



More time to learn

The Lenovo® ThinkPad® 11e with an Intel® Core™ M processor cuts waiting time in the classroom*



The classroom has come a long way from chalkboards and overhead projectors, and the technologies available today can have a huge impact on the way kids learn. When new devices are fast and efficient, teaching can be a pleasure. But when a laptop is

slow to respond, students can lose their focus—and teachers, their patience.

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

In all our evaluations, the Intel processor-powered ThinkPad went to the head of the class. Take a look inside to find out more.



47%
faster
overall

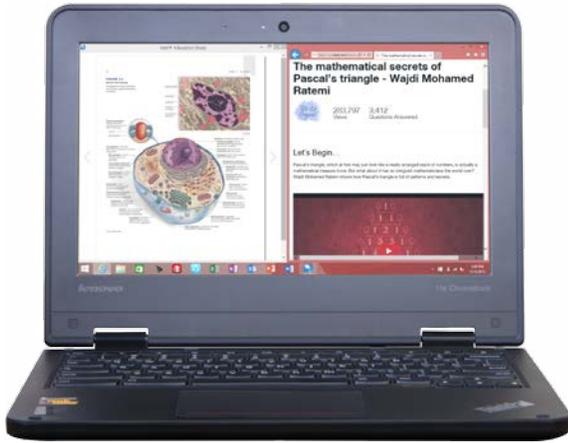


Full
school day
of battery life



1/3
less time
to do common tasks

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



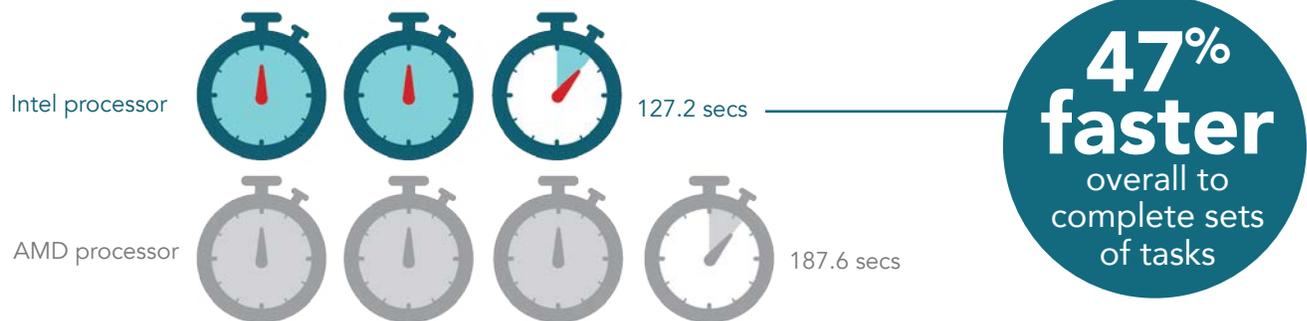
Lenovo ThinkPad 11e powered by Intel

A tale of two teachers

Two teachers sit in a coffee shop, comparing notes on how they use Lenovo laptops in their classrooms. Akash says the laptops are so slow he has trouble keeping his kids on task. But Fei says she never has that problem. Her laptops are fast and her students, attentive. Both classrooms use the Lenovo ThinkPad 11e—so what's going on?

The difference is in the processor. The laptops in Akash's school have AMD processors, while Fei's laptops are equipped with the Intel Core M. We found the Intel processor-powered ThinkPad 11e laptops finished two sets of classroom tasks 47% faster, and even completed some tasks in as little as half the time.

SECONDS ADD UP TO MINUTES SAVED IN EVERY CLASS



The ThinkPad powered by Intel completed sets of classroom tasks with battery life to spare.

So that's why Fei's students are staying focused and productive while students in Akash's class get distracted.

The Intel processor-powered ThinkPads also lasted 6 hours and 26 minutes on a single battery charge, enough for a full day's worth of classes. That means that Fei's students aren't spending the last hour of the day worrying about losing their work when their battery conks out.

To learn more about how these two laptops performed, let's look at how each teacher used them.

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

Akash's out-of-control history class (Powered by AMD)

Akash's first-period history class is working on a group project. To help boost the students' productivity, he brought in the school's new Lenovo ThinkPad 11e laptops.

The day began with so much promise. But a series of long wait times and interruptions threw Akash's history class off track.

For example, opening the Kindle® app to access the class's textbooks would have been 68% faster on laptops powered by Intel. Searching for ebooks with the Kindle app would have been 70% faster with Intel processor-powered laptops; but with the AMD processors, Akash's class was left frustrated from the longer wait. These are just a few examples of when the AMD processor kept the class waiting.



HISTORY CLASS



**39%
faster**
on history
class tasks

A few extra seconds may not seem like a lot, but when Akash has to wait for the class to catch up, the dead air becomes stifling. It's even worse when the entire classroom is waiting on him.

Over a school day, those extra seconds turn into minutes of waiting and give his students more opportunity to become distracted. And once their attention has wandered, it's hard for Akash to get them back to the task at hand.

What we learned

We put the laptops to the test with apps and websites a student would use for a multimedia history class project—things such as Microsoft® Office Online, YouTube®, and Khan Academy®. We finished this set of tasks 39% faster using the ThinkPad with the Intel Core M processor.

So while Akash's students wait for pages to load, for search results to complete, and for their work to sync with the cloud, they have more chances to lose focus. And Akash has more frustration as he struggles to keep his class from falling apart.

With ThinkPad
powered by Intel,
students spend
less time waiting.

MATH CLASS



**51%
faster**
on math
class tasks

Fei's focused math class (Powered by Intel)

Fei's third-period math class is learning about the Golden Ratio. She's discovered a treasure trove of online tools to help bring the subject to life for her students.

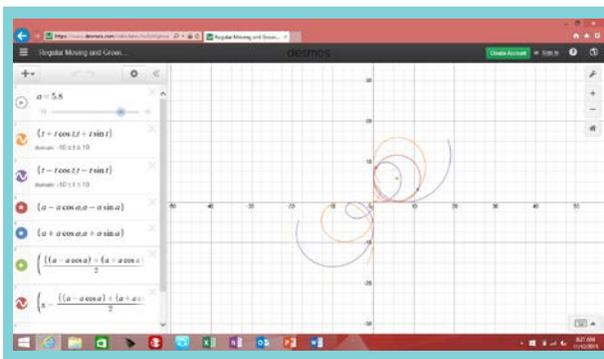
As they zip from one task to the next, she appreciates the speedy response time of the ThinkPad 11e laptops. Once her students have launched the Intel Education Study app, they can quickly search their online textbooks.

She doesn't know it, but her laptops can carry out the search 80% faster than the laptops in Akash's class. With her school's quicker laptops, Fei can fit more activities into a class period than her colleagues across town, and her students can explore the wealth of engaging online learning tools without getting distracted.

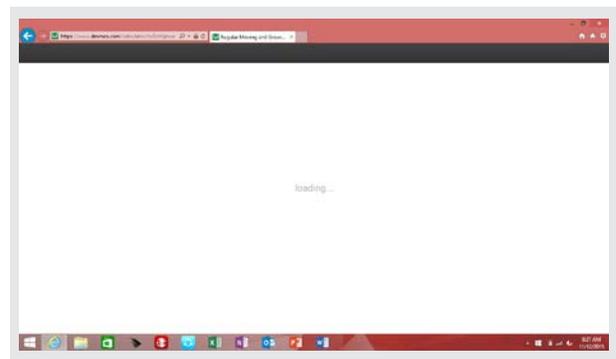
With ThinkPad powered by Intel, online learning tools load faster.

What we learned

We evaluated the laptops with a series of apps and websites students would use in math class—things such as online textbooks, TED-ed, and online quizzes. The Intel Core M-powered laptop outperformed the one with the AMD processor in every task, and was more than 50% faster overall, just as with the history class example.



Desmos® rendering on ThinkPad with Intel



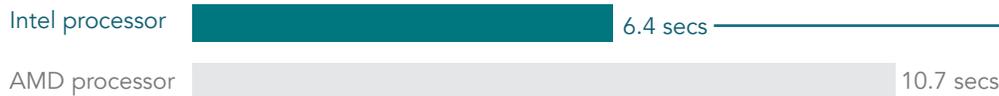
Desmos rendering on ThinkPad with AMD

The Intel processor helped load the page more than five seconds faster.

Streamline your classroom activities

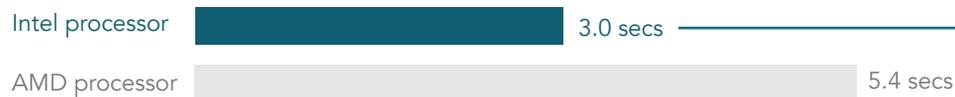
With a speedy laptop, keeping students attentive is easy. The ThinkPads with Intel processors bested the AMD alternative in each of the tasks below.

ONLINE QUIZ



up to
**67%
faster**
using quiz
websites

E-TEXTBOOK SEARCH

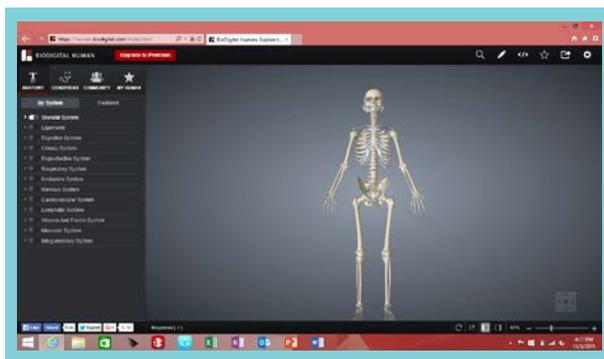


**80%
faster**
searching an
e-textbook

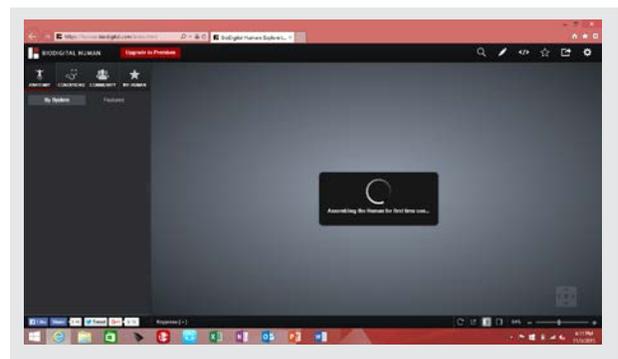
INTERACTIVE 3D WEBSITE



more than
**twice
as fast**
3D rendering



BioDigital Human™ rendering on ThinkPad with Intel



BioDigital Human rendering on ThinkPad with AMD

*The AMD processor left us waiting nearly half a minute for the page to load.
The Intel processor helped load the page more than twice as fast.*

Longer battery life

A good battery life is essential for classrooms, where power outlets are often in short supply. When classroom laptops are able to run the whole school day on a single charge, the teacher can rely on them to serve her students well.

A longer-running battery allows students to research and create materials without worrying about losing their work, or being distracted by beeping “low battery” notifications.

Every minute counts when it comes to battery life. The Intel Core M-powered laptop lasted 6 hours 26 minutes. That’s 19 extra minutes compared to the model with the AMD processor, and 14 minutes more than the average school day.¹

Wouldn’t it be nice not to worry about running out of juice before the end of the day?



A multi-modal classroom

Some of the Lenovo ThinkPad 11e laptops in Fei’s school are a special variation called the Yoga™.



True to its name, the Yoga can bend and fold into several modes, allowing students to work effectively in many different situations. But the best part about the Yoga might be its touch-sensitive screen. The touchscreen allows for a more tactile and visceral interaction, especially with interactive learning apps like BioDigital Human or Sumo Paint.

The Yoga’s tablet mode is great for when students are using the ThinkPad away from a desk—outdoors taking notes on plant life, or recording results from a chemistry experiment while standing at a crowded lab table.

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

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

¹ The average school day, minus 30 minutes for lunch, is 6 hours 12 minutes. Source: National Center for Education Statistics (NCES), the primary federal entity for collecting and analyzing data related to education (nces.ed.gov/surveys/pss/tables/table_2004_06.asp).

Conclusion

The two friends finish their coffee and begin to pack their things. As they do, Akash notices the Intel sticker on Fei's laptop. Could this be the key to Fei's better classroom experience?

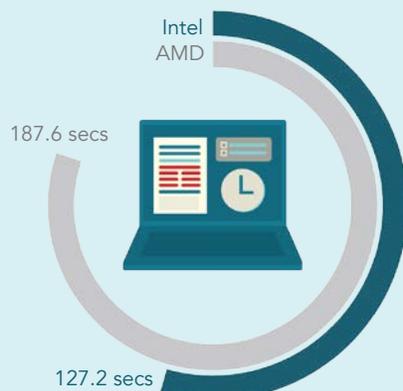
Yes—the proof is in our results.

In our hands-on evaluations, the ThinkPad with an Intel Core M processor was faster across the board than the one with an AMD processor, and its battery lasted for a whole school day. 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.

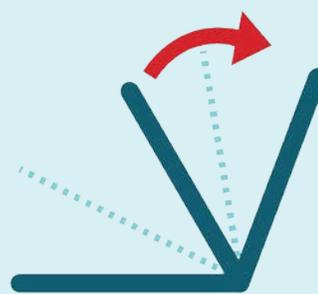
The speed, battery life, and flexible forms available with the Lenovo ThinkPad 11e laptops powered by Intel can help your classroom become a rich environment for young minds.



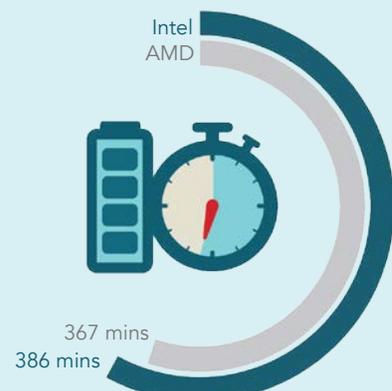
Cut classroom wait times with the ThinkPad 11e powered by Intel



47%
faster
overall



Multiple
modes
for classroom flexibility



All
school day
battery life

Appendix A – Test systems

General

	Lenovo ThinkPad 11e with AMD A4	Lenovo ThinkPad 11e with Intel Core M
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	3.44

Platform

	Lenovo ThinkPad 11e with AMD A4	Lenovo ThinkPad 11e with Intel Core M
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 JHET26WW (1.06) (7/22/15)
BIOS settings	Default	Default

Battery

	Lenovo ThinkPad 11e with AMD A4	Lenovo ThinkPad 11e with Intel Core M
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 11e with Intel Core M
Vendor	AMD	Intel
Name	A4	Core M
Model number	6210	5Y10c
Stepping	ML-A1	E0/F0
Socket type	BGA 769	1234FCBGA
Core frequency (GHz)	1.8	0.8
L1 cache	128KB + 128KB	2 × 32KB + 2 × 32KB
L2 cache	2MB	2 × 256KB
L3 cache	—	4MB

Memory module(s)

	Lenovo ThinkPad 11e with AMD A4	Lenovo ThinkPad 11e with Intel Core M
Total RAM in system (GB)	4	4
Vendor and model number	Samsung® M471B5173DB0- YK0	Samsung M471B5674QH0- 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	2
Number of RAM module(s)	1	2
Channel (single/dual)	Single	Dual

Wireless

	Lenovo ThinkPad 11e with AMD A4	Lenovo ThinkPad 11e with Intel Core M
Vendor and model number	Broadcom® 802.11ac Network Adapter	Intel Dual Band Wireless-AC 7265
Driver	Broadcom 6.35.223.4 (10/14/14)	Intel 17.13.11.5 (12/8/14)

Graphics

	Lenovo ThinkPad 11e with AMD A4	Lenovo ThinkPad 11e with Intel Core M
Vendor and model number	AMD Radeon™ R3 Graphics	Intel HD Graphics 5300
Type	Integrated	Integrated
Chipset	AMD Radeon R3 Graphics	Intel HD Graphics Family
Video BIOS/ Graphics Output Protocol version	113-C69300-100	5.5.1031
Total available graphics memory (MB)	2,048	2,000
Dedicated video memory (MB)	512	0
System video memory (MB)	0	0
Shared system memory (MB)	1,536	2,000
Resolution	1,366 × 768	1,366 × 768
Driver	AMD 13.352.1017.1002 (1/18/15)	Intel 10.18.14.4080 (1/5/15)

Operating system

	Lenovo ThinkPad 11e with AMD A4	Lenovo ThinkPad 11e with Intel Core M
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 11e with Intel Core M
Vendor and model number	Realtek® High Definition Audio	Realtek High Definition Audio
Driver	Realtek 6.0.1.7368 (10/21/14)	Realtek 6.0.1.7368 (10/21/14)

Hard disk

	Lenovo ThinkPad 11e with AMD A4	Lenovo ThinkPad 11e with Intel Core M
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 9 Series Chipset Family SATA AHCI Controller
Driver	Microsoft 6.3.9600.16384 (6/21/2006)	Intel 13.2.4.1000 (7/25/14)

Ethernet

	Lenovo ThinkPad 11e with AMD A4	Lenovo ThinkPad 11e with Intel Core M
Vendor and model number	Realtek PCIe® GBE Family Controller	Realtek PCIe GBE Family Controller
Driver	Realtek 8.35.716.2014 (7/16/14)	Realtek 8.35.716.2014 (7/16/14)

USB ports

	Lenovo ThinkPad 11e with AMD A4	Lenovo ThinkPad 11e with Intel Core M
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 11e with Intel Core M
LCD type	HD LED Anti-glare	HD LED Anti-glare
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	Core M
	Median times (minutes:seconds.deciseconds)	
Microsoft PowerPoint® Online: open file	00:07.4	00:07.2
Microsoft Word Online: launch	00:01.4	00:00.9
Microsoft Excel® Online: launch	00:01.6	00:01.1
Khan Academy: play video	00:04.6	00:04.1
YouTube: load Crash Course home page	00:03.8	00:02.7
Kindle: launch app	00:04.2	00:02.5
Kindle: search ebook	00:05.1	00:03.0
Star Chart: navigate to constellation	00:05.9	00:04.9
Photo Editor: launch app	00:02.2	00:01.6
Thinglink: load example	00:08.9	00:05.7
PowToon® Edu: start sample video	00:08.0	00:04.7
Canva®: log in website	00:02.5	00:01.4
Canva: presentation examples	00:06.8	00:04.8
Total Time	01:21.0	00:53.1

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	Core M
	Median times (minutes:seconds.deciseconds)	
Join Wi-Fi Network	00:04.4	00:03.9
BrainPOP: launch app	00:06.0	00:05.1
VoiceThread®: sample video	00:13.3	00:10.0
Desmos: graph demonstration	00:12.2	00:07.4
Intel Education Study: launch app	00:07.6	00:06.6
Intel Education Study: search textbook	00:05.4	00:03.0
TED: launch app	00:06.2	00:05.5
TED: play sample video	00:04.4	00:02.6
TED-ed: load sample lesson	00:08.9	00:06.0
BioDigital Human: load human	00:24.8	00:11.7
Sumo Paint: try online free	00:08.0	00:04.4
Quizizz: select sample quiz	00:10.7	00:06.4
Edcite: select sample quiz	00:07.0	00:04.9
myHomework: navigate to Homework	00:06.3	00:05.1
Total Time	02:05.2	01:22.6

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.

Testing battery life

Testing	AMD	Core M
	Median times (hours:minutes:seconds)	
Battery	06:07:35	06:26:59

We fully charged each of the laptops and connected them to a wireless network. While the laptops were still plugged in, we launched OneNote® and IE. We loaded two pages on IE, TED-ed (ed.ted.com) and Google Drive™ (google.com/drive/), and set each page to refresh once every 10 minutes. We made a video recording of all of the laptops and measured the time from when we unplugged the power cable to when the screen went black. We repeated this as needed.

Measuring Wi-Fi speeds

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

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.

This project was commissioned by Intel Corporation.



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