



Prepare print preview in 1.9 fewer minutes in Google Sheets™



Encode a GIF in 46% less time in Tumblr



Encode HD video in 1.1 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 (the Samsung Chromebook Pro), and the other powered by an Intel Celeron® N3150 processor (the Acer® Chromebook R 11). 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.

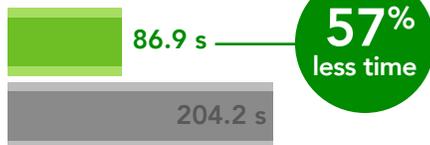
By choosing the Intel Core m3 processor-powered Samsung Chromebook Pro, you can spend more time doing what you love instead of waiting for pages to load or videos to encode.

## Faster experience using G Suite

Whether you're updating your resumé 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 PDF in Google Drive, opening a spreadsheet in Google Sheets, and 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.

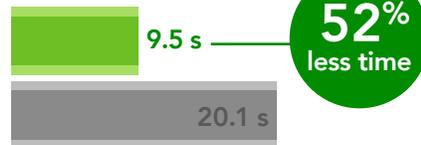
### Preparing print preview in Google Sheets

Time (sec)  
lower is better



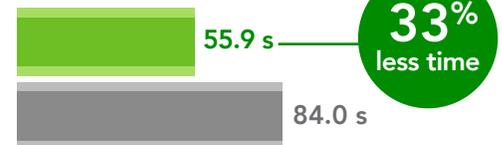
### Opening large sized spreadsheet in Google Sheets

Time (sec)  
lower is better



### Saving large Google Sheet as Excel file in Google Sheets™

Time (sec)  
lower is better



 Intel Core m3 processor (Samsung Chromebook Pro)  Intel Celeron N3150 processor (Acer Chromebook R 11)



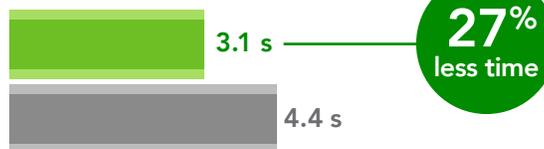
### Creating new Google doc in Google Drive™

Time (sec) – lower is better



### Loading resume (serif) template in Google Drive

Time (sec) – lower is better



### Opening PDF in Google Drive

Time (sec) – lower is better



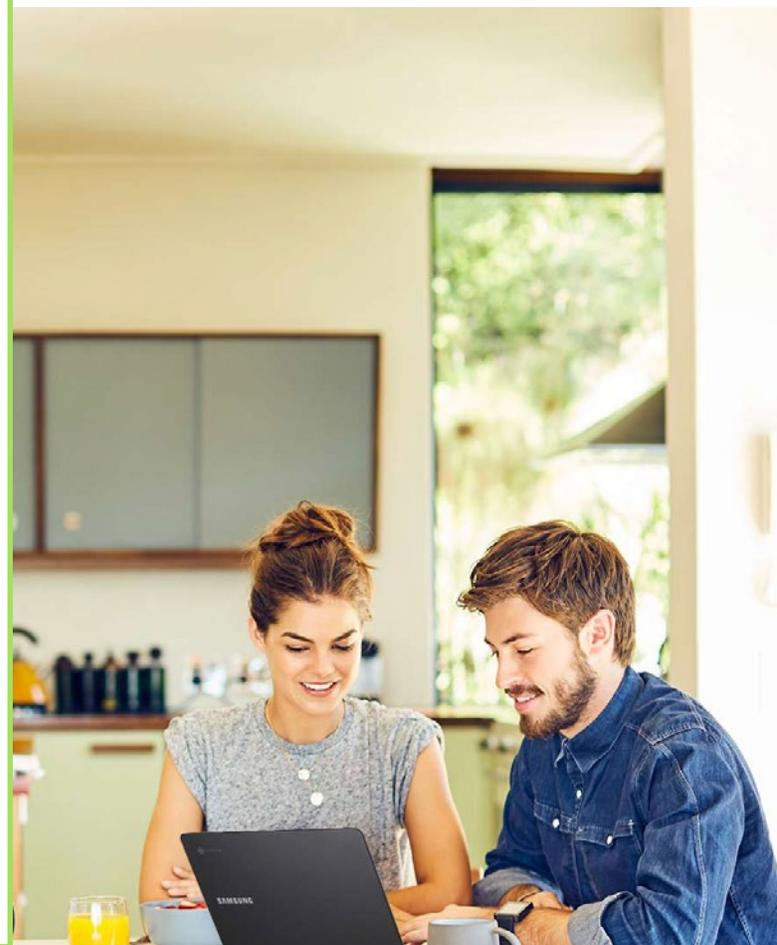
### Loading project proposal template in Google Drive

Time (sec) – lower is better



 Intel Core m3 processor (Samsung Chromebook Pro)     Intel Celeron N3150 processor (Acer Chromebook R 11)

An Intel Core m3 processor-powered Chromebook could also help you with home office tasks like putting together a proposal for house renovations or reading PDFs of instruction manuals to put together your new bookshelf. 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.

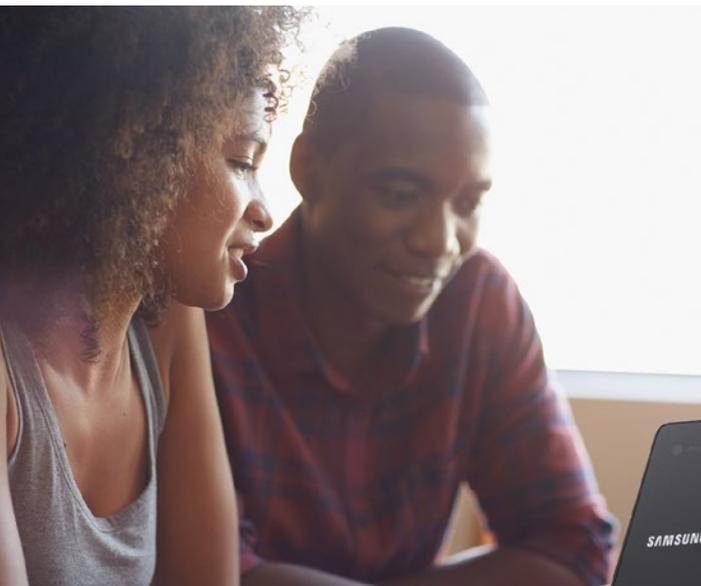


## Generate new creations faster

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.

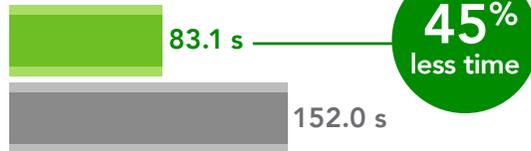
Need to capture a few precious seconds of video and share it with friends? With the Intel Core m3 processor-powered Chromebook, we shaved a few seconds off the time it took to encode a GIF in the Tumblr app compared to doing the same task with the Intel Celeron N3150 processor-based Chromebook.



### Encoding HD video

in PowerDirector Video Editor App

Time (sec) – lower is better



### Encoding SD video

in PowerDirector Video Editor App

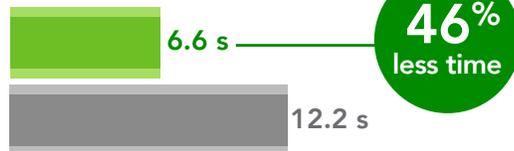
Time (sec) – lower is better



### Encoding a GIF

in Tumblr

Time (sec) – lower is better



### Playing rendered movie preview

in Magisto

Time (sec) – lower is better



Intel Core m3 processor  
(Samsung Chromebook Pro)

Intel Celeron N3150 processor  
(Acer Chromebook R 11)

## 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 Samsung Chromebook Pro, 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.



On June 12, 2017, 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 June 13, 2017.

## 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)	51	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)	60.0.3112.20 dev (64-bit)	61.0.3129.0 dev (64-bit)
Build/firmware	Caroline.7820.286.0	Cyan.7287.57.100

# 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

#### 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 Sheets 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 a project proposal template

1. From the shelf, click the Google Docs icon to launch the app.
2. Click the red + icon.
3. Click Choose template.
4. Scroll down to the Work template category.
5. Start the timer, and click Project proposal (tropic).
6. 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.

#### Opening a PDF

1. From the shelf, click the Google Docs icon to launch the app.
2. Simultaneously start the timer and click the test PDF from the files list.
3. When the PDF fully loads, 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.

## 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.

## Magisto

### Playing a rendered movie preview

1. From the Google Play store, install Magisto, and pin the app to the shelf.
2. From the shelf, launch the app, and click More Options.
3. Click Continue with Google.
4. Click Allow to enable access to device contacts.
5. Click Personal movie.
6. Click Allow to enable access to device storage.
7. Select the test clip, and click Next.
8. Click the Summer editing filter.
9. Click the Clint Eastwood soundtrack.
10. Click Make my movie!, and click No Thanks to skip adding a title.
11. Click the back arrow to skip the upgrade offer.
12. When the movie finishes encoding, start the timer, and click the play icon.
13. When movie playback begins, stop the timer.

This project was commissioned by Intel Corp.



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