Samsung®
Chromebook™ Pro with an

**Intel® Core™ m3
processor**

**Prepare print
preview in 45
fewer seconds**
in Google Sheets™

**Encode a
GIF in 49%
less time**
in Tumblr

**Encode HD
video in 1.2
fewer minutes**
in PowerDirector
Video Editor

Use your favorite Android apps on Chromebooks and spend less time waiting

A Chromebook with an Intel Core m3 processor enabled apps to run faster than a Chromebook with an Intel Celeron N3150 processor

With the new ability to use Android™ apps on Chromebooks via Google Play™, the number of things you can do on one of these devices has skyrocketed. To support this increased capability, you need to be sure the Chromebook you choose can handle the apps you use. So what do you need to look for? The device's processor may hold the key.

At Principled Technologies, we tested popular apps from Google Play on two Chromebooks: one powered by an Intel Core m3 processor, and the other powered by an Intel Celeron® N3150 processor. We compared the time it took to complete common tasks on each device, and found that as we moved from the Intel Celeron N3150 processor-based device to a Chromebook powered by the Intel Core m3 processor, we finished tasks faster and with less waiting.*

By choosing the Intel Core m3 processor-powered device, you can spend more time doing what you love instead of waiting for pages to load or videos to encode.

*See the appendices for complete test data and device configurations.

Faster experience using G Suite

Whether you're updating your résumé in your off hours, looking over a spreadsheet of your personal finances, a Chromebook powered by the Intel Core m3 processor could help you get to your projects faster. Productive tasks—such as opening a large spreadsheet in Google Sheets or opening a resume template in Google Docs—took less time with the Chromebook powered by the Intel Core m3 processor than with the Intel Celeron N3150 processor-powered Chromebook.[1]
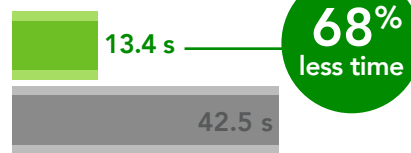
Preparing print preview
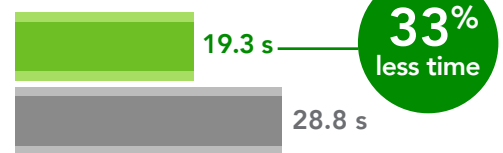in Google Sheets

Time (sec)
lower is better

157.4 s — **22%** less time

202.8 s
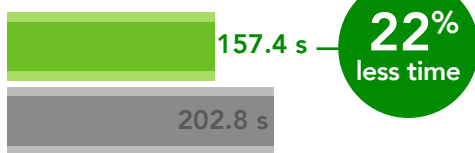
Opening large sized spreadsheet
in Google Sheets

Time (sec)
lower is better

13.4 s — **68%** less time

42.5 s

Saving large Google Sheet as Excel file
in Google Sheets™

Time (sec)
lower is better

19.3 s — **33%** less time

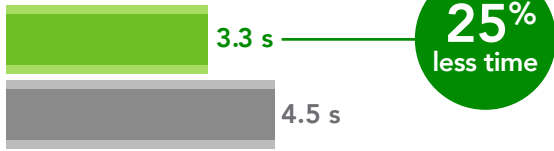28.8 s

■ Chromebook with Intel Core m3 processor
■ Chromebook with Intel Celeron N3150 processor

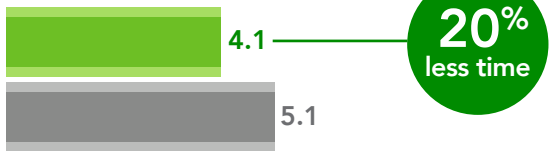*See the appendices for complete test data and device configurations.

Loading resume (serif) template
in Google Drive

Time (sec) – *lower is better*

3.3 s — **25%** less time

4.5 s

Loading project proposal template
in Google Drive

Time (sec) – *lower is better*

4.1 — **20%** less time

5.1

Chromebook with Intel Core m3 processor

Chromebook with Intel Celeron N3150 processor

An Intel Core m3 processor-powered Chromebook could also help you with home office tasks such as putting together a proposal for house renovations. Say you need to print a large spreadsheet of household financial information—in our tests, preparing a print preview of a Google Sheets spreadsheet was nearly two minutes faster with the Chromebook powered by the Intel Core m3 processor.

*See the appendices for complete test data and device configurations.

Generate new creations faster

With a Chromebook powered by an Intel Core m3 processor, you could bring your videos to life sooner than with an Intel Celeron N3150 processor-based Chromebook.

The Chromebook with an Intel Core m3 processor enabled us to export an HD video with the PowerDirector Video Editor app a minute sooner—a savings that multiplies with each video you export.

Need to capture a few precious seconds of video and share it with friends? With the Intel Core m3 processor-powered Chromebook, we shaved a few seconds off the time it took to encode a GIF in the Tumblr app compared to doing the same task with the Intel Celeron N3150 processor-based Chromebook.
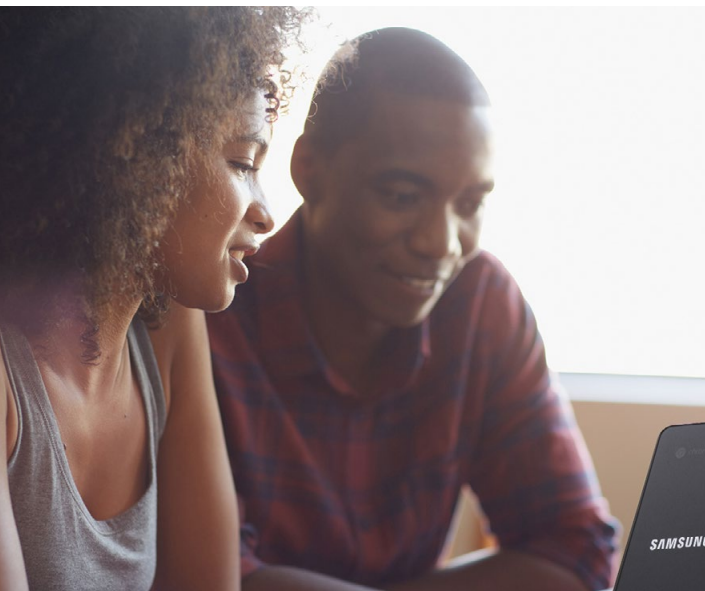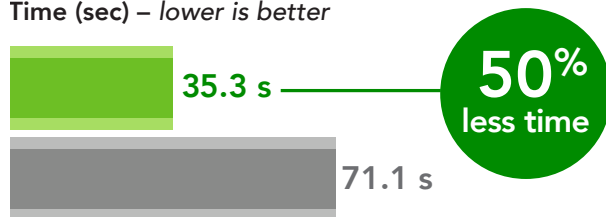
Encoding HD video
in PowerDirector Video Editor App

Time (sec) – *lower is better*

80.9 s

153.7 s

47% less time
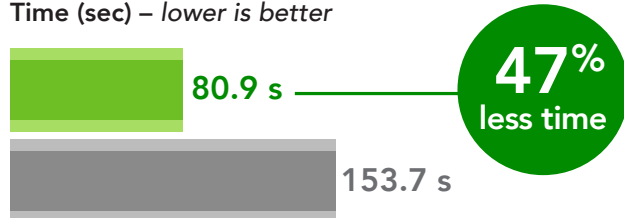
Encoding SD video
in PowerDirector Video Editor App

Time (sec) – *lower is better*

35.3 s

71.1 s

50% less time

Encoding a GIF
in Tumblr

Time (sec) – *lower is better*
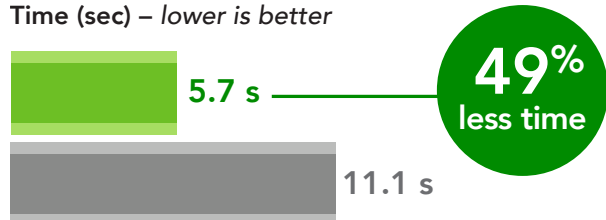
5.7 s

11.1 s

49% less time

Chromebook with Intel Core m3 processor

Chromebook with Intel Celeron N3150 processor

*See the appendices for complete test data and device configurations.

Conclusion: Choose a device that makes the most of your time

Your free time is precious. To make the best use of it, your Chromebook should be able to keep up with your life's pace. We tested popular Android apps on two Chromebooks: one powered by a Intel Core m3 processor, and the other by an Intel Celeron N3150 processor. The Chromebook with the Intel Core m3 processor enabled us to complete common tasks faster than the Intel Celeron processor-based Chromebook. With the Core m3 processor-based Chromebook, we spent less time waiting and more time doing. To reap the benefits of a faster device and take charge of your time, consider a Chromebook powered by the Intel Core m3 processor.

1   For more information on the specific devices we used, see Appendix A on page 6.

*See the appendices for complete test data and device configurations.

On August 20, 2018 we finalized the hardware and software configurations we tested. Updates for current and recently released hardware and software appear often, so unavoidably these configurations may not represent the latest versions available when this report appears. For older systems, we chose configurations representative of typical purchases of those systems. We concluded hands-on testing on August 21, 2018.

Appendix A: System configuration information

System	Samsung Chromebook Pro	Acer Chromebook R 11
Processor	Intel Core m3-6Y30	Intel Celeron N3150
Processor freq (GHz)	0.9-2.2	1.6-2.08
Processor cores	2	4
Memory (GB)	4	4
Storage (GB)	32	32
Battery type	Li-Ion	Li-Ion
Battery capacity (Wh)	39	36
Display	12.3" 2,400 x 1,600	11.6" 1,366 x 768
Wireless	802.11 AC	802.11 AC
Bluetooth	4.0	4.0
USB ports	2x USB-C	1x USB 3.0, 1x USB 2
System weight (lbs.)	2.38	2.71
OS (version)	67.0.3396.99 (64-bit)	67.0.3396.99 (64-bit)
Build/firmware	Caroline.7820.356.0	Cyan.7287.57.165

Appendix B: How we tested

Creating the background workload

To simulate typical Chromebook use, we ran a combination of news, email, chat, document viewing, music, 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, and select Open a specific page or set of pages.
3. Select Open a specific page or set of pages, insert the following URLs, and click OK.

   - forbes.com
   - markets.ft.com/data
   - arstechnica.com
   - mail.google.com
   - slack.com
   - drive.google.com
   - docs.google.com
   - youtube.com/feed/music
   - sheets.google.com
   - twitter.com
   - facebook.com

4. Restart the Chromebook. Before testing, navigate through each tab to ensure that both devices have fully loaded all the same content.

Testing each application

Google Sheets

Saving a large Google Sheet as Excel document

1. From the Google Play Store, install Google Sheets, 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. Click the menu icon from the top navigation bar.
6. Click Share & export, and click Save As…
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 to launch the app.
2. From the recent files screen, open the test Sheet.
3. Click the menu icon from the top navigation bar.
4. Click Share & export, start the timer, and click Print.
5. When the print preview fully loads, stop the timer.

Opening a large spreadsheet (Excel)

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

Google Docs

Loading a project proposal template

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 Sheets icon on the shelf.

4. Click the red + icon.
5. Click Choose template.
6. Scroll down to the Work template category.
7. Start the timer, and click Project proposal (tropic).
8. When the template fully loads, stop the timer.

Loading a resumé (serif) template
1. From the shelf, click the Google Docs icon to launch the app.
2. Click the red + icon.
3. Click Choose template.
4. Start the timer, and click Resumé (Swiss).
5. When the template fully loads, stop the timer.

PowerDirector Video Editor App: 4K, Slow Mo & More

Encoding an HD Video
1. Install PowerDirector from the Google Play Store, and pin the app to the shelf.
2. From the shelf, launch the app, and select Allow to enable access to device media storage.
3. Click the New Project icon, and enter a name for the test project.
4. Click the Download folder, and click the test footage to insert the footage onto the timeline.
5. Press the layers icon, and select the text icon to insert a title into the beginning of the clip. Name the title "Test HD Video."
6. Click the Export icon.
7. Click More Output Options.
8. With HD video resolution selected, start the timer and click Next.
9. When the video share screen appears, stop the timer.

Encoding an SD video
1. From the shelf, click the PowerDirector Video Editor icon to launch the app.
2. Load the saved test project.
3. Click the Export icon.
4. Click More Output Options.
5. With SD video resolution selected, start the timer, and click Next.
6. When the video share screen appears, stop the timer.

Tumblr

Encoding a GIF
1. From the Google Play store, install Tumblr, and pin the app to the shelf.
2. From the shelf, launch the app, and click Get Started.
3. Sign up for a Tumblr account by entering an email, password, and username. Click Get Started.
4. Enter an age, and click Done.
5. Tap on five categories, and click Next.
6. Close the app and reopen it by clicking the Tumblr icon on the shelf.
7. Click the pencil icon.
8. Click GIF.
9. Click Allow to enable access to device storage.
10. Click Allow to enable usage of device camera.
11. Click the test video clip.
12. Click Next.
13. Start the timer, and click Next.
14. When the loading bar completes, stop the timer.

Appendix C: Our results

The table below contains detailed results from our testing. All times are in seconds. Each result represents the median time of three separate runs.

Task	Samsung Chromebook Pro with Intel Core m3 processor	Acer Chromebook R 11 with Intel Celeron N3160 processor	Percentage difference
Google Sheets			
Save large Google Sheet as an Excel document	19.3	28.8	33%
Prepare print preview of a large document	157.4	202.8	22%
Open large sized spreadsheet	13.4	42.5	68%
Google Drive			
Load project proposal template	4.1	5.1	20%
Load resume template	3.3	4.5	25%
PowerDirector Video Editor App: 4K, Slow Mo & More			
Encode HD video	80.9	153.7	47%
Encode SD video	35.3	71.1	50%
Tumblr			
Encode a GIF	5.7	11.1	49%

This project was commissioned by Intel Corp.

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