



The science behind the report:

## Spend less on repairs and replacements with the Dell Chromebook 5190

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 [Spend less on repairs and replacements with the Dell Chromebook 5190](#).

On November 5, 2018, we finalized the hardware and software configurations we tested. Updates for current and recently released hardware and software appear often, so unavoidably these configurations may not represent the latest versions available when this report appears. For older systems, we chose configurations representative of typical purchases of those systems. We concluded hands-on testing on December 7, 2018.

## Our results

The tables below present our findings in detail.

Dell Chromebook 5190		
Test step	Test	Issue
1	5K hinge cycles	
2	1K micro-drops	<ul style="list-style-type: none"> <li>• 400 drops               <ul style="list-style-type: none"> <li>• structural issue (bottom-right corner screw moved slightly, about 5 degrees)</li> </ul> </li> <li>• 600 drops               <ul style="list-style-type: none"> <li>• cosmetic issue (minor scuffs/scratches on top)</li> </ul> </li> <li>• 800 drops               <ul style="list-style-type: none"> <li>• structural issue (bottom-right screw unscrewed a bit more, about 45 degrees)</li> </ul> </li> <li>• 1,000 drops               <ul style="list-style-type: none"> <li>• cosmetic issue (more scratches and scuffs on top)</li> </ul> </li> </ul>
3	5K hinge cycles	
4	1K micro-drops	<ul style="list-style-type: none"> <li>• 1,400 drops               <ul style="list-style-type: none"> <li>• structural issue (top-left and bottom-right screw unscrewed slightly)</li> <li>• cosmetic issue (some scratches and scuffs on exterior)</li> </ul> </li> <li>• 1,600 drops               <ul style="list-style-type: none"> <li>• cosmetic issue (couple extra scratches/scuffs on exterior)</li> </ul> </li> <li>• 1,800 drops               <ul style="list-style-type: none"> <li>• structural issue (top-left and bottom-right screw unscrewed a bit more)</li> <li>• cosmetic issue (extra scratches/scuffs on exterior)</li> </ul> </li> </ul>
5	5K hinge cycles	
6	1K micro-drops	<ul style="list-style-type: none"> <li>• 2,200 drops               <ul style="list-style-type: none"> <li>• structural issue (bottom-right screw unscrewed more)</li> </ul> </li> <li>• 2,600 drops               <ul style="list-style-type: none"> <li>• cosmetic issue (a few more scratches and scuffs)</li> </ul> </li> <li>• 3,000 drops               <ul style="list-style-type: none"> <li>• structural issue (top-left and bottom-right screws slightly unscrewed more)</li> </ul> </li> </ul>
7	5K hinge cycles	
8	1K micro-drops	<ul style="list-style-type: none"> <li>• 3,200 drops               <ul style="list-style-type: none"> <li>• structural issue (bottom-right screw unscrewed slightly more)</li> </ul> </li> <li>• 3,600 drops               <ul style="list-style-type: none"> <li>• structural issue (top-left and bottom-right screws unscrewed a bit more)</li> </ul> </li> <li>• 3,800 drops               <ul style="list-style-type: none"> <li>• structural issue (bottom-right screw unscrewed slightly more)</li> </ul> </li> </ul>
9	5K hinge cycles	
10	1K micro-drops	<ul style="list-style-type: none"> <li>• 4,600 drops               <ul style="list-style-type: none"> <li>• structural issue (bottom-right and top-left screw unscrewed slightly more; bottom-left screw began unscrewing very slightly)</li> </ul> </li> <li>• 4,800 drops               <ul style="list-style-type: none"> <li>• structural issue (bottom-right screw unscrewed slightly more)</li> </ul> </li> <li>• 5,000 drops               <ul style="list-style-type: none"> <li>• structural issue (rattling sound from inside Chromebook)</li> </ul> </li> </ul>

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11	5K hinge cycles	
12	1K micro-drops	<ul style="list-style-type: none"><li>• 5,600 drops<ul style="list-style-type: none"><li>• structural issue (top-left and bottom-right screw unscrewed a bit more)</li></ul></li><li>• 5,800 drops<ul style="list-style-type: none"><li>• cosmetic issue (some more light scratching on exterior)</li></ul></li><li>• 6,000 drops<ul style="list-style-type: none"><li>• structural issue (top-left and bottom-right screw unscrewed a light bit more)</li></ul></li></ul>
13	5K hinge cycles	
14	1K micro-drops	<ul style="list-style-type: none"><li>• 6,400 drops<ul style="list-style-type: none"><li>• functional issue (camera not working but was working after the next 200 drops)</li></ul></li><li>• 6,600 drops<ul style="list-style-type: none"><li>• cosmetic issue (slight change in bottom-right screw position)</li></ul></li><li>• 7,000 drops<ul style="list-style-type: none"><li>• cosmetic issue (bottom-front edge shows slight separation)</li><li>• structural issue (small change in bottom right screw position)</li></ul></li></ul>

**HP Chromebook 11 G6 EE**

Test step	Test	Summary
1	5K hinge cycles	
2	1K micro-drops	<ul style="list-style-type: none"> <li>• 200 drops                             <ul style="list-style-type: none"> <li>• cosmetic issue (exterior scuffing)</li> </ul> </li> <li>• 400 drops                             <ul style="list-style-type: none"> <li>• cosmetic issue (exterior scuffing)</li> </ul> </li> <li>• 600 drops                             <ul style="list-style-type: none"> <li>• cosmetic issue (scuffing on interior of laptop)</li> <li>• structural issue (left "alt" and "ctrl" keys pushed in slightly)</li> </ul> </li> <li>• 800 drops                             <ul style="list-style-type: none"> <li>• cosmetic issue (exterior scuffing)</li> <li>• structural issue (slight rattling noise when moving laptop)</li> </ul> </li> <li>• 1,000 drops                             <ul style="list-style-type: none"> <li>• cosmetic issue (exterior scuffing)</li> </ul> </li> </ul>
3	5K hinge cycles	
4	1K micro-drops	<ul style="list-style-type: none"> <li>• 1,200 drops                             <ul style="list-style-type: none"> <li>• cosmetic issue (exterior scuffing on corners and top of laptop)</li> </ul> </li> <li>• 1,400 drops                             <ul style="list-style-type: none"> <li>• structural issue (a couple screws unscrewed a bit)</li> </ul> </li> <li>• 1,600 drops                             <ul style="list-style-type: none"> <li>• structural issue (a couple screws unscrewed a bit more)</li> <li>• cosmetic issues (left-front corner plastic started to fray off, the top was a bit more scuffed)</li> </ul> </li> <li>• 1,800 drops                             <ul style="list-style-type: none"> <li>• structural issue (the middle screw on the right side dropped out during the right-side drop test)</li> </ul> </li> <li>• 2,000 drops                             <ul style="list-style-type: none"> <li>• cosmetic issue (the left and right front corners were more scuffed with the left front corner starting to show metal beneath the plastic; a small piece of the plastic on the back hinge had chipped off)</li> </ul> </li> </ul>
5	5K hinge cycles	<ul style="list-style-type: none"> <li>• 15,000 hinge cycles                             <ul style="list-style-type: none"> <li>• screen issue (screen turned on only when adjusted to around 90 degrees or less; if the laptop was fully opened the screen shuts off; the laptop was still on, but the display was not functioning)</li> </ul> </li> </ul>
6	1K micro-drops	<ul style="list-style-type: none"> <li>• 2,200 drops                             <ul style="list-style-type: none"> <li>• screen issue (screen turned off at different angles before the 90 degree point and turned back on at different angles)</li> </ul> </li> <li>• 2,400 drops                             <ul style="list-style-type: none"> <li>• screen issue (screen turned on only around 60 degree mark and lower; the issue seems to be with the LCD backlight as we saw faint images when screen went dark)</li> <li>• structural issue (top left screw unscrewed slightly)</li> </ul> </li> <li>• 2,600 drops                             <ul style="list-style-type: none"> <li>• screen issue (screen issues consistent with previous drop cycles)</li> <li>• functional issue (camera stopped working)</li> </ul> </li> <li>• 2,800 drops                             <ul style="list-style-type: none"> <li>• screen issue (screen issues consistent with previous drop cycles; screen backlight turned off at some angles below 45 degrees)</li> <li>• structural issue (top left screw unscrewed a very small amount more)</li> </ul> </li> <li>• 3,000 drops                             <ul style="list-style-type: none"> <li>• screen issue (screen issues consistent with previous drop cycle)</li> <li>• cosmetic issue (corners more damaged)</li> </ul> </li> </ul>
7	5K hinge cycles	
8	1K micro-drops	<ul style="list-style-type: none"> <li>• 4,000 drops                             <ul style="list-style-type: none"> <li>• cosmetic issue (a bit more scuffing on top)</li> </ul> </li> </ul>

## Lenovo 100e Chromebook

Test step	Test	Summary
1	5K hinge cycles	<ul style="list-style-type: none"> <li>• 5,000 hinge cycles <ul style="list-style-type: none"> <li>• structural issue (hinge slightly creaked when beginning to open/close it)</li> </ul> </li> </ul>
2	1K micro-drops	<ul style="list-style-type: none"> <li>• 400 drops <ul style="list-style-type: none"> <li>• structural issue (top-left, top-middle, middle, and bottom-right screws began unscrewing)</li> </ul> </li> <li>• 600 drops <ul style="list-style-type: none"> <li>• structural issue (screws unscrewed a bit more)</li> </ul> </li> <li>• 800 drops <ul style="list-style-type: none"> <li>• cosmetic issue (small scratch on top bottom left corner of casing)</li> <li>• structural issue (screws unscrewed more)</li> </ul> </li> <li>• 1,000 drops <ul style="list-style-type: none"> <li>• cosmetic issue (more small scratches on top)</li> <li>• structural issues (screws unscrewed more; very slight rattling sound inside the Chromebook)</li> </ul> </li> </ul>
3	5K hinge cycles	<ul style="list-style-type: none"> <li>• 10,000 hinge cycles <ul style="list-style-type: none"> <li>• functional issue (Chromebook shut down; when we turned it on again, the system needed to be restored; after we restored the Chromebook, it functioned as normal)</li> </ul> </li> </ul>
4	1K micro-drops	<ul style="list-style-type: none"> <li>• 1,400 drops <ul style="list-style-type: none"> <li>• structural issue (a couple screws unscrewed a bit more)</li> </ul> </li> <li>• 1,600 drops <ul style="list-style-type: none"> <li>• structural issue (one screw unscrewed a bit more)</li> </ul> </li> <li>• 1,800 drops <ul style="list-style-type: none"> <li>• cosmetic issue (scratches/scuffing on back left and right and front right corners)</li> <li>• structural issue (one screw unscrewed a bit more)</li> </ul> </li> <li>• 2,000 drops <ul style="list-style-type: none"> <li>• structural issue (backside middle screw fell out during right-side drops)</li> <li>• cosmetic issue (slightly more scuffing on top)</li> </ul> </li> </ul>
5	5K hinge cycles	<ul style="list-style-type: none"> <li>• 15,000 hinge cycles <ul style="list-style-type: none"> <li>• structural issue (hinge slightly creaked when beginning to open/close it)</li> </ul> </li> </ul>
6	1K micro-drops	<ul style="list-style-type: none"> <li>• 2,600 drops <ul style="list-style-type: none"> <li>• cosmetic issue (slightly more scuffing on top)</li> </ul> </li> </ul>
7	5K hinge cycles	
8	1K micro-drops	<ul style="list-style-type: none"> <li>• 3,600 drops <ul style="list-style-type: none"> <li>• structural issue (the middle left-side screw unscrewed a bit more)</li> </ul> </li> <li>• 3,800 drops <ul style="list-style-type: none"> <li>• cosmetic issue (slightly more scuffing on top)</li> <li>• structural issue (the middle left-side screw unscrewed a bit more)</li> </ul> </li> <li>• 4,000 drops <ul style="list-style-type: none"> <li>• structural issue (the middle left screw unscrewed a tiny bit more)</li> </ul> </li> </ul>

**Lenovo 100e Chromebook**

9	5K hinge cycles	
10	1K micro-drops	<ul style="list-style-type: none"><li>• 4,200 drops<ul style="list-style-type: none"><li>• cosmetic issue (scuffing and scratching)</li><li>• structural issue (some screws unscrewed a bit more)</li></ul></li><li>• 4,400 drops<ul style="list-style-type: none"><li>• structural issue (top-right screw unscrewed a bit more)</li></ul></li><li>• 4,600 drops<ul style="list-style-type: none"><li>• structural issue (top-right screw unscrewed a bit more)</li></ul></li><li>• 4,800 drops<ul style="list-style-type: none"><li>• structural issue (top-right screw unscrewed a bit more)</li></ul></li><li>• 5,000 drops<ul style="list-style-type: none"><li>• structural issue (some screws unscrewed more)</li></ul></li></ul>
11	5K hinge cycles	
12	1K micro-drops	<ul style="list-style-type: none"><li>• 5,200 drops<ul style="list-style-type: none"><li>• functional/screen issue (half of the screen was whited out with graphical glitches and lines; the other half was odd colors and graphical glitches)</li></ul></li></ul>

## System configuration information

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

System	Dell Chromebook 5190	HP Chromebook 11 G6 EE	Lenovo 100e Chromebook
Processor	Intel® Celeron™ N3350	Intel Celeron N3350	Intel Celeron N3350
Processor frequency (GHz)	1.10 - 2.40	1.10 – 2.40	1.10 – 2.40
Processor cores	2	2	2
Memory (GB)	4	4	4
Storage (GB)	32	32	32
Wireless	802.11 ac	802.11 ac	802.11 ac
Bluetooth	4.0	4.2	4.2
USB	2x USB 3.1 Type C, 2x USB 3.1	2x USB 3.1 Type C, 2x USB 3.1	2x USB 3.1 Type C, 2x USB 3.0
Battery type	Lithium-Ion	Lithium-Ion	Lithium-Ion
Battery capacity (Wh)	42	47.36	42
Display	11.6" 1366x768	11.6" 1366x768	11.6" 1366x768
OS (version)	70.0.3538.110	70.0.3538.110	70.0.3538.110
Build/firmware	Coral.10068.71.0	Coral.10068.71.0	Coral.10068.71.0
System weight (lbs.)	2.82	2.27	2.75

# How we tested

## 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 marked screws with a visible permanent mark to show movement (if any) during testing. We ran initial diagnostics using the Chrome Shell (cros) before testing.

## Running the test

1. Charge the system fully, and unplug the system.
2. Using a hinge tester, conduct 5,000 hinge test cycles.
3. Record any functional and/or visual damage to the system.
4. Put the system in sleep mode, and close the laptop lid.
5. Prepare a two-inch-thick plywood plate surface on which to drop the system. Complete the following drops onto this surface from a height of four inches off the plate.
6. Drop the system five times on each of the following locations:
  - Back-left corner
  - Back-right corner
  - Front-left corner
  - Front-right corner
7. Drop the system 30 times on each of the following locations:
  - Bottom
  - Left side
  - Right side
  - Top
  - Front side
  - Back side
8. After 200 drops, record any new functional and visual damage to the system, and take digital images of damage.
9. Complete steps 6 and 7 four more times for a total of 1,000 drops.
10. After 1,000 drops, perform a thorough check for any mechanical or physical damage, and run diagnostics using Chrome Shell to make sure the system is still functional.
11. Record the results of the diagnostics test.
12. Complete steps 2 through 11 six more times or until the system fails.

Read the report at <http://facts.pt/5wmb21h> ►

This project was commissioned by Dell Technologies.



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