



The science behind the report:

The HP EliteBook 8 G1a 14 inch Notebook Next Gen AI PC: Innovation at your fingertips

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 [The HP EliteBook 8 G1a 14 inch Notebook Next Gen AI PC: Innovation at your fingertips](#).

We concluded our hands-on testing on June 17, 2025. 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 August 22, 2025 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 1: Our prompts and the AI companions’ responses in cloud mode.

Prompt	HP AI companion output	Lenovo AI Now output
General knowledge prompts		
Factual response		
Run 1 What is the capital of France? Answer in one short sentence	The capital of France is Paris.	The capital of France is Paris.
Run 2 What is the capital of France? Answer in one short sentence	The capital of France is Paris.	The capital of France is Paris.
Run 3 What is the capital of France? Answer in one short sentence	The capital of France is Paris.	The capital of France is Paris.

Prompt	HP AI companion output	Lenovo AI Now output
Follow-up retention and accuracy		
Run 1 What river flows through it?	The Seine River flows through Paris.	The Seine River flows through Paris, winding its way through the heart of the city and offering picturesque views of landmarks such as the Eiffel Tower and Notre-Dame Cathedral. It has played a crucial role in the city's history and development, serving as a major trade route and a source of inspiration for artists and writers alike.
Run 2 What river flows through it?	The Seine River flows through Paris.	The river that flows through Paris is the Seine. It stretches for about 777 kilometers (483 miles) and is an important waterway in the Île-de-France region. The Seine is known for its picturesque views, with many famous landmarks, such as the Eiffel Tower and Notre-Dame Cathedral, located along its banks.
Run 3 What river flows through it?	The Seine River flows through Paris.	The Seine River flows through Paris, traversing the city and providing beautiful waterfront views and historic landmarks along its banks.
Long-form response		
Run 1 Write a 140-160 word summary of the Apollo 11 mission. Provide the launch date, the three crew members and their roles, the Moon landing date, the landing site, and the mission's significance.	The Apollo 11 mission, a landmark event in space exploration, launched on July 16, 1969. This historic mission was crewed by Commander Neil Armstrong, Command Module Pilot Michael Collins, and Lunar Module Pilot Edwin "Buzz" Aldrin. On July 20, 1969, the Lunar Module, known as the Eagle, successfully landed on the Moon's surface at the Sea of Tranquility. This monumental achievement marked the first time humans set foot on the Moon. Neil Armstrong famously took the first steps, uttering the iconic words, "That's one small step for man, one giant leap for mankind," followed by Buzz Aldrin shortly thereafter. Michael Collins remained in orbit aboard the Command Module, Columbia, ensuring the safe return of his fellow astronauts. The Apollo 11 mission's significance lies in its demonstration of human ingenuity and determination, establishing the United States as a leader in space exploration and igniting imaginations worldwide about the possibilities of space travel.	The Apollo 11 mission, a pivotal chapter in space exploration, launched on July 16, 1969, with the courageous crew consisting of Commander Neil Armstrong, Command Module Pilot Michael Collins, and Lunar Module Pilot Edwin "Buzz" Aldrin. On July 20, 1969, Armstrong and Aldrin made history as they landed the Lunar Module, named "Eagle," in the Sea of Tranquility on the Moon. Armstrong famously proclaimed, "That's one small step for [a] man, one giant leap for mankind," upon stepping onto the lunar surface, marking humanity's first footsteps beyond Earth. The mission's significance is immense, symbolizing the technological prowess of the United States during the space race against the Soviet Union and fulfilling President John F. Kennedy's goal of landing a human on the Moon before the end of the 1960s. After spending about 21 hours on the lunar surface, the astronauts safely returned to Earth, splashing down in the Pacific Ocean on July 24, 1969.
Run 2 Write a 140-160 word summary of the Apollo 11 mission. Provide the launch date, the three crew members and their roles, the Moon landing date, the landing site, and the mission's significance.	Apollo 11 was a historic space mission launched by NASA on July 16, 1969. It carried three astronauts: Neil Armstrong, serving as the mission commander; Edwin "Buzz" Aldrin, the lunar module pilot; and Michael Collins, the command module pilot. The spacecraft comprised two main parts: the Command Module (Columbia), piloted by Collins, and the Lunar Module (Eagle), used by Armstrong and Aldrin to descend to the Moon's surface. On July 20, 1969, the Lunar Module successfully landed at the Sea of Tranquility, marking the first time humans set foot on the Moon. Armstrong was the first human to walk on the lunar surface, followed by Aldrin. The famous words, "That's one small step for man, one giant leap for mankind," were uttered by Armstrong. The mission concluded with a safe return to Earth on July 24, 1969. Apollo 11's success fulfilled a global curiosity and ambition to explore space, establishing a milestone in human innovation and exploration.	The Apollo 11 mission, a landmark event in human history, launched successfully from Kennedy Space Center on July 16, 1969. The crew comprised Commander Neil Armstrong, who became the first human to set foot on the Moon; Command Module Pilot Michael Collins, who piloted the command module Columbia in lunar orbit; and Lunar Module Pilot Edwin "Buzz" Aldrin, who accompanied Armstrong to the Moon's surface. The mission achieved its historic Moon landing on July 20, 1969, at the Sea of Tranquility, a flat region that provided a safe site for lunar exploration. As Armstrong famously declared, "That's one small step for [a] man, one giant leap for mankind," he and Aldrin conducted vital scientific experiments, collected lunar samples, and demonstrated the capabilities of human space exploration. Apollo 11's successful mission marked a significant achievement in the Space Race, symbolizing human innovation and inspiring generations to pursue advancements in science and exploration.

Prompt	HP AI companion output	Lenovo AI Now output
Run 3 Write a 140-160 word summary of the Apollo 11 mission. Provide the launch date, the three crew members and their roles, the Moon landing date, the landing site, and the mission's significance.	Apollo 11, launched on July 16, 1969, marked a historic milestone in space exploration as it was the first manned mission to land on the Moon. The mission was crewed by three astronauts: Commander Neil Armstrong, Command Module Pilot Michael Collins, and Lunar Module Pilot Edwin "Buzz" Aldrin. After traveling over 240,000 miles, the mission achieved its goal on July 20, 1969, when the Lunar Module, known as the "Eagle," touched down on the Moon's surface in the Sea of Tranquility. Neil Armstrong famously became the first human to step onto the lunar surface, uttering the iconic words, "That's one small step for man, one giant leap for mankind," followed by Buzz Aldrin joining him shortly after. Michael Collins remained in lunar orbit aboard the Command Module "Columbia." Apollo 11's success achieved President John F. Kennedy's ambitious goal of landing a man on the Moon and returning him safely to Earth, marking a significant victory in the space race and demonstrating the capabilities of human ingenuity and exploration.	Apollo 11, launched on July 16, 1969, was a groundbreaking mission that marked humanity's first successful landing on the Moon. The mission was crewed by three astronauts: Neil Armstrong, the mission commander; Edwin "Buzz" Aldrin, the lunar module pilot; and Michael Collins, the command module pilot. After a journey of nearly four days, Armstrong and Aldrin landed on the lunar surface on July 20, 1969, at a site called the Sea of Tranquility. Armstrong famously declared, "That's one small step for [a] man, one giant leap for mankind," as he became the first human to set foot on the Moon, followed shortly by Aldrin. Collins remained in orbit aboard the Command Module, ensuring the mission's success from above. Apollo 11's significance lies not only in its technological achievements but also in its profound impact on science, exploration, and international rivalry during the Space Race, uniting people around the world in awe of this historic milestone.
Document-specific prompts		
Document summarization (.docx)		
Run 1 Summarize the document on Switchgrass in 140-160 words. Cover the primary uses, give a basic description, and include one establishment/management point. Use full sentences and avoid lists.	Switchgrass (<i>Panicum virgatum</i>) is a valuable native grass that serves multiple purposes. It is extensively used for livestock, providing good pasture and high-quality hay during the warm season. Additionally, it plays a crucial role in erosion control due to its adaptability across various sites. Switchgrass is also significant for wildlife, offering nesting and cover for various birds and mammals, and acts as a food source. Furthermore, it's an excellent biofuel, with the ability to produce high biomass yields on marginal lands, making it suitable for bioenergy conversion processes like cellulosic ethanol production and biogas. A perennial bunch grass, switchgrass grows 3 to 5 feet tall, with a round stem and a red to straw-colored tint. To establish switchgrass, it is typically planted using pure live seed, and management includes maintaining the planting site free of weeds.	N/A
Run 2 Summarize the document on Switchgrass in 140-160 words. Cover the primary uses, give a basic description, and include one establishment/management point. Use full sentences and avoid lists.	Switchgrass (<i>Panicum virgatum</i> L.) is a native perennial warm-season grass that produces abundant growth during late spring and early summer, making it an excellent source of pasture and high-quality hay for livestock. It is highly valued for erosion control due to its adaptability to various environments. Moreover, switchgrass serves as a biofuel source, providing moderate to high biomass yields on marginal lands, and is used in bioenergy conversion processes like cellulosic ethanol production. Described as a perennial bunch grass, it grows 3 to 5 feet tall and adapts well to moderately deep to deep, somewhat dry to poorly drained, sandy, or clay loam soils. For establishment, switchgrass is typically planted at a seeding rate of 6-12 lbs. of pure live seed per acre. It should be managed by controlling weeds during establishment through mowing and avoiding grazing in the first year.	N/A

Prompt	HP AI companion output	Lenovo AI Now output
Run 3 Summarize the document on Switchgrass in 140-160 words. Cover the primary uses, give a basic description, and include one establishment/management point. Use full sentences and avoid lists.	Switchgrass (<i>Panicum virgatum</i> L.) is a versatile perennial native to the continental United States, excluding California and the Pacific Northwest. It is particularly valued for its applications in livestock forage, erosion control, and biofuel production. As a warm-season grass, switchgrass offers substantial pasture and hay quality, supporting various wildlife and sustaining erosion-prone areas. Additionally, it contributes significantly to bioenergy processes, such as cellulosic ethanol production and biogas. The plant grows 3 to 5 feet tall, spreading through short rhizomes, and exhibits broad adaptability across diverse soil types, especially moderately deep to deep, somewhat dry to poorly drained. For proper establishment, recommended seeding involves pure live seed with region-specific rates. Effective management includes periodic burning to reduce weed competition and enhance growth, supported by soil test-based fertilization where needed. However, it can become invasive, requiring controlled management to prevent dominance over other native grasses.	N/A
Document summarization (.pdf)		
Run 1 Summarize the document on the Cumberland Plateau in 140-160 words. Cover the plateau's geologic setting and age, the dominant rock types, how erosion shaped characteristic, and one point of human/industrial history. Use full sentences and avoid lists.	The Cumberland Plateau, a flat-topped tableland part of the Appalachian Plateau, rises over 1,000 feet above the surrounding region, stretching from Alabama through Tennessee and Kentucky to New York. Its geologic history dates back over 350 million years to the Mississippian and Pennsylvanian periods when sediments in a shallow sea formed horizontal layers of limestone, shale, coal, and sandstone. As the plateau was uplifted about 285 million years ago, erosion began sculpting its landscape. Erosion of the softer underlying rocks led to the formation of dramatic cliffs, arches, and rock shelters within the resistant sandstone cap. Human history on the plateau includes early nomadic hunters, followed by agricultural societies before European settlement in the late 1700s. During the Industrial Revolution, the region saw economic activity such as nitre mining for gunpowder and later coal mining, with remnants like the Blue Heron Mining Community showcasing its industrial past.	N/A
Run 2 Summarize the document on the Cumberland Plateau in 140-160 words. Cover the plateau's geologic setting and age, the dominant rock types, how erosion shaped characteristic, and one point of human/industrial history. Use full sentences and avoid lists.	The Cumberland Plateau, rising over 1,000 feet above its surroundings, extends from Alabama through Tennessee and Kentucky to New York. This flat-topped tableland, rugged and densely forested, is composed mainly of limestone, shale, coal, and sandstone deposited over 350 million years ago during the Mississippian and Pennsylvanian periods. Around 285 million years ago, the region was uplifted above sea level, leading to extensive erosion that shaped its dramatic landscape. Erosion continues to carve gorges, canyons, and arches into the resistant sandstone, underlain by softer rocks. Human history on the plateau includes early nomadic settlers around 10,000 BC, thriving communities reliant on agriculture by 900-1000 AD, and sparse settlements by the late 1700s when longhunters first explored the area. Notably, coal mining played a significant role in the region's industrial history, particularly in Tennessee and Kentucky, as evidenced by sites like the Blue Heron Mining Community.	N/A

Prompt	HP AI companion output	Lenovo AI Now output
Run 3 Summarize the document on the Cumberland Plateau in 140–160 words. Cover the plateau's geologic setting and age, the dominant rock types, how erosion shaped characteristic, and one point of human/industrial history. Use full sentences and avoid lists.	The Cumberland Plateau, part of the Appalachian Plateau, extends from Alabama to New York but is especially known as the Cumberland Plateau in Tennessee and Kentucky. Formed over 350 million years ago during the Mississippian and Pennsylvanian periods, the plateau's rocks were deposited as thick, horizontal layers in an ancient shallow sea. These layers hardened into limestone, shale, coal, and sandstone, with sandstone forming its rugged cap. Erosion played a significant role in shaping the plateau's landscape, carving gorges, cliffs, and arches into the terrain as streams cut through the sandstone cap. This process revealed fascinating geological features like natural arches and rock shelters. In terms of human history, the area witnessed sparse human settlement until the Industrial Revolution, when economic activity increased, notably through coal mining. This industry left its mark on the landscape and history, ultimately leading to the establishment of recreational areas to preserve the region's unique geological and cultural heritage.	N/A
File Q&A retrieval		
Run 1 Using only my local files, which two planets did Voyager 1 fly by during its primary mission?	Voyager 1 flew by Jupiter in 1979 and Saturn in 1980 during its primary mission.	N/A
Run 2 Using only my local files, which two planets did Voyager 1 fly by during its primary mission?	Voyager 1 flew by Jupiter and Saturn during its primary mission.	N/A
Run 3 Using only my local files, which two planets did Voyager 1 fly by during its primary mission?	Voyager 1 flew by Jupiter and Saturn during its primary mission.	N/A
File Q&A hallucination check		
Run 1 Using only my local files, which document in my library describes the chemical composition of basalt on Mars?	The provided context does not include any document that describes the chemical composition of basalt on Mars.	N/A
Run 2 Using only my local files, which document in my library describes the chemical composition of basalt on Mars?	The provided local files do not contain information about the chemical composition of basalt on Mars.	N/A
Run 3 Using only my local files, which document in my library describes the chemical composition of basalt on Mars?	None of the provided documents describe the chemical composition of basalt on Mars. The files refer to subjects such as plate tectonics, ice cores, switchgrass, and the Voyager missions, but not to the chemical composition of basalt on Mars.	N/A

Prompt	HP AI companion output	Lenovo AI Now output
Multi-document analysis		
Run 1 Using only my local files, name two uses that both Switchgrass and Big Bluestem share. Answer in one short sentence.	Switchgrass and Big Bluestem are both used for livestock forage and erosion control.	N/A
Run 2 Using only my local files, name two uses that both Switchgrass and Big Bluestem share. Answer in one short sentence.	Both Switchgrass and Big Bluestem are used for livestock forage and erosion control.	N/A
Run 3 Using only my local files, name two uses that both Switchgrass and Big Bluestem share. Answer in one short sentence.	Switchgrass and Big Bluestem are both used for livestock forage and erosion control.	N/A
System task prompt		
Adjust screen brightness		
Run 1 Set my screen brightness to 60%	Your display brightness has been adjusted from 10% to 60%.	<p>I can't directly adjust the screen brightness for you, but I can guide you on how to do it! If you're using a Windows computer, you can usually find brightness settings by clicking on the Action Center icon in the taskbar (bottom right) and moving the brightness slider. On a Mac, you can adjust brightness using the F1 and F2 keys on your keyboard or by going to System Preferences > Displays.</p> <p>For mobile devices, the brightness can typically be changed in the settings menu or via the quick settings panel. Just look for a sun icon or a brightness slider.</p> <p>If you let me know your specific device, I could provide more tailored instructions!</p>

Prompt	HP AI companion output	Lenovo AI Now output
Run 2 Set my screen brightness to 60%	Your display brightness has been adjusted from 10% to 60%.	<p>I can't directly adjust your screen brightness for you, but I can guide you through the steps to do it yourself! Here's how you can adjust the screen brightness to 60% on different devices:</p> <p>On Windows:</p> <ol style="list-style-type: none"> Using Settings: <ul style="list-style-type: none"> Click on the Start Menu. Go to Settings (the gear icon). Click on System. Select Display from the left column. Use the slider under Change brightness to set it to 60%. Using Keyboard Shortcuts: <ul style="list-style-type: none"> Many laptops have brightness keys on the keyboard, typically represented by a sun icon. Hold Fn and press the brightness key until it reaches the desired level. <p>On macOS:</p> <ol style="list-style-type: none"> Click the Apple Menu at the top left corner. Select System Preferences. Click on Displays. Use the Brightness slider to set it to approximately 60%. <p>On Android:</p> <ol style="list-style-type: none"> Swipe down from the top of the screen to access the Quick Settings. Look for the Brightness slider. You can adjust it directly there. <p>On iOS:</p> <ol style="list-style-type: none"> Open the Settings app. Tap on Display & Brightness. Adjust the Brightness slider to 60%. <p>Setting the brightness to an optimal level not only helps protect your eyes but can also save battery life. If you need more tips or assistance, feel free to ask!</p>
Run 3 Set my screen brightness to 60%	Your display brightness has been adjusted from 10% to 60%.	<p>I'm unable to directly change your screen brightness for you, as I'm just a cloud-based AI assistant. However, I can definitely guide you on how to do it!</p> <p>If you're using a Windows computer, you can typically adjust the brightness by clicking on the battery icon in the system tray (bottom-right corner) and moving the brightness slider. You can also go to "Settings" > "System" > "Display," where you'll find a brightness slider.</p> <p>For Mac users, you can adjust the brightness by going to "System Preferences" > "Displays" and moving the brightness slider. If you have a laptop, you might also find dedicated brightness keys on the keyboard.</p> <p>If you're on a smartphone or tablet, you can usually swipe down from the top of the screen to access the quick settings menu, where you can adjust the brightness using a slider.</p> <p>Feel free to ask if you need help with a specific device!</p>

Table 2: Our prompts and the AI companions' responses in on-device mode.

Prompt	HP AI companion output	Lenovo AI Now output
General knowledge prompts		
Factual response		
Run 1 What is the capital of France? Answer in one short sentence	The capital of France is Paris.	N/A
Run 2 What is the capital of France? Answer in one short sentence	The capital of France is Paris.	N/A
Run 3 What is the capital of France? Answer in one short sentence	The capital of France is Paris.	N/A
Follow-up retention and accuracy		
Run 1 What river flows through it?	The Seine River flows through Paris.	N/A
Run 2 What river flows through it?	The Seine River flows through Paris.	N/A
Run 3 What river flows through it?	The Seine River flows through Paris.	N/A
Long-form response		
Run 1 Write a 140-160 word summary of the Apollo 11 mission. Provide the launch date, the three crew members and their roles, the Moon landing date, the landing site, and the mission's significance.	Apollo 11, launched on July 16, 1969, marked a monumental moment in space exploration history. The mission's crew consisted of astronauts Neil Armstrong, Buzz Aldrin, and Michael Collins. Armstrong served as the mission commander, while Aldrin was the lunar module pilot and Collins was the command module pilot. On July 20, 1969, Armstrong and Aldrin descended to the lunar surface, with Collins orbiting above in the command module. They landed in the Sea of Tranquility, a flat area on the Moon's surface. This historic event was significant as Armstrong became the first human to walk on the lunar surface, symbolizing human achievement and the culmination of the space race during the Cold War era. Their successful mission fulfilled President John F. Kennedy's 1961 goal of landing a man on the Moon and returning him safely to Earth. The Apollo 11 mission not only demonstrated technological prowess but also fostered international prestige and inspired generations to explore beyond Earth's confines. The lunar landing also paved the way for scientific advancements, including geological studies and experiments in zero gravity, contributing to our understanding of the Moon and the broader cosmos.	N/A

Prompt	HP AI companion output	Lenovo AI Now output
Run 2 Write a 140-160 word summary of the Apollo 11 mission. Provide the launch date, the three crew members and their roles, the Moon landing date, the landing site, and the mission's significance.	<p>Apollo 11, launched on July 16, 1969, marked a monumental moment in space exploration history. The mission's crew consisted of astronauts Neil Armstrong, Buzz Aldrin, and Michael Collins. Armstrong served as the mission commander, while Aldrin was the lunar module pilot and Collins was the command module pilot. On July 20, they achieved the first human Moon landing, with Armstrong stepping onto the lunar surface at 02:56 UTC. Their landing site, known as the Sea of Tranquility, was chosen for its relatively flat and safe terrain. This historic event was significant as it fulfilled President Kennedy's 1961 goal of landing a man on the Moon and returning him safely to Earth, symbolizing human ingenuity and the spirit of exploration. The successful mission not only demonstrated technological prowess but also fostered international prestige and inspired generations to dream big. The lunar module, Eagle, where Armstrong and Aldrin spent their time on the Moon, was connected to the command module, Columbia, orbiting above, piloted by Collins. The Apollo 11 mission concluded successfully on July 24, 1969, with the crew returning to Earth, leaving behind a legacy of human achievement and scientific advancement.</p>	N/A
Run 3 Write a 140-160 word summary of the Apollo 11 mission. Provide the launch date, the three crew members and their roles, the Moon landing date, the landing site, and the mission's significance.	<p>Apollo 11, launched on July 16, 1969, marked a monumental moment in space exploration history. The mission's crew consisted of astronauts Neil Armstrong, Buzz Aldrin, and Michael Collins. Armstrong served as the mission commander, while Aldrin was the lunar module pilot and Collins was the command module pilot. On July 20, they achieved the first human Moon landing, with Armstrong stepping onto the lunar surface at 02:56 UTC. Their landing site, known as the Sea of Tranquility, was chosen for its relatively flat and safe terrain. This historic event was significant as it fulfilled President Kennedy's 1961 goal of landing a man on the Moon and returning him safely to Earth by the end of the decade. The successful mission not only demonstrated technological prowess but also symbolized peace and unity during a time of global tension. Armstrong's famous words, "That's one small step for man, one giant leap for mankind," encapsulated the achievement's profound impact on humanity's exploration aspirations. The Apollo 11 mission stands as a testament to human ingenuity and the spirit of discovery.</p>	N/A

Prompt	HP AI companion output	Lenovo AI Now output
Document-specific prompts		
Document summarization (.docx)		
<p>Run 1 Summarize the document on Switchgrass in 140-160 words. Cover the primary uses, give a basic description, and include one establishment/management point. Use full sentences and avoid lists.</p>	<p>Switchgrass (<i>Panicum virgatum</i> L.), known as <i>Panicum virgatum</i>, is a valuable native perennial bunch grass in the United States, excluding California and the Pacific Northwest. It serves as a robust source of warm-season pasture and high-quality hay for livestock, while also excelling in erosion control due to its adaptability to diverse sites. The plant supports wildlife, offering nesting and cover for various species, and its seeds are a food source for birds and small mammals. However, it may become invasive if not managed properly. Switchgrass is characterized by its stout rhizomes, round stems, and open panicle seed heads, with a distribution noted in the USDA-NRCS PLANTS Database. For establishment, it is commonly planted using pure live seed at rates of 6-12 lbs/acre, with seeding rates and dates tailored to local conditions. Management practices include mowing to control weeds and fertilization based on soil tests, with periodic burning every 3-5 years to reduce weed competition and stimulate growth. Burning for wildlife management should occur every 2 years to prevent hatchling movement obstruction. The document, "factsheet_panicumvirgatum_switchgrass.docx," provides comprehensive insights into the plant's uses, characteristics, and cultivation.</p>	<p>The document provides information on switchgrass (<i>Panicum virgatum</i> L.), a native perennial warm-season grass with multiple uses, including livestock grazing, erosion control, wildlife habitat, and biofuel production.</p> <p>Primary Uses: Switchgrass produces heavy growth during late spring and early summer, providing good warm-season pasture and high-quality hay for livestock. It also stabilizes soil on strip-mine spoils, sand dunes, dikes, gullies, and other critical areas, making it suitable for low windbreak plantings in crop fields. Additionally, switchgrass provides excellent nesting and cover for pheasants, quail, and rabbits, holding up well in heavy snow.</p> <p>Description and Adaptation: Switchgrass is native to the continental United States except California and the Pacific Northwest, growing 3 to 5 feet tall with stout rhizomes. It thrives on moderately deep to deep, somewhat dry to poorly drained, sandy to clay loam soils.</p> <p>In summary, switchgrass is a versatile grass with multiple uses, adaptable to various environments, and suitable for different applications such as livestock grazing, erosion control, wildlife habitat, and biofuel production.</p>

Prompt	HP AI companion output	Lenovo AI Now output
<p>Run 2</p> <p>Summarize the document on Switchgrass in 140-160 words. Cover the primary uses, give a basic description, and include one establishment/management point. Use full sentences and avoid lists.</p>	<p>Switchgrass (<i>Panicum virgatum</i> L.), known as <i>Panicum virgatum</i>, is a valuable native perennial bunch grass in the United States, excluding California and the Pacific Northwest. It serves as a robust source of warm-season pasture and high-quality hay for livestock, while also excelling in erosion control due to its adaptability to diverse sites. The plant supports wildlife, offering nesting and cover for various species, and its seeds are a food source for birds. However, it may become invasive if not managed correctly. Switchgrass thrives in a range of conditions, with a typical height of 3 to 5 feet and a spreading panicle seed head. Establishment involves planting with pure live seed at rates of 6-12 lbs/acre, using seed drills or broadcast spreaders, with guidance from local NRCS offices. Management includes weed control through mowing and fertilization based on soil tests, as well as periodic burning every 3 to 5 years to reduce weed competition and stimulate growth. Burning should be done every 2 years for wildlife benefits. The document, "factsheet_panicumvirgatum_switchgrass.docx," provides comprehensive insights into the plant's characteristics and management.</p>	<p>The document provides a comprehensive overview of switchgrass (<i>Panicum virgatum</i> L.), a native perennial warm-season grass with multiple uses. It is primarily used for livestock grazing, hay production, erosion control, and as a biofuel source.</p> <p>Primary Uses:</p> <p>Livestock: Provides heavy growth during late spring and early summer, offering good warm-season pasture and high-quality hay.</p> <p>Erosion Control: Stabilizes soil on strip-mine spoils, sand dunes, dikes, gullies, and other critical areas.</p> <p>Biofuel Source: Native perennial warm season grass with moderate to high biomass yields on marginal lands for cellulosic ethanol production, biogas, and direct combustion.</p> <p>Description and Adaptation:</p> <p>Native in the continental United States except California and the Pacific Northwest.</p> <p>A perennial bunch grass averaging 3 to 5 feet tall, spreading from short, stout rhizomes.</p> <p>Climatically adapted throughout most of the United States when planted on suitable soils (moderately deep to deep, somewhat dry to poorly drained, sandy to clay loam).</p> <p>Establishment and Management:</p> <p>Seeding rate: 6-12 lbs. PLS/acre; consult local NRCS office or extension service for proper seeding rates and dates.</p> <p>Burning every 3 to 5 years decreases weed competition, eliminates excessive residue, and stimulates growth.</p> <p>In summary, switchgrass is a versatile native grass with various uses, suitable for different environments, and requires specific establishment and management practices.</p>

Prompt	HP AI companion output	Lenovo AI Now output
<p>Run 3</p> <p>Summarize the document on Switchgrass in 140-160 words. Cover the primary uses, give a basic description, and include one establishment/management point. Use full sentences and avoid lists.</p>	<p>Switchgrass (<i>Panicum virgatum</i> L.), known as Panicum virgatum, is a valuable native perennial bunch grass in the United States, excluding California and the Pacific Northwest. It serves as a robust source of warm-season pasture and high-quality hay for livestock, while also excelling in erosion control due to its adaptability to diverse sites. The plant supports wildlife, offering nesting and cover for various species, and its seeds are a food source for birds. However, it may become invasive if not managed correctly. Switchgrass is adaptable, with a height of 3 to 5 feet and a spreading panicle seed head, and it can be established using pure live seed at rates of 6-12 lbs/acre. Management includes mowing to control weeds and fertilization based on soil tests, with annual burning recommended every 2-3 years to stimulate growth and reduce weed competition. For further establishment and management guidance, consult local NRCS offices or extension services.</p>	<p>The document provides a comprehensive overview of switchgrass (<i>Panicum virgatum</i> L.), a native perennial warm-season grass with multiple uses. It is a valuable resource for livestock, wildlife, erosion control, and biofuel production.</p> <p>Primary Uses: Switchgrass produces heavy growth during late spring and early summer, providing good warm-season pasture and high-quality hay for livestock. It also offers excellent nesting and cover for pheasants, quail, and rabbits, as well as seed that provides food for various wildlife species.</p> <p>Description and Adaptation: Switchgrass is native to the continental United States except California and the Pacific Northwest, growing 3 to 5 feet tall with a round stem. It thrives on moderately deep to deep, somewhat dry to poorly drained, sandy to clay loam soils.</p> <p>In summary, switchgrass is a versatile plant with multiple uses, including livestock forage, wildlife habitat, erosion control, and biofuel production. Its adaptability to various soil types and climates makes it an attractive option for landowners seeking sustainable solutions.</p>
Document summarization (.pdf)		
<p>Run 1</p> <p>Summarize the document on the Cumberland Plateau in 140-160 words. Cover the plateau's geologic setting and age, the dominant rock types, how erosion shaped characteristic, and one point of human/industrial history. Use full sentences and avoid lists.</p>	<p>The Cumberland Plateau, a flat-topped tableland rising over 1000 feet in the Southeast, is characterized by rugged terrain and a moderate climate with abundant rainfall. Formed from sediments laid down in ancient shallow seas during the Mississippian and Pennsylvanian periods, the plateau's limestone, shale, coal, and sandstone layers were lifted and eroded over 2000 feet above sea level, creating its distinctive landscape. The Cumberland River and its tributaries, including the Clear Fork and New River, define the region's geography. Elevations vary from 1800 to 800 feet, with features like Yahoo Falls and Angel Falls offering scenic views. The plateau's coal reserves, primarily found in Kentucky and Tennessee, are significant for mining. Historically, the area was inhabited by nomadic hunters around 20,000 years ago, with sparse Indian settlements by the late 1700s. European settlement followed, leading to the establishment of homesteads and hunting activities. The plateau's geological and historical significance is underscored by its unique rock formations and cultural heritage, which are preserved through careful archaeological work.</p>	<p>The document provides an overview of the Cumberland Plateau, a large flat-topped tableland in eastern North America, characterized by rugged terrain, moderate climate, and abundant rainfall. The plateau's unique geology and erosion patterns have shaped its dramatic landscape, featuring numerous rock shelters, arches, cliffs, and waterfalls.</p> <p>Geological History: The rocks that form the cap of the Cumberland Plateau were laid down in a shallow sea over 350 million years ago during the Mississippian and Pennsylvanian periods. These sediments hardened into layers of limestone, shale, coal, and sandstone due to pressure.</p> <p>Rocks of the Plateau: The resistant Rockcastle Conglomerate caps the plateau, while softer underlying rocks are more susceptible to erosion. This differential weathering has created fascinating features like dramatic cliffs, arches, rock shelters, chimneys, and waterfalls.</p> <p>Human History: Early humans inhabited the area around 20,000 years ago, using rockshelters as convenient homes. As climate and forest changed, they adapted by hunting smaller game and collecting plants. Later, they shifted to agriculture in river bottoms.</p> <p>In summary, the Cumberland Plateau's unique geology and erosion patterns have created a dramatic landscape featuring numerous rock shelters, arches, cliffs, and waterfalls, while its human history reflects early inhabitants adapting to changing environments and eventually shifting to agriculture.</p>

Prompt	HP AI companion output	Lenovo AI Now output
<p>Run 2</p> <p>Summarize the document on the Cumberland Plateau in 140–160 words. Cover the plateau’s geologic setting and age, the dominant rock types, how erosion shaped characteristic, and one point of human/ industrial history. Use full sentences and avoid lists.</p>	<p>The Cumberland Plateau, a flat-topped tableland rising over 1000 feet in the southeastern United States, is characterized by its rugged terrain and moderate climate, with abundant rainfall. It is also known as the Cumberland Plateau in Tennessee and Kentucky, where it is dissected by the Cumberland River and its tributaries, including the Clear Fork and New River, forming the Big South Fork. The plateau’s geological history dates back 350-296 million years, with sediments deposited in ancient shallow seas hardened into limestone, shale, coal, and sandstone. Lifting and erosion over 2000 feet above sea level sculpted the landscape, with coal mining predominantly sourced from this region. The plateau’s conglomerate cap resists erosion, while softer rocks beneath are easily worn away, creating diverse features. Human history on the plateau began with nomadic hunters around 20,000 years ago, followed by sparse indigenous settlements and European exploration and homesteading by the 18th century. The area’s archaeological sites, though fragile due to vandalism, offer insights into prehistoric life, with trained archeologists working to preserve these non-renewable resources. The Cumberland Plateau’s geological and historical narrative intertwines natural processes with human activity, reflecting a dynamic interplay between the earth’s formations and human endeavors.</p>	<p>The document provides an overview of the Cumberland Plateau, a large flat-topped tableland in eastern North America, covering its geological history, river systems, and human settlement.</p> <p>Geological History: The plateau was formed over 350 million years ago from ancient sediments deposited in a shallow sea. Erosion has shaped the landscape, carving out gorges, canyons, cliffs, natural arches, rock shelters, and waterfalls.</p> <p>River Systems: The Clear Fork River and New River combine to form the Big South Fork of the Cumberland River, which drains an area of 1382 square miles primarily in Tennessee and Kentucky. Elevations range from 1800 feet on ridge tops to 800 feet along the river.</p> <p>Human History: The first humans arrived around 20,000 years ago, using rock shelters as homes. As the climate changed, they adapted by hunting smaller game and collecting plants. Later, a shift to agriculture led them to leave the plateau for more fertile areas.</p> <p>In summary, the Cumberland Plateau is a unique geological feature shaped by erosion over millions of years, with a rich human history marked by early settlement, adaptation to changing environments, and later agricultural development.</p>

Prompt	HP AI companion output	Lenovo AI Now output
<p>Run 3 Summarize the document on the Cumberland Plateau in 140–160 words. Cover the plateau's geologic setting and age, the dominant rock types, how erosion shaped characteristic, and one point of human/ industrial history. Use full sentences and avoid lists.</p>	<p>The Cumberland Plateau, a flat-topped tableland rising over 1000 feet in the southeast United States, is characterized by rugged terrain and a moderate climate with abundant rainfall. It is also known as the Cumberland Plateau in Tennessee and Kentucky, where it forms the Big South Fork of the Cumberland River. Geologically, the plateau's cap consists of sediments laid down over 350 million years ago during the Mississippian and Pennsylvanian periods, hardened into limestone, shale, coal, and sandstone. Erosion over 2000 feet of uplift has sculpted the landscape, with the resistant conglomerate rock cap contrasting against softer underlying rocks, creating diverse features. The area's coal deposits, significant in both Kentucky and Tennessee, are a testament to the plateau's geological history. Human history reveals that around 20,000 years ago, nomadic hunters entered North America, with sparse indigenous settlements by the late 1700s. The region saw European settlement by 1800, marked by rugged terrain and the establishment of homesteads. The plateau's archaeological sites, though vulnerable to vandalism, offer insights into prehistoric life, emphasizing the importance of preservation. The Big South Fork National River and Recreation Area showcases the plateau's natural beauty and historical significance. (Word count: 109)</p>	<p>The document provides an overview of the Cumberland Plateau, a large, flat-topped tableland that spans parts of Alabama, Tennessee, Kentucky, and Pennsylvania. The plateau's unique geology and erosion patterns have shaped its rugged terrain, featuring dramatic cliffs, arches, rock shelters, and waterfalls.</p> <p>Geological Setting: The Cumberland Plateau is characterized by a moderate climate, abundant rainfall, and thin, infertile soils.</p> <p>It was once covered by a dense hardwood forest similar to that of the Appalachians.</p> <p>The plateau's rocks were deposited in ancient shallow seas over 350 million years ago during the Mississippian and Pennsylvanian periods.</p> <p>Erosion and Landforms: Erosion has carved out gorges, canyons, cliffs, natural arches, rock shelters, and waterfalls.</p> <p>The river systems have played a significant role in shaping the landscape.</p> <p>The area contains numerous large rockshelters, with many more waiting to be discovered.</p> <p>Human History: Early humans inhabited the plateau around 20,000 years ago, using rockshelters as convenient homes.</p> <p>As climate and forest changed, people adapted by hunting smaller game and collecting plants for sustenance.</p> <p>By 900-1000 AD, a shift to agriculture led Indians to leave the Plateau for more fertile river bottoms.</p> <p>In summary, the Cumberland Plateau is a unique geological formation with a rich history of human settlement and adaptation.</p>
File Q&A retrieval		
<p>Run 1 Using only my local files, which two planets did Voyager 1 fly by during its primary mission?</p>	<p>Voyager 1 flew by Jupiter and Saturn during its primary mission.</p>	<p>Voyager 1 flew by Jupiter and Saturn during its primary mission.</p>
<p>Run 2 Using only my local files, which two planets did Voyager 1 fly by during its primary mission?</p>	<p>Voyager 1 flew by Jupiter and Saturn during its primary mission.</p>	<p>Voyager 1 flew by Jupiter and Saturn during its primary mission.</p>
<p>Run 3 Using only my local files, which two planets did Voyager 1 fly by during its primary mission?</p>	<p>Voyager 1 flew by Jupiter and Saturn during its primary mission.</p>	<p>Voyager 1 flew by Jupiter and Saturn during its primary mission.</p>

Prompt	HP AI companion output	Lenovo AI Now output
File Q&A hallucination check		
Run 1 Using only my local files, which document in my library describes the chemical composition of basalt on Mars?	The provided context does not contain information about the chemical composition of basalt on Mars. The documents mentioned discuss ice core paleoclimatology, GISP2 science trench details, volcanic eruptions recorded in ice cores, and snowfall on the Greenland Ice Sheet. For information on the chemical composition of basalt on Mars, you would need to refer to a different document or source.	Found 3 files for you: ice_core_paleoclimate.docx Voyager_Exhibit-1.pdf Hidden_Lives_Galaxies_Presentation1.ppt
Run 2 Using only my local files, which document in my library describes the chemical composition of basalt on Mars?	The provided context does not contain information about the chemical composition of basalt on Mars. The documents mentioned discuss ice core paleoclimatology, GISP2 science trench details, volcanic eruptions recorded in ice cores, and snowfall on the Greenland Ice Sheet. To find information on the chemical composition of basalt on Mars, you would need to look for a different document or source.	Found 3 files for you: ice_core_paleoclimate.docx Voyager_Exhibit-1.pdf Hidden_Lives_Galaxies_Presentation1.ppt
Run 3 Using only my local files, which document in my library describes the chemical composition of basalt on Mars?	The provided context does not contain information about the chemical composition of basalt on Mars. The documents mentioned discuss ice core paleoclimatology, GISP2 science trench details, volcanic eruptions, and snowfall on the Greenland Ice Sheet. To find information on the chemical composition of basalt on Mars, you would need to search a different document or source.	Found 3 files for you: ice_core_paleoclimate.docx Voyager_Exhibit-1.pdf Hidden_Lives_Galaxies_Presentation1.ppt
Multi-document analysis		
Run 1 Using only my local files, name two uses that both Switchgrass and Big Bluestem share. Answer in one short sentence.	Both Switchgrass and Big Bluestem are used for livestock forage and erosion control.	Erosion control and livestock forage are two uses shared by both Switchgrass and Big Bluestem.
Run 2 Using only my local files, name two uses that both Switchgrass and Big Bluestem share. Answer in one short sentence.	Both Switchgrass and Big Bluestem are used for livestock forage and erosion control.	Erosion control and livestock forage are two uses shared by both Switchgrass and Big Bluestem.
Run 3 Using only my local files, name two uses that both Switchgrass and Big Bluestem share. Answer in one short sentence.	Both Switchgrass and Big Bluestem are used for livestock forage and erosion control.	Erosion control and livestock forage are two uses shared by both Switchgrass and Big Bluestem.

Prompt	HP AI companion output	Lenovo AI Now output
System task prompt		
Adjust screen brightness		
Run 1 Set my screen brightness to 60%	Your display brightness has been adjusted from 10% to 60%.	Display brightness allows you to adjust the screen's brightness for better visibility and comfort, helping to reduce eye strain and improve battery life on device. System Settings
Run 2 Set my screen brightness to 60%	Your display brightness has been adjusted from 10% to 60%.	Display brightness allows you to adjust the screen's brightness for better visibility and comfort, helping to reduce eye strain and improve battery life on device. System Settings
Run 3 Set my screen brightness to 60%	Your display brightness has been adjusted from 10% to 60%.	Display brightness allows you to adjust the screen's brightness for better visibility and comfort, helping to reduce eye strain and improve battery life on device. System Settings

System configuration information

Table 3: Detailed information on the systems we tested.

System	HP EliteBook 8 G1a 14 inch Notebook Next Gen AI PC	Lenovo ThinkPad T14s Gen 6 14"	Dell Pro 14 Plus Laptop
Processor			
Vendor	AMD	Intel®	Intel
Model number	Ryzen™ AI 7 PRO 350	Core™ Ultra 7 268V with Intel vPro®	Core Ultra 7 268V with Intel vPro
Core frequency (GHz)	2.0–5.0	2.2–5.0	2.2–5.0
Number of cores	8	8	8
Logical processors	16	8	8
Memory			
Amount (GB)	32	32	32
Type	DDR5	LPDDR5x	LPDDR5x
Graphics			
Vendor	AMD	Intel	Intel
Model number	Radeon™ 860M Graphics	Intel Arc™ 140V	Intel Arc 140V
Storage			
Amount (GB)	1,024	1,024	1,024
Type	SSD	SSD	SSD
Connectivity/expansion			
Wireless internet	Qualcomm® FastConnect 7800 Wi-Fi 7 Dual Band Simultaneous	Intel Wi-Fi 7 BE201	Intel Wi-Fi 7 BE201
Bluetooth	5.4	5.4	5.4
USB	1x USB Type-C (USB Power Delivery, DisplayPort 1.2) 2x Thunderbolt 4 Type-C ports 1x USB-A 3.2 ports	2x Thunderbolt 4 Type-C ports 2x USB-A 3.0 ports	2x Thunderbolt 4 Type-C ports 2x USB-A 3.2 ports
Battery			
Type	Integrated lithium-polymer	Integrated lithium-polymer	Integrated lithium-polymer
Rated capacity (Whr)	62	58	55
Display			
Size (in.)	14	14	14
Resolution	1,920 x 1,200	1,920 x 1,200	1,920 x 1,200
Operating system			
Vendor	Microsoft	Microsoft	Microsoft
Name	Windows 11 Pro	Windows 11 Pro	Windows 11 Pro
Version	24H2 Build 26100.4351	24H2 Build 26100.4351	24H2 Build 26100.4351

System	HP EliteBook 8 G1a 14 inch Notebook Next Gen AI PC	Lenovo ThinkPad T14s Gen 6 14"	Dell Pro 14 Plus Laptop
BIOS			
BIOS name and version	HP X84 Ver. 92.09.00, 4/10/2025	Lenovo N4IET20W (1.06), 3/14/2025	Dell Inc. 2.4.2, 6/20/2025
Dimensions			
Height (in.)	0.61	0.78	0.78
Width (in.)	12.43	12.35	12.30
Depth (in.)	8.74	8.64	8.80
Weight (lb.)	3.08	2.82	3.10

How we tested

Setting up the systems

When running the tests, we used a factory-provided image. We reset the system image between tests to prevent software from corrupting the test image.

Setting up and updating the OEM image

1. Boot the system.
2. To complete installation, follow the on-screen instructions, using the default selections when appropriate.
3. Set the Windows Power Plan to Best Performance.
4. Set Screen and Sleep options to Never:
 - a. Right-click the desktop, and select Display settings.
 - b. From the left-hand column, select System.
 - c. Click Power.
 - d. For all power options listed under Screen and Sleep, select Never.
5. Disable User Account Control notifications:
 - a. Select Windows Start, type `UAC` and press the Enter key.
 - b. Move the slider control to Never notify, and click OK.
6. Run Windows Update, and install all updates available.
7. Launch each vendor's proprietary utility app installed on each system, and update any drivers or BIOS files:
 - For Dell, run the Dell Command | Update utility.
 - For Lenovo, run the Lenovo Commercial Vantage application. Run all Critical and Recommended Updates.
 - For HP, check for updates using HP PC Hardware Diagnostics Windows. Run the HP Support Assistant Application using a guest login, and run updates.
8. After running updates, in Application settings, disable automatic software updates.
9. Verify the date and time are correct, and synchronize the system clock with the time server.
10. Pause Automatic Windows Updates:
 - a. Click Windows Start.
 - b. Type `Windows Update settings` and press Enter.
 - c. From the Pause updates drop-down menu, select Pause for 5 weeks.

Capturing an image

1. Connect an external HDD to the system.
2. Click the Windows Menu button, and in the search bar, type `Control Panel`. Click Control Panel→System and Security→Backup and Restore (Windows 7)→Create a system image.
3. Verify that the external HDD is selected as the save drive, and click Next.
4. Verify that all drives are selected to back up, and click Next.
5. Click Start backup.
6. When the system asks if you want to create a system repair disc, select No, and close the dialogs.

Restoring an image

1. Connect an external HDD to the system.
2. Press and hold the Shift key while restarting the system.
3. Select Troubleshoot.
4. Select Advanced options.
5. Select See more recovery options.
6. Select System image recovery.
7. Select the User account.
8. Enter the system password, and click Continue.
9. At the Restore system files and settings screen, select Next.
10. Verify that the external HDD is selected, and click Next.
11. Once the recovery has completed, click Finish.

Running ProcessIdleTasks

Once every 24-hour period, before testing, we rebooted the system and ran the ProcessIdleTasks command, which forces idle processes to complete and minimizes the chance of background tasks affecting test runs.

1. Boot the system.
2. Select Windows Start.
3. Type `cmd` and press Ctrl+Shift+Enter.
4. Type `Rundll32.exe advapi32.dll, ProcessIdleTasks` Do not interact with the system until the command completes.
5. After the command completes, wait 5 minutes before running the test.

Running system performance and productivity tests

Measuring performance with the Procyon Office Productivity Benchmark

Setting up the test

1. Download and install Procyon.
2. Open Procyon.
3. Click Office Productivity Benchmark.
4. Click Register.
5. Enter the license key for the Office Productivity Benchmark, and click Register.
6. Before running the benchmark, make sure to install a licensed version of Microsoft 365.

Running the test

1. Boot the system.
2. Launch Procyon.
3. Click Office Productivity Benchmark.
4. Click Run.
5. When the benchmark is complete, record the results. Wait 15 minutes before rerunning the benchmark.
6. Repeat steps 3 through 5 twice more.

Measuring performance with Cinebench 2024

Setting up the test

1. Download and install Cinebench 2024 from <https://www.maxon.net/en/downloads/cinebench-2024-downloads>.
2. Launch Cinebench 2024.
3. Select File → Advanced benchmark.
4. From the Minimum Test Duration drop-down menu, select Off.

Running the test

1. Launch Cinebench 2024.
2. Click File, Run All tests.
3. Record the result. Wait 10 minutes before rerunning.
4. Repeat steps 1 through 3 twice more.

Measuring performance with Geekbench 6 Pro GPU OpenCL

Setting up the test

1. Purchase a Geekbench Pro license, and download and install Geekbench 6 Pro from <https://www.geekbench.com/download/>.

Running the test

1. Launch Geekbench.
2. Click Run CPU Benchmark.
3. Record the result.
4. Wait 5 minutes before rerunning.
5. Repeat steps 1 through 4 twice more.

Measuring multitasking performance (with NPU)

Setting up the test

1. Download and install Procyon.
2. Open Procyon.
3. Click Office Productivity Benchmark.
4. Click Register.
5. Enter the license key for the Office Productivity Benchmark, and click Register.
6. Before running the benchmark, install a licensed version of Microsoft 365.
7. Select Windows Start.
8. Type `camera` and select Change the default settings for your camera.
9. Click the Connected Camera listed.
10. Under Windows Studio Effects, enable the following settings:
 - Automatic framing
 - Eye contact
 - Background effects with the default Standard blur applied

Running the test

1. Boot the system.
2. Launch Microsoft Teams.
3. In the left pane, click Calendar.
4. Click the Meet Now button, and click Start meeting.
5. Ensure Camera and Computer Audio are enabled, and click Join now.
6. Launch Procyon.
7. Click Office Productivity Benchmark.
8. Click Run. The Teams call window should be maximized in the background.
9. When the benchmark is complete, record the results.
10. Quit Microsoft Teams.
11. Wait 15 minutes before rerunning the benchmark. Repeat steps 2 through 10 twice more.

Measuring multitasking performance (without NPU)

Setting up the test

1. Download and install Procyon.
2. Open Procyon.
3. Click Office Productivity Benchmark.
4. Click Register.
5. Enter the license key for the Office Productivity Benchmark, and click Register.
6. Before running the benchmark, install a licensed version of Microsoft 365.
7. Select Windows Start.
8. Type `camera` and select Change the default settings for your camera.
9. Click the Connected Camera listed.
10. Under Windows Studio Effects, disable the following settings:
 - Automatic framing
 - Eye contact
 - Background effects with the default Standard blur applied

Running the test

1. Boot the system.
2. Launch Microsoft Teams.
3. In the left pane, click Calendar.
4. Click the Meet Now button, and click Start meeting.
5. Ensure Camera and Computer Audio are enabled, and click Join now.
6. Launch Procyon.
7. Click Office Productivity Benchmark.
8. Click Run. The Teams call window should be maximized in the background.
9. When the benchmark is complete, record the results.
10. Quit Microsoft Teams.
11. Wait 15 minutes before rerunning the benchmark. Repeat steps 2 through 10 twice more.

Running the AI tests

Measuring performance with the Procyon AI Computer Vision Benchmark

Setting up the test

1. Purchase and download the Procyon AI Computer Vision Benchmark from <https://benchmarks.ul.com/procyon>.
2. Install the Procyon benchmark.
3. Launch Procyon.
4. Select Settings, and input the Procyon AI Computer Vision license key.
5. Close Procyon.

Running the test

1. Launch Procyon.
2. Select the Computer Vision test.
3. For the Float32 and Float16 tests, make the following selections:
 - For AMD processor-based devices, select the Windows ML tab.
 - For Intel processor-based devices, select the Intel OpenVINO tab.
4. Select NPU (or GPU if unavailable), and select Float32.
5. Click Run.
6. When the test completes, record the results, and wait 15 minutes before rerunning. When three runs have been completed, complete three runs of Float16.
7. For the Integer test, make the following selections:
 - For AMD processor-based devices, select the AMD Ryzen AI tab.
 - For Intel processor-based devices, select the Intel OpenVINO tab.
8. Select NPU, and select Integer.
9. Click Run.
10. When the test completes, record the results, and wait 15 minutes before rerunning.
11. Complete three runs.

Measuring performance with Geekbench AI Pro

Setting up the test

1. Purchase and download a Geekbench AI Pro license from <https://www.geekbench.com/ai/download/>.
2. Run the installer, and install using all defaults.

Running the test

1. Launch Geekbench AI.
2. Enter the license key.
3. For CPU testing, select:
 - AI Framework: ONNX/OpenVINO
 - AI Backend: CPU
 - AI Device: processor
4. For GPU testing, select:
 - AI Framework: ONNX/OpenVINO
 - AI Backend: DirectML/GPU
 - AI Device: graphics card
5. Click Run AI Benchmark.
6. Wait 5 minutes, and complete steps 3 through 5 twice more.

Measuring performance with LM Studio

Setting up the test

1. Download LM Studio from <https://lmstudio.ai>.
2. Run the installer, and install using all defaults.
3. Launch LM Studio.
4. In the Select a model to load field, download the Llama 3.1 8B model.

Running the test

1. Launch LM Studio.
2. Select Load a model, and choose the Meta-Llama-3.1-8B-Instruct-Q4_K_M model.
3. When the model is fully loaded, in the message field, type: How can AMD Ryzen Processors in HP workstations help enterprise customers deliver better user experience, productivity performance and ROI? and click Send.
4. When the test is complete, record the results.
5. Eject the model.
6. Delete the Chat messages.
7. Open a new chat by clicking the + icon, and reload the same model.
8. Wait 5 minutes, open a new chat window, and repeat steps 2 through 7 twice more.

Measuring thermals and sustained performance with Cinebench 2024

These tests require the following:

- A FLIR E6-XT Infrared Camera
- Cinebench 2024

Running the test

1. Start the thermal recorder.
2. Boot the system and leave the system plugged in.
3. Launch Cinebench 2024.
4. Select File → Advanced benchmark.
5. Verify that the Custom Test setting is set to 30 minutes.
6. Select CPU (Multi Core), and click Start.
7. Record the performance results and skin temperatures after 30 minutes. Note the ambient room temperature, and take a skin temperature photo with the FLIR E6xt infrared Camera of the keyboard deck and underside of chassis.
8. Repeat steps 1 through 7 twice more.

Measuring battery life

Measuring battery life with Microsoft Teams (3x3 gallery view)

This test requires the following:

- Nine non-testing systems as permanent meeting attendees; one of these with a licensed account to host.
- Microsoft Teams
- PT internal battery life logger

Setting up the test

1. Boot the systems under test.
2. Verify the following display and power settings:
 - a. Right-click the desktop, and select Display settings.
 - b. Uncheck the box next to Change brightness automatically when lighting changes, if available.
 - c. Uncheck the box next to Change brightness based on content, if available.
 - d. In the Scale drop-down menu, select 100%.
 - e. In the left pane, select System.
 - f. Click Power & Battery.
 - g. For all power options listed under Screen and Sleep, select Never.
 - h. Set Power mode while unplugged to the desired setting.

3. To bring up a white screen, open a web browser and type `about:blank` into the address bar.
4. Unplug the system.
5. Using a nit meter, adjust the screen brightness to as close to 250 nits as possible.
6. Plug in the system.
7. Open Settings, and click Bluetooth & Devices.
8. Click Cameras, and click the built-in connected camera.
9. Under Windows Studio Effects, turn on all settings.
10. Copy the battery life logger to each system under test.
11. Open PowerShell as administrator, and run `Set-ExecutionPolicy Unrestricted`
12. On one of the non-testing systems, launch Teams, and log into a licensed Microsoft account.
13. In the left pane, click Calendar.
14. Click Meet Now, and click Start Meeting.
15. Ensure the camera is turned on, and click Join now.
16. In the top toolbar, click More, and click Meeting Info.
17. Note the Meeting ID and Passcode.
18. On the remaining eight non-testing systems, launch Teams, and click Join a meeting.
19. Enter the Meeting ID and Passcode, and click Join meeting.
20. Ensure the camera is turned on, and click Join now.

Running the test

1. Verify that the system's battery is fully charged.
2. Launch Teams, and click Join a meeting.
3. Enter the Meeting ID and Passcode, and click Join meeting.
4. Ensure the camera and audio are turned on, and click Join now.
5. In the top toolbar, click View.
6. Ensure Gallery View is selected, and set the Max Gallery Size to 9 people.
7. Open PowerShell as administrator, and navigate to the directory containing the battery life logger script.
8. Run the script:

```
.\<battery_script_name>.ps1
```

9. Unplug the system when prompted, and switch back to the Teams meeting.
10. When the system has shut down, plug in the system, and start it.
11. In Explorer, navigate to `C:\ptbat\`.
12. Open the folder corresponding with the date and time of the test, and record the results from `batresults_minutes.txt`.
13. Repeat steps 1 through 12 twice more.

Measuring privacy feature performance

Setting up the test

1. Set up a video camera to capture the system's screen and the user/onlooker path in front of the system.
2. On the systems under test, click Start, type `Power` and select Power, sleep and battery settings.
3. On the Power & battery screen, select Screen and sleep.
4. Ensure the following settings are turned on:
 - Turn off my screen when I leave.
 - Wake my device when I approach.
5. Launch each vendor's proprietary management application, and enable onlooker detection:
 - For HP, open the myHP application, select Presence detection, and enable Onlooker detection and Enable screen blur.
 - For Lenovo, open the Lenovo View application, select the Dashboard tab, and enable Privacy Guard.

Testing Wake on approach

1. Start the video recording.
2. Stand just outside of the system's camera view, and allow the system to enter Sleep mode.
3. When the system has entered Sleep mode, simultaneously start the stopwatch and sit down in front of the system.
4. When the login screen appears, stop the stopwatch, and record the results.
5. Wait 5 minutes. Perform steps 1 through 4 twice more.

Testing Onlooker detection

1. Start the video recording.
2. Sit at the laptop, and have an onlooker stand just outside of the system's camera view.
3. Simultaneously start the stopwatch and have the onlooker walk into the system's camera view.
4. When the screen blurs due to detecting the onlooker, stop the stopwatch, and record the results.
5. Wait 5 minutes. Perform steps 1 through 4 twice more.

OEM AI Companion assessment

Corpus files

- USDA Natural Resources Conservation Service, Switchgrass (*Panicum virgatum* L.) Plant Fact Sheet, docx, <https://plants.usda.gov/plant-profile/PAVI2>, 256KB
- USDA Natural Resources Conservation Service, Big Bluestem (*Andropogon gerardii*) Plant Fact Sheet, docx, <https://plants.usda.gov/plant-profile/ANGE>, 296KB
- *USDA Natural Resources Conservation Service, Purple Giant Hyssop (*Agastache scrophulariifolia*) Plant Fact Sheet, docx, <https://plants.usda.gov/plant-profile/AGSC>, 92.1KB
- *NOAA, Ice Core Paleoclimate Slide Set, docx, https://cdn.oceanservice.noaa.gov/oceanserviceprod/education/pd/climate/teachingclimate/ice_core_paleoclimate_slide_set.docx, 568KB
- National Park Service, Geology and History of the Cumberland Plateau, pdf, <https://www.nps.gov/biso/planyourvisit/upload/webgeo.pdf>, 315KB
- NASA, Voyager exhibit, pdf, https://science.nasa.gov/wp-content/uploads/2023/10/Voyager_Exhibit-1.pdf, 58.6MB
- *NASA, Hidden Lives of Galaxies Presentation, ppt, <https://imagine.gsfc.nasa.gov/educators/galaxies/galaxies.html>, 1.49MB

* indicates files that were included in the corpus libraries but not directly referenced by any prompts.

Setting up the test

1. On the HP system, open HP AI Companion:
 - a. Select the Library tab.
 - b. Select the New Library button.
 - c. Enter a library name.
 - d. Drag the corpus files into the pop-up window, and click Create private library.
 - e. Close the HP AI Companion app when the library creation is complete.
2. On the Lenovo system, open Lenovo AI Now:
 - a. Select the Knowledge Assistant tab.
 - b. Select the Import button, and click the Files dropdown option.
 - c. Select the corpus files, and click Open.
 - d. When the library creation is complete, close the Lenovo AI Now app.

Testing general knowledge

1. On the system under test, open the AI companion app.
2. To test the cloud mode, select the appropriate option in the AI companion app:
 - In the HP AI Companion app, select the Home tab and select the Cloud option under the text box.
 - In the Lenovo AI Now app, select the Cloud Chat tab.
3. Start a new chat, if necessary.
4. Enter the following question with a factual answer into the text field:

What is the capital of France? Answer in one short sentence

5. Record whether the factual answer is correct ("Paris").
6. Ask the following related follow-up question to test multi-turn retention:

What river flows through it?

7. Record whether the AI correctly retained the context of the conversation and whether the factual answer is correct ("Seine").
8. Repeat steps 3 through 7 twice more.
9. Start a new chat.
10. Enter the following prompt to produce a long-form response:

Write a 140-160 word summary of the Apollo 11 mission. Provide the launch date, the three crew members and their roles, the Moon landing date, the landing site, and the mission's significance.

11. Record whether all points were provided and correct. Expected outputs are as follows:
July 16 1969 launch, Neil Armstrong, Buzz Aldrin, Michael Collins, July 20 1969 landing, Sea of Tranquility
12. Repeat steps 9 through 11 twice more.
13. Repeat steps 2 through 12 for On Device/Local mode.

Testing document summarization

1. On the system under test, open the AI companion app.
2. To test the cloud mode, select the appropriate option in the AI companion app.
 - In the HP AI Companion app, select the Library tab, select Open library on the library created earlier, and select the Cloud option under the text box.
 - In the Lenovo AI Now app, select the Knowledge Assistant tab.
3. Start a new chat, and select the target document, if necessary.
4. Enter the following prompt to summarize a docx file from the corpus:

Summarize the document on Switchgrass in 140-160 words. Cover the primary uses, give a basic description, and include one establishment/management point. Use full sentences and avoid lists.

5. Record whether all points were provided and correct. Expected outputs are as follows:
uses (livestock/erosion/wildlife/biofuel), description (native, perennial), and management (seeding/burning/grazing).
6. Repeat steps 3 through 5 twice more.
7. Start a new chat and select the target document, if necessary.
8. Enter the following prompt to summarize a pdf file from the corpus:

Summarize the document on the Cumberland Plateau in 140-160 words. Cover the plateau's geologic setting and age, the dominant rock types, how erosion shaped characteristic, and one point of human/industrial history. Use full sentences and avoid lists.

9. Record whether all points were provided and correct. Expected outputs are as follows:
Pennsylvanian/Mississippian period, 350 million years; sandstone (cap)/limestone/shale/coal; erosion shaping gorges/arches/rock shelters/waterfalls; hunters, 20000 years; moonshining/nitre-mining/coal-mining/railroad.
10. Repeat steps 7 through 9 twice more.
11. Repeat steps 2 through 10 for On Device/Local mode.

Testing file Q&A retrieval

1. On the system under test, open the AI companion app.
2. To test the cloud mode, select the appropriate option in the AI companion app.
 - In the HP AI Companion app, select the Library tab, select Open library on the library created earlier, and select the Cloud option under the text box.
 - In the Lenovo AI Now app, select the Knowledge Assistant tab.
3. Start a new chat, if necessary.
4. Enter the following prompt to retrieve information from the corpus:

Using only my local files, which two planets did Voyager 1 fly by during its primary mission?

5. Record whether all points were provided and correct. Expected outputs are as follows:
Saturn and Jupiter.
6. Repeat steps 3 through 5 twice more.
7. Start a new chat.
8. Enter the following prompt to retrieve information that is not provided in the corpus:

Using only my local files, which document in my library describes the chemical composition of basalt on Mars?

9. Record whether the answer correctly states the information is not in the corpus.
10. Repeat steps 7 through 9 twice more.
11. Repeat steps 2 through 10 for On Device/Local mode.

Testing multi-doc analysis

1. On the system under test, open the AI companion app.
2. To test the cloud mode, select the appropriate option in the AI companion app.
 - In the HP AI Companion app, select the Library tab, select Open library on the library created earlier, and select the Cloud option under the text box.
 - In the Lenovo AI Now app, select the Knowledge Assistant tab.
3. Start a new chat and select the target documents, if necessary.
4. Enter the following prompt to compare two documents from the corpus:

Using only my local files, name two uses that both Switchgrass and Big Bluestem share.

5. Record whether all points were provided and correct. Expected outputs are as follows:
livestock & erosion control
6. Repeat steps 3 through 5 twice more.
7. Repeat steps 2 through 6 for On Device/Local mode.

Testing system task management

1. On the system under test, open the AI companion app.
2. To test the cloud mode, select the appropriate option in the AI companion app.
 - In the HP AI Companion app, select the Perform tab.
 - In the Lenovo AI Now app, select the PC Assistant tab.
3. Start a new chat, if necessary.
4. Enter the following prompt to test device control:

```
Set my screen brightness to 60%.
```

5. Record whether the screen brightness was set to the correct value.
6. Repeat steps 3 through 5 twice more.
7. Repeat steps 2 through 6 for On Device/Local mode.

Replacing system components

In this testing, we determined how easy it was to replace two components on each system: the fan(s), battery, SSD, and memory.

For each replacement, we followed these steps:

1. Start with the system fully assembled.
2. Start the timer and begin the process to replace that part.
3. Record the time to replace that part.

Replacing the fans on the HP EliteBook 8 G1a 14 inch Notebook Next Gen AI PC

1. On the bottom of the system, unscrew the four captive Phillips-head screws that secure the bottom cover to the system.
2. Using a plastic pry tool, pry open and remove the bottom cover.
3. Disconnect the battery cable from the system board.
4. Disconnect the webcam cable from the system board.
5. Unroute the webcam cable from the routing channels along the sides of the right system fan.
6. Disconnect the left and right system fan cables from the system board.
7. Unscrew the four captive Phillips-head screws that secure the left and right system fans to the top cover.
8. Remove the left and right system fans from the top cover.
9. Place the new left and right system fans into the top cover.
10. Screw the four captive Phillips-head screws that secure the left and right system fans to the top cover.
11. Connect the left and right system fan cables to the system board.
12. Reroute the webcam cables into the routing channels along the side of the right system fan.
13. Connect the webcam cable to the system board.
14. Connect the battery cable to the system board.
15. Attach the bottom cover and snap it back into place.
16. On the bottom of the system, screw the four captive Phillips-head screws that secure the bottom cover to the system.

Replacing the fan on the Dell Pro 14 Plus

1. On the bottom of the system, unscrew the six captive Phillips-head screws that secure the bottom cover to the system.
2. Using a plastic pry tool, pry open and remove the bottom cover.
3. Disconnect the battery cable from the system board.
4. Disconnect the system fan cable from the connector on the system board.
5. Unscrew the two Phillips-head screws that secure the fan to the top cover.
6. Unscrew the four captive Phillips-head screws that secure the fan and heat sink assembly to the system board.
7. Remove the fan and heat sink assembly from the system board.
8. Place the new fan and heat sink assembly onto the system board.
9. Screw the four captive Phillips-head screws that secure the fan and heat sink assembly to the system board.
10. Screw the two Phillips-head screws that secure the fan to the top cover.
11. Connect the system fan cable to the system board.
12. Connect the battery cable to the system board.
13. Attach the bottom cover and snap it back into place.
14. On the bottom of the system, screw the six captive Phillips-head screws that secure the bottom cover to the system.

Replacing the fan on the Lenovo ThinkPad T14s Gen 6

1. On the bottom of the system, unscrew the five captive Phillips-head screws that secure the bottom cover to the system.
2. Using a plastic pry tool, pry open and remove the bottom cover.
3. Disconnect the battery cable from the system board.
4. Disconnect the webcam cable from the system board.
5. Unroute the webcam cable from the routing channels along the sides of the system fan.
6. Disconnect the two WLAN cables from the WLAN module.
7. Unroute the two WLAN cables from the routing channels along the sides of the system fan.
8. Disconnect the system fan cable from the system board.
9. Unscrew the five captive screws that secure the fan and heat sink assembly to the system board.
10. Remove the fan and heat sink assembly from the system board.
11. Place the new fan and heat sink assembly onto the system board.
12. Screw the five captive Phillips-head screws that secure the fan and heat sink assembly to the system board.
13. Connect the fan cable from the connector on the system board.
14. Reroute the two WLAN cables into the routing channels along the sides of the system fan.
15. Connect the two WLAN cables to the WLAN module.
16. Reroute the webcam cable into the routing channels along the sides of the system fan.
17. Connect the webcam cable to the system board.
18. Connect the battery cable to the system board.
19. Attach the bottom cover and snap it back into place.
20. On the bottom of the system, screw the five captive Phillips-head screws that secure the bottom cover to the system.

Replacing the battery on the HP EliteBook 8 G1a 14 inch Notebook Next Gen AI PC

1. On the bottom of the system, unscrew the four captive Phillips-head screws that secure the bottom cover to the system.
2. Using a plastic pry tool, pry open and remove the bottom cover.
3. Disconnect the battery cable from the system board.
4. Push down on the two latches that secure the battery to the system.
5. Remove the battery from the enclosure.
6. Place the new battery into the enclosure.
7. Push up on the two latches that secure the battery to the system.
8. Connect the battery cable to the system board.
9. Attach the bottom cover and snap it back into place.
10. On the bottom of the system, screw the four captive Phillips-head screws that secure the bottom cover to the system.

Replacing the battery on the Dell Pro 14 Plus

1. On the bottom of the system, unscrew the six captive Phillips-head screws that secure the bottom cover to the system.
2. Using a plastic pry tool, pry open and remove the bottom cover.
3. Disconnect the battery cable from the system board.
4. Unscrew the four captive Phillips-head screws that secure the battery to the system.
5. Remove the battery from the enclosure.
6. Unroute the battery cable from the routing channels on the battery.
7. Disconnect the battery cable from the battery.
8. Connect the battery cable to the new battery.
9. Reroute the battery cable into the routing channels on the battery.
10. Place the battery into the enclosure.
11. Screw the four captive Phillips-head screws that secure the battery to the system.
12. Connect the battery cable to the system board.
13. Attach the bottom cover and snap it back into place.
14. On the bottom of the system, screw the six captive Phillips-head screws that secure the bottom cover to the system.

Replacing the battery on the Lenovo ThinkPad T14s Gen 6

1. On the bottom of the system, unscrew the five captive Phillips-head screws that secure the bottom cover to the system.
2. Using a plastic pry tool, pry open and remove the bottom cover.
3. Disconnect the battery cable from the system board.
4. Unscrew the three captive Phillips-head screws that secure the battery to the system.
5. Remove the battery from the enclosure.
6. Place the new battery into the enclosure.
7. Screw the three captive Phillips-head screws that secure the battery to the system.
8. Connect the battery cable to the system board.
9. Attach the bottom cover and snap it back into place.
10. On the bottom of the system, screw the five captive Phillips-head screws that secure the bottom cover to the system.

Replacing the SSD on the HP EliteBook 8 G1a 14 inch Notebook Next Gen AI PC

1. On the bottom of the system, unscrew the four captive Phillips-head screws that secure the bottom cover to the system.
2. Using a plastic pry tool, pry open and remove the bottom cover.
3. Disconnect the battery cable from the system board.
4. Unscrew the one Phillips-head screw that secures the M.2 SSD to the system board.
5. Remove the M.2 SSD from the system board.
6. Place the new M.2 SSD into the slot on the system board.
7. Screw the one Phillips-head screw that secures the M.2 SSD to the system board.
8. Connect the battery cable to the system board.
9. Attach the bottom cover and snap it back into place.
10. On the bottom of the system, screw the four captive Phillips-head screws that secure the bottom cover to the system.

Replacing the SSD on the Dell Pro 14 Plus

1. On the bottom of the system, unscrew the six captive Phillips-head screws that secure the bottom cover to the system.
2. Using a plastic pry tool, pry open and remove the bottom cover.
3. Disconnect the battery cable from the system board.
4. Unscrew the three Phillips-head screws that secure the M.2 SSD cover to the system board.
5. Remove the M.2 SSD cover from the system board.
6. Remove the M.2 SSD from the system board.
7. Place the new M.2 SSD into the slot on the system board.
8. Place the M.2 SSD cover onto the system board.
9. Screw the three Phillips-head screws that secure the M.2 SSD cover to the system board.
10. Connect the battery cable to the system board.
11. Attach the bottom cover and snap it back into place.
12. On the bottom of the system, screw the six captive Phillips-head screws that secure the bottom cover to the system.

Replacing the SSD on the Lenovo ThinkPad T14s Gen 6

1. On the bottom of the system, unscrew the five captive Phillips-head screws that secure the bottom cover to the system.
2. Using a plastic pry tool, pry open and remove the bottom cover.
3. Disconnect the battery cable from the system board.
4. Unscrew the one Phillips-head screw that secures the M.2 SSD to the system board.
5. Remove the M.2 SSD from the system board.
6. Place the new M.2 SSD into the slot on the system board.
7. Screw the one Phillips-head screw that secures the M.2 SSD to the system board.
8. Connect the battery cable to the system board.
9. Attach the bottom cover and snap it back into place.
10. On the bottom of the system, screw the five captive Phillips-head screws that secure the bottom cover to the system.

Replacing the memory on the HP EliteBook 8 G1a 14 inch Notebook Next Gen AI PC

1. On the bottom of the system, unscrew the four captive Phillips-head screws that secure the bottom cover to the system.
2. Using a plastic pry tool, pry open and remove the bottom cover.
3. Disconnect the battery cable from the system board.
4. Using a plastic pry tool, remove the memory bracket from the alignment pins and retention clips on the system board.
5. Push both arms on the memory slot simultaneously to release the memory module to the spring tension position.
6. Repeat and remove both memory modules.
7. Place the new memory modules into the slots on the system board and press down to latch the arms in place.
8. Place the memory bracket into the alignment pins and retention clips on the system board.
9. Connect the battery cable to the system board.
10. Attach the bottom cover and snap it back into place.

Replacing the memory on the Dell Pro 14 Plus

The memory on the Dell Pro 14 Plus was soldered to the board, so we could not replace it.

Replacing the memory on the Lenovo ThinkPad T14s Gen 6

The memory on the Lenovo ThinkPad T14s Gen 6 was soldered to the board, so we could not replace it.

[Read the report ►](#)

This project was commissioned by HP and AMD.



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