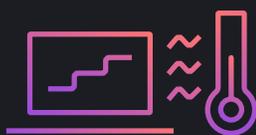




Higher or comparable scores on performance benchmarks

Up to 2.58x the performance on the Blender Benchmark 3.1.0 Classroom render



Cooler surface temperature

Up to 6.2 degrees Celsius lower (top hot spot while under load)



Comparable noise level

The six-core AMD Ryzen 5 PRO 5675U processor-based HP EliteBook 645 G9 achieved strong performance on industry-standard benchmarks

This laptop delivered performance better than or comparable to that of the Dell Latitude 5420, powered by the four-core Intel Core i5-1145G7 processor, and had lower surface temperatures for a more comfortable user experience

Those who are purchasing employee laptops often prioritize performance. While workers appreciate a system that helps them execute tasks quickly and reduces waiting, the sensory experience they have while working is also important. A speedy device that makes a lot of noise or is extremely warm to the touch is not conducive to productivity.

We evaluated two business laptops with comparable specifications aside from their processors: the HP® EliteBook 645 G9, enabled by the six-core AMD Ryzen™ 5 PRO 5675U processor, and the Dell™ Latitude™ 5420, enabled by the four-core Intel® Core™ i5-1145G7 processor. The models we tested had the same amount of RAM and the same size and type of solid-state drive for storage.

In our tests, the AMD Ryzen 5 PRO 5675U processor-powered laptop outperformed or delivered comparable performance to the laptop with the Intel Core i5-1145G7 processor on 26 tests from eight benchmark tools. In addition, the AMD Ryzen 5 PRO 5675U processor-powered HP EliteBook 645 G9 generated less heat and comparable levels of noise while under CPU load.

Putting two laptops to the test

We compared two business laptops:

The HP EliteBook 645 G9

AMD Ryzen 5 PRO 5675U processor
6 cores
16GB RAM
512GB SSD

The Dell Latitude 5420

Intel Core i5-1145G7 processor
4 cores
16GB RAM
512GB SSD

We conducted a series of performance benchmark tests:

- ◆ Cinebench R23 vR23.200
- ◆ Geekbench 5 Pro
- ◆ Passmark® PerformanceTest 10
- ◆ PCMark 10
- ◆ UL Procyon® Office Productivity Benchmark
- ◆ UL Procyon Photo Editing Benchmark
- ◆ UL Procyon Video Editing Benchmark
- ◆ Blender Benchmark 3.1.0

Note: For UL Procyon benchmark testing, we installed a clean Windows 11 image. For all other tests, we used OEM Windows images.

To get a feel for the sensory experience users would have when using these two laptops, we also measured the amount of sound and heat that each system generated while idle and while under load running Cinebench R23. For complete configuration information for the two test systems and step-by-step details of our testing, see the [science behind the report](#).

The costs for the two systems were comparable. The Dell Latitude 5320 with an Intel Core i5-1145G7 processor had a discounted price of \$1,757.60 USD, and the HP EliteBook 645 G9 with AMD Ryzen 5 PRO 5675U processor had a discounted price of \$1,802.00 USD.

About the AMD Ryzen 5 PRO 5675U processor

The AMD Ryzen 5 PRO 5675U processor is part of the AMD Ryzen PRO 5000 Series processors product line, which AMD claims offers “blazing fast performance that accelerate the latest productivity, collaboration, and office applications that are essential to the hybrid workforce.”¹ The AMD Ryzen 5 PRO 5675U processor has 12 threads, a 2.3GHz base clock, and up to a 4.3GHz maximum boost clock.² In our testing, the AMD Ryzen 5 PRO 5675U processor powered the HP EliteBook 645 G9.

Learn more at

<https://www.amd.com/en/products/apu/amd-ryzen-5-pro-5675u>.



Comparing system performance using benchmark scores

Because laptop users carry out a variety of workloads, we conducted a range of industry-standard benchmarks that measure different aspects of system performance. Together, these results provide a picture of the kind of responsiveness users are likely to experience. In this section, we show what the eight benchmarks we ran revealed.

Cinebench R23

The Cinebench R23 benchmark measures both multi-core and single-core performance. The AMD Ryzen 5 PRO 5675U processor-powered HP EliteBook 645 G9 achieved a Cinebench R23 CPU multi-core score up to 80.7 percent higher than that of the Intel Core i5-1145G7 processor-powered Dell Latitude 5420. The CPU single-core scores for the two laptops were almost identical (see Figure 1).

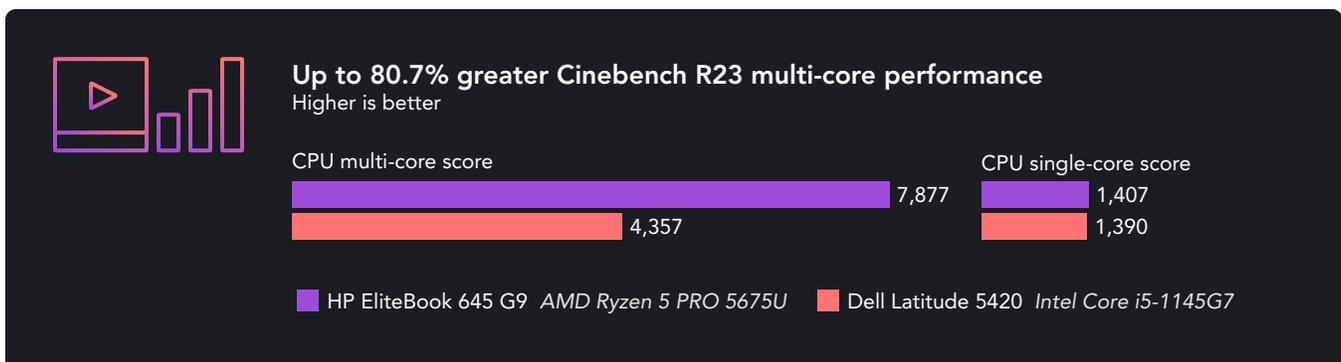


Figure 1: Cinebench R23 vR23.200 performance scores. Higher is better. Source: Principled Technologies.

Geekbench 5 Pro

Geekbench 5 Pro tests how well a system can handle tasks such as gaming and video editing. The AMD Ryzen 5 PRO 5675U processor-powered HP EliteBook 645 G9 achieved a Geekbench 5 CPU multi-core score up to 21.1 percent higher than the Intel Core i5-1145G7 processor-powered Dell Latitude 5420. The CPU single-core scores for the two laptops were almost identical (see Figure 2).

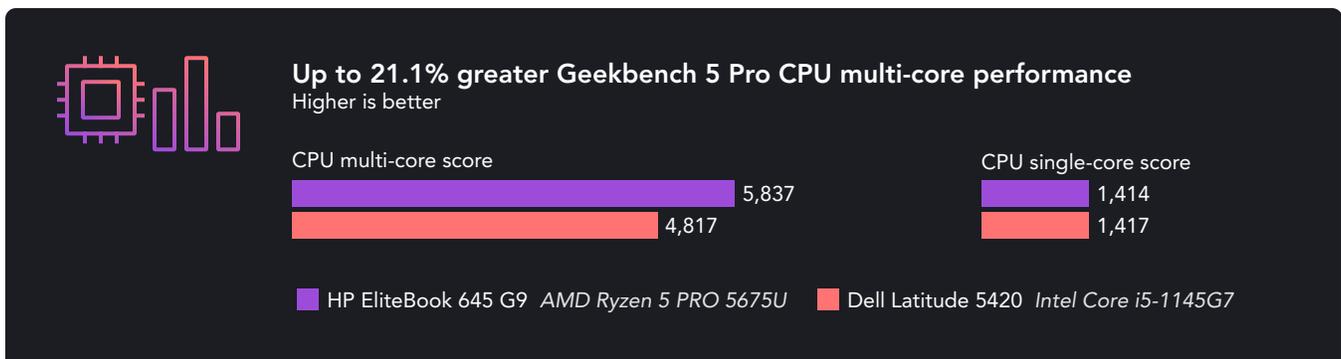


Figure 2: Geekbench 5 Pro performance scores. Higher is better. Source: Principled Technologies.



PassMark PerformanceTest 10

The PassMark PerformanceTest 10 is a benchmark tool that measures performance in many areas, including CPU, 2D and 3D graphics, disk, and memory. The AMD Ryzen 5 PRO 5675U processor-powered HP EliteBook 645 G9 achieved a PassMark PerformanceTest 10 score up to 48.3 percent higher than the Intel Core i5-1145G7 processor-powered Dell Latitude 5420 (see Figure 3).

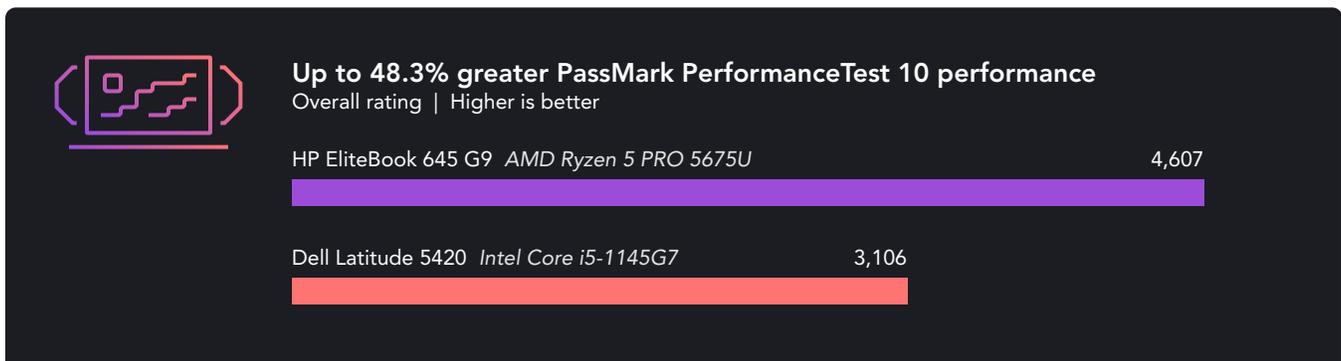


Figure 3: Passmark PerformanceTest 10 overall ratings. Higher is better. Source: Principled Technologies.

PCMark 10

PCMark 10 includes “a comprehensive set of tests that cover the wide variety of tasks performed in the modern workplace.”³ The AMD Ryzen 5 PRO 5675U processor-powered HP EliteBook 645 G9 achieved a PCMark 10 score up to 7.9 percent higher than the Intel Core i5-1145G7 processor-powered Dell Latitude 5420 (see Figure 4).

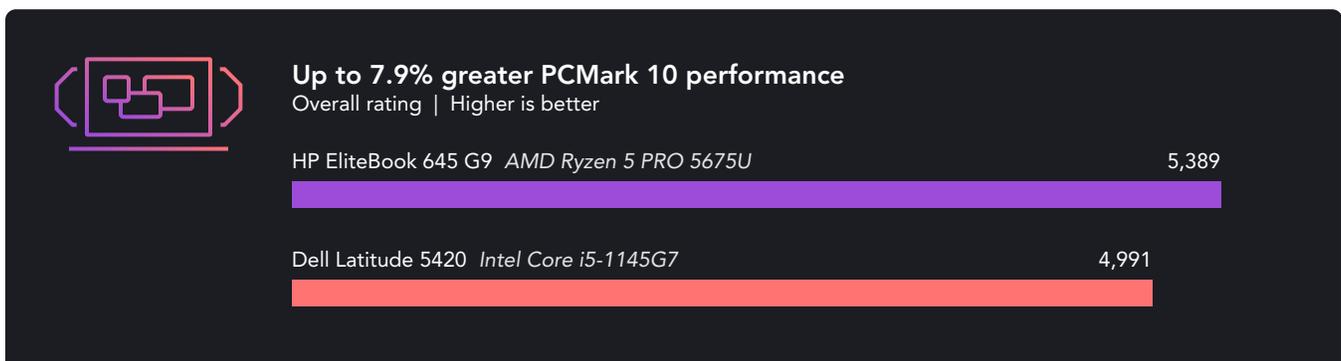


Figure 4: PCMark 10 overall ratings. Higher is better. Source: Principled Technologies.

Blender Benchmark 3.1.0

The Blender 3.1.0 benchmark tool tests 3D modeling performance. We executed three Blender renders and found that the AMD Ryzen 5 PRO 5675U processor-powered HP EliteBook 645 G9 outperformed the Intel Core i5-1145G7 processor-powered Dell Latitude 5420 on all of them. As Figure 5 shows, the HP EliteBook 645 G9 achieved up to 68 percent more samples per minute than the Dell Latitude 5420 on the Monster render, up to 2.13 times as many samples per minute on the Junkshop render, and up to 2.58 times as many samples per minute on the Classroom render.

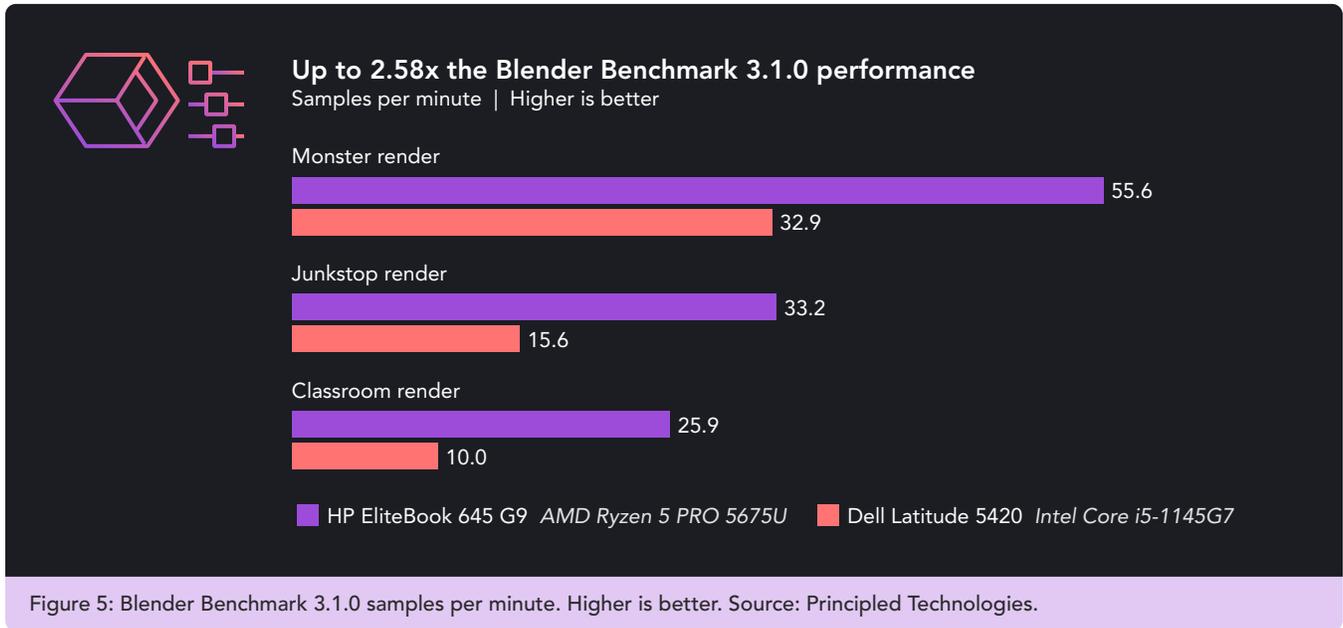


Figure 5: Blender Benchmark 3.1.0 samples per minute. Higher is better. Source: Principled Technologies.



The UL Procyon benchmark suite

UL Procyon is a suite of benchmarks for professional users working in “industry, enterprise, government, retail and press.”⁴

UL Procyon Office Productivity Benchmark

The AMD Ryzen 5 PRO 5675U processor-powered HP EliteBook 645 G9 achieved a UL Procyon Office Productivity Benchmark overall score up to 10.1 percent higher than the Intel Core i5-1145G7 processor-powered Dell Latitude 5420 (see Figure 6).

UL Procyon Photo Editing Benchmark

The AMD Ryzen 5 PRO 5675U processor-powered HP EliteBook 645 G9 achieved a UL Procyon Photo Editing Benchmark overall score up to 20.3 percent higher than the Intel Core i5-1145G7 processor-powered Dell Latitude 5420 (see Figure 7).

UL Procyon Video Editing Benchmark

The AMD Ryzen 5 PRO 5675U processor-powered HP EliteBook 645 G9 achieved a UL Procyon Video Editing Benchmark overall score up to 16.3 percent higher than the Intel Core i5-1145G7 processor-powered Dell Latitude 5420 (see Figure 8).

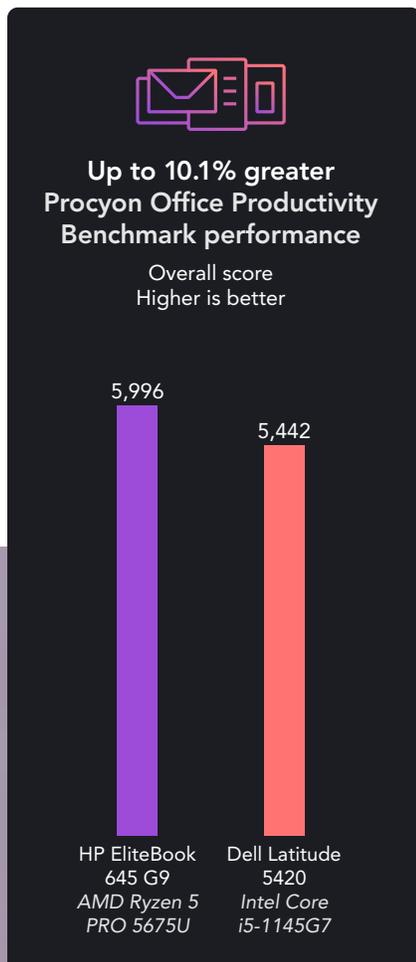


Figure 6: Overall Procyon Office Productivity rating. Higher is better. Source: Principled Technologies.

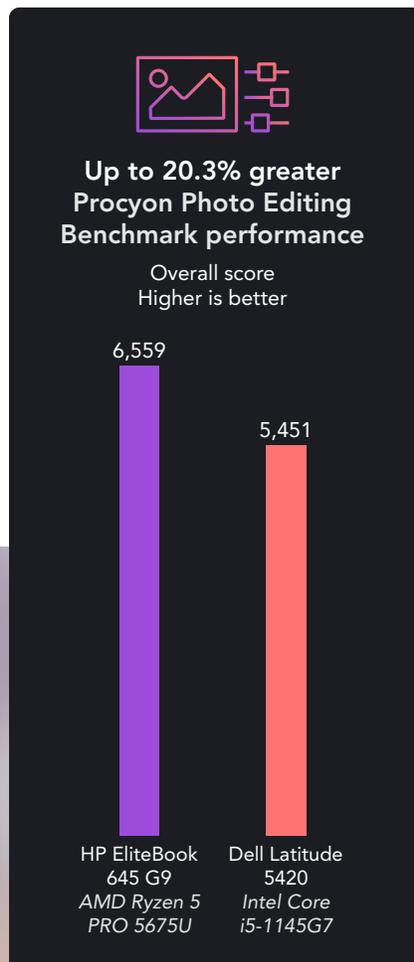


Figure 7: Overall Procyon Photo Editing rating. Higher is better. Source: Principled Technologies.

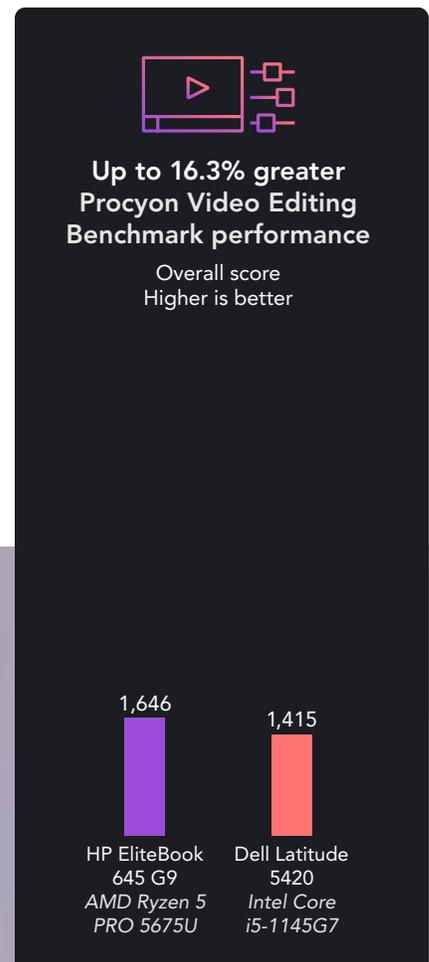
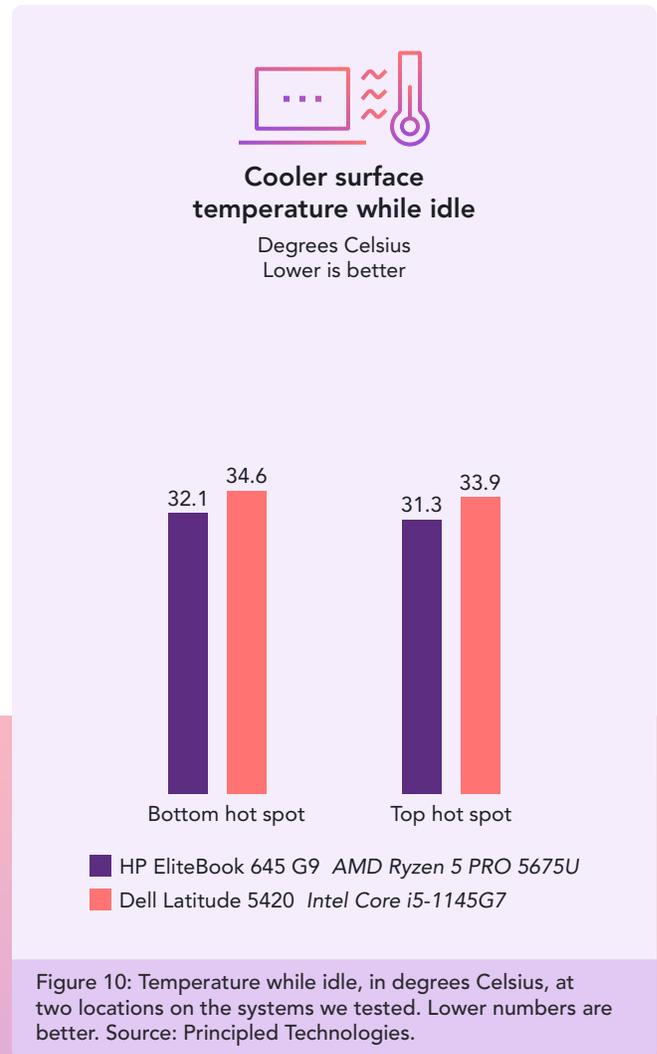
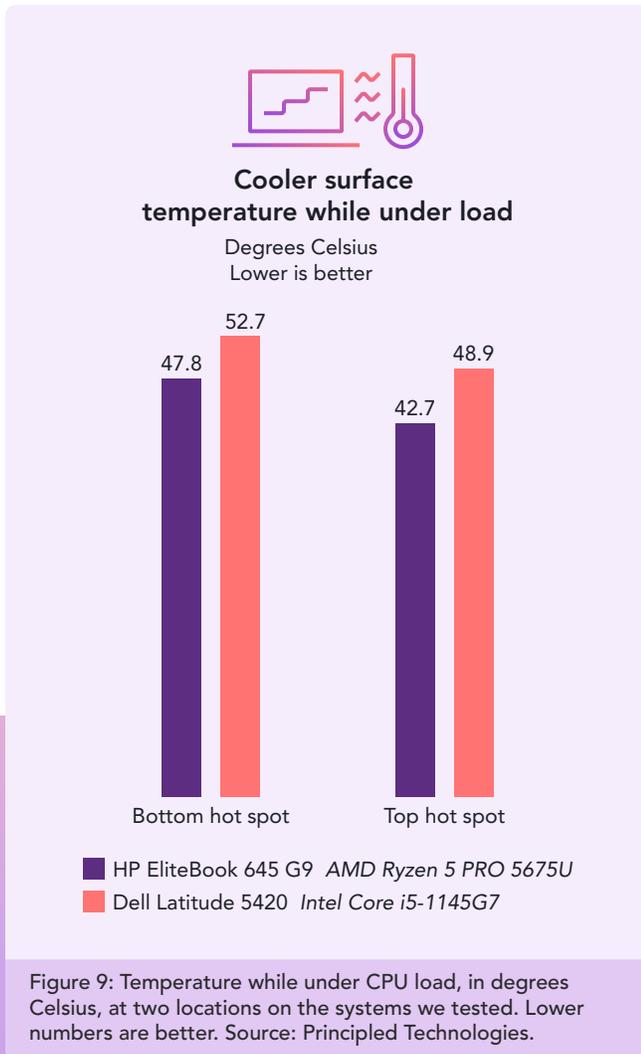


Figure 8: Overall Procyon Video Editing rating. Higher is better. Source: Principled Technologies.

Cooler surface temperatures

Employees aren't always sitting at a desk or table while using their computers. Sometimes they're working at home on the couch, or even in the car while waiting for a child's sports practice to end. In these situations where a laptop is actually on top of your lap, an extra-warm device can be very unpleasant. Figure 9 shows temperature readings, in Celsius, we took at two locations on our test devices while they were under CPU load running the multi-core workload in Cinebench R23. Despite its greater performance on this benchmark, the bottom hot spot of the AMD Ryzen 5 PRO 5675U processor-powered HP EliteBook 645 G9 ran up to 4.9 degrees cooler than the same spot on the Intel Core i5-1145G7 processor-powered Dell Latitude 5420 and the top hot spot ran up to 6.2 degrees cooler.

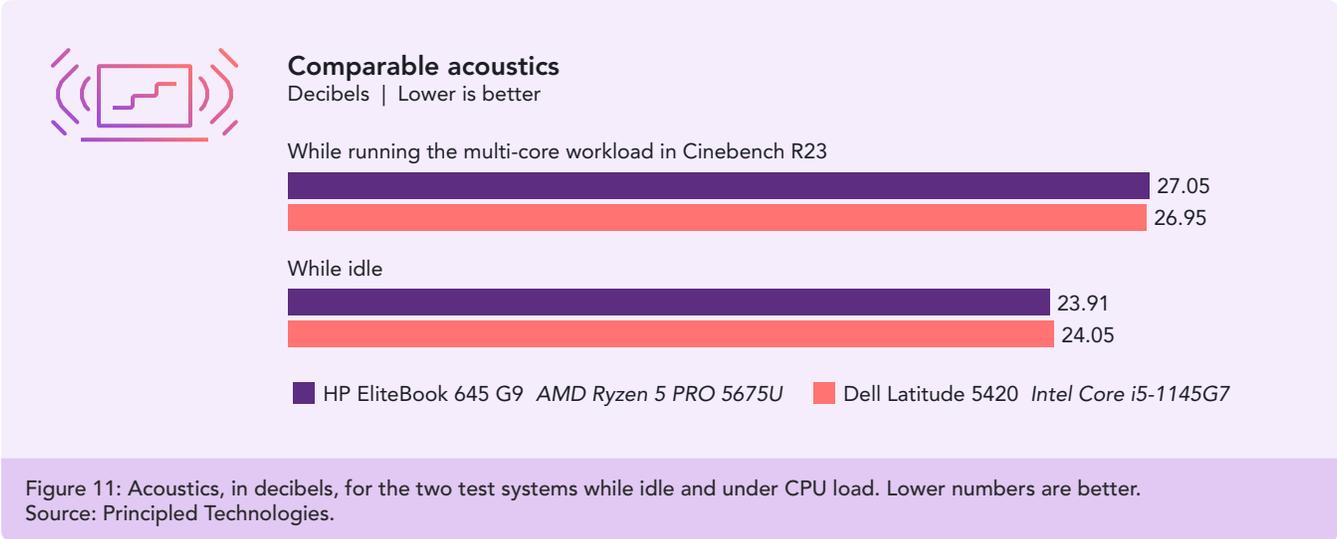
The AMD Ryzen 5 PRO 5675U processor-powered laptop was also cooler than the Intel Core i5-1145G7 processor-powered device when idle, with its bottom hot spot up to 2.5 degrees cooler and its top hot spot up to 2.6 degrees cooler.





Comparable noise

Some people can tune out the sound of an unusually noisy computer, but others can find it distracting. We measured how much sound the two laptops generated while idle and while running the multi-core workload in Cinebench R23. As Figure 11 shows, under both conditions, the noise was almost identical.





Conclusion

Performance is an important consideration when selecting laptops. Noise and heat levels, which can affect the user experience, are also worth investigating. In our tests, an AMD Ryzen 5 PRO 5675U processor-enabled HP EliteBook 645 G9 outperformed or delivered comparable performance to a Dell Latitude 5420 with the Intel Core i5-1145G7 processor on 26 tests from eight benchmark tools. It was also cooler overall, and the two devices generated comparable levels of noise while under heavy CPU stress.

1. AMD, "AMD Ryzen™ Processors with PRO Technologies," accessed June 1, 2022, <https://www.amd.com/en/products/ryzen-pro-processors-laptop>.
2. According to AMD, "Max boost for AMD Ryzen processors is the maximum frequency achievable by a single core on the processor running a bursty single-threaded workload. Max boost will vary based on several factors, including, but not limited to: thermal paste; system cooling; motherboard design and BIOS; the latest AMD chipset driver; and the latest OS updates." Source: "AMD Processor Specifications," accessed August 3, 2022, <https://www.amd.com/en/partner/processor-specifications>.
3. UL Solutions, "PCMark 10," accessed July 1, 2022, <https://benchmarks.ul.com/pcmark10>.
4. UL Solutions, "UL Procyon® benchmark suite," accessed July 1, 2022, <https://benchmarks.ul.com/procyon>.

Read the science behind this report at <https://facts.pt/76W2Rni> ►



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