



The science behind the report: Dell Chromebooks: Durable, easy to deploy, and easy to service

This document describes what we tested, how we tested, and what we found. To learn how these facts translate into real-world benefits, read the report [Dell Chromebooks: Durable, easy to deploy, and easy to service](#).

We concluded our hands-on testing on December 8, 2023. During testing, we determined the appropriate hardware and software configurations and applied updates as they became available. The results in this report reflect configurations that we finalized on October 9, 2023 or earlier. Unavoidably, these configurations may not represent the latest versions available when this report appears.

Our results

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

Table 2: Results of our testing.

Devices	Time	Steps
Dell Latitude 3445 Chromebook	4m 9s	10
Acer Chromebook Vero 514	4m 15s	9
HP Elite c645 G2 Chromebook Enterprise	4m 16s	10
Lenovo Chromebook 14e	4m 24s	10
Dell Chromebook 3110	4m 37s	10
Acer Chromebook Spin 514	4m 53s	9
Dell Latitude 5430 Chromebook	5m 5s	10
Lenovo ThinkPad C14 Gen 1 Chromebook	5m 11s	10
Acer Chromebook C734	5m 36s	9
HP Chromebook 11 G9 EE	6m 23s	12
Lenovo 100e Chromebook Gen 3 10 steps	6m 35s	10
HP Chromebook x360	7m 9s	12

Table 3: Comparison of available support options across vendors.

Support feature	Dell ProSupport Plus	Lenovo Premier Support Plus	Acer 3 Year Protection Upgrade for Chromebooks (Accidental Damage Protection)	HP Care Pack
Hardware and software support	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
24x7 Technical phone support	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Next day onsite repair	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Local experts	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Portal for monitoring	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Standard reports available	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Single point of contact available	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Keep your hard drive	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Asset tag option	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Accidental protection	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Battery replacement (used, up to one year)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Sealed battery warranty (3 years)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

System configuration information

Table 4: Detailed information on the systems we tested.

System configuration information	Dell Latitude 3445 Chromebook	Dell Latitude 5430 Chromebook	Dell Chromebook 3110
Processor			
Vendor	AMD	Intel®	Intel
Name	Ryzen™ 5 7520C	Core® i5-1235U	Celeron® N4500
Core frequency (GHz)	2.8-4.3	3.3-4.4	1.1-2.8
Number of cores	4	2 performance, 8 efficient	2
Cache (MB)	4	12	4 MB
Memory			
Amount (GB)	8	8	4
Type	LPDDR5	LPDDR5	LPDDR4
Storage			
Amount (GB)	256	256	32
Connectivity/expansion			
Wireless internet	MediaTek 7921 Wi-Fi 6	Intel Wi-Fi 6E AX211	Intel® Wi-Fi 6 AX201
Bluetooth	5.3	5.3	
USB	2 USB Type-C, 1 USB Type-A	2 USB Type-C, 1 USB Type-A	1 USB Type-C, 1 USB Type-A
Video	HDMI 2.0	HDMI 1.4b	1 HDMI 1.4
Battery			
Type	Li-ion	Li-ion	Li-ion
Rated capacity (mAh)	54Wh	54Wh	42Wh
Display			
Size (in.)	14	14	11.6
Type	TN	TN	TN
Resolution	1920 x 1080	1920 x 1200	1366 x 768
Touchscreen	No	No	No
Operating system			
Build number or version	ChromeOS™ 120.0.6099.203	ChromeOS 120.0.6099.203	ChromeOS 120.0.6099.203
Dimensions			
Height (in)	0.8	0.7	0.8
Width (in)	12.7	12.3	11.9
Depth (in)	8.6	9.1	8.1
Weight (lbs.)	3.37	3.34	2.83

Table 5: Detailed information on the systems we tested.

System configuration information	Acer Chromebook 511	Acer Chromebook Spin 514	Acer Chromebook Vero 514
Processor			
Vendor	Intel	AMD	Intel
Name	Celeron N4500	Ryzen 5 5625C	Core i5-1235U
Core frequency (GHz)	1.1-2.8	2.3-4.3	3.3-4.4
Number of cores	2	6	2 performance, 8 efficient
Cache (MB)	4	16	12
Memory			
Amount (GB)	4	8	8
Type	LPDDR4	LPDDR4	LPDDR4
Storage			
Amount (GB)	32	128	256
Connectivity/expansion			
Wireless internet	IEEE 802.11	IEEE 802.11	IEEE 802.11
Bluetooth	5.0	5.1	5.1
USB	2 USB Type-C, 2 USB Type-A	2 USB Type-C, 1 USB Type-A	2 USB Type-C, 1 USB Type-A
Video	None	HDMI	HDMI
Battery			
Type	Li-ion	Li-ion	Li-ion
Rated capacity (mAh)	42Wh	56Wh	56Wh
Display			
Size (in.)	11.6"	14"	14"
Type	IPS	IPS	IPS
Resolution	1366 x 768	1920 x 1080	1920 x 1080
Touchscreen	No	Yes	Yes
Operating system			
Build number or version	ChromeOS 120.0.6099.203	ChromeOS 120.0.6099.203	ChromeOS 120.0.6099.203
Dimensions			
Height (in)	0.8 in	0.6 in	0.8 in
Width (in)	11.7 in	12.7 in	12.3 in
Depth (in)	8.1 in	8.8 in	8.8 in
Weight (lbs.)	2.87 lbs	3.3 lbs	3.09 lbs

Table 6: Detailed information on the systems we tested.

System configuration information	Lenovo 14e Chromebook	Lenovo ThinkPad C14 Gen 1 Chromebook	Lenovo 100e Chromebook Gen 3
Processor			
Vendor	AMD	Intel	Intel
Name	A4-9120C	Core i5-1245U	Celeron N4500
Core frequency (GHz)	1.6-2.4	3.3-4.4	1.1-2.8
Number of cores	2	2 performance, 8 efficient	2
Cache (MB)	1	12	4
Memory			
Amount (GB)	4	8	4
Type	DDR4	LPDDR4	LPDDR4
Storage			
Amount (GB)	32	128	32
Connectivity/expansion			
Wireless internet	802.11 AC	Intel WiFi 6E AX211	802.11AC
Bluetooth	5.1	5.1	5.0
USB	2 USB Type-C, 2 USB Type-A	2 USB Type-C, 2 USB Type-A	1 USB Type-C, 2 USB Type-A
Video	None	HDMI	HDMI
Battery			
Type	Li-ion	Li-ion	Li-ion
Rated capacity (mAh)	57 Wh	57 Wh	47 Wh
Display			
Size (in.)	14"	14"	11.6"
Type	IPS	IPS	TN
Resolution	1920 x 1080	1920 x 1080	1366 x 768
Touchscreen	No	No	No
Operating system			
Build number or version	ChromeOS 120.0.6099.203	ChromeOS 120.0.6099.203	ChromeOS 120.0.6099.203
Dimensions			
Height (in)	0.6 in	0.7 in	0.7 in
Width (in)	12.9 in	12.8 in	11.4 in
Depth (in)	8.8 in	8.5 in	7.9 in
Weight (lbs.)	3.27 lbs	3.5 lbs	2.7 lbs

Table 7: Detailed information on the systems we tested.

System configuration information	HP Elite c645 G2 Chromebook Enterprise	HP Chromebook x360	HP Chromebook 11 G9 EE
Processor			
Vendor	AMD	Intel	Intel
Name	Ryzen 5 5625C	Core i5-1235U	Celeron N4500
Core frequency (GHz)	2.3-4.3	3.3-4.4	1.1-2.8
Number of cores	6	2 performance, 8 efficient	2
Cache (MB)	16	12	4
Memory			
Amount (GB)	8	16	4
Type	LPDDR4	LPDDR4	LPDDR4
Storage			
Amount (GB)	256	256	32
Connectivity/expansion			
Wireless internet	Qualcomm FastConnect 6900 Wi-Fi 6E	Intel Wi-Fi 6E AX211	Intel Dual Band Wi-Fi 6 AX201
Bluetooth	5.2	5.2	5
USB	2 USB Type-C, 2 USB Type-A	2 USB Type-C, 1 USB Type-A	2 USB Type-C, 1 USB Type-A
Video	HDMI	None	None
Battery			
Type	Li-ion	Li-ion	Li-ion
Rated capacity (mAh)	58 Wh	58 Wh	47 Wh
Display			
Size (in.)	14"	14"	11.6"
Type	IPS	IPS	WLED
Resolution	1920 x 1080	1920 x 1200	1366 x 768
Touchscreen	No	Yes	Yes
Operating system			
Build number or version	ChromeOS 120.0.6099.203	ChromeOS 120.0.6099.203	ChromeOS 120.0.6099.203
Dimensions			
Height (in)	0.7 in	0.7 in	0.7 in
Width (in)	12.7 in	12.3 in	11.6 in
Depth (in)	8.7 in	8.6 in	8.0 in
Weight (lbs.)	3.3 lbs	3.34 lbs	2.95 lbs

How we tested

Hinge cycle testing

Setting up the test

Before testing, we documented each system's configuration details and inspected each system to ensure there was no damage, noting the physical appearance. We checked for any damage to screws, keyboards, screen bezels, chassis, and the display. We used the Design & Assembly Concepts Hinge Cycle Machine HiCym-1002 to conduct our hinge cycle testing.

1. Turn on the HiCym-1002, and use the control interface to ensure the following settings are configured:
 - a. Cycles until pause: 1000
 - b. Cycle speed (steps/sec): 6.00
 - c. Pause at open (sec): 3.00
 - d. Pause at close (sec): 3.00
2. Secure the device to the hinge cycling machine's bed.
3. To begin the first 1,000 hinge test cycles, press the Start button.
4. After 1,000 cycles, remove the device from the bed, and inspect the device. Record any functional and/or visual damage to the system.
5. Repeat steps 2 through 4 nine more times to complete a total of 10,000 test cycles.

Battery replacement testing

Dell Chromebook 3110

1. Unscrew nine Phillips head screws on the bottom of the system (nine captive screws; do not need to be removed).
2. Using a plastic opener pick, pry open and remove the bottom cover.
3. Remove the battery cable pull tab from the battery.
4. Unscrew the three Phillips head screws that secure the battery in place (three non-captive).
5. Remove the battery from the enclosure.
6. Insert the new battery into the enclosure.
7. Screw the three Phillips head screws to secure the new battery in place.
8. Connect the battery cable to the battery.
9. Re-attach the bottom cover, and snap it back into place.
10. Screw the nine Phillips head screws on the bottom of the system back into place to secure the bottom cover.

Dell Latitude 5430 Chromebook

1. Unscrew seven Phillips head screws on the bottom of the system (seven captive screws; do not need to be removed).
2. Using a plastic opener pick, pry open and remove the bottom cover.
3. Unplug the battery cable from the motherboard.
4. Unscrew the five Phillips head screws that secure the battery in place (four non-captive).
5. Remove the battery from the enclosure.
6. Insert the new battery into the enclosure.
7. Screw the five Phillips head screws to secure the new battery in place.
8. Connect the battery cable to the motherboard.
9. Re-attach the bottom cover, and snap it back into place.
10. Screw the seven Phillips head screws on the bottom of the system back into place to secure the bottom cover.

Dell Latitude 3445 Chromebook

1. Unscrew eight Phillips head screws on the bottom of the system (seven captive screws; do not need to be removed).
2. Using a plastic opener pick, pry open and remove the bottom cover.
3. Unplug the battery cable from the motherboard.
4. Unscrew the five Phillips head screws that secure the battery in place (four non-captive).
5. Remove the battery from the enclosure.
6. Insert the new battery into the enclosure.
7. Screw the five Phillips head screws to secure the new battery in place.
8. Connect the battery cable to the motherboard.
9. Re-attach the bottom cover, and snap it back into place.
10. Screw the eight Phillips head screws on the bottom of the system back into place to secure the bottom cover.

Lenovo 100e Chromebook Gen 3

1. Unscrew ten Phillips head screws on the bottom of the system (ten captive screws; do not need to be removed).
2. Using a plastic opener pick, pry open and remove the bottom cover.
3. Unplug the battery from the motherboard.
4. Unscrew the four Phillips head screws that secure the battery in place (four non-captive).
5. Remove the battery from the enclosure.
6. Insert the new battery into the enclosure.
7. Screw the four Phillips head screws to secure the new battery in place.
8. Connect the battery cable to the motherboard.
9. Re-attach the bottom cover, and snap it back into place.
10. Screw the ten Phillips head screws on the bottom of the system back into place to secure the bottom cover.

Lenovo ThinkPad C14 Gen 1 Chromebook

1. Unscrew 11 Phillips head screws on the bottom of the system (11 captive screws; do not need to be removed).
2. Using a plastic opener pick, pry open and remove the bottom cover.
3. Unplug the battery from the motherboard.
4. Unscrew the four Phillips head screws that secure the battery in place (four non-captive).
5. Remove the battery from the enclosure.
6. Insert the new battery into the enclosure.
7. Screw the four Phillips head screws to secure the new battery in place.
8. Connect the battery cable to the motherboard.
9. Re-attach the bottom cover, and snap it back into place.
10. Screw the 11 Phillips head screws on the bottom of the system back into place to secure the bottom cover.

Lenovo Chromebook 14e

1. Unscrew nine Phillips head screws on the bottom of the system (11 captive screws; do not need to be removed).
2. Using a plastic opener pick, pry open and remove the bottom cover.
3. Unplug the battery from the motherboard.
4. Unscrew the four Phillips head screws that secure the battery in place (four non-captive).
5. Remove the battery from the enclosure.
6. Insert the new battery into the enclosure.
7. Screw the four Phillips head screws to secure the new battery in place.
8. Connect the battery cable to the motherboard.
9. Re-attach the bottom cover, and snap it back into place.
10. Screw the nine Phillips head screws on the bottom of the system back into place to secure the bottom cover.

Acer Chromebook Vero 514

1. Unscrew ten Phillips head screws on the bottom of the system (ten non-captive screws with washers; need to be removed).
2. Using a plastic opener pick, pry open and remove the bottom cover.
3. Peel back the tape that secures the battery plug to the motherboard, and peel back the protective tape.
4. Remove the battery from the enclosure.
5. Insert the new battery into the enclosure.
6. Connect the battery cable to the motherboard.
7. Replace the first and second piece of tape.
8. Re-attach the bottom cover, and snap it back into place.
9. Screw the ten Phillips head screws on the bottom of the system back into place to secure the bottom cover.

Acer Chromebook Spin 514

1. Unscrew nine Phillips head screws on the bottom of the system (nine non-captive screws with washers; need to be removed).
2. Using a plastic opener pick, pry open and remove the bottom cover.
3. Peel back the tape that secures the battery plug to the motherboard, and peel back the protective tape.
4. Remove the battery from the enclosure.
5. Insert the new battery into the enclosure.
6. Connect the battery cable to the motherboard.
7. Replace the first and second piece of tape.
8. Re-attach the bottom cover and snap it back into place.
9. Screw the nine Phillips head screws on the bottom of the system back into place to secure the bottom cover.

Acer Chromebook C734

1. Unscrew 11 Phillips head screws on the bottom of the system (11 non-captive screws with washers; need to be removed).
2. Using a plastic opener pick, pry open and remove the bottom cover.
3. Peel back the tape that secures the battery plug to the motherboard, and peel back the protective tape.
4. Remove the battery from the enclosure.
5. Insert the new battery into the enclosure.
6. Connect the battery cable to the motherboard.
7. Replace the first and second piece of tape.
8. Re-attach the bottom cover, and snap it back into place.
9. Screw the 11 Phillips head screws on the bottom of the system back into place to secure the bottom cover.

HP Chromebook 11 G9 EE

1. Unscrew six Phillips head screws on the bottom of the system (six non-captive screws; need to be removed).
2. Turn the system over, open the lid, and use a plastic opener pick to pry open the palm rest.
3. Lift up the top panel and unclip the touchpad cable, and unclip the keyboard cable.
4. Unplug the battery from the motherboard.
5. Unscrew the four Phillips head screws that secure the battery in place (four non-captive).
6. Remove the battery from the enclosure.
7. Insert the new battery into the enclosure.
8. Screw the four Phillips head screws to secure the new battery in place.
9. Connect the battery cable to the motherboard.
10. Connect the touchpad cable, and connect the keyboard cable.
11. Re-attach the palm rest, and snap it into place.
12. Screw the six Phillips head screws on the bottom of the system back into place to secure the top cover.

HP Chromebook x360

1. Use a razor blade to gently pry and peel off the six adhesive screw covers on the bottom of the system.
2. Unscrew six Phillips head screws on the bottom of the system (six non-captive screws; need to be removed).
3. Using a plastic opener pick, pry open and remove the bottom cover.
4. Unplug the battery from the motherboard.
5. Unscrew the five Phillips head screws that secure the battery in place (five non-captive).
6. Remove the battery from the enclosure.
7. Insert the new battery into the enclosure.
8. Screw the five Phillips head screws to secure the new battery in place.
9. Connect the battery cable to the motherboard.
10. Re-attach the bottom cover, and snap it back into place.
11. Screw the six Phillips head screws on the bottom of the system back into place to secure the top cover.
12. Replace the six adhesive screw covers.

HP Elite c645 G2 Chromebook Enterprise

1. Unscrew six Phillips head screws on the bottom of the system (six non-captive screws; need to be removed).
2. Using a plastic opener pick, pry open and remove the bottom cover.
3. Unplug the battery from the motherboard.
4. Unscrew the five Phillips head screws that secure the battery in place (five non-captive).
5. Remove the battery from the enclosure.
6. Insert the new battery into the enclosure.
7. Screw the five Phillips head screws to secure the new battery in place.
8. Connect the battery cable to the motherboard.
9. Re-attach the bottom cover, and snap it back into place.
10. Screw the six Phillips head screws on the bottom of the system back into place to secure the top cover.

Read the report at <https://facts.pt/LTa77x5>



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