The science behind the report:

Create and share content in less time with a fast 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 Create and share content in less time with a fast Chromebook.

We concluded our hands-on testing on September 14, 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 7, 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.

Task	Configuration A Acer Chromebook Spin 713 with an Intel® Core™ i5-10210U processor	Configuration B Acer Chromebook 315 with an Intel Celeron® N4020 processor	Configuration C HP Chromebook 14A G5 with an AMD® A6-9220C processor	Percentage win		
				Configuration A vs. Configuration B	Configuration B vs. Configuration C	Configuration A vs. Configuration C
Scenario 1						
Median sum of all tasks for Scenario 1	**117.0**	**271.7**	**543.9**	**56%**	**50%**	**78%**
Google Meet						
Launch Google Meet	1.6	2.1	4.2	**22%**	**50%**	**61%**
Launch new meeting	2.4	3.3	5.2	**26%**	**37%**	**53%**
Unarchive photos						
Unzip 140 photos from desktop	5.2	16.5	49.0	**68%**	**66%**	**89%**
Adobe Lightroom						
Launch Adobe® Lightroom®	2.7	3.2	4.9	**17%**	**33%**	**45%**
Import 140 photos	77.6	143.7	339.4	**45%**	**57%**	**77%**
Batch process 140 photos with filter preset	13.4	87.1	121.5	**84%**	**28%**	**88%**

Task	Configuration A Acer Chromebook Spin 713 with an Intel® Core™ i5-10210U processor	Configuration B Acer Chromebook 315 with an Intel Celeron® N4020 processor	Configuration C HP Chromebook 14A G5 with an AMD® A6-9220C processor	Percentage win		
				Configuration A vs. Configuration B	Configuration B vs. Configuration C	Configuration A vs. Configuration C
Google Photos						
Load photo album	3.3	5.4	8.1	38%	32%	58%
Load full resolution photo	1.7	2.0	2.8	13%	29%	39%
Save copy of high resolution photo	3.5	3.6	3.9	3%	7%	10%
Load filter presets	3.9	5.1	3.8	23%	-34%	-2%
Apply auto filter and save changes	5.2	4.5	4.6	-15%	1%	-13%
Scenario 2						
Median sum of all tasks for Scenario 2	**933.3**	**959.1**	**1894.3**	**4%**	**53%**	**55%**
Iron Blade: Medieval Legends RPG						
Launch Iron Blade: Medieval Legends RPG	15.0	20.8	54.6	27%	61%	72%
Screencastify						
Export recording to 30 FPS .mp4	286.7	343.0	418.6	16%	18%	31%
Lexis Audio Editor						
Open audio file	8.6	16.7	51.4	48%	67%	83%
Export audio file	48.2	84.4	238.7	42%	64%	79%
Kinemaster						
Time to export 720p video	423.8	351.0	984.2	-20%	64%	56%

Task	Configuration A Acer Chromebook Spin 713 with an **Intel® Core™ i5-10210U processor**	Configuration B Acer Chromebook 315 with an **Intel Celeron® N4020 processor**	Configuration C HP Chromebook 14A G5 with an **AMD® A6-9220C processor**	Percentage win		
				Configuration A vs. Configuration B	**Configuration B vs. Configuration C**	**Configuration A vs. Configuration C**
Scenario 3						
Median sum of all tasks for Scenario 3	**26.4**	**31.6**	**40.6**	**16%**	**22%**	**34%**
Google Photos						
Create new photo animation	2.7	3.4	4.5	**19%**	**24%**	**39%**
Create photo animation	11.5	13.8	15.0	**16%**	**7%**	**22%**
Create new photo collage	4.9	5.2	7.2	**5%**	**27%**	**32%**
Add photo collage to New Shared Album	2.1	1.8	2.6	**-13%**	**29%**	**20%**
Apply auto filter to photo collage	1.9	2.9	3.4	**31%**	**14%**	**42%**
Time to open shared Google Photos album	3.0	4.2	7.7	**28%**	**45%**	**60%**
Scenario 4						
Median sum of all tasks for Scenario 4	**203.0**	**314.7**	**548.3**	**35%**	**42%**	**62%**
Krita						
Launch Krita	4.4	7.7	12.1	**42%**	**36%**	**63%**
Open high resolution photo	3.9	7.6	15.8	**48%**	**51%**	**75%**
Unarchive video						
Unzip video from desktop	9.4	23.0	33.4	**59%**	**30%**	**71%**
Soundtrap						
Merge audio tracks	15.7	37.4	48.8	**58%**	**23%**	**67%**
WeVideo						
Export video	169.5	238.8	438.0	**28%**	**45%**	**61%**

System configuration information

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

System	Acer Chromebook Spin 713	Acer Chromebook 315	HP Chromebook 14A G5
Processor	Intel Core i5-10210U	Intel Celeron N4020	AMD A6-9220C
Processor frequency (GHz)	1.6	1.10	1.8
Processor cores	4	2	2
Memory (GB)	8	4	8
Storage (GB)	128	64	64
Bluetooth	5	5	4.2
USB	2x USB 3.1 Type-C, 1x USB 3.1 Gen 1	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	Lithium-Ion
Battery capacity (Wh)	48	48	47.36
Display	13.5" 2256x1054	15.6" 1366x768	14" 1920x1080
OS (version)	85.0.4183.84	85.0.4183.84	85.0.4183.84
System Weight (lbs.)	3.02	4.19	3.46

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.

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.

Unarchiving photos

Unzipping 140 photos from the desktop

1. From the shelf, launch the Files app.
2. Navigate to the test archive location.
3. Double-click to open the test archive using the default system viewer.
4. Select the contents of the test archive, and click and drag the contents to an empty folder.
5. Simultaneously start the timer and un-click the dragged content.
6. When the copying files dialog completes, stop the timer.

Adobe Lightroom

Launching Adobe Lightroom

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

Importing 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. When the import dialog completes, stop the timer.

Batch-processing 140 photos with the 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. In the top-right, click the menu button, and select Select All.
10. In the top-right, click the menu button, and select Paste Settings.
11. Simultaneously start the timer and click Apply.
12. When the processing dialog closes, and "Changes applied to 140 photos" appears, stop the timer.

Google Photos

Loading a photo album

1. From the app shelf, reopen Google Meet.
2. Simultaneously start the timer and click the link to the test Google Photos album.
3. When the photo album fully loads in the Chrome browser, stop the timer.

Loading a full-resolution photo

1. From the test photo album, simultaneously start the timer and click the first image.
2. When the photo fully loads with detail, stop the timer.

Saving a copy of a high-resolution photo

1. With the high-resolution photo open, click the menu icon in the top right.
2. Simultaneously start the timer and click Download.
3. When the download completes, and the image preview appears in the notifications pane, stop the timer.

Loading the filter presets

1. With the high-resolution photo open, click the menu icon in the top right.
2. Simultaneously start the timer and click Edit.
3. When the Color filter preset previews fully load, stop the timer.

Applying an auto filter and saving changes

1. From the Color filter preset edit pane, click Auto to choose the automatic color filter preset.
2. Simultaneously start the timer and click Done.
3. When the edited photo refreshes, stop the timer.

Scenario two

Iron Blade: Medieval Legends RPG

Launching the game
1. Simultaneously start the timer and launch the Iron Blade: Medieval Legends RPG app from the shelf.
2. When the game loads into the tutorial gameplay, stop the timer.

Screencastify

Exporting a recording to 30 FPS .mp4
1. Reopen the Chrome browser, and 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 Application Window.
5. Select the Iron Blade: Medieval Legends RPG application Window, and click Share.
6. Record 5 minutes of the tutorial gameplay without interacting with the game or advancing the tutorial options. When the recording completes, reopen the Chrome Screencastify extension.
7. Click to expand the Download options.
8. Click Export as MP4.
9. Check Convert to fixed frame rate, and leave the default value of 30.
10. Simultaneously start the timer and click Export.
11. When the export dialog completes, stop the timer.

Lexis Audio Editor

Opening an audio file
1. From the app shelf, launch Lexis Audio Editor.
2. Click Open.
3. Navigate to the device's download folder, and select the test audio file.
4. Simultaneously start the timer and click Open.
5. When the audio file has fully loaded, stop the timer.

Exporting an audio file
1. With the test audio file loaded, click Save.
2. From the Save menu, enter a file name. Simultaneously start the timer and click Save.
3. When saving completes, stop the timer.

Scenario three

Connect each device to a four-way Google Meet video meeting before timing the following tasks.

Google Photos

Creating a new photo animation
1. Using the Chrome browser, navigate to photos.google.com.
2. Select 10 images from the test collection, and click the Add to or create new button.
3. Simultaneously start the timer and click Animation.
4. When the Animation preview playback begins, stop the timer.

Loading a photo animation
1. From the app shelf, reopen Google Meet.
2. Open the chat box.
3. Simultaneously start the timer and click the link to the photo animation from chat.
4. When the Chrome browser launches and the photo animation playback begins, stop the timer.

Creating a new photo collage

1. Return to photos.google.com.
2. Select nine photos from the test collection.
3. Click the Add to or create new button.
    a. Simultaneously start the timer and click Collage.
    b. When the collage preview fully loads, stop the timer.

Adding a photo collage to New Shared Album

1. From the photo collage editor, click the menu button in the top right.
2. Click Add to album.
3. Simultaneously start the timer and click New Album.
4. When the Edit album page fully loads, stop the timer.

Applying an auto filter to a photo collage

1. Return to photos.google.com.
2. Click to open the test photo collage.
3. Click the Edit icon from the menu.
4. Click to select the Auto color filter preset.
5. Simultaneously start the timer and click Done.
6. When the editing image refreshes, stop the timer.

Opening a shared Google Photos album

1. From the app shelf, reopen Google Meet.
2. Open the chat box.
3. Simultaneously start the timer and click the link to the shared Google Photo album.
4. When the Chrome browser launches and the photo album fully loads, stop the timer.

Scenario #4

Krita

Launching the app

1. Simultaneously start the timer and launch Krita from the shelf.
2. When the app fully loads, stop the timer.

Opening a high-resolution photo

1. From the Krita homescreen, click Open File.
2. Click to select the test photo.
3. Simultaneously start the timer and click Open.
4. When the image fully loads, stop the timer.

Unarchiving a video

Unzipping a video from the desktop

1. Launch the Files app from the shelf.
2. Navigate to the test archive location.
3. Double-click to open the test archive using the default system viewer.
4. Select the contents of the test archive, and click and drag the contents to an empty folder.
5. Simultaneously start the timer and un-click the dragged content.
6. When the copying files dialog completes, stop the timer.

Soundtrap

Merging audio tracks

1. From the app shelf, launch the Soundtrap app.
2. From the template selection screen, click Dubstep DEMO.
3. From the horizontal drop-down menu, click Settings, and click Merge Tracks…
4. Select all of the instrument tracks.
5. Simultaneously start the timer and click Merge.
6. When merging completes, stop the timer.

WeVideo

Exporting a video

1. From the app shelf, launch the WeVideo app.
2. Click the green plus icon.
3. Delete the six-second title text.
4. Click the blue plus icon.
5. Click Gallery.
6. From the folder browser, select the test footage, and click the green checkmark icon.
7. Click Gallery again.
8. From the folder browser, select the test audio, 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.

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