

# 7-INCH AND 8-INCH TABLET COMPARISON WITH BENCHMARKS

Benchmarks for tablets give a representative view of device performance. When purchasing a tablet, consumers can use benchmark results that measure battery life, graphics performance, and processor power to better understand these important and varied capabilities. In the Principled Technologies labs, we measured the performance of ten Android™ tablets, five 7-inch and five 8-inch models from multiple brands, using an assortment of benchmarks. Two 7-inch and two 8-inch tablets featured Intel processors while the rest were ARM-based devices.

## TABLETS WE TESTED

We tested the following 7-inch tablets:

- Amazon® Kindle Fire HD
- Intel® processor-powered Dell™ Venue™ 7
- Intel processor-powered ECS TA70CA2
- Lenovo® IdeaTab™ A3000
- Samsung® Galaxy Tab® 3

In addition, we tested the following 8-inch tablets:

- Acer® Iconia A1-810-L615
- Intel processor-powered Acer Iconia A1-830-1633
- Asus® MeMO Pad™ 8 ME180A-A1-WH
- Intel processor-powered Dell Venue 8
- HP 8 1401

## BENCHMARKS WE USED

We ran the following benchmarks to test the tablets:

- BatteryXPRT 2014, divided into Battery Life Network and Network Performance categories
- Futuremark® 3DMark®
- GeekBench 3, Single-core and Multi-core
- MobileXPRT 2013, divided into Performance and User Experience categories
- Passmark® PerformanceTest™ Mobile
- WebXPRT 2013

We ran each test three times and report the median of the runs. For detailed information about the tablets we tested, see [Appendix A](#). For detailed testing steps, see [Appendix B](#).



# BATTERY LIFE COMPARISON

## BatteryXPRT 2014

Many consumers consider battery life to be a crucial feature when purchasing a tablet. The benchmark BatteryXPRT 2014 produces two results: Battery Life Network (battery life measured in hours and minutes) and Network Performance (performance while connected to a network). Note: battery life results are absent for the Kindle HD Fire and the HP 8 tablets due to the inability to run the benchmark.

Figure 1 shows the results of the Battery Life Network test. The Intel processor-powered Dell Venue 8 had the highest estimated battery life at 13 hours and 54 minutes and the Intel processor-powered Acer Iconia A1-830 had the lowest estimated battery life at 9 hours and 54 minutes.

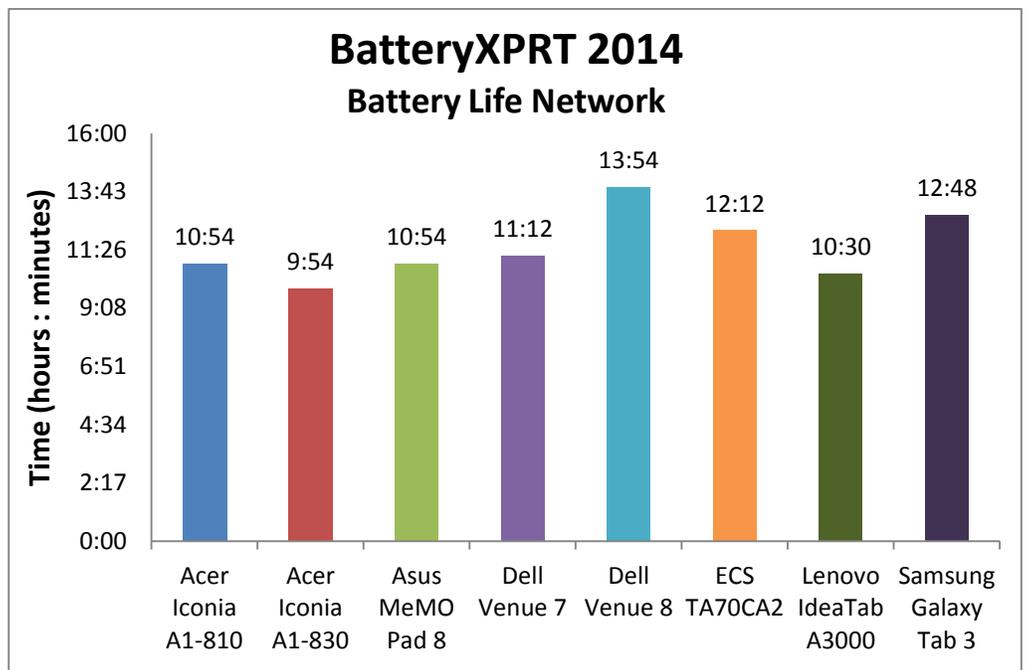
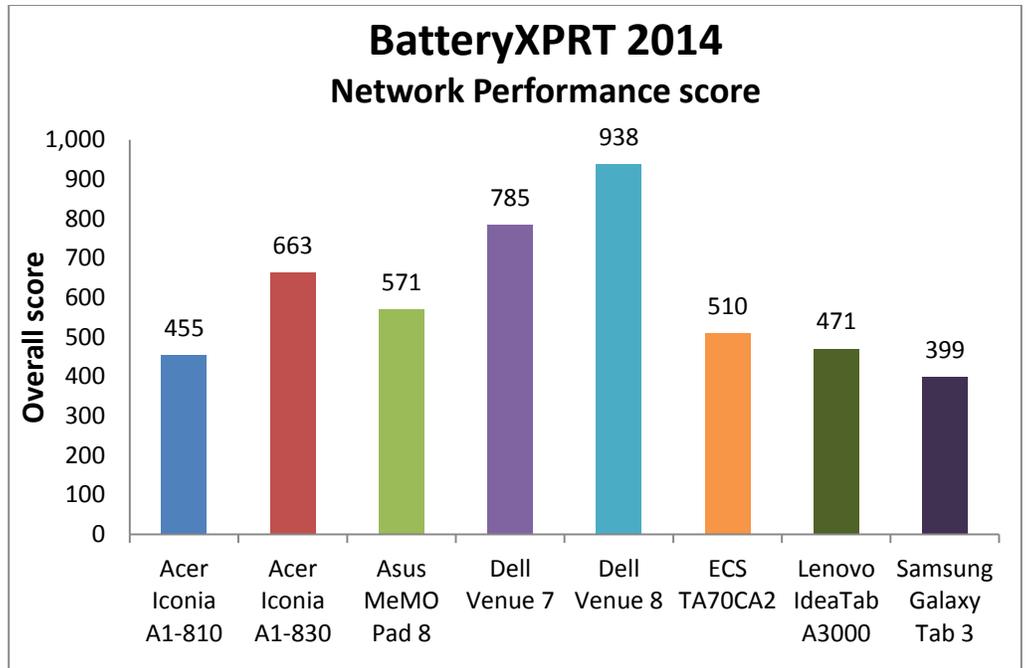


Figure 1: The estimated battery life of each tablet in hours and minutes. Higher numbers are better.

Figure 2 shows the scores for the BatteryXPRT 2014 Network Performance test. Scores reflect performance of a device when it is connected to a wireless network. The Intel processor-powered Dell Venue 8 had the highest score at 938 and the ARM-powered Samsung Galaxy Tab 3 had the lowest score at 399.

Figure 2: Scores from the Network Performance test. Higher numbers are better.



## PERFORMANCE COMPARISON

Perhaps the strongest consideration for consumers looking to purchase a tablet is performance. Benchmarks measure performance in different ways—some focus on processors or operating systems while others cover a wide range of factors, including graphics. We chose seven varied performance-measuring benchmarks for our testing.

### Futuremark 3DMark

Viewing graphic-heavy apps or large images can cause a tablet to run slow. The 3DMark benchmark rates a system’s graphics performance. Figure 3 shows the results from our 3DMark testing for the 7-inch tablets. Of these, the tablet with the highest score was the Intel processor-powered Dell Venue 7 at 5,809 and the tablet with the lowest score was the ARM-powered Samsung Galaxy Tab 3 at 2,044.

Figure 3: Graphics-based 3DMark scores for the five 7-inch tablets. Higher numbers are better.

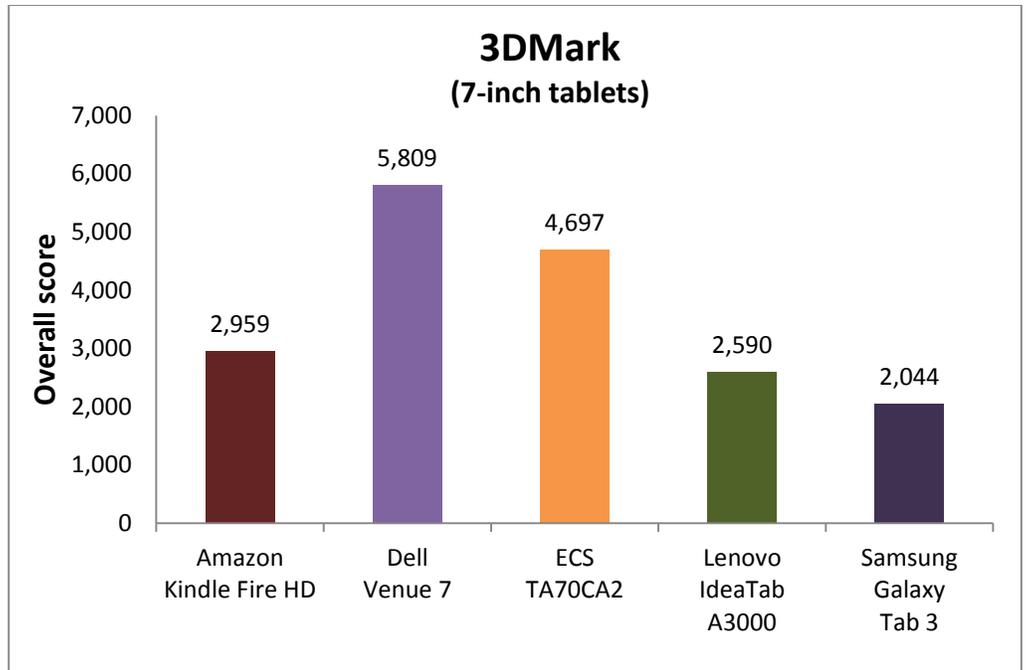
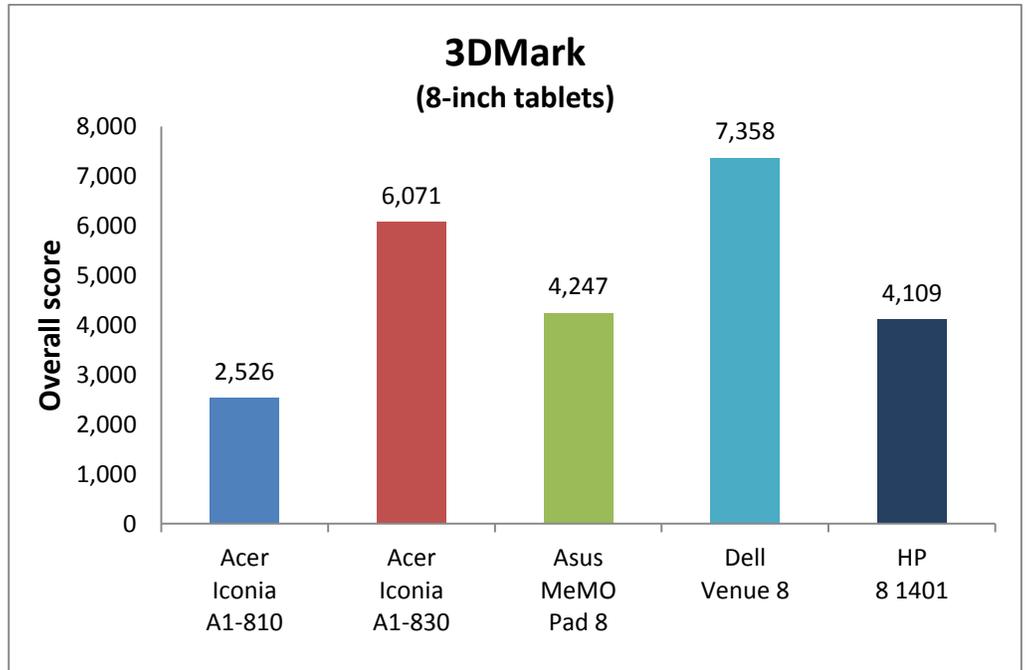


Figure 4 shows the results from our 3DMark testing for the 8-inch tablets. Of these, the tablet with the highest score was the Intel processor-powered Dell Venue 8 at 7,358 and the tablet with the lowest score was the ARM-powered Acer Iconia A1-810 at 2,526.

Figure 4: Graphics-based 3DMark scores for the five 8-inch tablets. Higher numbers are better.



### GeekBench 3

The GeekBench 3 benchmark measures processor performance and has single-core and multi-core tests. Its workloads derive from real-world scenarios.

## Single-core test

The single-core test stresses only one core to produce a result. Figure 5 shows the results for the 7-inch tablets. Of these, the Intel processor-powered Dell Venue 7 had the highest score at 464 and the ARM-powered Lenovo IdeaTab A3000 had the lowest score at 327.

Figure 5: Single-core performance for the five 7-inch tablets. Higher numbers are better.

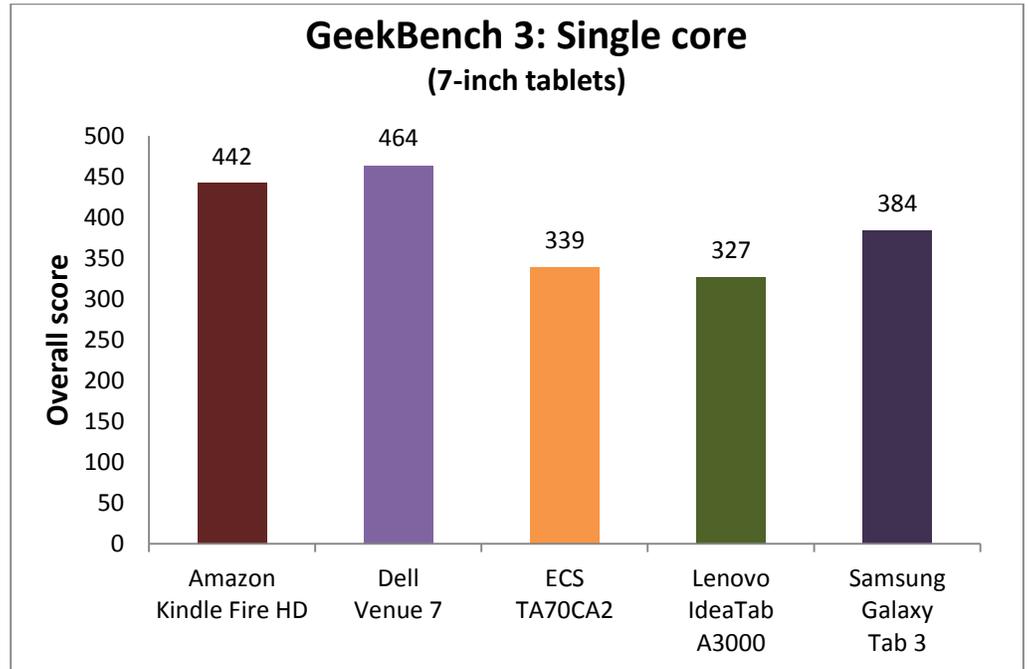
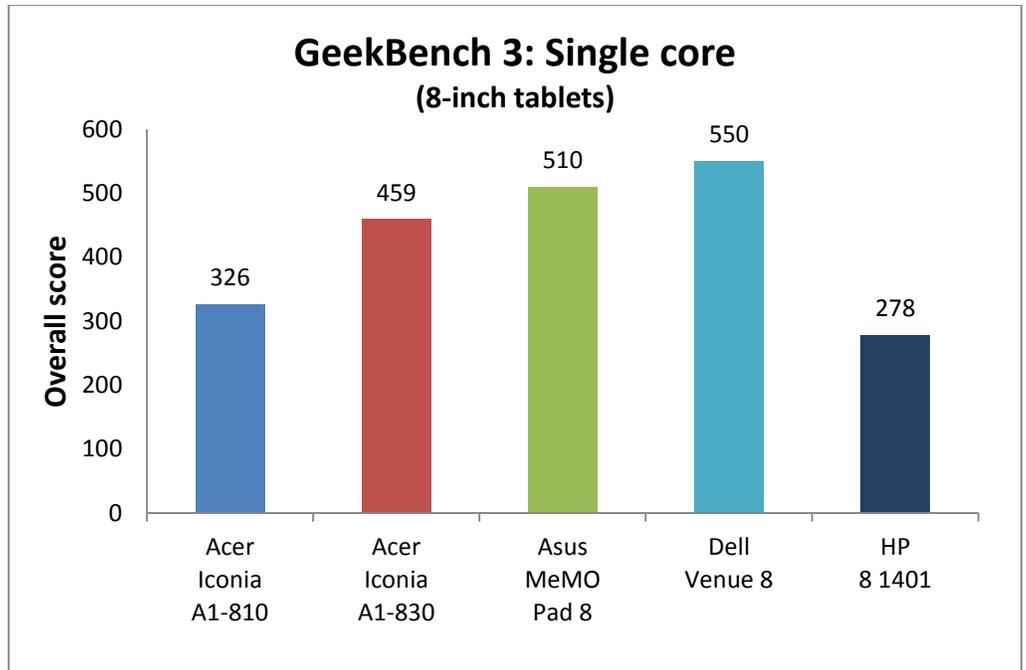


Figure 6 shows the results for the 8-inch tablets. Of these, the Intel processor-powered Dell Venue 8 had the highest score at 550 and the ARM-powered HP 8 1401 had the lowest score at 278.

Figure 6: Single-core performance for the five 8-inch tablets. Higher numbers are better.



### Multi-core test

The multi-core test stresses multiple cores to produce a result. Figure 7 shows the results for the 7-inch tablets. Of these, the ARM-powered Lenovo IdeaTab A3000 had the highest score at 1,140 and the ARM-powered Samsung Galaxy Tab 3 had the lowest score at 691.

Figure 7: Multi-core performance for the five 7-inch tablets. Higher numbers are better.

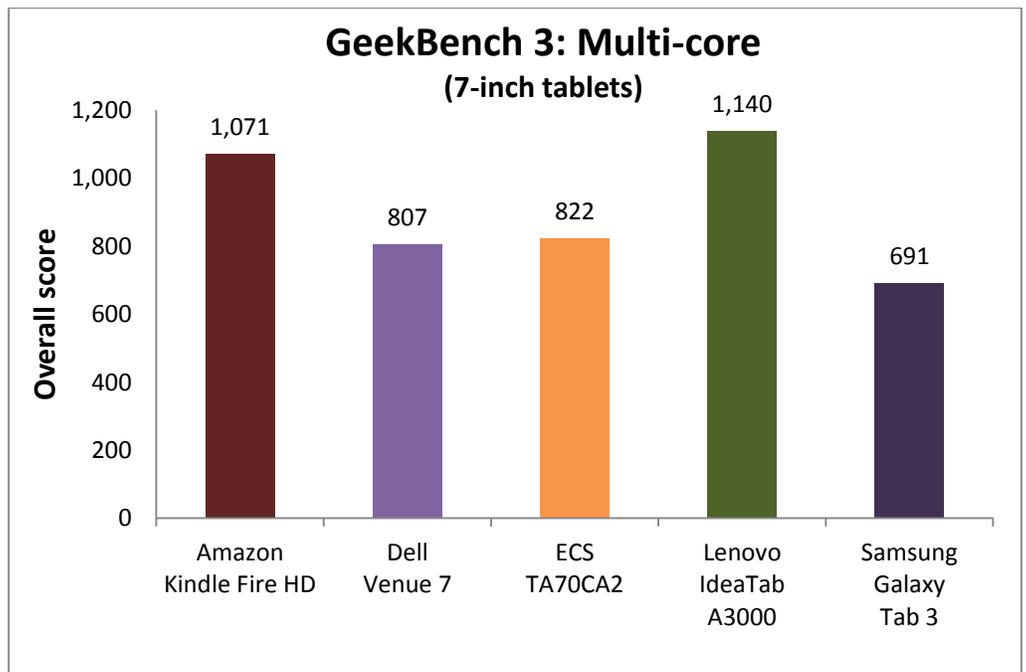


Figure 8 shows the results for the 8-inch tablets. Of these, the ARM-powered ASUS MeMO Pad 8 had the highest score at 1,405 and the ARM-powered HP 8 1401 had the lowest score at 955.

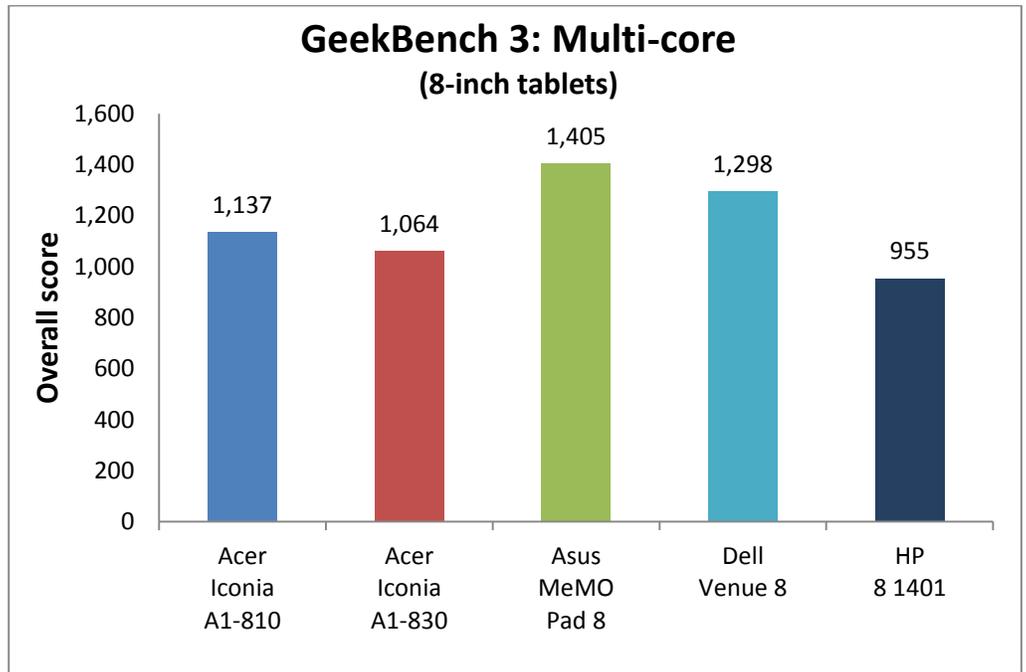


Figure 8: Multi-core performance for the five 8-inch tablets. Higher numbers are better.

## MobileXPRT 2013

MobileXPRT 2013 tests the performance of Android devices. The benchmark provides a Performance score and a User Experience score, with five different tests for each score.

### Performance scores

The Performance tests of MobileXPRT 2013 focus on the abilities of the device by using photo- and image-based workloads. Figure 9 shows the Performance scores for the five 7-inch tablets. Of these, the Intel processor-powered Dell Venue 7 had the highest score at 159 and the ARM-powered Samsung Galaxy Tab 3 had the lowest score at 84.

Figure 9: Performance scores for the five 7-inch tablets. Higher numbers are better.

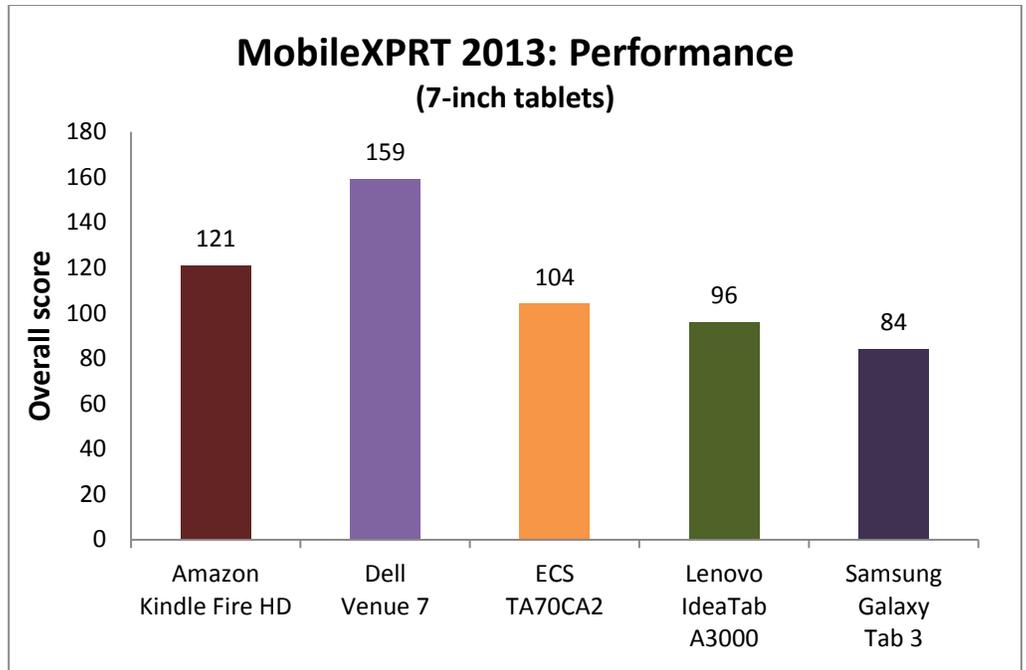
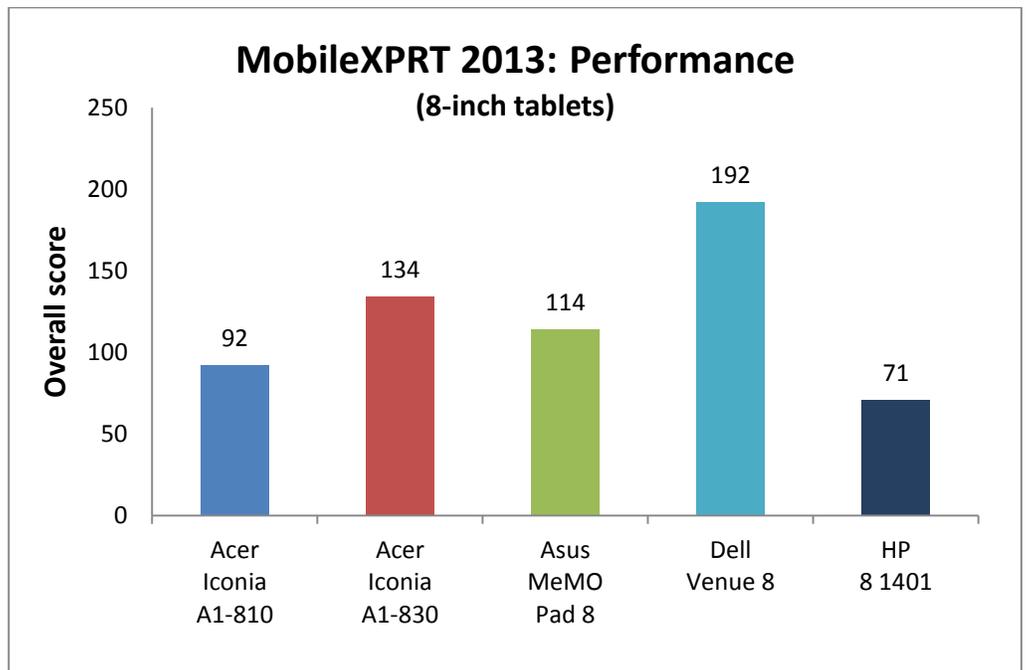


Figure 10 shows the Performance scores for the five 8-inch tablets. Of these, the Intel processor-powered Dell Venue 8 had the highest score at 192 and the ARM-powered HP 8 1401 had the lowest score at 71.

Figure 10: Performance scores for the five 8-inch tablets. Higher numbers are better.



### User Experience scores

The User Experience tests of MobileXPRT 2013 have a user-centric focus for devices being tested. The workloads create real-world scrolling and viewing scenarios. Figure 11 shows the User Experience scores for the five 7-inch tablets. Of these, the

ARM-powered Amazon Kindle Fire HD had the highest score at 104 and the ARM-powered Samsung Galaxy Tab 3 had the lowest score at 85.

Figure 11: User Experience scores for the five 7-inch tablets. Higher numbers are better.

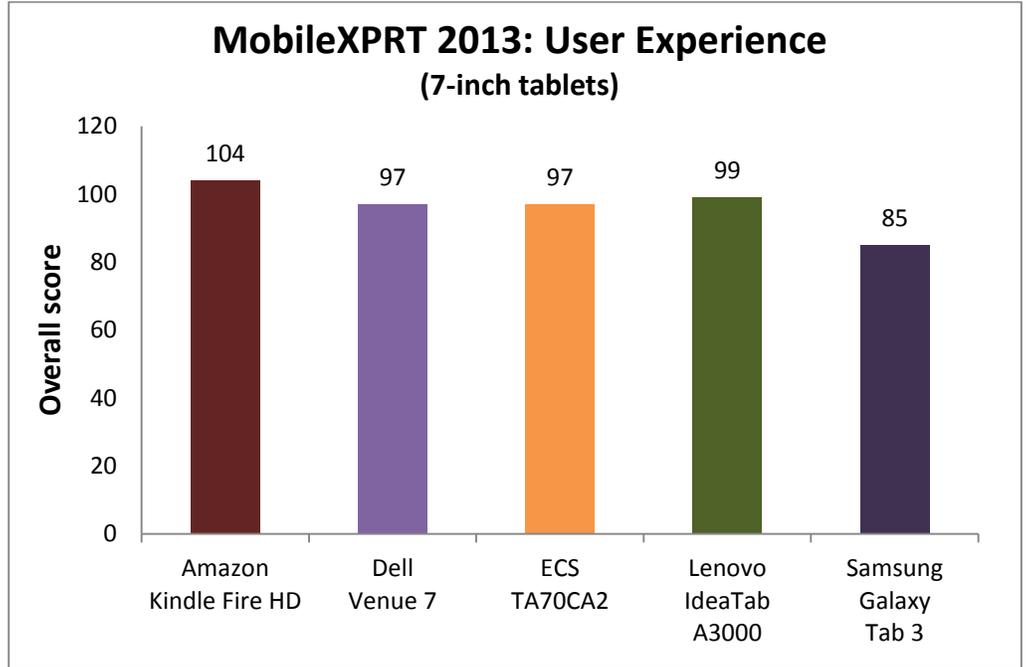
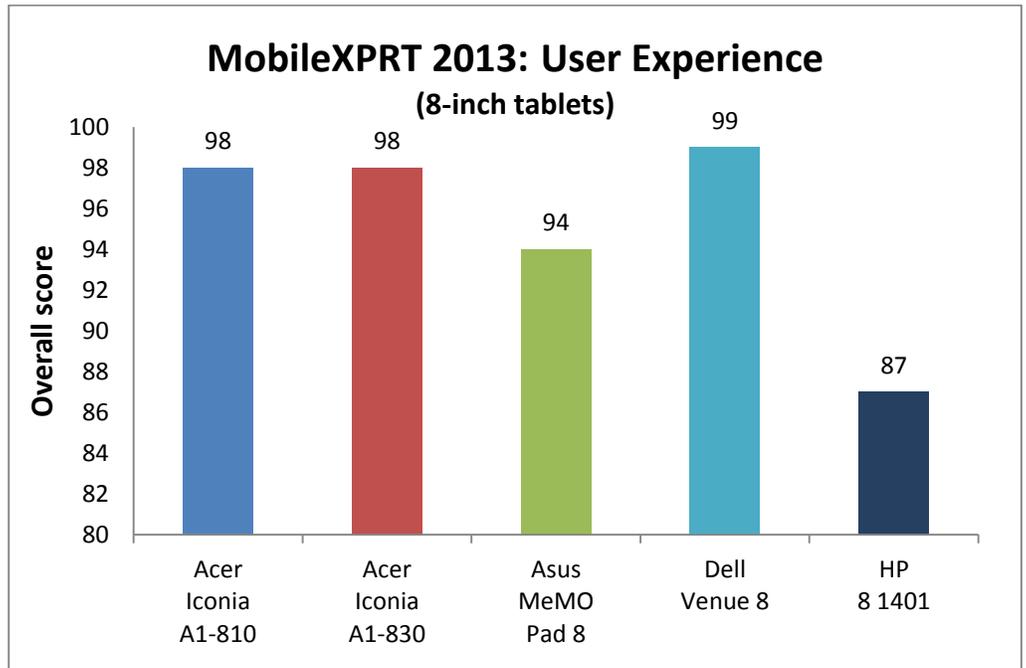


Figure 12 shows the User Experience scores for the five 8-inch tablets. Of these, the Intel processor-powered Dell Venue 8 had the highest score at 99 and the ARM-powered HP 8 1401 had the lowest score at 87.

Figure 12: User Experience scores for the five 8-inch tablets. Higher numbers are better.



## PassMark PerformanceTest Mobile

PassMark PerformanceTest Mobile tests the speed and general performance of a mobile device. Figure 13 shows the scores for the five 7-inch tablets. Of these, the Intel processor-powered Dell Venue 7 had the highest score at 3,308 and the ARM-powered Samsung Galaxy Tab 3 had the lowest score at 1,647.

Figure 13: Speed and performance scores for the five 7-inch tablets. Higher numbers are better.

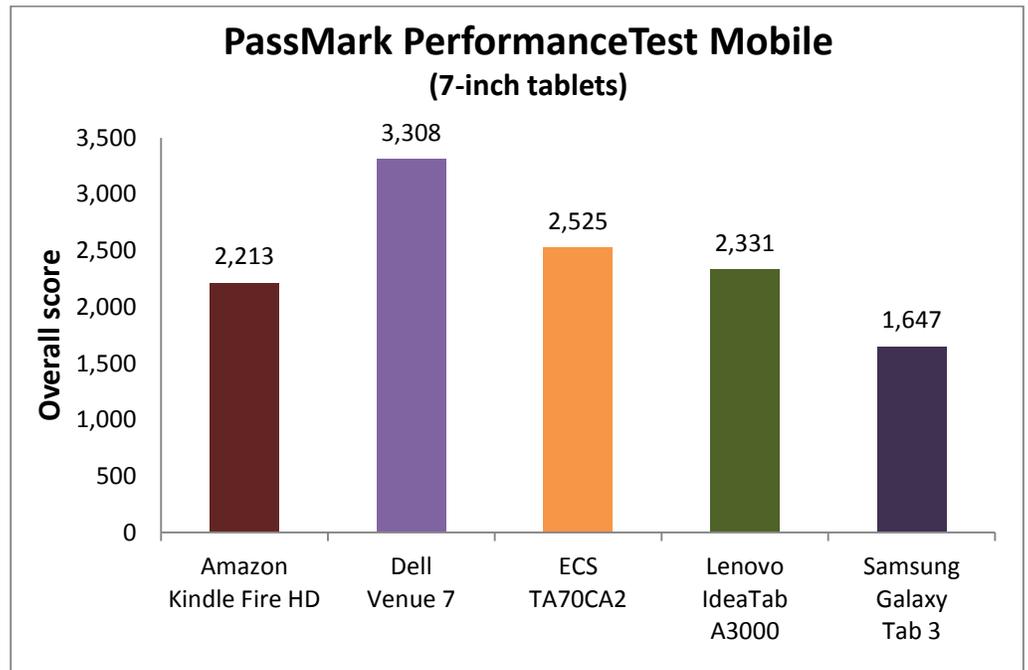
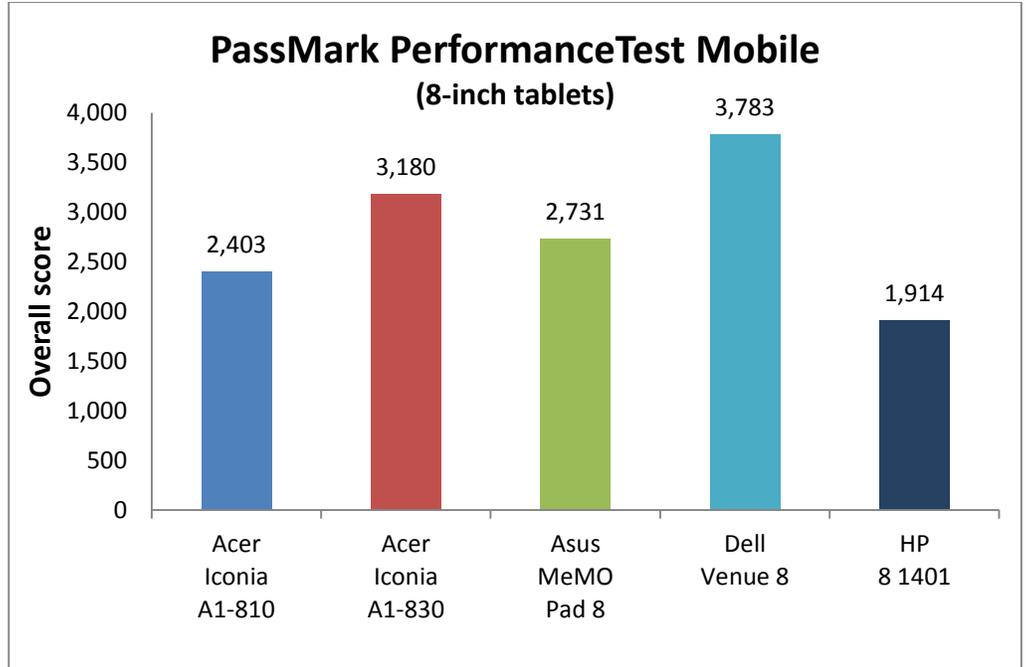


Figure 14 shows the scores for the five 8-inch tablets. Of these, the Intel processor-powered Dell Venue 8 had the highest score at 3,783 and the ARM-powered Samsung Galaxy Tab 3 had the lowest score at 1,914.

Figure 14: Speed and performance results for the five 8-inch tablets. Higher numbers are better.



## WebXPRT 2013

WebXPRT 2013 measures Web-browsing performance by simulating everyday usage scenarios. The benchmark uses four workloads to produce an Overall Score. Figure 15 shows the scores for the five 7-inch tablets. Of these, the Intel processor-powered Dell Venue 7 had the highest score at 234 and the ARM-powered Lenovo IdeaTab A3000 and the ARM-powered Samsung Galaxy Tab 3 had the lowest scores at 144.

Figure 15: Web browsing performance for the five 7-inch tablets. Higher numbers are better.

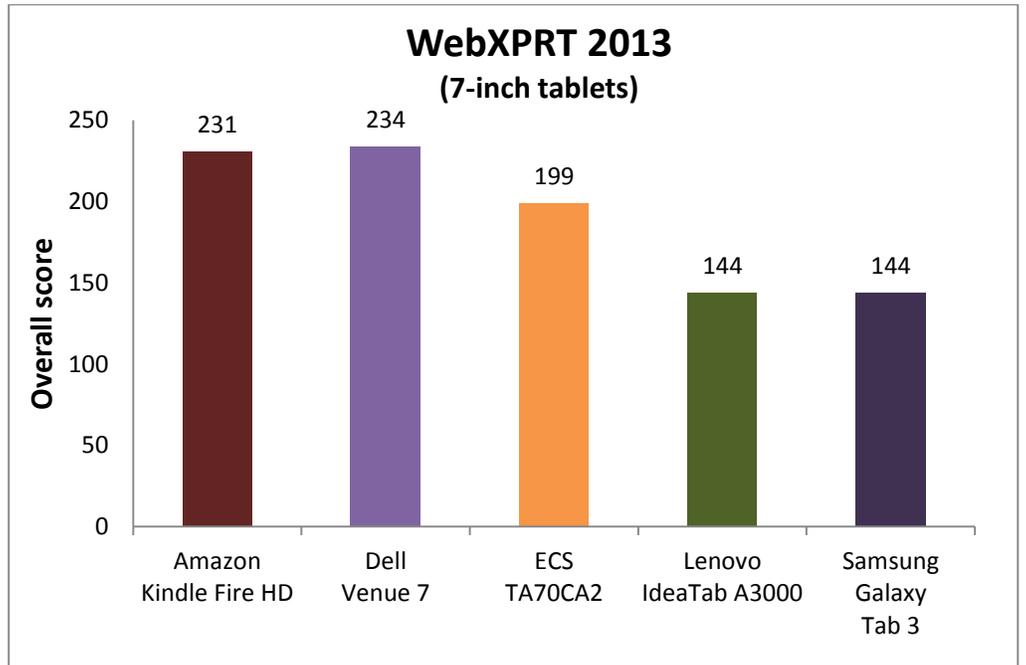


Figure 16 shows the scores for the five 8-inch tablets. Of these, the Intel processor-powered Dell Venue 8 had the highest score at 280 and the ARM-powered HP 8 1401 had the lowest score at 129.

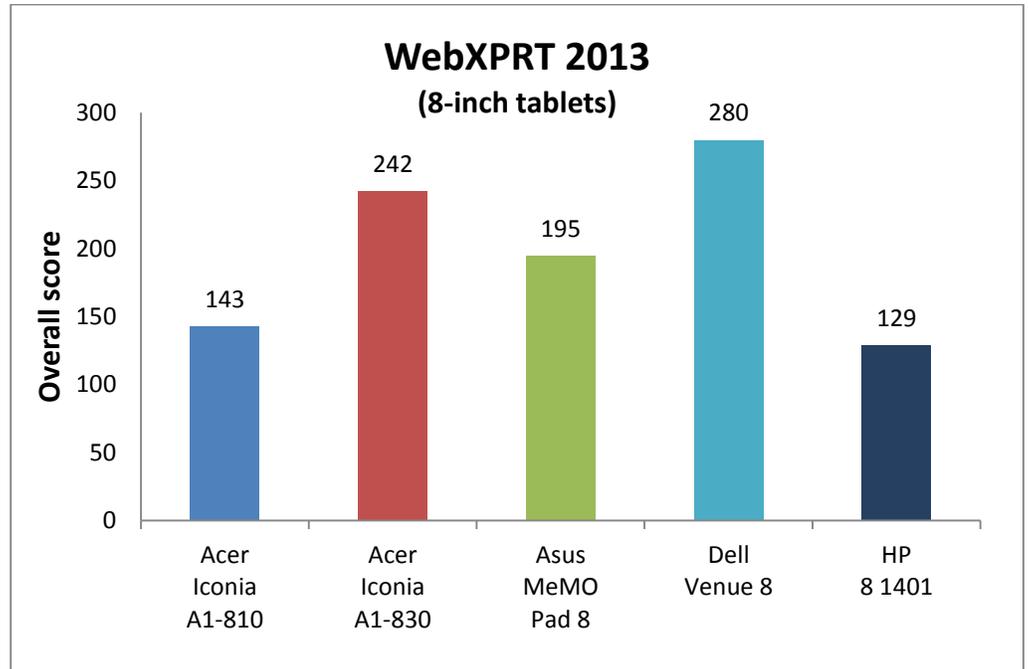


Figure 16: Web browsing performance for the five 8-inch tablets. Higher numbers are better.

## IN CONCLUSION

When consumers want to purchase tablets, the two biggest factors they consider are battery life and performance. We used nine benchmark tests to evaluate these two factors for ten publicly available tablets. The highest score from the BatteryXPRT 2014 Battery Life Network test, which looks at battery life, and the highest score for the BatteryXPRT 2014 Network Performance test came from the Intel processor-powered Dell Venue 8. In terms of performance, the Intel processor-powered Dell Venue 7 had the highest score for 7-inch tablets in the following tests: Futuremark 3DMark, GeekBench Single-core, MobileXPRT 2013 Performance, PassMark Performance Test Mobile, and WebXPRT 2013. The Dell Venue 8 had the highest score for 8-inch tablets in the following tests: Futuremark 3DMark, GeekBench Single-core, MobileXPRT 2013 Performance, MobileXPRT 2013 User Experience, PassMark Performance Test Mobile, and WebXPRT 2013. For the GeekBench 3, Multi-core test, the Lenovo IdeaTab A3000 had the highest score for 7-inch tablets and the ASUS MeMO Pad 8 had the highest score for 8-inch tablets. The Amazon Kindle Fire HD had the highest score for 7-inch tablets in the MobileXPRT 2013, User Experience tests.

## WHAT WE TESTED

### About BatteryXPRT 2014

BatteryXPRT 2014 for Android evaluates the battery life of Android-based phones and tablets. The benchmark also provides a performance score. For more information about BatteryXPRT 2014, visit [www.batteryxprt.com](http://www.batteryxprt.com).

### About 3DMark

3DMark is a benchmark that uses 3D graphics and physics simulations to evaluate the graphics capabilities as well as the general performance of a system. For more information about 3DMark, visit [www.futuremark.com/benchmarks/3dmark/all](http://www.futuremark.com/benchmarks/3dmark/all).

### About GeekBench 3

According to Primate Labs, GeekBench 3 is a processor benchmark with a “new scoring system that separates single-core and multi-core performance, and new workloads that simulate real-world scenarios.” For more information on GeekBench 3, visit [www.primatelabs.com/geekbench/](http://www.primatelabs.com/geekbench/).

### About MobileXPRT 2013

MobileXPRT 2013 is a benchmark for evaluating the capabilities of Android devices. MobileXPRT runs five performance scenarios (Apply Photo Effects, Create Photo Collages, Create Slideshow, Encrypt Personal Content, and Detect Faces to Organize Photos) and five user-experience scenarios (List Scroll, Grid Scroll, Gallery Scroll, Browser Scroll, and Zoom and Pinch). It also gives you overall measures by generating a single score for performance and one for the user experience. For more information on MobileXPRT 2013, visit [www.mobilexprt.com](http://www.mobilexprt.com).

### About PassMark PerformanceTest Mobile

According to PassMark, PerformanceTest Mobile is designed for “Android device speed testing and benchmarking. PassMark PerformanceTest Mobile allows you to objectively benchmark a Android device using a variety of different speed tests and compare the results to others.” For more information about PassMark PerformanceTest Mobile, visit [www.passmark.com/products/pt\\_mobile.htm](http://www.passmark.com/products/pt_mobile.htm).

### About WebXPRT 2013

WebXPRT 2013 uses scenarios created to mirror the tasks you do every day to compare the performance of almost any Web-enabled device. It contains four HTML5- and JavaScript-based workloads: Photo Effects, Face Detect, Stocks Dashboard, and Offline Notes. From these workloads, the benchmark calculates a composite Overall Score for easy comparison. For more information about WebXPRT, visit [www.webxprt.com](http://www.webxprt.com).

## APPENDIX A – THE DEVICES WE TESTED

Figures 17 and 18 present detailed specifications for the tablets we tested.

System information	Amazon Kindle Fire HD	Dell Venue 7	ECS TA70CA2	Lenovo IdeaTab A3000	Samsung Galaxy Tab 3
Screen size	7.01"	7.01"	7.05"	7.01"	7.01"
Display resolution	1280 × 800	1280 × 800	1024 × 600	1024 × 600	1024 × 600
PPI	215	215	169	169	169
Dimensions	7.49" × 5.00" × 0.42"	7.59" × 4.65" × 0.39"	7.93" × 4.86" × 0.46"	7.62" × 4.71" × 0.46"	7.40" × 4.39" × 0.41"
Weight	0.75 lb.	0.68 lb.	0.78 lb.	0.73 lb.	0.66 lb.
CPU	ARM Cortex-A9 dual-core @1.5GHz	Intel Atom Z2560 dual-core @ 1.6GHz	Intel Atom Z2520 dual-core @ 1.2GHz	MTK MT8125 ARM Cortex-A7 quad-core @ 1.2GHz	ARM Cortex-A9 dual-core @ 1.2GHz
Storage	8 GB	16 GB	8 GB	16 GB	8 GB
Browser	Android browser	Android browser	Android browser	Android browser	Android browser
OS	Kindle 11.3.2.2	Android 4.3	Android 4.2.2	Android 4.2.2	Android 4.1.2
RAM	1 GB	2 GB	1 GB	1 GB	1 GB
Price as of 04-18-14	\$134.00	\$149.99	\$146.69	\$149.00	\$179.99

Figure 17: Specifications for the five 7" tablets we tested.

System information	Acer Iconia A1-810-L615	Acer Iconia A1-830-1633	Asus MeMO Pad 8 ME180A-A1-WH	Dell Venue 8	HP 8 1401
Screen size	7.91"	7.89"	8.02"	8.05"	7.90"
Display resolution	1024 × 768	1024 × 768	1280 × 800	1280 × 800	1024 × 768
PPI	162	162	188	188	162
Dimensions	8.23" × 5.73" × 0.47"	7.98" × 5.46" × 0.38"	8.37" × 5.01" × 0.43"	8.34" × 5.11" × 0.43"	7.89" × 5.36" × 0.35"
Weight	0.86 lb.	0.83 lb.	0.80 lb.	0.81 lb.	0.81 lb.
CPU	MTK MT8125 ARM Cortex-A7 quad-core @ 1.2GHz	Intel Atom Z2560 dual-core @ 1.6GHz	ARM Cortex-A9 quad-core @ 1.6GHz	Intel Atom Z2580 dual-core @ 2.0GHz	Allwinner A31 ARM Cortex-A7 quad-core @ 1.0GHz
Storage	8 GB	16 GB	16 GB	16 GB	16 GB
Browser	Android browser	Android browser	Android browser	Android browser	Android browser
OS	Android 4.2.2	Android 4.2.2	Android 4.2.2	Android 4.3	Android 4.2.2
RAM	1 GB	1 GB	1 GB	2 GB	1 GB
Price as of 04-18-14	\$179.99	\$179.99	\$179.00	\$179.99	\$169.99

Figure 18: Specifications for the five 8" tablets we tested.

## APPENDIX B – HOW WE TESTED

### BatteryXPRT 2014 (Android devices only)

#### Setting up the test

1. Download and install the BatteryXPRT app from the BenchmarkXPRT Developer Community [here](#).
2. Set the display brightness to 200 nits.
  - a. Open the default Web browser and type `about:blank` in the address bar to produce a white screen.
  - b. Using a Gossen Mavolux5032C luminance meter, adjust the screen brightness to as close as possible to 200 nits without going under.
3. Adjust the headphone volume setting to 75dB.
  - a. Connect a set of ear-fitting headphones with a volume adjustment wheel to the audio port.
  - b. Set the tablet volume level to 100%.
  - c. Using the volume adjustment wheel on the headphones, turn the headphone volume down all the way.
  - d. Position one of the headphone earpieces directly over an Extech SDL600 Sound Level Meter. Make sure the earpiece is centered directly over the Sound Level Meter.
  - e. Play a 1 KHz test tone video ([www.youtube.com/watch?v=SpQ1nISiEM](http://www.youtube.com/watch?v=SpQ1nISiEM)). As it plays, slowly scroll the headphone volume adjustment wheel to a louder setting until the output volume stabilizes at 75dB.
4. Charge the battery of the device to 100 percent.
5. Go to Settings | Display | Daydream, and turn Daydream OFF (Android 4.4 KITKAT only).
6. Make sure that automatic updating is turned off for the duration of testing. (Update notices may interrupt the benchmark run.)
7. Make sure to close all running apps. To do this, click the Recent apps menu item and remove all apps from the list.
8. In your device's Settings menu, set the device to never fall asleep unless you direct it to.
9. Reboot the device.
10. Set the proper connectivity configuration to Network mode.
  - a. Turn on Wi-Fi.
  - b. If using Wi-Fi, connect to a wireless access point.
  - c. Disable Bluetooth and NFC connectivity.
  - d. Make sure the device is a minimum of 5 feet from the router.

#### Running the test

1. Launch the BatteryXPRT app.
2. Select Network mode.
3. Use the default option of seven iterations.
4. Verify that the current battery capacity is at least 95 percent.
5. Disconnect the device from its power adapter.
6. Click the red Start button to begin the test.
7. When the test completes, record the results.
8. Repeat steps 1 through 7 two more times.
9. Report the median of the three runs.

## 3DMark

### Setting up the test

1. Install 3DMark.
  - a. Download 3DMark from the Google Play Store.
  - b. To begin the installation, click Install.
  - c. After the installation is complete, click Open.
  - d. Press OK, Let's go.
  - e. Press Install to install the Ice Storm benchmark.
  - f. Close 3DMark.

Setup is complete.

### Running the test

1. Launch 3DMark by pressing the 3DMark icon.
2. Press the drop-down arrow to display the different benchmark options.
3. Press Ice Storm Unlimited to start the benchmark.
4. When the test completes, record the results.
5. Repeat steps 1 through 4 two more times.
6. Report the median of the three runs.

## GeekBench 3

### Setting up the test

1. Install GeekBench 3.
  - a. Download GeekBench 3 from the Google Play Store.
  - b. To begin the installation, click Install.
  - c. After the installation is complete, close the Google Play Store.

Setup is complete.

### Running the test

1. Launch GeekBench 3 by pressing the GeekBench 3 icon.
2. Press Run Benchmarks.
3. When the test completes, record the results.
4. Repeat steps 1 through 3 two more times.
5. Report the median of the three runs.

## MobileXPRT 2013 (Android devices only)

### Setting up the test

1. Install MobileXPRT 2013.
  - a. Download MobileXPRT 2013 from the Google Play Store or [here](#).
  - b. To begin the installation, click Install.
  - c. After the installation is complete, click Open.
  - d. MobileXPRT will then prompt to install the UX Tests component. Click Install.

2. After installation of the UX Tests is complete, click Done. MobileXPRT will then copy the workload data files to required folders.

Once the workload data files are copied, setup is complete.

### Running the test

1. Launch MobileXPRT 2013 by pressing the MobileXPRT icon.
2. Press All Tests.
3. When the test completes, record the results.
4. Repeat steps 1 through 3 two more times.
5. Report the median of the three runs.

## PassMark PerformanceTest Mobile

### Setting up the test

1. Install PassMark PerformanceTest Mobile.
  - a. Download PassMark PerformanceTest Mobile from the Google Play Store.
  - b. To begin the installation, press Install.
  - c. Press Accept to accept the license agreement.
  - d. After the installation is complete, close the Google Play Store.

Setup is complete.

### Running the test

1. Launch PassMark PerformanceTest Mobile by pressing the PassMark PerformanceTest Mobile icon.
2. Touch the Screen to continue.
3. Press Run Benchmark to start the benchmark.
4. When the test completes, record the results.
5. Repeat steps 1 through 4 two more times.
6. Report the median of the three runs.

## WebXPRT 2013

### Running the test

1. Open the default Web browser and go to [www.principledtechnologies.com/benchmarkxpert/webxpert/](http://www.principledtechnologies.com/benchmarkxpert/webxpert/).
2. Click Run WebXPRT 2013.
3. At the Ready to test your browser screen, click Continue.
4. Click Start.
5. When the test completes, record the results.
6. Repeat steps 1 through 5 two more times.
7. Report the median of the three runs.

## ABOUT PRINCIPLED TECHNOLOGIES



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