Samsung®
Chromebook™ Pro with an
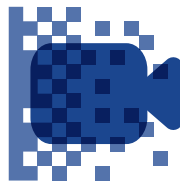
**Intel® Core™ m3
processor**

**Prepare print
preview in 50%
less time**
in Google Sheets™

**Encode HD
video in 2.8
fewer minutes**
in PowerDirector
Video Editor

# Increase your productivity with a Chromebook powered by an Intel Core m3 processor

An Intel Core m3 processor-powered Chromebook enabled us to get work done in less time than with a Chromebook based on an Arm Rockchip processor

If you're in the market for a new Chromebook to use for work, you'll want a device that helps you get things done. A device that enables you to complete application tasks with little delay can ensure you make the most of your time in the office—and make it less likely that you'll need to take your work home.

At Principled Technologies, we compared daily office tasks in common Android™ applications on two Chromebooks: A Samsung® Chromebook Pro powered by an Intel® Core m3 processor, and the Arm Rockchip processor-powered Samsung Chromebook Plus. With the Intel Core m3 processor-powered device, we completed tasks in less time, which could translate to increased productivity during your workday.
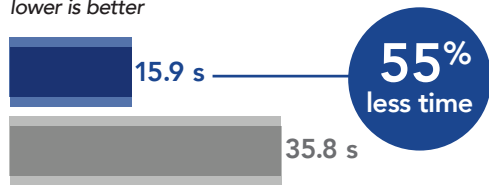
Previewing Excel file
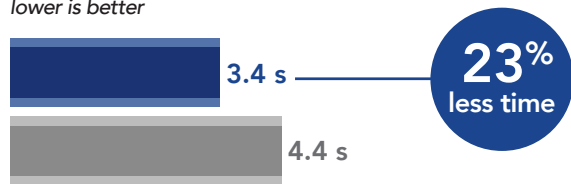in Google Drive

Time (sec)
lower is better

18.4 s

29% less time

25.8 s
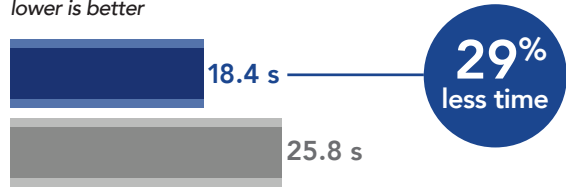
Opening Excel file
in Google Sheets

Time (sec)
lower is better

15.9 s

55% less time

35.8 s

Opening Excel file
in Google Drive

Time (sec)
lower is better

3.4 s

23% less time

4.4 s

Preparing large file print preview
in Google Sheets

Time (min)
lower is better

1.8 m

50% less time

3.7 m
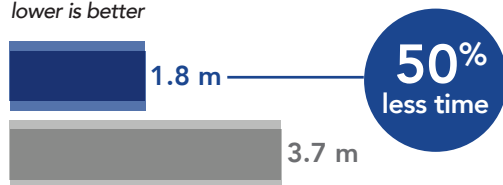
Saving large Excel document
in Google Sheets

Time (sec)
lower is better

25.1 s

37% less time

40.0 s
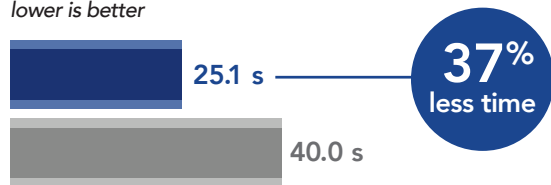
Intel Core m3 processor
(Samsung Chromebook Pro)

ARM Rockchip
(Samsung Chromebook Plus)

How we tested

Over the course of a single workday, you'll interact with many types of documents and media. We compared how each Chromebook handled spreadsheets, images, PDFs, videos, and document templates—the tools necessary for tasks you do every day. The following scenarios detail how a Chromebook powered by an Intel Core m3 processor could get you through the day while keeping waiting to a minimum.

Dealing with huge spreadsheets

A very important client just sent Andrew a Microsoft Excel spreadsheet to review and edit. He takes a quick glance with the Google Drive preview feature, which loads in less time with the Intel Core m3 processor-powered Chromebook than it would if he'd used a Chromebook with an Arm Rockchip processor. When he's ready to make changes in Google Sheets, the client's file opens in 20 fewer seconds with the Intel processor-powered Chromebook.

After editing the spreadsheet, Andrew prints it for his records—two minutes faster with the Intel processor-powered device. Finally, Andrew saves the Google Sheets document as an Excel file so he can send it back to the client. With the time saved by using a Chromebook powered by the Intel Core m3 processor, he's ready to tackle the next item on his to-do list.

Some of the spreadsheets you use could end up being quite large, with hundreds of cells containing critical business data. Frequent delays during spreadsheet-related tasks could bring your workday to a standstill, but our test results suggest you could wait less with the Chromebook powered by the Intel Core m3 processor.
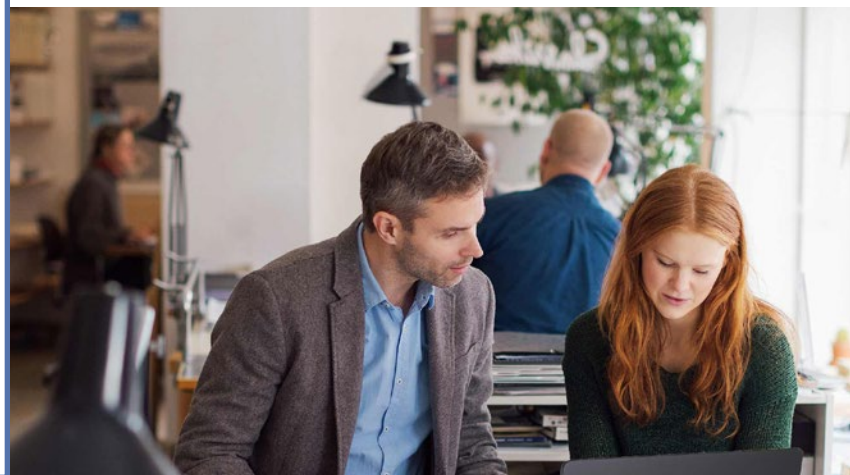
Working with images

Just before a big meeting, Janet gets a message she's been waiting for all morning. She opens her team's Google Hangouts group chat, and there they are—the images Janet needs for her afternoon presentation.

One by one, Janet attaches the images to a note in Evernote. With the Intel Core m3 processor-powered Chromebook, this takes 40 percent less time with each image. And just in time for the meeting!

Now back at her desk, Janet quickly opens the images in Adobe Creative Cloud to see if she needs to make any changes—a task that's nearly two seconds faster each time with the Intel processor-powered device. Good news: everything checks out. The images are ready for a prime spot in Janet's Google Slides presentation. She inserts the images, and sits back to take a breath before diving back into her work.
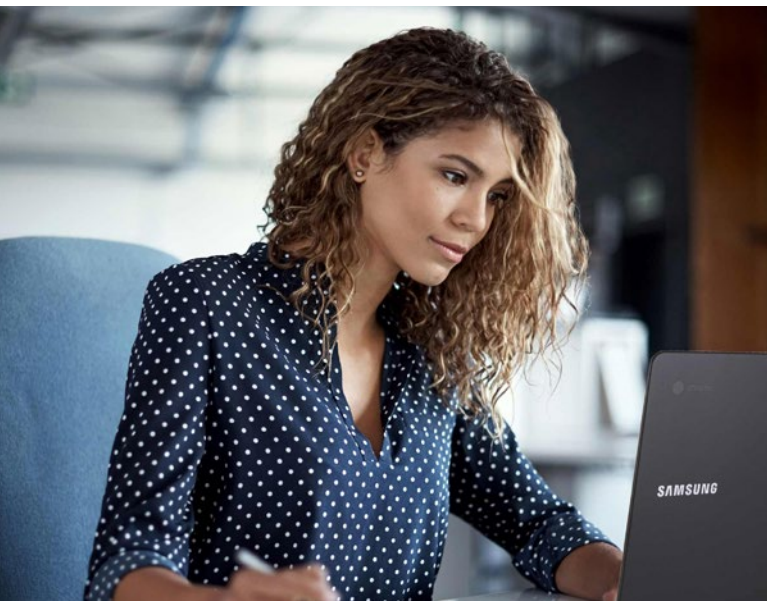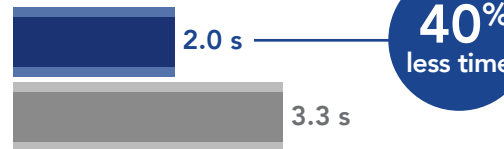
Loading group chat
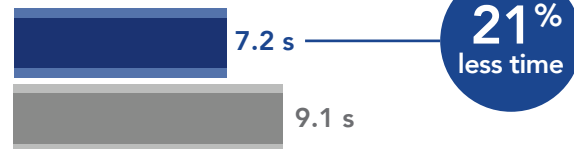in Google Hangouts

Time (sec) – *lower is better*

1.1 s

47% less time

2.1 s
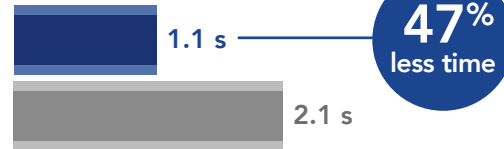
Attaching image
in Evernote

Time (sec) – *lower is better*

2.0 s

40% less time

3.3 s

Opening fullscreen image
in Adobe Creative Cloud

Time (sec) – *lower is better*

7.2 s

21% less time

9.1 s

Inserting image to presentation
in Google Slides

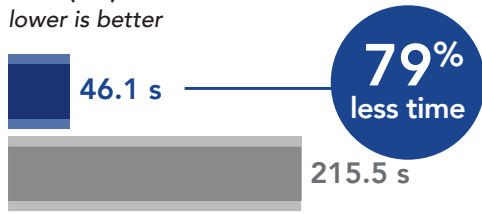**Time (sec)** – *lower is better*

1.7 s

40% less time

2.8 s
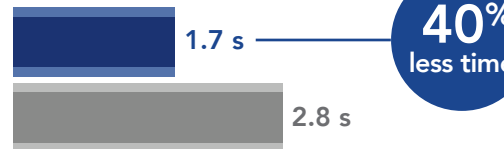
Intel Core m3 processor
(Samsung Chromebook Pro)

ARM Rockchip
(Samsung Chromebook Plus)

Rendering video

As a videographer, Sasha would be delighted to know that her Intel Core m3 processor-powered Chromebook can get video exported sooner than with an Arm Rockchip processor-based alternative. From within PowerDirector, encoding an HD video is 2.8 minutes faster, and encoding an SD video is over half a minute faster with the Intel Core m3 processor-powered Chromebook. These time savings multiply as Sasha finds herself exporting many versions of a video to get it just right.
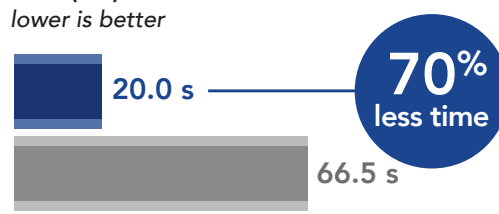
Encoding HD video
in PowerDirector

Time (sec)
lower is better

46.1 s

79%
less time

215.5 s

Encoding SD video
in PowerDirector

Time (sec)
lower is better

20.0 s

70%
less time

66.5 s

■ **Intel Core m3 processor**
(Samsung Chromebook Pro)
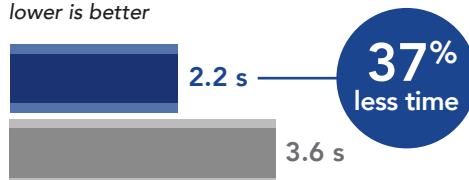
■ **ARM Rockchip**
(Samsung Chromebook Plus)

Working with PDF documents

Abdullah is editing a set of handbooks that will be distributed to his entire company later this year. In the morning, he grabs the PDF drafts from the company's cloud storage system—and each one saves more than a second with the Intel Core m3 processor-powered Chromebook compared to the Chromebook with an Arm Rockchip processor.

Abdullah opens each of the PDFs in Adobe Acrobat Reader to give them once-overs before proofreading. It looks like it'll be a long read, but Abdullah's up to the challenge. He prints the documents so he can make copy edits throughout the day. Loading a print preview of the ebooks in Google Drive takes two fewer seconds with the Intel Core m3 processor-powered Chromebook. Since documents are often shared as PDFs in Abdullah's office, he saves time on a significant part of his daily office life.

Exporting imported PDF
in Dropbox

Time (sec)
lower is better

2.2 s

37%
less time

3.6 s

Opening downloaded PDF
in Adobe Acrobat Reader

Time (sec)
lower is better

2.1 s

38%
less time

3.4 s
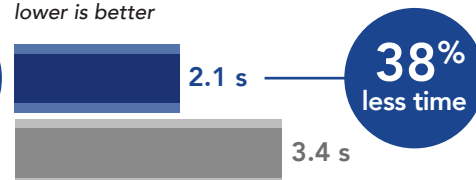
Loading print preview for eBook
in Google Drive

Time (sec)
lower is better

5.8 s

26%
less time

7.9 s
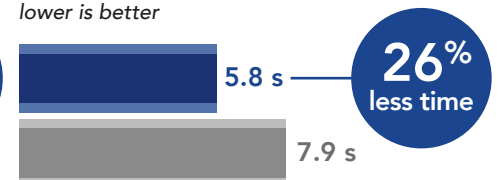
■ **Intel Core m3 processor**
(Samsung Chromebook Pro)

■ **ARM Rockchip**
(Samsung Chromebook Plus)

Loading report template
in Google Slides

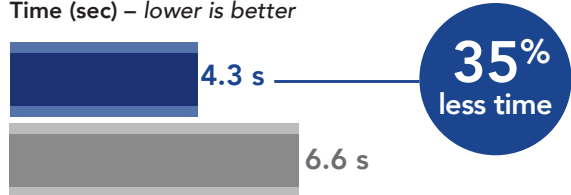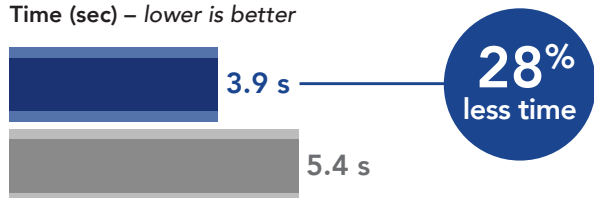Time (sec) – *lower is better*

4.3 s
6.6 s

35%
less time

Loading project template
in Google Docs

Time (sec) – *lower is better*

3.9 s
5.2 s

24%
less time
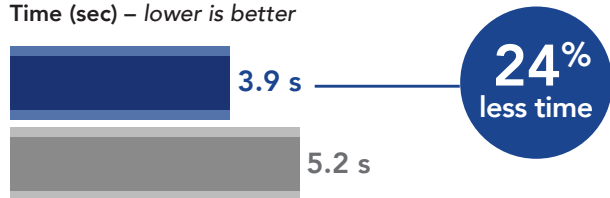
Loading resume template
in Google Docs

Time (sec) – *lower is better*

3.9 s
5.4 s

28%
less time

Loading brochure template
in Google Docs

Time (sec) – *lower is better*

3.3 s
5.4 s

39%
less time
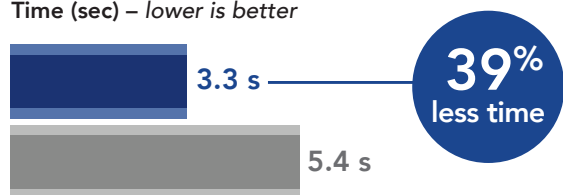
Intel Core m3 processor
(Samsung Chromebook Pro)

ARM Rockchip
(Samsung Chromebook Plus)

Using document templates

Jae is responsible for creating many types of documents each day. He uses templates to help him get started, but having to wait longer for his templates to load could interrupt his content-cranking flow.

With his Intel Core m3 processor-powered Chromebook, Jae loads a Google Slides status report template over two seconds faster than if he'd used a Chromebook with an Arm Rockchip processor.

In Google Docs, whether it's loading a project proposal template, a resumé template, or a brochure template, each task takes less time with his Intel Core m3 processor-powered machine.

Conclusion: Get a Chromebook that boosts your productivity

Your company may agonize over which Chromebook to roll out to employees, but for you, the choice is clear: You need a responsive device that doesn't leave you waiting on simple tasks. In our tests, the Samsung Chromebook Pro powered by an Intel Core m3 processor enabled us to complete office tasks in less time than with an Arm Rockchip processor-powered Samsung Chromebook Plus. With devices powered by the Intel Core m3 processors, you could save time every day in tasks that range from tiny touch-ups to mission-critical workflows.

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	Samsung Chromebook Plus
Processor	Intel Core m3-6Y30	ARM Rockchip
Processor freq (GHz)	0.9-2.2	2.0
Processor cores	2	6
Memory (GB)	4	4
Storage (GB)	32	32
Battery type	Li-Ion	Li-Ion
Battery capacity (Wh)	39	39
Display	12.3" 2,400 x 1,600	12.3" 2,400x1,600
Wireless	802.11 AC	802.11 AC
Bluetooth	4.0	4.0
USB ports	2x USB-C	2x USB-C
System weight (lbs.)	2.38	2.38
OS (version)	60.0.3112.20 dev (64-bit)	61.0.3163.38 dev (32-bit)
Build/firmware	Caroline.7820.286.0	Kevin.8785.220.0

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 Slides

Loading a status report template

1. From the Google Play Store, install Google Slides, and pin the app to the shelf.
2. Launch the app from the shelf.
3. Click the red + icon.
4. Click Choose template.
5. Start the timer, and click the Status report template.
6. When the slideshow fully loads, stop the timer.

Inserting an image into a slideshow

1. From the shelf, click the Google Slides icon to launch the app.
2. Click the red + icon.
3. Click Choose template.
4. Click the fourth slide from the template.
5. Click the + icon from the top navigation bar.
6. Select Image, and click From photos.
7. Select the test image, start the timer, and click Open.
8. When the image fully loads into the slideshow, stop the timer.

Google Sheets

Saving a large Google Sheet as an Excel document

1. From the Google Play Store, install Google Sheets, and pin the app to the shelf.
2. From the shelf, launch the app, 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 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, click the test Sheet to open it.
3. From the top navigation bar, click the menu icon.
4. Click Share & export, start the timer, and click Print.
5. When the print preview fully loads, stop the timer.

Opening a large-sized 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. From the Google Play store, install Google Docs, and pin the app to the shelf.
2. From the shelf, click the Google Docs icon to launch the app.
3. Click the red + icon.
4. Click Choose template.
5. Scroll down to the Work template category.
6. Start the timer, and click Project proposal (tropic).
7. When the template fully loads, stop the timer.

Loading the 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 Resume (Swiss).
5. When the template fully loads, stop the timer.

Loading the brochure (geometric) 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 Resume (Swiss).
5. When the template fully loads, stop the timer.

Adobe Acrobat Reader

Opening a downloaded PDF

1. From the Google Play store, install Adobe Acrobat Reader, and pin the app to the shelf.
2. From the shelf, launch the app, and click the Local tab.
3. Click Allow to enable access to local device storage.
4. Start the timer, and click the test PDF file.
5. When the PDF fully loads, stop the timer.

Adobe Creative Cloud

Viewing an image in fullscreen view

1. From the Google Play store, install Adobe Creative Cloud, and pin the app to the shelf.
2. Launch the app from the shelf, and click Sign In.
3. Sign in with the test account.
4. From the Files screen, click the blue + icon.
5. Click Upload a File.
6. Click Allow to enable access to device media storage.
7. Select the test image, and click Open.
8. Close the app, and relaunch from the shelf.
9. Start the timer, and click the test image thumbnail.
10. When the fullscreen image fully loads, stop the timer.

Google Drive

Opening an Excel spreadsheet in Google Sheets

1. From the Google Play store, install Google Drive, and launch the app from the shelf.
2. From the shelf, click the Google Drive icon to launch the app.
3. From the files list, click the drop-down menu icon next to the test Excel spreadsheet.
4. Start the timer, and click Open With.
5. When the sheet fully loads, stop the timer.

Opening a preview of an Excel spreadsheet

1. Launch the app from the shelf.
2. From the files list, start the timer, and click the test Excel spreadsheet thumbnail.
3. When the sheet fully loads, stop the timer.

Loading a print preview for eBook PDF

1. Launch the app from the shelf.
2. From the files list, click the thumbnail for the test PDF.
3. When the PDF loads, click the drop-down menu icon.
4. Start the timer, and click Print.
5. When the print preview fully loads, stop the timer.

Dropbox

Exporting an imported PDF

1. Install Dropbox from the Google Play Store, and pin the app to the shelf.
2. From the shelf, launch the app, and click Sign in with Google.
3. Click Allow to enable offline access.
4. Click the test account.
5. Click Not Now to skip setting up Dropbox on an additional computer.
6. Close and relaunch the app.
7. Click the test PDF document.
8. Click the drop-down arrow from the top navigation bar.
9. Click Export.
10. Click Save to device.
11. From the files screen, change the current folder to Downloads by clicking the hamburger menu icon, and clicking Downloads.
12. Start the timer, and click Save.
13. When the Export Complete dialog appears, stop the timer.

Evernote – stay organized

Attaching an image to a note

1. From the Google Play store, install Evernote, and pin the app to the shelf.
2. From the shelf, launch the app, and click Continue with Google.
3. Click the test account.
4. Close and relaunch the app from the shelf.
5. Click the green + icon, and click Text Note.
6. Click the attachment icon.
7. Click Photo.
8. Select the test image.
9. Start the timer and click Open.
10. When the image fully loads, stop the timer.

Hangouts

Loading a group chat

1. From the Google Play store, install Google Hangouts, and pin the app to the shelf.
2. From the shelf, launch the app.
3. Start the timer and click the group chat thumbnail.
4. When the group chat fully loads, stop the timer.

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

Encoding an HD Video

1. From the Google Play store, install PowerDirector, 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. With SD video resolution selected, start the timer and click Next.
5. When the video share screen appears, stop the timer.

This project was commissioned by Intel Corp.

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Facts matter.®