



The science behind the report:

# Give your workforce stronger system performance and longer battery life with the HP EliteBook 845 G10 Notebook PC

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 [Give your workforce stronger system performance and longer battery life with the HP EliteBook 845 G10 Notebook PC](#).

We concluded our hands-on testing on September 29, 2023. 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 July 17, 2023 or earlier. Unavoidably, these configurations may not represent the latest versions available when this report appears.

## Our results

To learn more about how we have calculated the wins in this report, go to <http://facts.pt/calculating-and-highlighting-wins>. Unless we state otherwise, we have followed the rules and principles we outline in that document.

Table 1: Results of our testing.

	HP EliteBook 845 G10 with an AMD Ryzen™ 7 PRO 7840HS processor	Dell Latitude 7440 with an Intel Core i7-1370P vPro processor
Performance benchmark results (higher is better)		
PassMark PerformanceTest	7,467.8	4,924.0
Cinebench R23 multi-core benchmark	14,572	13,062
3DMark		
Fire Strike DX11 Overall Score	6,454	4,935
Fire Strike Extreme Overall Score	3,242	2,464
Time Spy DX11 Overall Score	2,675	1,763
Time Spy Extreme Overall Score	1,192	832

	HP EliteBook 845 G10 with an AMD Ryzen™ 7 PRO 7840HS processor	Dell Latitude 7440 with an Intel Core i7-1370P vPro processor
Procyon Benchmark		
Video Editing	3,178	2,523
Photo Editing	5,587	5,242
SPECviewperf2020 v3.1 (higher is better)		
3DS Max	29.2	14.4
Catia	27.9	13.5
Creo	46.6	25.5
Energy	18.9	3.8
Medical	33.4	8.9
Solidworks	52.0	12.4
Maya	109.1	56.7
SNX	122.5	5.9
PugetBench (higher is better)		
Adobe Premiere Pro	288	217
Adobe After Effects	703	638
DaVinci Resolve	693	473
Battery life and efficiency results (higher is better)		
MobileMark 2018 "Best Battery Life" mode (higher is better)		
Battery life (hr:mm)	12:53	10:20
Minutes per WHr	15.2	10.9
Performance score	941	538
MobileMark 2018 "Best Performance" mode (higher is better)		
Battery life (hr:mm)	8:57	8:04
Minutes per WHr	10.5	8.5
Performance score	1,335	1,556

	HP EliteBook 845 G10 with an AMD Ryzen™ 7 PRO 7840HS processor	Dell Latitude 7440 with an Intel Core i7-1370P vPro processor
MobileMark 25 "Best Battery Life" mode (higher is better)		
Battery life (hr:mm)	12:35	9:28
Minutes per WHr	14.8	10.0
DC performance score	736	430
Performance score	576	244
MobileMark 25 "Best Performance" mode (higher is better)		
Battery life (hr:mm)	9:56	7:26
Minutes per WHr	11.7	7.8
DC performance score	1,074	1,160
Performance score	640	517

## System configuration information

Table 2: Detailed information on the system we tested.

System	HP EliteBook 845 G10 Notebook PC	Dell Latitude 7440
Processor		
Vendor	AMD	Intel®
Model number	Ryzen™ 7 PRO 7840HS	Core™ i7-1370P vPro
Core frequency (GHz)	3.8 – 5.1	1.9 – 5.2
Number of cores	8	14
Number of threads	16	20
Cache (MB)	16	24
Memory		
Amount (GB)	32 (2x 16GB)	32 (2x 16GB)
Type	DDR5-5600	DDR5-4800
Speed (MHz)	5,600	4,800
Graphics		
Vendor	AMD	Intel
Model number	Radeon™ Graphics	Iris Xe® Graphics
Driver version	v.31.0.14003.38003	v.31.0.101.4502
Storage		
Model	Western Digital SN740	KIOXIA® KBG50ZNS512G
Amount (GB)	512	512
Type	4x NVMe® PCIe® Gen 4	4x NVMe PCIe Gen 4
Connectivity/expansion		
Wireless internet	MediaTek Wi-Fi 6E MT7922	Intel Wi-Fi 6E AX211
Bluetooth	5.3	5.2
USB	2x Thunderbolt 4 USB Type-C (USB Power Delivery, DisplayPort 1.4) 2x USB Type-A (1 charging)	2x USB 3.2 Type-A port, (PowerShare) 2x USB Type-C Thunderbolt 4 (Power Delivery, DisplayPort 1.4)
Video	1x HDMI 2.0	1x HDMI 2.0
Battery		
Type	Lithium-polymer	Lithium-polymer
Rated capacity (WHr)	51	57
Cells	3	3

System	HP EliteBook 845 G10 Notebook PC	Dell Latitude 7440
Display		
Size (in.)	14	14
Type	WUXGA WLED+LBL UWVA Anti-Glare for IR Webcam 1920x1200 400 nits	FHD+ Anti-Glare, IPS 1920x1200 300 nits
Resolution	1920x1200	1920x1200
Touchscreen	No	Yes
Operating system		
Vendor	Windows	Windows
Name	11 Pro	11 Pro
Build number or version	22H2 22621.1992	22H2 22621.1992
BIOS		
BIOS name and version	HP V82 Ver. 01.03.01	Dell 1.4.1
Dimensions		
Height (in)	0.76	0.68 – 0.71
Width (in)	12.42	12.32
Depth (in)	8.82	8.67
Weight (lbs.)	3.27	3.32

# How we tested

## Setting up the systems

### Creating and updating the OEM Windows 11 Pro Image

1. Boot the system.
2. Follow the on-screen instructions to complete installation, using the default selections when appropriate.
3. In the bottom right corner, click the battery icon, and adjust the Windows Power mode (plugged in) to Best Performance.
4. Unplug the system, and in the bottom right corner, click the battery icon, and adjust the Windows Power mode (on battery) to Best Performance. Plug the system back in.
5. Set DPI scaling to 100%, and set Screen and Sleep options to Never:
  - a. Right-click the desktop and select Display settings.
  - b. Under the Scale and layout section, for the Change the size of text, apps, and other items option, select 100%.
  - c. From the left column, select Power & Sleep.
  - d. For all power options listed under Screen and Sleep, select Never.
6. Disable User Account Control notifications:
  - a. Select Windows Start, type `UAC`, and press the Enter key.
  - b. Move the slider control to Never notify, and click OK.
7. Run Windows Update, and install all updates available.
8. Launch the Windows Store app, and install all Store app updates.
9. Launch each vendor proprietary utility app installed on each system, and update any drivers or BIOS files.
  - For Dell, run the Dell Command Update utility.
  - For HP, run the HP Support Assistant utility.
10. Verify the date and time are correct, and synchronize the system clock with the time server.
11. Disable Automatic Windows Update:
  - a. Right-click the Windows Start button.
  - b. Select Computer Management.
  - c. Select Services and Applications.
  - d. Select Services.
  - e. Scroll down, and double-click Windows Update.
  - f. Click Stop.
  - g. From the Startup type drop-down menu, select Disabled.

### Capturing an image

1. Connect an external HDD to the system.
2. Click Windows Menu button, and type `Control Panel` in the search bar. Click Control Panel→System and Security→Backup and Restore (Windows 7)→Create a system image.
3. Verify that the external HDD is selected as the save drive, and click Next.
4. Verify that all drives are selected to back up, and click Next.
5. Click Start backup.
6. At Do you want to create a system repair disc, select No, and close the dialogs.

### Restoring an image

1. Connect an external HDD to the system.
2. Press and hold the Shift key while Restarting the system.
3. Select Troubleshoot.
4. Select Advanced options.
5. Select See more recovery options.
6. Select System image recovery.
7. Select the User account.
8. Enter the system password, and click Continue.
9. At the Restore system files and settings screen, select Next.
10. Verify that the external HDD is selected, and click Next.
11. Once the recovery has completed, click Finish.

## Measuring performance with SYSmark 25

### Avoiding antivirus software conflicts

SYSmark 25 is not compatible with any virus-scanning software, so we uninstalled any such software present on the notebook PCs before we installed the benchmark.

### Avoiding pre-installed software conflicts

SYSmark 25 installs the following applications, which its test scripts employ:

#### Productivity

- Adobe® Acrobat® Pro DC
- Audacity 2.3.2
- AutoIT 3.3.15.2
- Corel WinZip 24 Enterprise
- Google® Chrome®
- Microsoft Excel 2019
- Microsoft Outlook 2019
- Microsoft PowerPoint 2019
- Microsoft Word 2019
- Shotcut v19.09.14

#### Creativity

- Adobe Lightroom® Classic CC 2019
- Adobe Premiere® Pro CC 2019 v20.0.6
- Adobe Photoshop® CC 2019 v13.1.5

#### Responsiveness

- Adobe Acrobat Pro DC
- Adobe Lightroom Classic CC 2019
- Adobe Premiere Pro CC 2019
- Adobe Photoshop CC 2019
- Google Chrome
- Microsoft Excel 2019
- Microsoft Outlook 2019
- Microsoft PowerPoint 2019
- Microsoft Word 2019

If any of these applications already exist on the system under test, they could cause problems with the benchmark due to software conflicts. To avoid any such issues, we uninstalled all conflicting pre-installed software applications—including different versions of any of the programs SYSmark 25 uses—before we installed the benchmark.

### Using the SYSmark built-in configuration tool

This tool supports three levels of configuration:

1. Only makes changes that are REQUIRED for the benchmark to run.
2. Additionally, makes changes that are RECOMMENDED for repeatable results.
3. Additionally, makes OPTIONAL changes that help ensure best results.

The configuration tool makes the following configuration changes at each of the three levels:

#### Level 1 - Required

- Disables User Account Control (UAC)
- Set DPI Scaling to 100%
- Disables Low Battery Actions
- Disables Network Proxies
- Disables System Sleep and Hibernate
- Disables Windows Update
- Disables the WinSAT service

#### Level 2 - Recommended

- Disables User Account Control
- Set DPI Scaling to 100%
- Disables Low Battery Actions
- Disables Network Proxies
- Disables System Sleep and Hibernate
- Disables Windows Update
- Create BAPCo power scheme
- Set Power Plan Type to High Performance
- Set CPU High Performance
- Disables Disk Defrag
- Disables Windows Error Reporting
- Disables Windows Lock Screen
- Disables Windows Pop-ups
- Disables Screen Saver and Monitor Timeout
- Disables Windows Sidebar/Gadgets
- Disables Desktop Slideshow
- Disables Windows Defender
- Disables Windows Firewall
- Set Font Smoothing

#### Level 3 - Optional

- Disables Hard Disk Timeout
- Disables System Restore
- Ignores Laptop Lid Close
- Enables Dark Mode

We chose the official BAPCo "Run Benchmark" default as outlined in the BAPCo SYSmark 25 User Guide ([https://bapco.com/wp-content/uploads/2020/09/BAPCo\\_SYSmark25\\_user\\_guide\\_v1.4.pdf](https://bapco.com/wp-content/uploads/2020/09/BAPCo_SYSmark25_user_guide_v1.4.pdf)), which runs the benchmark using the Required and Recommended options.

## Setting up the test

1. Install SYSmark 25 with the default options.
2. Install the latest patch.

## Running the test

1. Boot the system.
2. Select Windows Start.
3. Type `cmd`, and press `Ctrl+Shift+Enter`.
4. Type `Cmd.exe /c start /wait Rundl132.exe advapi32.dll,ProcessIdleTasks`. Do not interact with the system until the command completes.
5. After the command completes, wait 5 minutes before running the test.
6. Launch SYSmark 25.
7. Click the Settings Gear icon.
8. Verify that the iterations are set to the default 1.
9. Verify that Conditioning Run is enabled.
10. Enter a name for the benchmark run.
11. To return to the main menu, click the Back button.
12. Click Run Benchmark.
13. When the benchmark finishes, record the SYSmark 25 benchmark results.
14. Repeat steps 1 through 13 twice more, and record the median results.

## Measuring performance with Procyon Photo Editing Benchmark

### Setting up the test

1. Download and install Procyon.
2. Open Procyon.
3. Click Photo Editing Benchmark.
4. Click Register.
5. Enter the license key for the Photo Editing Benchmark, and click Register.
6. Before running the benchmarks, make sure to install licensed versions of Adobe Photoshop 22.0 or higher and Adobe Lightroom Classic 10.0 or higher.

### Running the test

1. Boot the system.
2. Select Windows Start.
3. Type `cmd`, and press `Ctrl+Shift+Enter`.
4. Type `Cmd.exe /c start /wait Rundl132.exe advapi32.dll,ProcessIdleTasks`. Do not interact with the system until the command completes.
5. After the command completes, wait 5 minutes before running the test.
6. Launch Procyon.
7. Click Photo Editing Benchmark.
8. Click Run.
9. When the benchmark is complete, record the results.
10. Wait 15 minutes before rerunning the benchmark.
11. Repeat steps 8 through 10 twice more.



## Measuring performance with Procyon Video Editing Benchmark

### Setting up the test

1. Download and install Procyon.
2. Open Procyon.
3. Click Video Editing Benchmark.
4. Click Register.
5. Enter the license key for the Video Editing Benchmark, and click Register.
6. Before running the benchmarks, make sure to install a licensed version of Adobe Premiere 14.5 or higher.

### Running the test

1. Boot the system.
2. Select Windows Start.
3. Type `cmd`, and press `Ctrl+Shift+Enter`.
4. Type `Cmd.exe /c start /wait Rundll32.exe advapi32.dll,ProcessIdleTasks`. Do not interact with the system until the command completes.
5. After the command completes, wait 5 minutes before running the test.
6. Launch Procyon.
7. Click Video Editing Benchmark.
8. Click Run.
9. When the benchmark is complete, record the results.
10. Wait 15 minutes before rerunning the benchmark.
11. Repeat steps 8 through 10 twice more.

## Measuring performance with PassMark Performance Test

### Setting up the test

1. Install PassMark PerformanceTest.
2. Download PassMark PerformanceTest from <https://www.passmark.com/products/performancetest/download.php>.
3. To begin the installation, press Install.
4. Select Accept to accept the license agreement, and press Next.
5. After the installation is complete, deselect Launch Performance Test, and press Finish.

### Running the test

1. Boot the system.
2. Select Windows Start.
3. Type `cmd`, and press `Ctrl+Shift+Enter`.
4. Type `Cmd.exe /c start /wait Rundll32.exe advapi32.dll,ProcessIdleTasks`. Do not interact with the system until the command completes.
5. After the command completes, wait 5 minutes before running the test.
6. To launch PassMark PerformanceTest, press the PassMark PerformanceTest icon.
7. To start the benchmark, press Run Benchmark.
8. When the test completes, record the results.
9. Repeat steps 6 through 8 two more times.
10. Report the median of the three runs.

## Measuring performance with Cinebench R23

### Setting up the test

1. Download and install Cinebench from <https://www.maxon.net/en/downloads/cinebench-r23-downloads>.

### Running the test

1. Boot the system.
2. Select Windows Start.
3. Type `cmd`, and press `Ctrl+Shift+Enter`.
4. Type `Cmd.exe /c start /wait Rundl132.exe advapi32.dll,ProcessIdleTasks`. Do not interact with the system until the command completes.
5. After the command completes, wait 5 minutes before running the test.
6. Launch Cinebench.
7. Select `File`→`Advanced benchmark`.
8. Set the `Minimum Test Duration` to `Off`.
9. Select either `CPU (Multi Core)` or `CPU (Single Core)`, and click `Start`.
10. Record the result.
11. Wait 10 minutes before re-running.
12. Repeat steps 7 through 11 twice more, and record the median result.

## Measuring performance with 3DMark

### Setting up the test

1. Download the 3DMark from <http://www.futuremark.com/benchmarks/3dmark/all>.
2. To install 3DMark with the default options, double-click the 3DMark installer.exe file.
3. To launch 3DMark, double-click the 3DMark desktop icon. Enter the registration code, and click `Register`.
4. Exit 3DMark.

### Running the test

1. Boot the system.
2. Select Windows Start.
3. Type `cmd`, and press `Ctrl+Shift+Enter`.
4. Type `Cmd.exe /c start /wait Rundl132.exe advapi32.dll,ProcessIdleTasks`. Do not interact with the system until the command completes.
5. After the command completes, wait 5 minutes before running the test.
6. To launch the benchmark, double-click the 3DMark desktop icon.
7. At the 3DMark Home screen, click the `More Tests` button.
8. Select the desired benchmark to run (i.e., `Fire Strike` or `Time Spy`).
9. Move the slider button to turn off the “`Include Demo`” feature.
10. Click `Run`.
11. When the benchmark run completes, record the results.
12. Perform steps 7 through 11 two more times for each benchmark, and report the median of the three runs.

## Measuring performance with PugetBench for Premiere Pro

We used the following application:

- Adobe Premiere Pro

### Setting up the test

1. Launch Adobe Premiere Pro.
2. Click through the Tutorial pop-up tips.
3. Close Adobe Premiere Pro.
4. Purchase a PugetBench for Premiere Pro license from <https://www.pugetsystems.com/labs/articles/PugetBench-for-Adobe-Creative-Cloud-1642/>.
5. Click Get on Adobe Marketplace, and log into your Adobe account.
6. To install the PugetBench Premiere Pro Plug-in, click it.
7. Open Adobe Premiere Pro.
8. Click Create New ProjectàCreate.
9. Click WindowàExtensionsàPugetBench for Premiere Pro.
10. Next to License Key, click Change, and enter your license key. Click Save.
11. Click Download Project Files, and download the test assets.
12. From Downloads, extract the PugetBench for Premiere Pro 0.98 test assets.

### Running the test

1. Boot the system
2. Open Adobe Premiere Pro.
3. In DownloadsàPugetBench for Premiere Pro, open the Benchmark\_Project\_23.prproj file.
4. Click WindowàExtensionsàPugetBench for Premiere Pro.
5. Click Run Benchmark.
6. When the benchmark finishes, record the overall score.
7. Close Adobe Premiere Pro, and restart the system under test.
8. Wait 30 minutes before performing the next run.
9. Repeat steps 1 through 8 twice more, and record the median result.

## Measuring performance with PugetBench for After Effects

We used the following application:

- Adobe After Effects

### Setting up the test

1. Launch Adobe After Effects.
2. Click through the Tutorial pop-up tips.
3. Close Adobe After Effects.
4. Purchase and download the PugetBench for After Effects license from <https://www.pugetsystems.com/labs/articles/PugetBench-for-Adobe-Creative-Cloud-1642/>.
5. Click Get on Adobe Marketplace, and log into your Adobe account.
6. To install the PugetBench After Effects Plug-in, click it.
7. Open Adobe After Effects.
8. Click EditàPreferencesàScripting & Expressions.
9. Select Allow Scripts to Write Files and Access Network, and click OK.
10. Click EditàPreferencesàMemory & Performance.
11. The benchmark requires After Effects to have 12 GB of RAM space. Adjust the RAM reserved for other applications to get to 12 GB RAM reserved for After Effects, and click OK.
12. Click CompositionàNew Composition.
13. Accept the default Composition Settings, and click OK.
14. Click CompositionàPreview, and uncheck Cache Frames When Idle.
15. Click WindowàExtensionsàPugetBench for After Effects.
16. Next to License Key, click Change, and enter your license key. Click Save.

## Running the test

1. Boot the system.
2. Open Adobe After Effects.
3. Click on WindowàExtensionsàPugetBench for After Effects.
4. Click Run Benchmark.
5. When the benchmark finishes, record the overall score.
6. Close Adobe After Effects, and restart the system under test.
7. Wait 30 minutes before performing the next run.
8. Repeat steps 1 through 7 twice more, and record the median result.

## Measuring performance with PugetBench for DaVinci Resolve

We used the following application:

- DaVinci Resolve 18 Studio

### Setting up the test

1. Purchase, download, and install DaVinci Resolve 18 Studio from <https://www.blackmagicdesign.com/products/davinciresolve>.
2. Launch DaVinci Resolve Studio.
3. When prompted, enter the DaVinci Resolve Studio registration key.
4. Accept default configuration options and firewall permissions.
5. To confirm the Resolve configuration options, click DaVinci Resolve → Preferences.
6. In the Memory and GPU tab, ensure the GPU processing mode is set to Auto.
7. Close DaVinci Resolve Studio.
8. Purchase a PugetBench for DaVinci Resolve license from <https://www.pugetsystems.com/labs/articles/pugetbench-for-davinci-resolve-1523/>.
9. Download PugetBench for DaVinci Resolve.
10. When the download completes, unzip the benchmark.

### Running the test

1. Boot the system.
2. From the extracted benchmark folder, extract the Run PugetBench for DaVinci Resolve program.
3. Click Run Benchmark.
4. When the benchmark finishes, record the overall score.
5. Wait 30 minutes before performing the next run.
6. Repeat steps 1 through 5 twice more, and record the median result.

## Measuring performance with Unigine Superposition

### Setting up the test

1. Purchase, download, and install the Superposition Professional benchmark from <https://store.unigine.com/accounts/files>.

### Running the test

1. Launch the Superposition benchmark.
2. Click Run.
3. Click the Benchmark button.
4. Record the result.
5. Wait 15 minutes before re-running.
6. Repeat steps 1 through 6 twice more.

## Measuring performance with SPECviewperf®2020 v3.1

### Setting up the test

1. Navigate to <https://gwp.org/benchmarks/benchmark/specviewperf-2020-v3-1/>, and purchase and download the vendor license of the benchmark.
2. Download and unzip SPECviewperf® 2020 v3.1.
3. Navigate to the extracted SPECviewperf® 2020 v3.1 directory, and click the .exe file to install.
4. Shut down the system.

### Running the test

1. Boot the system.
2. Select Windows Start.
3. Type `cmd`, and press Ctrl+Shift+Enter.
4. Type `Cmd.exe /c start /wait Rundll32.exe advapi32.dll,ProcessIdleTasks`. Do not interact with the system until the command completes.
5. After the command completes, wait 5 minutes before running the test.
6. Launch SPECviewperf®.
7. Change the iterations to 1.
8. Choose the resolution options you desire for testing.
9. Click Run.
10. When the test is complete, record the results.
11. Repeat steps 1 through 10 twice more.

## Measuring thermals and sustained performance with Cinebench R23

These tests require the following:

- A FLIR E6xt Infrared Camera
- Cinebench R23

12. Boot the system.
13. Select Windows Start.
14. Type `cmd`, and press Ctrl+Shift+Enter.
15. Type `Cmd.exe /c start /wait Rundll32.exe advapi32.dll,ProcessIdleTasks`. Do not interact with the system until the command completes.
16. After the command completes, wait 5 minutes before running the test.
17. Launch Cinebench R23.
18. Select File→Advanced benchmark.
19. Verify that the Minimum Test Duration is set to the default 10 minutes (Test Throttling).
20. Select CPU (Multi Core) and click Start.
21. Record the performance results for the next five back-to-back 10-minute iterations and at the end of each run, note the ambient room temperature, and take a skin temperature photo with the FLIR E6xt infrared Camera of the top and bottom. Report the hottest spots.

## Measuring acoustics

### Measuring acoustics while idle

1. Boot the system.
2. Select Windows Start.
3. Type `cmd`, and press Ctrl+Shift+Enter.
4. Type `Cmd.exe /c start /wait Rundll32.exe advapi32.dll,ProcessIdleTasks`. Do not interact with the system until the command completes.
5. After the command completes, wait 5 minutes before running the test.
6. Start the Extech SDL600 Sound Level Meter/Datalogger and allow the laptop to run at idle for 20 minutes.
7. At the end of the 20 minutes, stop the Extech SDL600 and record the average Idle (dB).
8. Shut down the laptop.
9. Repeat steps 1 through 8 two more times.

## Measuring acoustics while running Cinebench R23

### Setting up the test

1. Purchase and download the Cinebench R23 benchmark from <https://www.maxon.net/en/downloads/cinebench-r23-downloads>.
2. Launch Cinebench R23.
3. Select File→Advanced benchmark.
4. Select File→Preferences, and change the Custom Minimum Test Duration to 20 minutes, and click OK.
5. Exit Cinebench.

### Running the test

1. Boot the system.
2. Select Windows Start.
3. Type cmd, and press Ctrl+Shift+Enter.
4. Type `Cmd.exe /c start /wait Rundl132.exe advapi32.dll,ProcessIdleTasks`. Do not interact with the system until the command completes.
5. After the command completes, wait 5 minutes before running the test.
6. Launch Cinebench R23.
7. In the Minimum Test Duration field, select Custom (20 minutes).
8. In Cinebench R23, simultaneously start the Extech SDL600 Sound Level Meter/Datalogger and click CPU (Multi Core) Start.
9. At the end of the Cinebench R23 run, stop the Extech SDL600, and record the average sound level (dB) while running Cinebench R23.
10. Shut down the laptop for 40 minutes, and let it return to room temperature.
11. Repeat steps 1 through 10 two more times.

## Measuring battery life with MobileMark 2018

This test requires a X-Rite - i1Display Plus colorimeter.

### Avoiding antivirus software conflicts

MobileMark 2018 is not compatible with any virus-scanning software, so we uninstalled any such software present on the notebook PCs before we installed the benchmark.

### Avoiding pre-installed software conflicts

MobileMark 2018 installs the following applications, which its test scripts employ:

#### Productivity

- Adobe Acrobat Pro DC
- AutoIT 3.3.14.2
- Google Chrome
- Microsoft Excel 2016
- Microsoft OneNote 2016
- Microsoft Outlook 2016
- Microsoft PowerPoint 2016
- Microsoft Word 2016
- Windows Zip

#### Creativity

- Adobe Photoshop CC
- Adobe Lightroom Classic CC
- CyberLink PowerDirector® 2015

#### Web Browsing

- Google Chrome
- Microsoft Movies & TV

If any of these applications already exist on the system under test, they could cause problems with the benchmark due to software conflicts. To avoid any such issues, we uninstalled all conflicting pre-installed software applications—including different versions of any of the programs MobileMark 2018 uses—before we installed the benchmark.

## Adjusting display brightness and power settings

The brightness of a notebook's display affects its battery life. Therefore, BAPCo requires that, before you test with MobileMark 2018, you ensure the brightness of the notebook's monitor is greater than or equal to 200 nits in the center of a completely white screen while the notebook is unplugged and running on battery power. The measurement follows the standards from the Video Electronics Standards Association ([www.vesa.org](http://www.vesa.org)).

We complied with this standard for all our tests by setting each notebook PC's brightness as close to 200 nits as we could without going below that level. We used the following procedure before we started each test. Note: This procedure assumes we began with the notebook plugged into the power supply.

1. To create a completely blank, white screen, open Microsoft Paint by clicking Start→All Programs→Accessories→Paint.
2. Press Ctrl+W to open the Resize and Skew dialog.
3. Under Horizontal and Vertical, enter 200, and click OK.
4. Click the View tab.
5. To view a white screen, click Full screen.
6. To allow the screen to warm, wait 45 minutes.
7. Unplug the notebook from the power supply, and measure the display's brightness using a luminance meter in the center of the screen. (We used an X-Rite - i1Display Plus colorimeter.)
8. If the reading is below or significantly greater than 200 nits, adjust the screen brightness to as close to 200 nits as you can without going under, and retest:
  - a. Click the Windows Start button.
  - b. In the Windows Start search box, type `display settings`
  - c. Adjust the slider to change the Display brightness to the correct percentage that produces no less than 200 nits.
9. Allow the notebook to run on battery power for 10 minutes, re-measure the display, and adjust the brightness up or down as necessary.
10. Verify that the notebook saved the brightness setting by plugging in the system, unplugging it, and taking another reading.

## Using the MobileMark built-in configuration tool

This tool supports three levels of configuration:

1. Only makes changes that are REQUIRED for the benchmark to run.
2. Additionally, makes changes that are RECOMMENDED for repeatable results.
3. Additionally, makes OPTIONAL changes that help ensure best results.

The configuration tool makes the following configuration changes at each of the three levels:

### Level 1 - Required

- Disables User Account Control (UAC)
- Set DPI Scaling to 100%
- Disables Low Battery Actions
- Disables Network Proxies
- Disables System Sleep and Hibernate
- Disables Windows Update
- Enables Windows Search

### Level 2 - Recommended

- Create BAPCo power scheme
- Set Power Plan Type to Balanced
- Set CPU Adaptive Mode
- Disables Battery Saver Dimming
- Verifies Battery Saver Threshold
- Disables Disk Defrag
- Disables Windows Error Reporting
- Disables Windows Lock Screen
- Disables Windows Pop-ups
- Disables Screen Saver and Monitor Timeout
- Disables Windows Sidebar/Gadgets
- Disables Desktop Slideshow
- Disables Windows Defender
- Disables Windows Firewall
- Set Font Smoothing

### Level 3 - Optional

- Disables Hard Disk Timeout
- Disables System Restore
- Ignores Laptop Lid Close

We chose the official BAPCo "Run Benchmark" default as outlined in the BAPCo MobileMark2018 User Guide ([http://bapco.com/wp-content/uploads/2019/03/BAPCo\\_MobileMark2018\\_user\\_guide\\_v1.3.pdf](http://bapco.com/wp-content/uploads/2019/03/BAPCo_MobileMark2018_user_guide_v1.3.pdf)), which runs the benchmark using the Required and Recommended options.

## Setting up the performance-qualified battery life test

1. On a separate PC, install the i1Profiler software from <https://www.xrite.com/categories/formulation-and-quality-assurance-software/i1profiler>, and connect the X-Rite - i1Display Plus colorimeter to that PC.
2. On the system under test, verify that the wireless adapter is enabled and connected to a wireless router that is not connected to the internet.
3. On the system under test, verify that the Lower screen brightness when using battery saver is turned off:
  - a. Select Windows Start, type `Battery saver`, and press the Enter key.
  - b. Next to Turns on at 20%, click the down arrow. Next to Lower screen brightness when using battery saver, toggle the button to Off.
4. On the system under test, verify that the volume is set to 50%.
5. On systems with AMD processors, disable Vari-Bright to prevent the screen from automatically dimming:
  - a. Launch AMD Software.
  - b. Click the Settings gear icon.
  - c. Select the Display tab, and disable Vari-Bright.
6. Verify that the screen brightness is set to no less than 200 nits.
7. Install MobileMark 2018 with the default options.

## Running the performance-qualified battery life test

1. Boot the system.
2. Select Windows Start.
3. Type `cmd`, and press Ctrl+Shift+Enter.
4. Type `Cmd.exe /c start /wait Rundll32.exe advapi32.dll,ProcessIdleTasks`. Do not interact with the system until the command completes.
5. After the command completes, wait 5 minutes before running the test.
6. Launch MobileMark 2018.
7. Click the Settings gear icon.
8. Verify that Conditioning Run is enabled.
9. Enter a name for the benchmark run.
10. To return to the main menu, click the Back button.
11. Click Run Benchmark.
12. When prompted, unplug the AC power adapter. The test will begin immediately.

The benchmark is complete when the notebook PC has fully depleted its battery and is no longer operational when running on battery power.

We executed the MobileMark 2018 benchmark three times on the system and took the median battery life score run as the representative performance score result for that test.



## Measuring battery life with MobileMark 25

This test requires a X-Rite - i1Display Plus colorimeter.

### Avoiding antivirus software conflicts

MobileMark 25 is not compatible with any virus-scanning software, so we uninstalled any such software present on the notebook PCs before we installed the benchmark.

### Avoiding pre-installed software conflicts

MobileMark 25 installs the following applications, which its test scripts employ:

#### Productivity

- Adobe Acrobat Pro DC
- Audacity
- Corel WinZip 24.0 Enterprise
- Google Chrome
- Microsoft Excel 2019 Professional Plus VL
- Microsoft Outlook 2019 Professional Plus VL
- Microsoft PowerPoint 2019 Professional Plus VL
- Microsoft Word 2019 Professional Plus VL
- Shotcut

#### Creativity

- Adobe Photoshop CC
- Adobe Lightroom Classic CC
- Adobe Premiere Pro CC.

If any of these applications already exist on the system under test, they could cause problems with the benchmark due to software conflicts. To avoid any such issues, we uninstalled all conflicting pre-installed software applications—including different versions of any of the programs MobileMark 25 uses—before we installed the benchmark.

### Using the MobileMark built-in configuration tool

This tool supports three levels of configuration:

1. Only makes changes that are **REQUIRED** for the benchmark to run.
2. Additionally, makes changes that are **RECOMMENDED** for repeatable results.
3. Additionally, makes **OPTIONAL** changes that help ensure best results.

The configuration tool makes the following configuration changes at each of the three levels:

#### Level 1 - Required

- Disables User Account Control (UAC)
- Set DPI Scaling to 100%
- Disables Low Battery Actions
- Disables Network Proxies
- Disables System Sleep and Hibernate
- Disables Windows Update
- Enables Windows Search
- Disables WinSAT

#### Level 2 - Recommended

- Create BAPCo power scheme
- Set Power Plan Type to Balanced
- Set CPU Adaptive Mode
- Disables Battery Saver Dimming
- Verifies Battery Saver Threshold
- Disables Disk Defrag
- Disables Windows Error Reporting
- Disables Windows Lock Screen
- Disables Screen Saver and Monitor Timeout
- Disables Windows Security Center
- Set Font Smoothing

#### Level 3 - Optional

- Disables Hard Disk Timeout
- Disables System Restore
- Ignores Laptop Lid Close
- Enables Dark Mode
- No Wait for OpenMP Threads

We chose the official BAPCo "Run Benchmark" default as outlined in the BAPCo MobileMark25 User Guide ([https://bapco.com/wp-content/uploads/2021/09/bapco\\_mobilemark25\\_user\\_guide\\_v1.1.pdf](https://bapco.com/wp-content/uploads/2021/09/bapco_mobilemark25_user_guide_v1.1.pdf)), which runs the benchmark using the Required and Recommended options.

## Setting up the performance-qualified battery life test

1. On a separate system, install the i1Profiler software from <https://www.xrite.com/categories/formulation-and-quality-assurance-software/i1profiler>, and connect the X-Rite - i1Display Plus colorimeter to that PC.
2. On the system under test, verify that the wireless adapter is enabled and connected to a wireless router that is not connected to the internet.
3. On the system under test, verify that the Lower screen brightness when using battery saver is turned off:
  - a. Select Windows Start, type `Battery saver`, and press the Enter key.
  - b. Next to Turns on at 20%, click the down arrow. Next to Lower screen brightness when using battery saver, toggle the button to Off.
4. On the system under test, verify that the volume is set to 50%.
5. On systems with AMD processors, disable Vari-Bright to prevent the screen from automatically dimming:
  - a. Launch AMD Software.
  - b. Click the Settings gear icon.
  - c. Select the Display tab, and disable Vari-Bright.
6. Verify the system is no less than 250 nits.
7. On the system under test, install MobileMark 25 with the default options.

## Running the performance-qualified battery life test

1. Boot the system.
2. Select Windows Start.
3. Type `cmd`, and press Ctrl+Shift+Enter.
4. Type `Cmd.exe /c start /wait Rundll32.exe advapi32.dll,ProcessIdleTasks`. Do not interact with the system until the command completes.
5. After the command completes, wait five minutes before running the test.
6. Launch MobileMark 25.
7. Click Run Benchmark.
8. Click the Brightness Profiler button.
  - a. Allow the white screen to warm up for 30 minutes. After 30 minutes, click Skip.
  - b. At the Panel Dark Luminance pop-up, to use the value that is queried from the display, select Yes.
  - c. Place the X-Rite - i1Display Plus colorimeter in the outlined spot on the screen.
  - d. On the system under test, toggle the F1 button to turn off the test overlay.
  - e. On the colorimeter system, start i1Profiler program, and select Advanced.
  - f. Click Display, and click Profiling.
  - g. Next to Luminance, click the drop-down menu and select Measure.
  - h. In the drop-down menu that appears below, select Paper in booth.
  - i. In the box with the image that says, "Place your paper in the light booth," scroll down so that you can click the Measure button.
  - j. On the system under test, adjust the slider until the Target White luminance is met on the colorimeter system.
  - k. Once the correct Target White luminance is met on the test PC, click Done.
  - l. Click Continue.
9. The test will begin immediately. When prompted, unplug the AC power adapter.

The benchmark is complete when the notebook PC has fully depleted its battery and is no longer operational when running on battery power.

We executed the MobileMark 25 benchmark three times on the system and took the median battery life score run as the representative performance score result for that test.

Read the report at <https://facts.pt/W8VMdku> ▶

This project was commissioned by HP and AMD.



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