



The science behind the report:

# New Chromebooks with AMD A4-9120C processors handled common education tasks with ease

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 [New Chromebooks with AMD A4-9120C processors handled common education tasks with ease](#).

We concluded our hands-on testing on May 20, 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 April 17, 2019 or earlier. Unavoidably, these configurations may not represent the latest versions available when this report appears.

## Our results

We selected hardware based on availability at the start of testing. We tested eight total systems; four different models each with two identical systems. We completed each test three times and used the median score. We then compared the scores between the two systems for each model and recorded the better score. The tables below present our findings in detail.

## Benchmarks

Benchmark	HP Chromebook 11A with AMD A4-9120C processor	HP Chromebook 11A with Intel Celeron N3350 processor	Acer Chromebook Spin 311 with AMD A4-9120C processor	Acer Chromebook Spin 11 with Intel Celeron N3350 processor
<b>CrXPRT</b>				
Download CrXPRT app score	<b>111.00</b>	104.00	<b>113.00</b>	104.00
<b>JetStream 2</b>				
JetStream 2 web page score	<b>38.09</b>	36.71	<b>39.19</b>	36.52
<b>Mozilla Kraken</b>				
Mozilla Kraken web page (ms) [lower is better]	<b>2916.30</b>	2988.60	<b>2924.80</b>	2991.10
<b>Speedometer 2.0</b>				
Speedometer 2.0 web page score	<b>31.70</b>	25.71	<b>32.48</b>	25.70
<b>WebXPRT</b>				
Preview multiple files score	<b>79.00</b>	67.00	<b>80.00</b>	68.00

## Real-world applications

All times are in seconds.

Task	HP Chromebook 11A with AMD A4-9120C processor	HP Chromebook 11A with Intel Celeron N3350 processor	Acer Chromebook Spin 311 with AMD A4-9120C processor	Acer Chromebook Spin 11 with Intel Celeron N3350 processor
<b>Google Docs</b>				
Create new doc	5.5	6.4	6.0	5.0
Load resume template	6.4	7.3	6.8	6.8
Print preview resume	2.9	3.2	3.0	3.1
Load large document	197.3	220.3	195.9	216.5
<b>Google Sheets</b>				
Save large sheet as an Excel document	1.5	1.4	1.6	1.3
Print preview large document	29.8	37.7	30.4	36.4
Open large Excel spreadsheet	16.4	17.3	13.5	14.4
Import spreadsheet with images	20.6	20.7	19.9	22.0
Print preview spreadsheet with images	11.6	11.8	10.9	11.0
<b>Google Slides</b>				
Load slides template	18.0	18.6	17.0	17.0
Export slides to PowerPoint	6.5	7.1	6.3	6.2
Preview slides	7.0	6.9	6.5	6.5
<b>Google Drive</b>				
Preview multiple files	2.5	3.1	2.8	2.6
Copy a file	4.2	4.5	5.5	5.0
<b>Magisto Video editor</b>				
Render a 720p video	32.5	32.9	32.6	33.4
Save and share video	1.9	1.9	1.7	1.7
<b>Soundtrap for Education</b>				
Enter studio and create new project Template	7.3	7.1	7.3	6.8
Merge tracks	31.6	31.8	31.7	33.4
<b>Screencastify Video Editor</b>				
Record desktop	4.0	3.8	4.6	5.2
View video on Google Drive	5.2	5.3	3.7	4.0
<b>Explain Everything</b>				
Load template	5.7	6.2	6.0	6.3
Share link	1.5	1.4	1.0	1.1

Task	HP Chromebook 11A with AMD A4-9120C processor	HP Chromebook 11A with Intel Celeron N3350 processor	Acer Chromebook Spin 311 with AMD A4-9120C processor	Acer Chromebook Spin 11 with Intel Celeron N3350 processor
<b>Tinkercad</b>				
Create new design	5.8	5.8	5.2	6.1
Load design gallery	5.8	5.3	5.2	4.9
Open a medium model (Hot Rod)	10.5	11.2	9.3	10.7
Open a large model (Dragon)	28.5	29.4	27.5	28.1
Export medium model (Hot Rod)	3.5	3.2	3.1	3.3
Export large model (Dragon)	6.5	6.1	6.1	5.9
<b>EquatIO</b>				
Create fraction circle	5.6	5.7	4.4	4.8
Insert LaTeX math function	5.0	5.1	4.7	4.6
<b>Scribble EDU</b>				
Upload pdf file	3.5	3.0	2.9	3.4
Open pdf from Scribble	3.7	4.0	3.5	3.6
<b>Seesaw</b>				
Open and share activity	1.4	1.3	1.0	1.1
Edit activity	1.3	1.6	1.1	1.0

## System configuration information

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

System	HP Chromebook 11A with AMD A4-9120C processor	HP Chromebook 11A with Intel Celeron N3350 processor	Acer Chromebook Spin 311 (R721T) with AMD A4-9120C processor	Acer Chromebook Spin 11 (C733) with Intel Celeron N3350 processor
<b>Processor</b>				
Vendor	AMD	Intel	AMD	Intel
Model number	A4-9120C	Celeron N3350	A4-9120C	Celeron N3350
Core frequency (GHz)	1.6	1.1	1.6	1.1
Number of cores	2	2	2	2
Cache (MB)	2	2	2	2
<b>Memory</b>				
Amount (GB)	4	4	4	4
Type	LPDDR4	LPDDR4	DDR4	DDR4
Speed (MHz)	2,400	2,400	2,400	2,400
<b>Integrated graphics</b>				
Vendor	AMD	Intel	AMD	Intel
Model number	Radeon R4	HD Graphics 500	Radeon R4	HD Graphics 500
<b>Storage</b>				
Amount (GB)	16	16	32	32
Type	SSD	SSD	SSD	SSD
<b>Connectivity/expansion</b>				
Wireless internet	802.11ac Dual Band	802.11ac Dual Band	802.11ac	802.11ac
Bluetooth	4.2	4.2	4.2	4.2
USB	2 x USB 3.1 2 x USB Type-C	2 x USB 3.1 2 x USB Type-C	2 x USB 3.0 2 x USB Type-C	2 x USB 3.0 2 x USB Type-C
Thunderbolt	N/A	N/A	N/A	N/A
Video	1 x HDMI	1 x HDMI	N/A	N/A
<b>Battery</b>				
Type	Lithium-ion	Lithium-ion	Lithium-ion	Lithium-polymer
Size	Integrated	Integrated	Integrated	Integrated
Rated capacity (Wh)	47	47	37	60
<b>Display</b>				
Size	11.6"	11.6"	11.6"	14"
Type	LED-backlit	LED-backlit	LED-backlit	LED-backlit
Resolution	1366 x 768	1366 x 768	1366 x 768	1920 x 1080

System	HP Chromebook 11A with AMD A4-9120C processor	HP Chromebook 11A with Intel Celeron N3350 processor	Acer Chromebook Spin 311 (R721T) with AMD A4-9120C processor	Acer Chromebook Spin 11 (C733) with Intel Celeron N3350 processor
Touchscreen	No	No	Yes	Yes
<b>Operating system</b>				
Vendor	Google	Google	Google	Google
Name	Chrome OS	Chrome OS	Chrome OS	Chrome OS
Build number or version	Version: 73.0.3683.88 (Official Build)(64 bit)	Version: 73.0.3683.88 (Official Build)(64 bit)	Version: 73.0.3683.88 (Official Build)(64 bit)	Version: 73.0.3683.88 (Official Build)(64 bit)
<b>Dimensions</b>				
Height	0.71"	0.71"	0.9"	0.6"
Width	12.04"	12.04"	11.7"	12.8"
Depth	8.2"	8.2"	8.1"	8.9"
Weight (lbs.)	2.73	2.73	3.31	3.70

# How we tested

## Completing common tasks in applications

### Creating the background workload

To simulate typical Chromebook use, we ran a combination of news, email, chat, video, document viewing, and education websites in the background during application tests. 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 On Startup.
3. Select Open a specific page or set of pages.
4. Insert the following URLs, and click OK.
  - a. [ted.com/talks](https://ted.com/talks)
  - b. [simple.wikipedia.org](https://simple.wikipedia.org)
  - c. [mail.google.com](https://mail.google.com)
  - d. [hangouts.google.com](https://hangouts.google.com)
  - e. [drive.google.com](https://drive.google.com)
  - f. [docs.google.com](https://docs.google.com)
  - g. [youtube.com/edu](https://youtube.com/edu)
  - h. [sheets.google.com](https://sheets.google.com)
  - i. [wolframalpha.com](https://wolframalpha.com)
5. Restart the Chromebook. Before testing, navigate through each tab to ensure that the device has fully loaded the content.
6. Complete each of the application tasks below three times, record the timing result, and report the median of the three tests.

### Google Docs

To test how well Google Docs performed on the systems, we timed how long it took to 1) open a new document in Google Docs, 2) open the Resume (serif) template, and 3) print preview the resume template. We used the Resume (serif) template in Google Docs to perform this test. We also opened a large document in Google Docs to see how the systems handled larger files.

#### Creating a new Google Doc

1. Install Google Docs from the Google Play Store, and pin the app to the shelf.
2. Launch the app from the shelf, and click Skip to skip the tutorial.
3. Close the app and reopen it by clicking on the Docs icon on the shelf.
4. Click the red + icon.
5. Start the timer, and click New document.
6. When the new Google Doc fully loads, stop the timer.

#### Loading the Resume (serif) template

1. From the shelf, click the Google Docs icon.
2. Click the red + icon.
3. Choose New Template.
4. Start the timer, and click the Resume Serif from the files list.
5. When the template fully loads, stop the timer.

#### Print previewing a resume

1. From the shelf, click the Google Docs icon.
2. From the files list, click test .docx.
3. In the top left, click the menu icon, click the print icon, and start the timer.
4. When the print preview fully loads, stop the timer.

#### Loading a large document

1. From the shelf, click the Google Docs icon.
2. Click File→Open.
3. From the files list, choose the War and Peace 1st half.docx.
4. Click Open, and start the timer.
5. When the document fully loads, stop the timer.

## Explain Everything

We simulated the use of a flow chart creator in [explaineverything.com](https://explaineverything.com) by opening the Cause and Effect template and timed how long it took to completely open the template. We then timed how long it took to share a link.

1. Navigate to <https://explaineverything.com/education/>.
2. Select For School.
3. Select Try it Now.

### Selecting a template

1. Start the timer, and select Cause and Effect template.
2. When the image is complete, stop the timer.

### Sharing a link

1. With Cause and Effect opened, click Share.
2. Start the timer, and choose Create web Video link.
3. When link the is created, stop the timer.

## Soundtrap

In Soundtrap, we timed the creation of the New Pop template in the Soundtrap studio. We also tested time to Merge Tracks by timing the creation of a single audio track from the Dubstep demo template (which has multiple tracks).

### Creating a New Pop template

1. From the Google Play store, install Soundtrap. Pin the app to the shelf.
2. Launch the Soundtrap app from the shelf.
3. Simultaneously start the timer and click Create New Pop from template.
4. When the studio fully loads, stop the timer.

### Merging tracks

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

## Scrcastify

In Scrcastify, we timed how long it took a screen capture to render. We created a screen capture by recording the desktop for 10 seconds and saving the file. We also timed how long it took to share the link to that screen capture to Google Drive.

### Recording a desktop

1. Install the Scrcastify addon from Google Play store, and pin the app to the shelf.
2. Launch Scrcastify from the Chrome toolbar.
3. Sign in with your Google account.
4. From the Scrcastify toolbar, select Desktop.
5. Enable microphone and embed webcam.
6. Click Record.
7. Select Your entire desktop, and click Share.
8. Record audio and video for 10 seconds.
9. Simultaneously click Stop Recording and start the timer to capture how long it takes the finished screen capture to render.
10. When the video is complete, stop the timer.

### Viewing a video on Google drive

1. When the above video is complete, start a new timer.
2. Click View on Drive.
3. When Google drive is done loading, stop the timer.

## Google Sheets

We used Google Sheets to import and save, open, and preview spreadsheets. We imported a large 0.9MB spreadsheet to Google Sheets and timed the previewing of this large document. We also simulated opening and previewing a .5MB file that included both data and images.

### Saving a large Google Sheet as an Excel document

1. Install Google Sheets from the Google Play Store, and pin the app to the shelf.
2. Launch the app from the shelf, and click Skip to skip the tutorial.
3. Close the app and reopen it by clicking on the Sheets icon on the shelf.
4. From the recent files screen, click the test Sheet to open it.
5. From the top navigation bar, click the menu icon.
6. Click File→Download as, and click Microsoft Excel (.xlsx).
7. With Excel (.xlsx) selected, start the timer, and click OK.
8. When the saving dialog closes, stop the timer.

### Preparing a print preview (large document)

1. From the shelf, click the Google Sheets icon.
2. From the recent files screen, click the test Sheet to open it.
3. From the top navigation bar, click the menu icon.
4. Click File, start the timer, and click Print.
5. When the print preview fully loads, stop the timer.

### Opening a large Excel spreadsheet

1. From the shelf, click the Google Sheets icon.
2. Simultaneously start the timer and, from the recent files screen, click the test Excel spreadsheet to open it.
3. When the Excel spreadsheet fully loads, stop the timer.

### Importing a spreadsheet with images

1. From the shelf, click the Google Sheets icon.
2. Simultaneously start the timer, and, from the recent files screen, click the test Excel sheet with images to open it.
3. When the Excel sheet fully loads, stop the timer.

### Print previewing a spreadsheet with images

1. From the shelf, click the Google Sheets icon.
2. From the recent files screen, click the test Excel Sheet with images to open it.
3. From the top navigation bar, click the menu icon.
4. Click File, start the timer, and click Print.
5. When the print preview fully loads, stop the timer.

## Tinkercad

We timed opening a small and medium sized 3D model templates, using Hot Rod for the medium template and Dragon for the large template. We also timed exporting these templates to a .obj format.

### Creating a new design

1. From the Chrome browser, navigate to [tinkercad.com](https://tinkercad.com).
2. Sign in with your Google account.
3. Simultaneously start the timer and click Create new design.
4. When the editor fully loads, stop the timer.

### 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 a medium model (Hot Rod)

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

### Opening a large model (Dragon)

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

### Exporting a medium model to an OBJ file (Hot Rod)

1. From the Chrome browser, navigate to [tinkercad.com](https://tinkercad.com).
2. Click Copy of Hot Rod, and click Tinker this.
3. Click Export.
4. Simultaneously start the timer and click .OBJ.
5. When the model finishes downloading, stop the timer.

### Exporting a large model to an OBJ file (Dragon)

1. From the Chrome browser, navigate to [tinkercad.com](https://tinkercad.com).
2. Click Copy of Dragon, and click Tinker this.
3. Click Export.
4. Simultaneously start the timer and click .OBJ.
5. When the model finishes downloading, stop the timer.

## EquatIO

Using EquatIO, we timed how long it took to insert a fraction circle and a LaTeX math function into a Google Doc.

### Creating a fraction circle

1. Install EquatIO Chrome addon from the Google Play Store, and pin the app to the shelf.
2. Choose Student.
3. Sign in with your Google account.
4. In EquatIO, select Insert math space.
5. In the lower bar, select Smart Shapes.
6. Select Fraction Circle.
7. Draw a fraction circle.
8. Simultaneously start the timer and select Insert.
9. When the image is complete, stop the timer.

### Inserting a LaTeX math function

1. In the lower bar, select LaTeX editor.
2. In lower right, select Function.
3. Select Quadratic formula.
4. Simultaneously start the timer and select Insert math.
5. When the formula renders in Google doc, stop the timer.

## Seesaw

We timed both the creation and editing of the Earth Day activity using seesaw.com.

### Opening and sharing an activity

1. Navigate to [seesaw.com](https://seesaw.com).
2. Sign in as a teacher.
3. Create an activity.
4. Click Green "+", and click Create or share activity.
5. Click Browse activity library.
6. Select Earth Day activity.
7. Click Share.
8. Simultaneously start the timer and click Share with class.
9. Click View activity in class.
10. Stop the timer.

### Editing an activity

1. Go to the class page.
2. Select Earth Day activity.
3. Simultaneously click the ellipsis→Copy and Edit activity and start the timer.
4. Change the title to Testing.
5. Simultaneously click Save and stop the timer.

### Magisto Video Editor

We timed editing, saving, and sharing a 720p video that was 1 MB in size. We added the video to a new project and timed how long it took to render the video. We also timed how long it took to save and share the same video.

#### Rendering a 720p video for free

1. Navigate to [magisto.com](https://magisto.com).
2. Click login, and log in with your Google account.
3. Click Start Here→Create video.
4. Click Upload.
5. Select test video from USB, and click Open.
6. Click Next.
7. Choose Extreme Editing style.
8. Choose No Music.
9. Add a title, and simultaneously start the timer and click Create Preview.
10. When the draft completes, stop the timer.

#### Sharing and saving video

1. Click Share and Save.
2. Select Private album.
3. Simultaneously start timer and click Save.
4. When share screen renders, stop the timer.

### Google Slides

In Google Slides, we opened templates, previewed slides, and exported slides to .pdf format. We timed opening the Photo album template and stopped the time when the template fully loaded. We also timed how long it took to print preview the Photo album template. Finally, we timed how long it took to export the Photo album template to a PPTX file.

#### Loading a slides template

1. Install Google Slides from the Google Play Store, and pin the app to the shelf.
2. Launch the app from the shelf.
3. From the Templates gallery list, choose Photo album, start the timer, and click the Photo album template.
4. When the template fully loads, stop the timer.

#### Previewing shared slides

1. Launch the app from the shelf.
2. From the recent files list, click the Photo album document.
3. When the document loads, click File.
4. Simultaneously click Print settings and Preview and start the timer.
5. When the print preview fully loads, stop the timer.

#### Exporting slides to PPTX

1. Launch the app from the shelf.
2. From the recent files list, click the Photo album document.
3. When the document loads, click the drop-down menu, and select Download as.
4. Click Microsoft PowerPoint (pptx) and start the timer.
5. When the saving dialog completes, stop the timer.

## Scribble EDU

We used scribble.com EDU edition to time how long it took to upload a 29.5KB PDF file. We also timed how long it took to open the 29.5 PDF file from within scribble.com.

1. Navigate to <https://www.scribble.com>.
2. Sign up for a student account.

### Uploading a pdf file

1. Open [scribble.com](https://www.scribble.com) in Chrome.
2. From the top left, click Add Source.
3. Click Open pdf.
4. Choose test pdf from Google Drive.
5. Simultaneously start the timer and click Open.
6. When pdf is done loading, stop the timer.

### Opening a pdf

1. Open [scribble.com](https://www.scribble.com) in Chrome.
2. Click Library.
3. Simultaneously start the timer and click Open source on test doc.
4. When document fully loads, stop the timer.

## Google Drive

We used Google Drive to test previewing multiple files as well as copying a file within Google Drive. We timed how long it took to select and preview the Photo album and a 29.5KB PDF document. We also timed how long it took to copy a large .9MB spreadsheet within Google Drive.

### Previewing multiple files

1. Open Google Drive from the shelf.
2. Select the three test files.
3. Simultaneously start the timer, right-click, and select Preview.
4. When all three files are complete, stop the timer.

### Making a copy

1. Select the test Google Sheets file.
2. Simultaneously start the timer and right-click and select Make a copy.
3. When the copy is complete, stop the timer.

## Running the benchmarks

### Creating the background workload

To simulate typical Chromebook use during benchmark testing, we again ran a combination of news, email, chat, video, document viewing, and education 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.
  - a. [ted.com/talks](https://ted.com/talks)
  - b. [simple.wikipedia.org](https://simple.wikipedia.org)
  - c. [mail.google.com](https://mail.google.com)
  - d. [hangouts.google.com](https://hangouts.google.com)
  - e. [drive.google.com](https://drive.google.com)
  - f. [docs.google.com](https://docs.google.com)
  - g. [youtube.com/edu](https://youtube.com/edu)
  - h. [sheets.google.com](https://sheets.google.com)
  - i. [wolframalpha.com](https://wolframalpha.com)
5. Restart the Chromebook. Before benchmark testing, navigate through each tab to ensure that the device has fully loaded the content.
6. Run each benchmark three times, record the results, and report the median of the three runs.

## CrXPRT

1. Install the CrXPRT extension from the Google Play Store.
2. Launch the app from the Chrome toolbar, and click Performance Test.
3. Set input device name to laptop type.
4. Click Start Test.
5. Save the results.

## JetStream2

1. Navigate to <https://browserbench.org/JetStream2.0>.
2. Click Start Test.
3. Save the results.

## Mozilla Kraken

1. Navigate to <https://krakenbenchmark.mozilla.org/>.
2. Click Begin.
3. Save the results.

## Speedometer 2.0

1. Navigate to <https://browserbench.org/Speedometer2.0>.
2. Click Start Test.
3. Save the results.

## WebXPRT 3

We completed testing for WebXPRT 3 on a later version of Chrome OS on all systems. We used version 73.0.3683.114.

1. Navigate to <https://www.pricedtechnologies.com/benchmarkxpert/webxpert/>.
2. Click Run WebXPRT.
3. Click Continue.
4. Click Start.
5. Save the results.

Read the report at <http://facts.pt/v2ccfhn> ▶

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