



Intel® Pentium® Silver N6000 processor-powered Microsoft Windows 10 laptop<sup>†‡</sup>



## Get a more responsive Windows laptop and help students tinker and create

### An Intel Pentium Silver N6000 processor-powered Windows 10 laptop completed tasks in educational apps in less time than a laptop powered by an AMD A9-9245 processor

At Principled Technologies, we compared the time required to complete tasks in a variety of educational apps when using the following Windows 10 laptops:

- An Intel Pentium Silver N6000 processor-powered laptop
- An AMD A9-9245 processor-powered Dell™ Inspiron™ 3595

The apps we tested include Microsoft Teams, Autodesk® Tinkercad®, and Minecraft. In each test, the Intel Pentium Silver N6000 processor-powered laptop completed the tasks in less time than the AMD A9-9245 processor-powered laptop. In addition, the Intel Pentium Silver N6000 processor-powered laptop achieved a higher score in a web-app responsiveness benchmark test called Speedometer 2.0.



**27% less time** to open a presentation while video conferencing<sup>†‡</sup>



**26% less time** to launch a video game<sup>†‡</sup>



**23% less time** to batch-edit 140 photos<sup>†‡</sup>

<sup>†</sup>HP ProBook x360 11 G7 (pre-production unit) with an Intel Pentium Silver N6000 processor compared to a Dell Inspiron 3595 with an AMD A9-9425 processor

<sup>‡</sup>See [the science behind this report](#) for detailed system configurations and benchmark results.

In this report, text in the **teal-colored sections** represents fictional scenarios based on the results of PT testing. Though the people aren't real, the scenarios represent a lifelike picture of the benefits users may see in the real world.



## How we tested

We tested each laptop by hand-timing common tasks in a variety of classroom and creativity apps. To reflect a real-world scenario where students and teachers need to perform tasks in the middle of a virtual class session, we performed tasks in Microsoft Teams and Microsoft PowerPoint Online while each laptop was connected to a two-way video call via Microsoft Teams Meeting. We performed the rest of testing without a video call to reflect students working on assignments outside of class.



<sup>A</sup>See [the science behind this report](#) for detailed system configurations and benchmark results.

Note: Each of the graphs in this report uses a different x axis in order to keep to a consistent size. Please be mindful of each graph's data range as you compare.

Ms. Kay's classroom recently switched from AMD A9-9245 processor-powered Windows laptops to laptops powered by the new Intel Pentium Silver N6000 processor.

The students find the new laptops to be much snappier than their old ones, and Ms. Kay agrees. Now, it takes much less time for her to open up the day's lesson in Microsoft Teams, and even to edit presentations on-the-fly during class.



Terrance P.



Sammy R.



Shayna L.



Nyla D.

## Save time completing tasks while class is in session

We assessed the multitasking capabilities of each device by measuring the time required to complete tasks in Microsoft Teams OneDrive and Microsoft PowerPoint Online while each device was connected to a Microsoft Teams Meeting call. Notably, the Intel Pentium Silver N6000 processor-powered laptop saved 33.6 seconds opening a .PPTX file from Teams OneDrive compared to the AMD A9-9245 processor-powered laptop.

### Save 33.6 seconds opening a .PPTX file during a meeting

with OneDrive and PowerPoint Online while running a Teams meeting

Time (sec)



### Save 1.7 seconds changing slides

with PowerPoint Online and Edge while running a Teams meeting

Time (sec)



### Save 1.6 seconds copying/pasting a table

with PowerPoint Online and Edge while running a Teams meeting

Time (sec)



■ HP ProBook x360 11 G7 with an Intel Pentium Silver N6000 processor (pre-production unit)  
 ■ Dell Inspiron 3595 with an AMD A9-9245 processor

Figure 1: Time (in seconds) to complete tasks in Microsoft Teams OneDrive and Microsoft PowerPoint Online while each device was connected to a Microsoft Teams Meeting call. Less time is better. Source: Principled Technologies.

#### Microsoft Teams

Teams is a platform for online conferencing and collaboration. It contains features such as Together Mode, which puts all classroom participants on a shared background, and integrates with more than 700 popular apps.<sup>1,2</sup>

#### Microsoft OneDrive

OneDrive is online storage that enables users to access and edit files across devices, back up precious data to the cloud, and share and collaborate on documents in real time via Microsoft Online apps (such as PowerPoint Online).<sup>3</sup>

<sup>Δ</sup>See [the science behind this report](#) for detailed system configurations and benchmark results.

Ms. Kay loves to bring out the creative potential of each of her students. There's truly an app for everything these days—with creative apps being so accessible, she makes it her responsibility to teach her students a broad smattering of basics. Recently, the students have learned how to use Adobe Photoshop Lightroom® to edit photos. This week, they're using Autodesk Tinkercad to explore and deconstruct 3D objects.



## Save time editing photos and 3D-modeled assets

In our photo-editing tests with Adobe Photoshop Lightroom, the Intel Pentium Silver N6000 processor-powered laptop saved 23.2 seconds batch-processing a set of 140 photos using a preset filter compared to the AMD A9-9245 processor-powered laptop. In our 3D modeling tests with Autodesk Tinkercad, the Intel Pentium Silver N6000 processor-powered laptop saved 12.7 seconds using the Copy and Tinker function on a 3D asset.

### Save 23.2 seconds batch-processing 140 photos

with Lightroom

Time (sec)

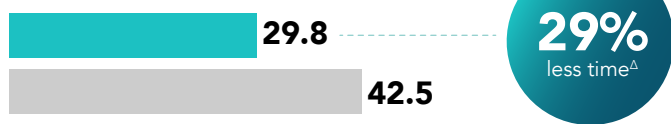


Figure 2: Time (in seconds) to edit photos in Adobe Lightroom. Less time is better. Source: Principled Technologies.

### Save 12.7 seconds using the Copy and Tinker function

with Tinkercad

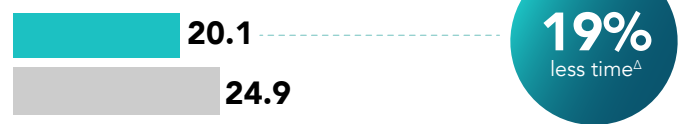
Time (sec)



### Save 4.8 seconds rendering the 3D Rally Car asset

with Tinkercad

Time (sec)



■ HP ProBook x360 11 G7 with an Intel Pentium Silver N6000 processor (pre-production unit)

■ Dell Inspiron 3595 with an AMD A9-9245 processor

Figure 3: Time (in seconds) to complete tasks in Autodesk Tinkercad. Less time is better. Source: Principled Technologies.

#### Adobe Photoshop Lightroom

Lightroom is a cloud-based photo editing app that enables you to edit, organize, and manage photos across your devices, and to share your next big photography project with collaborators.<sup>4</sup>

<sup>Δ</sup>See [the science behind this report](#) for detailed system configurations and benchmark results.

#### Autodesk Tinkercad

Tinkercad is a browser-based program for computer-aided design.<sup>5</sup> Common Sense Education® gave Tinkercad a 4 out of 5 star rating, citing the app's pedagogical utility.<sup>6</sup>

Last year, Ms. Kay learned that students often found it difficult to work on group projects remotely. But teamwork and communication are important skills she wants her kids to develop even while they're apart from one another. That's why Ms. Kay introduced Minecraft Fridays into her teaching schedule.

Each week, Ms. Kay sends out design plans for a particular building she wants the kids to create in Minecraft. She sorts the students into teams, and each team competes to see who can finish building Ms. Kay's design accurately and in the least amount of time. The kids look forward to Fridays each week, and are steadily building up their social cooperation skills from a distance.



## Save time launching educational video games

In our Minecraft tests, compared to the AMD A9-9245 processor-powered laptop, the laptop powered by an Intel Pentium Silver N6000 processor saved 6.6 seconds launching a trial of the game from Microsoft Store, and 6.2 seconds launching a demo of the game's Java edition from Minecraft Launcher.

### Save 6.6 seconds launching the Minecraft for Windows 10 game trial with Minecraft, Microsoft Store

Time (sec)



26%  
less time<sup>Δ</sup>

Figure 4: Time (in seconds) to launch Minecraft from Microsoft Store. Less time is better. Source: Principled Technologies.

### Save 6.2 seconds launching the Minecraft Java Edition game with Minecraft

Time (sec)



11%  
less time<sup>Δ</sup>

■ HP ProBook x360 11 G7 with an Intel Pentium Silver N6000 processor (pre-production unit)  
■ Dell Inspiron 3595 with an AMD A9-9245 processor

Figure 5: Time (in seconds) to launch Minecraft Java Edition from Minecraft Launcher. Less time is better. Source: Principled Technologies.

#### Minecraft

The best-selling video game of all time isn't just for having fun outside of school.<sup>7</sup> Minecraft has an education edition that features classroom management tools and pre-made lesson plans on everything from code to history to social-emotional learning (SEL).<sup>8</sup>

<sup>Δ</sup>See [the science behind this report](#) for detailed system configurations and benchmark results.



## Better responsiveness in the Speedometer 2.0 benchmark test

In addition to the hand-timed tasks, we tested each laptop with the Speedometer 2.0 web responsiveness benchmark. Speedometer 2.0 assesses the responsiveness of web apps by simulating user actions and measuring the time required to complete those actions. The Intel Pentium Silver N6000 processor-powered laptop we tested achieved a 36 percent better Speedometer 2.0 score compared to the AMD A9-9245 processor-powered laptop, suggesting that the laptop with the Intel processor would be better equipped to handle web-based applications.

### Speedometer 2.0 score with BrowserBench.org benchmark

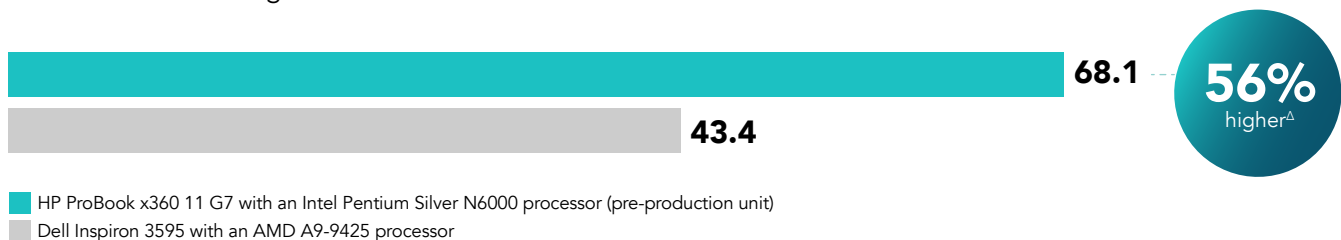


Figure 6: Speedometer 2.0 benchmark results. A higher score is better. Source: Principled Technologies.

## Conclusion

If your classroom is virtual, the more responsive your laptops are, the better the classroom experience will be. In our hands-on tests, a Windows 10 laptop PC powered by an Intel Pentium Silver N6000 processor enabled us to complete common tasks in a variety of educational apps in less time than a laptop powered by an AMD A9-9245 processor, including tasks we performed while multitasking during a two-way Microsoft Teams video call. The Intel Pentium Silver N6000 processor-powered laptop also showed stronger performance during the Speedometer 2.0 benchmark for web-app responsiveness.

To learn more, visit <https://intel.com/content/www/us/en/windows/windows-10.html>.

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- 1 "Chat, Meetings, Calling, Collaboration | Microsoft Teams," accessed January 13, 2021, <https://www.microsoft.com/en-us/microsoft-teams/group-chat-software>.
  - 2 "Apps and Workflow Automation | Microsoft Teams," accessed January 13, 2021, <https://www.microsoft.com/en-us/microsoft-teams/apps-and-workflows>.
  - 3 "Personal Cloud Storage – Microsoft OneDrive," accessed January 13, 2021, <https://www.microsoft.com/en-us/microsoft-365/onedrive/online-cloud-storage>.
  - 4 "Photo editing and organizing software | Adobe Photoshop Lightroom," accessed January 13, 2021, <https://www.adobe.com/products/photoshop-lightroom.html>.
  - 5 "Tinkercad | Create 3D digital designs with online CAD | Tinkercad," accessed January 13, 2021, <https://www.tinkercad.com/>.
  - 6 Marianne Rogowski, "Tinkercad Review for Teachers," accessed January 13, 2021, <https://www.common sense.org/education/website/tinkercad>.
  - 7 Tom Warren, "Minecraft still incredibly popular as sales top 200 million 126 play monthly," accessed January 13, 2021, <https://www.theverge.com/2020/5/18/21262045/minecraft-sales-monthly-players-statistics-youtube>.
  - 8 "Homepage | Minecraft Education Edition," accessed January 13, 2021, <https://education.minecraft.net/>

We concluded our hands-on testing on December 23, 2020. 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 December 21, 2020 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 hand-timed tasks for each Microsoft Windows 10 laptop. Time is in seconds. Less time is better. Each result represents the median of three test runs.

Task	HP ProBook x360 11 G7 (pre-production unit) with an Intel® Pentium® N6000 processor	Dell™ Inspiron™ 3595 with an AMD A9-9425 processor	Intel processor-powered laptop percent less time
Opening a .PPTX document from OneDrive during a Microsoft Teams meeting	87.6	121.2	27%
Changing slides in a Microsoft PowerPoint Online presentation in Microsoft Edge browser during a Microsoft Teams meeting	5.7	7.4	23%
Copying and pasting a table in a PowerPoint Online presentation in Microsoft Edge browser during a Microsoft Teams meeting	7.1	8.7	18%
Batch-processing 140 photos in Adobe Photoshop Lightroom®	75.8	99.0	23%
Using the Copy and Tinker function for the Rally Car project in Autodesk® Tinkercad®	29.8	42.5	29%
Rendering the 3D Rally Car asset in Autodesk Tinkercad	20.1	24.9	19%
Launching the Minecraft for Windows 10 game trial from Microsoft Store	18.4	25.0	26%
Launching the Minecraft Java Edition game demo from Minecraft Launcher	48.2	54.4	11%

Table 2: Results of the Speedometer 2.0 benchmarking test for each Windows 10 laptop. Higher score is better. Each result represents the median of three test runs.

Task	HP ProBook x360 11 G7 (pre-production unit) with an Intel Pentium N6000 processor	Dell Inspiron 3595 with an AMD A9-9425 processor	Intel processor-powered laptop percent higher score
Speedometer 2.0 score	68.1	43.4	56%



## System configuration information

Table 3: The table below presents detailed information on the systems we tested.

System	HP ProBook x360 11 G7 (pre-production unit)	Dell Inspiron 3595
Processor	Intel Pentium N6000	AMD A9-9425
Processor frequency (GHz)	1.10	3.1
Processor cores	4	2
Memory (GB)	8	8
Storage (GB)	256	256
USB	1 x USB 3.1 Type-C 2x USB 3.1 Gen 1	3 x USB 3.1 Gen 1
Battery type	Lithium ion	Lithium ion
Battery capacity (Wh)	47	33
Display (in.)	11.6	15.6
Display resolution	1,366 x 768	1,366 x 768
OS (version)	Windows 10 Pro 1909	Windows 10 Pro 1909
System Weight (lbs.)	2.93	4.88

# How we tested

## Application testing

For each scenario, we downloaded, installed, and pinned the requisite apps to the taskbar. For applications that required accounts, we created test profiles and logged the users into their accounts on each device. We ran a total of three test runs for each task. Between each run, we reset the laptop.

### Testing with Adobe Photoshop Lightroom

#### Batch-processing 140 photos with a filter preset

1. From the Adobe Lightroom home page, click the collection containing the test photos.
2. Click the first image.
3. Click the Adjustments icon.
4. To apply auto-adjustments, click Auto.
5. In the top-right, click the menu button, and select Copy Settings.
6. Leave the default Copy settings, and click OK.
7. To return to the collection view, click the back arrow.
8. Select all photos in the test collection.
9. Click the menu button, and select Paste Settings.
10. Simultaneously start the timer and click Apply.
11. When the processing dialog closes and the phrase “Changes applied to 140 photos” appears, stop the timer.

### Testing with Autodesk Tinkercad

#### Using the Copy and Tinker function on the 3D Rally Car project

1. From the Microsoft Edge web browser, navigate to the test project at <https://tinkercad.com/things/4x4r4zQvlbL>.
2. Simultaneously start the timer and click Copy and Tinker.
3. When the 3D model has fully loaded, stop the timer.

#### Rendering the 3D Rally Car project

1. From the Microsoft Edge web browser, navigate to the test project at <https://tinkercad.com/things/4x4r4zQvlbL>.
2. Click Copy and Tinker.
3. When the test project has loaded, simultaneously start the timer and click the Bricks icon.
4. When the 3D Bricks view has fully loaded, stop the timer.

### Testing with Minecraft for Windows 10

#### Launching the game

1. Launch the Microsoft Store.
2. Type `Minecraft for Windows 10` in the Search bar, and click the first result.
3. Simultaneously start the timer and click Play.
4. When the game’s home screen fully loads, stop the timer.

### Testing with Minecraft: Java Edition

#### Launching the game

1. Launch the Minecraft Launcher application.
2. Ensure that Minecraft: Java Edition is selected from the launcher app.
3. Simultaneously start the timer and click Play Demo.
4. When the game’s home screen fully loads, stop the timer.

## Testing with Browserbench.org

### Running the Speedometer 2.0 benchmark test

1. From the Microsoft Edge web browser, navigate to <http://browserbench.org/Speedometer2.0/>.
2. Ensure the browser window fits the required view port size.
3. Click Start Test.
4. When the test completes, record the results.

## Multitasking with Microsoft Teams

To conduct our multitasking testing, we opened Microsoft Teams in the Microsoft Edge web browser and joined a two-participant video meeting.

### Joining the meeting

1. Open the Microsoft Edge web browser.
2. Navigate to <https://teams.microsoft.com>, and click Teams.
3. To join the meeting, click Meet.
4. Ensure that video is connected. For our testing, to ensure the video content was roughly the same across devices, we pointed each laptop's camera at a blank ceiling.
5. From the meeting host, share and begin playback of the following YouTube video: <https://www.youtube.com/watch?v=4VQYiksNQFQ>.
6. Complete the tasks in the following sections.

### Opening a .PPTX file from OneDrive

1. From the Teams web interface, click Files.
2. Under Cloud storage, click OneDrive.
3. Navigate to the test file, right-click it, and hover over Open.
4. Simultaneously start the timer and click Open in browser.
5. When the presentation fully loads in Microsoft PowerPoint, stop the timer.

### Changing a slide in PowerPoint Online

1. With the test presentation open, simultaneously start the timer and click the second slide.
2. When the second slide has fully loaded into the current slide preview, stop the timer.

### Copying and pasting a table in PowerPoint Online

1. With the test presentation open, click a table column to select it.
2. Copy the table column.
3. Click the blank slide.
4. Simultaneously start the timer and paste the copied table.
5. When the copied content fully loads, stop the timer.

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