to the system under test.
3. Open the File application from the ChromeOS application launcher, and select the attached drive.
4. Click and drag the .zip archive to the Download folder. Start the timer before releasing the trackpad mouse button.
5. Stop the timer when the file transfer completes.

#### Unzip 140 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, and click and drag the contents to an empty folder.
4. Simultaneously start the timer and unclick the dragged content.
5. Stop the timer when the copying files dialog completes.

## Adobe Lightroom

### Launch Adobe Lightroom

1. Simultaneously start the timer, and launch Adobe Lightroom from the shelf.
2. Stop the timer when the app has fully loaded.

### Import 140 photos

1. From the Adobe Lightroom home page, click the blue import photos icon.
2. Sort by Device Folders, and select the unarchived test photos by clicking the checkbox next to the folder name.
3. Simultaneously start the timer, and click Add.
4. Stop the timer when the import dialog completes.

### Batch process 140 photos with 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. Click Auto to apply auto adjustments.
5. Click the menu button in the top right, and select Copy Settings.

6. Leave the default Copy Settings, and click OK.
7. Click the back arrow to return to the collection view.
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. Stop the timer when the processing dialog closes, and “Changes applied to 140 photos” appears.

#### **Export 140 photos**

1. From the Adobe Lightroom home page, click the collection containing the test photos.
2. Click to select the first image.
3. From the dropdown 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. Stop the timer when the export dialog completes.

## **Kinemaster**

#### **Time to export 1080p video**

1. Launch the application from the shelf.
2. Click the + icon to create a new video project.
3. Click 16:9 to set the video aspect ratio.
4. From the Media Browser, click to select the test video footage. Import the test audio, and test photo files.
5. From the video editor, click the export icon.
6. Leave the default Resolution and Frame Rate settings. Simultaneously start the timer, and click Export.
7. Stop the timer when the export completes.

## **Google Tour Creator**

#### **Open Google Tour Creator Template**

1. Open the Chrome Browser window, and navigate to the Google Tour Creator web application ([avvr.google.com](http://avvr.google.com)).
2. Click Get Started.
3. Click to select the Templates tab.
4. Simultaneously start the timer, and click the New York City template.

#### **Publish Google Tour Creator tour**

1. From the Google Tour Creator editor, click Publish.
2. Simultaneously start the timer, and click Publish again.
3. Stop the timer when the published tour preview fully loads.

## **Scenario Three**

## **Google Slides**

#### **Open shared Google Slides Presentation**

1. From the Google Meet chat window, simultaneously start the timer, and click the link to the Google Slides test document shared via Google Drive.
2. Stop the timer when the Slides presentation fully loads.

#### **Print Preview Google Slides Presentation**

1. From the Google Meet chat window, click the link to the Google Slides test document shared via Google Drive.
2. When the Slides presentation loads, click the File dropdown menu.
3. Simultaneously start the timer, and click Print.
4. Stop the timer when the Print Preview fully loads.

#### **Begin Google Slides Presentation**

1. From the Google Meet chat window, click the link to the Google Slides test document shared via Google Drive.'
2. Simultaneously start the timer, and click the Present button.
3. Stop the timer when the Presentation fully loads.

## Screencastify

### Open Recording In Project Editor

1. From the Chrome browser, click the Extensions icon.
2. From the Extensions menu, click Screencastify - Screen Video Recorder.
3. When the Screencastify extension menu loads, click the Record button.
4. Click to select Entire Desktop.
5. Record 5 minutes of the Google Slides presentation set to loop and auto advance every 10 seconds. When recording reaches 5 minutes, the Chrome Screencastify extension will open.
6. Simultaneously start the timer, and click Project Editor.
7. Stop the timer when the video editor fully loads.

### Export presentation video to .mp4

1. From the Editor window, click to expand the Download options.
2. Click Export as MP4.
3. Check Convert to fixed frame rate, and leave the default value of 30.
4. Simultaneously start the timer, and click Export.
5. Stop the timer when the export dialog completes.

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