Don't wait to learn

The Lenovo® ThinkPad® 11e with an Intel® Celeron® processor gives students more time to learn*

In the classroom, every moment counts. An extra second spent waiting can be the difference between staying on task and becoming distracted, between learning and falling behind. When the devices students use for learning are fast and efficient, teaching can be a pleasure. But when a laptop is slow to respond, kids can lose their focus—and teachers, their patience.

A laptop's response time often depends on the processor inside. Lenovo ThinkPad 11e laptops are available with several different processors. We tested how well two versions of the 11e (one with an Intel Celeron processor, and the other with an AMD A4 processor) handled a series of typical classroom tasks.

In our evaluations, the Intel processor-powered ThinkPad often outperformed the AMD alternative. Take a look inside to find out more.

Finish classroom tasks faster
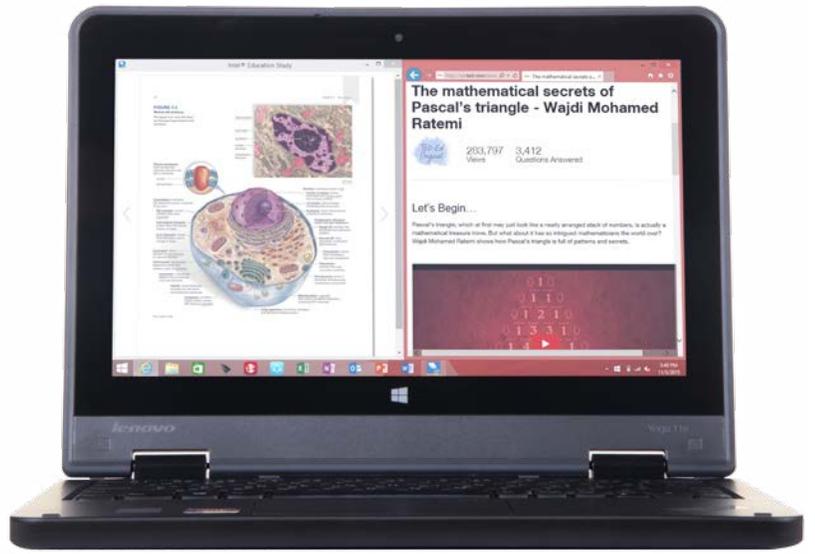
Faster e-textbook search

Faster interactive 3D app navigation

Faster using a quiz website

*vs. the same Lenovo ThinkPad 11e powered by the AMD A4 processor

Lenovo ThinkPad 11e powered by Intel

A day in the classroom

We put the Celeron processor-powered ThinkPads through a series of classroom activities to gauge how well they handle a typical school day. We chose these activities from apps we found in a list of top-rated education apps maintained by Microsoft, as well as other free learning apps that take advantage of the system's hardware. We found the Celeron-powered laptop was faster than the AMD-powered laptop in many of these tasks. For example, it was faster at playing Khan Academy® videos, running an interactive app of the night sky called "Star Chart," and searching through an e-book's text via the Intel Education Study app.

Students have more time for schoolwork with the ThinkPad powered by Intel.

When we added together the times for all of the tasks we measured, we found the laptop with the Celeron processor outperformed the AMD model by 4.5%. The time saved allows students to spend more time doing in the classroom and less time waiting. A few extra seconds may not seem like a lot, but when you're waiting for an entire class to catch up, the dead air becomes stifling. It's even worse when the class is waiting for you.

Over a school day, the extra seconds spent waiting for a slower processor turn into minutes—and it only takes a second to lose a student's attention. As any teacher can tell you, once a student's mind wanders, it's hard to get them back to the task at hand.

*see Appendix A for full information on the systems we tested

Streamline your classroom activities

With a speedy laptop, keeping students attentive is easy. The ThinkPad with the Intel processor bested the AMD alternative in each of the tasks below.

E-TEXTBOOK SEARCH

Intel processor	4.2 secs
AMD processor	5.4 secs

faster
searching an
e-textbook

INTERACTIVE 3D APP

Intel processor	4.9 secs
AMD processor	5.9 secs

faster
navigating an
interactive
3D app

ONLINE QUIZ

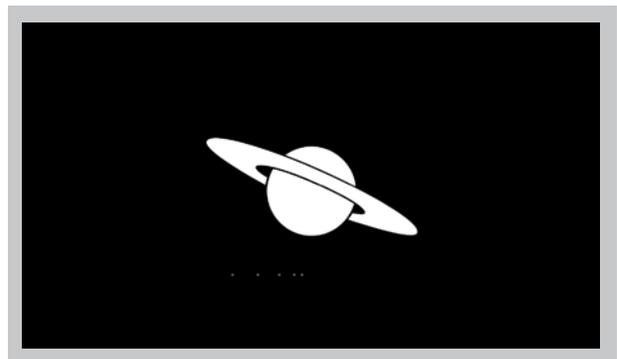|	
Intel processor	6.2 secs
AMD processor	7.0 secs

faster
using a quiz
website
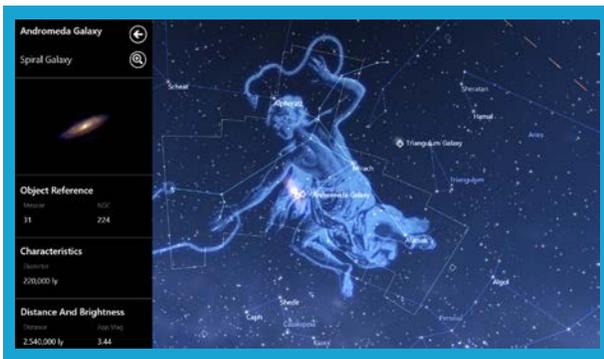
Star Chart rendering on ThinkPad with Intel

Star Chart rendering on ThinkPad with AMD

Explore the galaxy at warp speed with the ThinkPad powered by Intel.
The AMD processor took longer to load the constellation.

A multi-modal classroom

You can also purchase a special version of the ThinkPad 11e called the Yoga.™ True to its name, the Yoga can bend and fold into several modes, allowing students to work in many different situations. But the best part about the Yoga might be its touch-sensitive screen. The touchscreen allows students to engage learning materials in a tactile way, especially with interactive apps like Star Chart or BioDigital Human.™ The Yoga's tablet mode is handy for when students use their ThinkPad away from a desk—outdoors taking notes on plant life, or recording results from a chemistry experiment while standing at a crowded lab bench.

The ThinkPad Yoga 11e with touchscreen comes only with Intel processors.

The Yoga option is available *only* **with Intel processors.**

Laptop

Tent

Stand

Tablet

Conclusion

When shopping for classroom technology, it pays to consider the processor inside. The right processor could reduce the headaches that come when devices force students to wait.

In our hands-on evaluations, the ThinkPad with the Intel Celeron processor was faster than the one with the AMD processor in many tasks. Not only that, the touchscreen Yoga version of the ThinkPad 11e offers options that can give students more freedom and flexibility—and you can get it only with an Intel processor.
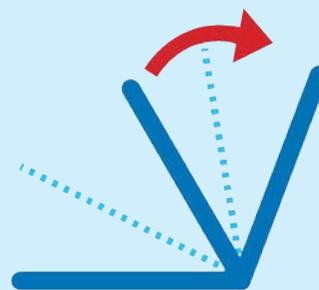
The speed and flexible forms available with these Intel Celeron processor-powered laptops can help your classroom become a rich environment in which young minds can stay engaged in learning.

Cut classroom wait times
with the ThinkPad 11e powered by Intel

Faster
to finish
classroom tasks

Multiple
modes
for classroom flexibility

Appendix A – Test systems

General

	Lenovo ThinkPad 11e with AMD A4	Lenovo ThinkPad Yoga 11e with Intel Celeron
Number of processor packages	1	1
Number of cores per processor	4	4
Number of hardware threads per core	4	4
Total number of processor threads in system	16	16
System power management policy	Balanced	Balanced
Processor power-saving option	AMD Enduro™ Technology	Enhanced Intel SpeedStep Technology
System dimensions (length × width × height in inches)	11.8 × 8.5 × 0.8	11.8 × 8.5 × 0.8
System weight (lbs.)	3.44	3.72

Platform

	Lenovo ThinkPad 11e with AMD A4	Lenovo ThinkPad Yoga 11e with Intel Celeron
Vendor and model number	Lenovo	Lenovo
Motherboard model number	20EDS00700 SDK0E50510 WIN	Intel-powered classmate PC SDK0E50510 WIN
BIOS name and version	Lenovo JIET18WW (1.03) (4/27/15)	Lenovo N15ET57W (1.17) (4/20/15)
BIOS settings	Default	Default

Battery

	Lenovo ThinkPad 11e with AMD A4	Lenovo ThinkPad Yoga 11e with Intel Celeron
Type	Li-Polymer	Li-Polymer
Size	Integrated	Integrated
Rated capacity (Wh)	35	35
Weight	Integrated	Integrated

CPU

	Lenovo ThinkPad 11e with AMD A4	Lenovo ThinkPad Yoga 11e with Intel Celeron
Vendor	AMD	Intel
Name	A4	Celeron
Model number	6210	N2940
Stepping	ML-A1	C0
Socket type	BGA 769	1170 BGA
Core frequency (GHz)	1.8	1.83
L1 cache	128KB + 128KB	4 × 24KB + 4 × 32KB
L2 cache	2MB	2 × 1MB
L3 cache	——	——

Memory module(s)

	Lenovo ThinkPad 11e with AMD A4	Lenovo ThinkPad Yoga 11e with Intel Celeron
Total RAM in system (GB)	4	4
Vendor and model number	Samsung® M471B5173DB0-YK0	Samsung M471B5173DB0-YK0
Type	DDR3 PC3-12800	DDR3 PC3-12800
Speed (MHz)	1,600	1,600
Speed running in the system (MHz)	1,600	1,600
Timing/Latency (tCL-tRCD-tRP-tRASmin)	11-11-11-28	11-11-11-28
Size (GB)	4	4
Number of RAM module(s)	1	1
Channel (single/dual)	Single	Single

Wireless

	Lenovo ThinkPad 11e with AMD A4	Lenovo ThinkPad Yoga 11e with Intel Celeron
Vendor and model number	Broadcom® 802.11ac Network Adapter	Intel Dual Band Wireless-AC 7260
Driver	Broadcom 6.35.223.4 (10/14/14)	Intel 16.6.0.8 (10/14/13)

Graphics

	Lenovo ThinkPad 11e with AMD A4	Lenovo ThinkPad Yoga 11e with Intel Celeron
Vendor and model number	AMD Radeon™ R3 Graphics	Intel HD Graphics
Type	Integrated	Integrated
Chipset	AMD Radeon R3 Graphics	Intel HD Graphics Family
Video BIOS/ Graphics Output Protocol version	113-C69300-100	7.1.1008
Total available graphics memory (MB)	2,048	1,792
Dedicated video memory (MB)	512	64
System video memory (MB)	0	0
Shared system memory (MB)	1,536	1,728
Resolution	1,366 × 768	1,366 × 768
Driver	AMD 13.352.1017. 1002 (1/18/15)	Intel 10.18.10.3958 (9/30/14)

Operating system

	Lenovo ThinkPad 11e with AMD A4	Lenovo ThinkPad Yoga 11e with Intel Celeron
Name	Windows® 8.1 Pro x64	Windows 8.1 Pro x64
Build number	9600	9600
Service Pack	n/a	n/a
File system	NTFS	NTFS
Kernel	ACPI x64-based PC	ACPI x64-based PC
Language	English	English
Microsoft DirectX® version	11	11

Sound card/subsystem

	Lenovo ThinkPad 11e with AMD A4	Lenovo ThinkPad Yoga 11e with Intel Celeron
Vendor and model number	Realtek® High Definition Audio	Realtek High Definition Audio
Driver	Realtek 6.0.1.7368 (10/21/14)	Realtek 6.0.1.7283 (7/1/14)

Hard disk

	Lenovo ThinkPad 11e with AMD A4	Lenovo ThinkPad Yoga 11e with Intel Celeron
Vendor and model number	Seagate® ST500LM021	Seagate ST500LM021
Number of disks in system	1	1
Size (GB)	500	500
Buffer size (MB)	32	32
RPM	7,200	7,200
Type	SATA HDD	SATA HDD
Controller	Standard SATA AHCI Controller	Intel Celeron processor N- and J-series AHCI
Driver	Microsoft 6.3.9600.16384 (6/21/2006)	Intel 9.4.4.1005 (7/9/13)

Ethernet

	Lenovo ThinkPad 11e with AMD A4	Lenovo ThinkPad Yoga 11e with Intel Celeron
Vendor and model number	Realtek PCIe® GBE Family Controller	Realtek PCIe GBE Family Controller
Driver	Realtek 8.35.716.2014 (7/16/14)	Realtek 8.20.815.2013 (8/15/13)

USB ports

	Lenovo ThinkPad 11e with AMD A4	Lenovo ThinkPad Yoga 11e with Intel Celeron
Number	2	2
Type	USB 3.0, USB 2.0	USB 3.0, USB 2.0
Other	SD™ card	SD card

Monitor

	Lenovo ThinkPad 11e with AMD A4	Lenovo ThinkPad Yoga 11e with Intel Celeron
LCD type	HD LED Anti-glare	HD IPS Multitouch Display
Screen size (inches)	11.6	11.6
Refresh rate (Hz)	60	60

Appendix B – Test methodology

At Principled Technologies, we pride ourselves on the rigor and relevance of our testing. To that end, we followed scientific testing procedures and used the two laptops in our study just as students would. Because we want you to be able to recreate our results, in this section, we provide all of the steps we followed—our complete testing methodologies.

We repeated each scenario until we had three consecutive data sets with a variance of 5% or less. That means our results did not change significantly from one run to the next. The data below represents the median of our three runs. The low variance means you should be able to do our tests yourself and achieve similar outcomes.

We tested each laptop using a wireless network and battery power.

Setting up Windows 8.1

1. Power on the laptop.
2. Select (UTC-05:00) Eastern Time (US & Canada), and click Next.
3. Click I accept.
4. Click Next.
5. When prompted for a computer name, type `pc`, and click Next.
6. Select the appropriate Internet connection, and click Next.
7. Click Use express settings.
8. Click Create a new account.
9. Click Sign in without a Microsoft account.
10. Click Finish.
11. When prompted for a user name, type `user`, and click Finish.
12. After the apps finish installing, click Not right now.

Preparing the Windows 8.1 notebooks for testing

Updating Windows 8.1
1. From Windows Search, type `Windows Update`, and click Check for updates.
2. Click Check now.
3. Click View Details.
4. Click Install.
5. After the updates install, restart the laptop.

Turning off automatic updates
1. From Windows Search, type `Windows Update`, and click Windows Update settings.
2. Click Choose how updates get installed.
3. Select Never check for updates (not recommended).
4. Uncheck all boxes, and click Apply.
5. Close window.

Turning off User Account Control notifications
1. In Windows Search, type `User Account Control.`
2. Click Change User Account Control settings.
3. Move the slider bar to Never notify, and click OK.
4. Click Yes.

Turning off screen saver
1. In Windows Search, type `Screen saver.`
2. Click Change screen saver.
3. Ensure that the drop-down box says None.
4. Close window.

Setting Turn off the display to Never

1. In Windows Search, type `Power options`, and click Power options.
2. Next to the active power plan, click Change plan settings.
3. Change every setting to Never.
4. Slide both plan brightness sliders all the way to the right, and click Save changes.
5. Close window.

Turning off Action Center alerts

1. In Windows Search, type `Action Center`, and click Action Center.
2. Click Change Action Center settings.
3. Uncheck every box, and click OK.
4. Close window.

Joining the test Wi-Fi® network

1. Click the Networks icon.
2. Click the desired network.
3. Check Connect automatically, and click Connect. If asked for a password, enter the password for the network.
4. Test the Internet connection by opening Internet Explorer® (IE).
5. Close IE.

Downloading the applications

Download the following free applications from the Microsoft App Store:

- BrainPOP® Featured Movie
- TED®
- myHomework
- Khan Academy
- Kindle®
- Star Chart
- Photo Editor

Installing the applications

Installing Intel Education Study

1. Open IE, and navigate to study.intel.com/
2. Click Windows.
3. Click Download Study App for Windows.
4. Click the download icon next to the file name.
5. Accept the terms in the license agreement.
6. Click Run.
7. When the InstallShield Wizard opens, click Next.
8. Accept the terms in the license agreement, and click Next.
9. Click Next twice.
10. Click Install.
11. Click Finish.

Installing and setting up AutoRefresher for Internet Explorer

1. Open IE, and navigate to download.cnet.com/AutoRefresher-for-IE/3000-12512_4-10062693.html
2. Click Download Now.
3. Click Run.
4. Click Accept.
5. Click Agree & Install.
6. Click Install Now.
7. Click Yes.
8. When the InstallShield Wizard opens, click Next.
9. Click Next three times.
10. Click Install.
11. Click Finish.
12. Return to IE, and click the Settings icon.
13. Click Manage add-ons.
14. Select RefresherBand Class, and click Enable. Click Close.
15. Close IE.

Scenario 1: History project

Testing	AMD	Celeron
	Median times (minutes:seconds.deciseconds)	
Microsoft PowerPoint® Online: open file	00:07.4	00:07.1
Microsoft Word Online: launch	00:01.4	00:01.4
Microsoft Excel® Online: launch	00:01.6	00:01.5
Khan Academy: play video	00:04.6	00:04.0
YouTube®: load Crash Course home page	00:03.8	00:03.8
Kindle: launch app	00:04.2	00:04.0
Kindle: search ebook	00:05.1	00:05.0
Star Chart: navigate to constellation	00:05.9	00:04.9
Photo Editor: launch app	00:02.2	00:01.9
Thinglink: load example	00:08.9	00:08.9
PowToon Edu: start sample video	00:08.0	00:06.8
Canva®: log in website	00:02.5	00:01.9
Canva: presentation examples	00:06.8	00:06.7
Total Time	01:21.0	00:57.9

Using Microsoft Office Online
1. Open IE and enter the URL login.microsoftonline.com.
2. Enter your email address and password, and click Sign in.
3. Click OneDrive®.
4. Simultaneously click Test1.pptx and start the stopwatch.
5. When the first slide of the presentation fully loads, stop the stopwatch.
6. Record the time.
7. Open the apps list in the top left corner.
8. Simultaneously click Word Online and start the stopwatch.
9. When the page fully loads, stop the stopwatch.
10. Record the time.
11. Click New Blank document.
12. Open the apps list in the top left corner.
13. Simultaneously click Excel Online and start the stopwatch.
14. When the page fully loads, stop the stopwatch.
15. Record the time.
16. Click Make a List.

Watching a video on Khan Academy
1. Navigate to Apps.
2. Click Khan Academy.
3. Scroll over to Downloaded Videos.
4. Simultaneously click Violin: Interview and demonstration with concertmaster David Kim and start the stopwatch.
5. Press Play to start the video.
6. When the video reaches the 1 second mark, stop the stopwatch.
7. Record the time.
8. Pause the video.

Watching a video on YouTube

1. Open a new tab in IE.
2. Navigate to youtube.com/user/crashcourse. Simultaneously press Enter and start the stopwatch.
3. Click Playlists.
4. Click World History.
5. Click The Persians & Greeks: Crash Course World History #5.
6. When the video begins to play, stop the stopwatch.
7. Record the time.
8. Pause the video.

Searching for an ebook in Kindle

1. Navigate to Apps.
2. Simultaneously click Kindle and start the stopwatch.
3. When the library loads, stop the stopwatch.
4. Record the time.
5. Click A Little Bit of Everything for Dummies.
6. Right-click the page, and type `meditation` in the search bar.
7. Simultaneously press Enter and start the stopwatch.
8. Click to navigate to Location 2236.
9. When the page loads, stop the stopwatch.
10. Record the time.
11. Click Go to, and select Cover.
12. Return to the Library.

Navigating to a constellation in Star Chart

1. Navigate to Apps.
2. Click Star Chart.
3. Simultaneously right-click and start the stopwatch.
4. Click Constellations.
5. Click Andromeda.
6. When the Andromeda constellation is fully loaded, stop the stopwatch.
7. Record the time.

Editing using Photo Editor

1. Navigate to Apps.
2. Simultaneously click Photo Editor and start the stopwatch.
3. When the first photo loads, stop the stopwatch.
4. Record the time.

Investigating Thinglink

1. Open a new tab in IE.
2. Navigate to thinglink.com. Simultaneously press Enter and start the stopwatch.
3. In the sample image, hover over the far right link. When the box with the link preview appears, stop the stopwatch.
4. Record the time.

Investigating PowToon Edu

1. Open a new tab in IE.
2. Navigate to powtoon.com/edu-home/. Simultaneously press Enter and start the stopwatch.
3. Click to start the example video. When the video begins, stop the stopwatch.
4. Record the time.

Investigating Canva

1. Open a new tab in IE.
2. Navigate to canva.com. Simultaneously press Enter and start the stopwatch.
3. When the background for the login screen fully loads, stop the stopwatch.
4. Record the time.
5. Click Log in.
6. Enter your email address and password, and click Log in.
7. Simultaneously click Presentation and start the stopwatch.
8. When all of the free example images have appeared, stop the stopwatch.
9. Record the time.

Scenario 2: Math class

Testing	AMD	Celeron
	Median times (minutes:seconds.deciseconds)	
Join Wi-Fi Network	00:04.4	00:03.9
BrainPOP: launch app	00:06.0	00:05.9
VoiceThread®: sample video	00:13.3	00:12.9
Desmos: graph demonstration	00:12.2	00:11.0
Intel Education Study: launch app	00:07.6	00:07.6
Intel Education Study: search textbook	00:05.4	00:04.2
TED: launch app	00:06.2	00:06.5
TED: play sample video	00:04.4	00:04.0
TED-ed: load sample lesson	00:08.9	00:10.3
BioDigital Human: load human	00:24.8	00:23.4
Sumo Paint: try online free	00:08.0	00:09.3
Quizizz: select sample quiz	00:10.7	00:10.6
Edcite: select sample quiz	00:07.0	00:06.2
myHomework: navigate to Homework	00:06.3	00:05.8
Total Time	02:05.2	02:01.6

Joining a known Wi-Fi network
1. Click the Networks icon.
2. Turn on Airplane mode. Wait 4 or 5 seconds to ensure that the network is fully disconnected.
3. Simultaneously turn off Airplane mode and start the stopwatch.
4. When the known network is connected, stop the stopwatch.
5. Record the time.

Opening BrainPOP Featured Movie
1. Navigate to Apps.
2. Simultaneously click BrainPOP Featured Movie and start the stopwatch.
3. When the image for Today's Featured Topic appears, stop the stopwatch.
4. Record the time.

Watching a video on VoiceThread
1. Open IE, and navigate to voicethread.com. Simultaneously press Enter and start the stopwatch.
2. Click Browse.
3. Click Social Justice Poetry Slam.
4. When the video begins playing, stop the stopwatch.
5. Record the time.

View a created graph on Desmos
1. Open a new tab in IE.
2. Navigate to desmos.com. Simultaneously press Enter and start the stopwatch.
3. Click Staff Picks: Math Examples.
4. Click Regular Moving and Growing and Shrinking Circle.
5. When the graph fully loads, stop the stopwatch.
6. Record the time.

Searching a textbook in Intel Education Study
1. Navigate to Apps.
2. Simultaneously click Intel Education Study and start the stopwatch.
3. When the home page loads, stop the stopwatch.
4. Record the time.

5. Click My Collections.
6. Click Sample: Biology – Chapter 4.
7. Click anywhere on the page, and click the Search icon.
8. Type `mitochondria`.
9. Simultaneously press Enter and start the stopwatch.
10. Click the result at the top of the page.
11. When the page loads, stop the stopwatch.
12. Record the time.
13. Return to the first page of the sample.

Watching a video in the TED App
1. Navigate to Apps.
2. Simultaneously click TED and start the stopwatch.
3. Click Today's Talk.
4. Click to play the video for Today's Talk.
5. When the video begins to play, stop the stopwatch.
6. Record the time.

Loading a lesson on TED-ed
1. Open a new tab in IE.
2. Navigate to ed.ted.com. Simultaneously press Enter and start the stopwatch.
3. Click the example lesson in the center of the screen.
4. When the video loads, stop the stopwatch.
5. Record the time.

Loading BioDigital Human
1. Open a new tab in IE.
2. Navigate to human.biodigital.com.
3. Enter an email address and password. Uncheck Remember Me.
4. Simultaneously click Sign In and start the stopwatch.
5. When the loading box disappears, stop the stopwatch.
6. Record the time.

Opening a free Sumo Paint session
1. Open a new tab in IE.
2. Navigate to sumopaint.com. Simultaneously press Enter and start the stopwatch.
3. Click Try Online.
4. When the paint window loads, stop the stopwatch.
5. Record the time.

Joining an online quiz at Quizizz
1. Open a new tab in IE.
2. Navigate to quizizz.com. Simultaneously press Enter and start the stopwatch.
3. Click Get Started!
4. Click the first quiz listed.
5. When the Play window loads, stop the stopwatch.
6. Record the time.

Taking an online quiz at Edcite
1. Open a new tab in IE.
2. Navigate to quizizz.com. Simultaneously press Enter and start the stopwatch.
3. Click Get Started!
4. Click the first quiz listed.
5. When the Play window loads, stop the stopwatch.
6. Record the time.

Updating homework assignments in myHomework
1. Navigate to Apps.
2. Simultaneously click myHomework and start the stopwatch.
3. Click Homework from the left menu bar.
4. When all three lists have loaded, stop the stopwatch.
5. Record the time.

Preparing the laptop for the next run

1. Close all applications.
2. Shut down the laptop.
3. Power on the laptop.

Measuring Wi-Fi speeds

We used speedtest.net to measure the download speed and upload speed of the wireless network we used for testing every 20 minutes. We then averaged those values.

Testing	AMD	Celeron
	Average speeds (Mb/s)	
Wi-Fi	45.6	68.7

This project was commissioned by Intel Corporation.