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(Image credit: Yevheniia Kudrova via Getty Images) Quick facts about the sunHow big it is: 865,000 miles (1.392 million kilometers) acrossHow far away it is: 93 million miles (150 million km)What type of star it is: A yellow dwarf starThe sun is the star at the center of our solar system. It's the largest, brightest and most massive object in the solar system, and it provides the light and heat that life on Earth depends on. Powered by a process called nuclear fusion, the sun can get hotter than 27 million degrees Fahrenheit (15 million degrees Celsius). The sun has been around for over 4 billion years, but one day, it will run out of fuel. Read on to learn more about what our local star is made of, how it formed and what will happen when it dies.Over 1 million Earths could fit inside the sun.The sun may look yellow from Earth, but it actually releases every color of light, meaning its true color is white.The sun is unique in that it's the only star in our solar system. Up to 85% of stars have at least one companion star.The sun contains over 99% of the mass of our entire solar system.Like Earth, the sun also rotates on its axis. Each rotation takes about 27 Earth days.The sun is a ball of gas and plasma made mostly of hydrogen. The sun uses these vast stores of hydrogen to generate the heat and light that sustain our planet. It does this through a process called nuclear fusion, in which two hydrogen atoms combine to create a different element, helium. The sun is about three-quarters hydrogen and one-quarter helium, with tiny amounts of metals. The larger a star is, the more rapidly it burns through its hydrogen. Some of the largest known stars — such as those with masses 40 times that of the sun — will live just 1 million years. By contrast, the sun will have a lifetime of around 10 billion years.Different parts of the sun reach different temperatures. The sun's core gets as hot as 27 million F (15 million C). The part of the sun we can see from Earth is called the photosphere, which is the "surface" of the huge ball of plasma. The temperature of the photosphere is about 9,900 F (5,500 C).Above the photosphere is the loose outer atmosphere of the sun, known as the corona. We can't see the corona from Earth under ordinary conditions, though it can be photographed during a total solar eclipse. This view of the sun taken by the Solar Dynamics Observatory highlights the outer atmosphere of the sun, called the corona, as well as hot flare plasma. (Image credit: Courtesy of NASA/SDO and the AIA, EVE, and HMI science teams.)The sun formed around 4.5 billion years ago. At that time, the area of the Milky Way galaxy that would become the solar system was a dense cloud of gas — the leftovers of an earlier generation of stars. The densest region of this cloud collapsed and created a seed, called a protostar, that would become the sun. As this young protostar grew, planets, moons and asteroids formed from the remaining raw material, and then began circling around the growing sun as they were sucked into orbit by the star's powerful gravity.At the heart of the sun, this same force sparked nuclear fusion. The heat and light from this nuclear reaction allowed life on Earth to evolve and prosper. However, this reaction will eventually lead to the sun's death when it runs out of nuclear fuel.The sun is around halfway through its lifetime. Our star is locked in a constant battle as outward pressure from nuclear fusion fights the inward pull of gravity. When the sun runs out of hydrogen in about 5 billion years, the inward force of gravity will win.The center of the sun will collapse, compressing into a dense core. Helium will start fusing into even denser elements, like carbon, nitrogen and oxygen. While this happens, the heat generated by the fusing of these elements will push the sun's outer shell to swell. This will be bad news for the inner planets of the solar system — including Earth.As the sun becomes a type of star called a red giant, its outer shell will expand to the orbit of Mars, gobbling up Mercury, Venus, Earth and Mars. But the red-giant phase is not when the sun will die.The outer layers that swell during the red-giant phase will become a shell of gas called a surrounding planetary nebula. This shell will be shed after approximately 1 billion years. This will expose the star's smoldering core, which, by this point, will be a dense ball called a white dwarf.As a white dwarf, the sun will dim. The material from the planetary nebula will spread out into the galaxy and form the building blocks of the next generation of stars and planets.Image 1 of 5(Image credit: NASA/Johns Hopkins APL/Steve Gribben)Space agencies have launched many spacecraft that help us observe and gather data about the sun. Pictured here is an artist's concept of the sun being observed by NASA's Parker Solar Probe.(Image credit: ESA/NASA)The red giant star Camelopardalis. The sun will eventually become a red giant, and as it expands, it will engulf its nearest planets, including Earth. (Image credit: R. Kamlah et al. 2025)Sunspots are darker, cooler areas that temporarily appear on the sun. They're caused by changes in the sun's magnetic field.(Image credit: NASA's Goddard Space Flight Center/Genna Duberstein)Solar storms happen when the sun releases flares of energy and particles. (Image credit: Juan Maria Coy Vergara via Getty Images)Auroras on Earth happen when charged particles from the sun interact with our planet's atmosphere. You may like Get the world's most fascinating discoveries delivered straight to your inbox. The temperature of the Sun varies, from 5500 C (10,000 F) on its surface up to 15 million C (27 million F) at its core.Have you ever wondered just how hot the Sun is? It's not a single temperature because the Sun consists of layers where different processes occur. From the fiery depths of its core to the outermost reaches of its corona, here are the temperatures, from millions of degrees in Kelvin to the more comprehensible Celsius and Fahrenheit scales.The hottest part of the Sun is the core: 15 million K; ~15 million °C; 27 million °F.The coolest part of the Sun is the visible surface or photosphere: 4,000 – 6,500 K; ~5,500 °C; ~10,000 °F.Surprisingly, the solar atmosphere or corona is hotter than the Sun's surface. Also, the temperature is quite variable: 500,000 – 2,000,000 K; ~2 million °C; ~ 3.5 million °F.The core, where nuclear fusion occurs, is the hottest part of the Sun. Here, hydrogen atoms fuse to form helium, releasing immense energy.Temperature: Approximately 15 million Kelvin (K)In Celsius: Around 15 million °CIn Fahrenheit: About 27 million °FThis intense heat overcomes the strong nuclear force between protons, allowing fusion to occur.Surrounding the core, the radiative zone is where energy moves outward via radiation. The temperature gradually decreases in this zone.Temperature: Roughly 7 million KIn Celsius: Approximately 7 million °CIn Fahrenheit: Around 12.6 million °FIn this zone, photons bounce around, taking a long time to travel through due to the high density of solar material.In the convective zone, energy is transported by convection currents, similar to boiling water.Temperature: About 2 million KIn Celsius: Near 2 million °CIn Fahrenheit: Close to 3.6 million °FHot plasma rises, cools as it nears the surface, then sinks back down to be reheated, creating convection cells.The photosphere is the visible surface of the Sun.Temperature: Roughly 5,500 KIn Celsius: About 5,300 °C (usually rounded up to 5.500 °C)In Fahrenheit: Approximately 9,500 °F (usually rounded up to 10,000 °F)This layer emits the light we see, appearing bright due to the contrast with cooler outer layers.Above the photosphere is the chromosphere, a layer visible during solar eclipses as a reddish glow.Temperature: Around 4,000 to 20,000 KIn Celsius: Between 3,500 and 20,000 °CIn Fahrenheit: Approximately 6,700 to 35,500 °FThis layer shows an interesting temperature rise, thought to be influenced by magnetic fields.The corona, the Sun's outermost layer, is surprisingly hotter than the layers beneath it.Temperature: Ranges from 1 to 3 million KIn Celsius: About 1 million to 3 million °CIn Fahrenheit: Around 1.8 million to 5.4 million °FThe corona's higher temperature than the photosphere is a subject of scientific study. One theory is that magnetic waves carry energy from the Sun's surface to its outer layers, heating the corona.Scientists apply several methods for measuring or calculating the Sun's temperature:Spectroscopy: Spectroscopy analyzes the spectrum of light from the Sun to determine temperature based on emission and absorption lines.Solar Probes: Instruments on spacecraft measure various properties of the Sun, providing direct temperature data.Radio Telescopes: Telescopes measure the intensity of the Sun's radio waves to infer temperature.Stellar Models: The primary method for estimating the core temperature of the Sun involves theoretical models of stellar structure and evolution. These models take into account various physical principles, including nuclear physics, thermodynamics, and fluid dynamics.Nuclear Fusion Rates: By understanding the physics of nuclear reactions (specifically the proton-proton chain dominant in stars like the Sun) and the rate at which energy is produced, scientists estimate the necessary core temperature for these reactions to occur at the observed rate.Helioseismology: This is the study of oscillations and waves in the Sun. By observing sound waves that travel through the Sun and emerge at its surface, scientists infer a lot about the internal structure of the Sun, including temperature gradients.Solar Neutrinos: Neutrinos are elementary particles produced by the nuclear reactions in the Sun's core. They interact very weakly with matter, meaning they escape the Sun's core and reach Earth almost unimpeded. By detecting and studying these solar neutrinos, scientists gain insights into the nuclear reactions occurring in the core.Comparative Analysis with Other Stars: Astronomers also compare the Sun with similar stars (main-sequence stars of similar mass and composition). Observations of these stars, alongside theoretical models, provide additional context for understanding the Sun's internal processes.The Sun is a G-type main-sequence star, and there are both hotter and cooler stars in the universe.Hotter Stars: Blue giants like Rigel are much hotter, with surface temperatures exceeding 10,000 K.Cooler Stars: Red dwarfs like Proxima Centauri have surface temperatures as low as 3,000 K.Each star's temperature depends on its size, age, and composition, influencing the nuclear fusion processes within.On Earth, the hottest temperatures are in particle accelerators and fusion reactors:Particle Accelerators: In experiments with particle accelerators like the Large Hadron Collider (LHC), temperatures have momentarily exceeded the core temperature of the Sun. For instance, collisions of heavy ions create a state of matter known as quark-gluon plasma, with temperatures estimated to be over 5 trillion Kelvin (5,000,000,000,000 K). These temperatures are brief and occur in an incredibly small space.Fusion Experiments: In fusion research, experiments aim to replicate the conditions inside the Sun to achieve nuclear fusion. The ITER (International Thermonuclear Experimental Reactor) project, for instance, aims to reach temperatures of around 150 million Celsius (150,000,000°C), which is about 10 times hotter than the core of the Sun. However, these temperatures haven't been fully achieved yet.Goupil, M.J.; Lebreton, Y.; Marques, J.P.; Samadi, R.; Baudin, F. (2011). "Open issues in probing interiors of solar-like oscillating main sequence stars 1. From the Sun to nearly suns". Journal of Physics: Conference Series. 271 (1): 012031. doi:10.1088/1742-6596/271/1/012031Marshall Space Flight Center "The Solar Interior." Solar Physics.Mullan, D.J (2000). "Solar Physics: From the Deep Interior to the Hot Corona". In Page, D.; Hirsch, J.G. (eds.). From the Sun to the Great Attractor. Springer. ISBN 978-3-540-41064-5.Phillips, K.J.H. (1995). Guide to the Sun. Cambridge University Press. ISBN 978-0-521-39788-9.Shu, F.H. (1982). The Physical Universe: An Introduction to Astronomy. University Science Books. ISBN 978-0-935702-05-7.Related Posts Life on Earth would not exist without our huge hot glowing ball of gas. But just how hot is the sun? Well, that depends... The temperature of the sun varies from around 27 million degrees Fahrenheit (15 million degrees Celsius) at the core to only about 10,000 degrees F (5,500 degrees C) at the surface, according to NASA. Every 1.5 millionths of a second, the sun releases more energy than all humans consume in an entire year according to NASA Space Place. Here, we explore how hot each layer of the sun is and why the temperatures vary so much. You may like Related: When will the sun die? The sun is made of gas and plasma. Most of the gas — 92% — is hydrogen. If the sun were smaller, it would just be a huge ball of hydrogen akin to Jupiter. According to NASA Space Place, the hydrogen in the sun's core is held together by a lot of gravity resulting in high pressure. The pressure is so high that when hydrogen atoms collide with enough force they create a new element — helium — in a process called nuclear fusion. The continual nuclear fusion, causes energy to build up and the sun's core reaches temperatures of about 27 million degrees F (15 million degrees C). The energy then radiates outward to the sun's surface, atmosphere and beyond.Radiative zone temperaturesOutside the sun's core lies the radiative zone where temperatures range from 12 million degrees F (7 million degrees C) nearest the core to around 4 million degrees F (2 million degrees C) in the outer radiative zone, according to the educational website Study.com. No thermal convection occurs in this layer, according to the science news website Phys.org. Instead, heat is transferred via thermal radiation whereby hydrogen and helium emit photons that travel a short distance prior to getting reabsorbed by other ions. It can take light particles (photons) thousands of years to meander their way through this layer before reaching the surface of the sun. Convection zone temperaturesBeyond the radiative zone is the sun's convective zone which extends for 120,000 miles (200,000 kilometers) according to Study.com. Temperatures in the convection zone are approximately 4 million degrees F (2 million degrees C). Plasma in this layer moves in a convective motion — like boiling water — bubbles of hot plasma transport heat to the surface of the sun. The sun's atmosphere: Photosphere, chromosphere and corona temperaturesThe temperature of the sun varies between each layer of the atmosphere. (Image credit: NASA/SDO)Temperatures in the sun's atmosphere also vary considerably between the layers. In the photosphere, temperatures reach about 10,000 degrees F (5,500 degrees C) according to the educational website The Sun Today. It is here that the sun's radiation is detected as visible light. Sunspots on the photosphere appear dark because they are cooler than the other parts of the sun's surface. The temperature of sunspots can be as low as 5,400 to 8,100 degrees F (3,000 to 4,500 degrees C) according to the University Corporation of Atmospheric Research (UCAR).The chromosphere lies above the photosphere and temperatures range from approximately 11,000 degrees F (6,000 degrees C) nearest the photosphere to about 7,200 degrees F (4,000 degrees C) a couple of hundred miles higher up. Now here is where things get a little bit strange. Above the chromosphere lies the corona — the outermost layer of the sun's atmosphere. The sun's corona extends thousands of miles above the visible "surface" (photosphere) of the sun. Now you might think that temperatures here must be the lowest here since we are the farthest away from the heat-generating core... but that isn't the case. At all. The sun's corona can reach temperatures of around 1.8 million degrees F to 3.6 million degrees F (1 to 2 million degrees C), that's up to 500 times hotter than the photosphere. But how is the sun's upper atmosphere hotter than the surface? It's a great question, and one that has scientists rather stumped. There are some ideas about where the energy comes from that heats the corona, but a definitive conclusion is yet to be made. If you'd like to read more about this solar mystery check out this article on "Why is the sun's atmosphere hotter than its surface?". Sun temperature FAQs answered by an expertWe asked Jia Huang, solar researcher at UC Berkeley's Space Sciences Laboratory, a few frequently asked questions about the sun. In my opinion, we know the temperature of the sun in two ways: theory and observation. Theoretically, we can estimate the temperatures of various solar layers by considering the underlying physical processes. Observationally, we can directly measure the temperatures of the layers above the photosphere (including photosphere, chromosphere, transition region, and corona) either with remote telescopes (we can derive the temperatures based on spectroscopic data) or with in-situ instruments onboard spacecraft (a method applies only to the solar corona when Parker Solar Probe enters it). The temperature of the sun relates to the generation, transport, and dissipation of energies. The distinct physical processes occurring in various layers of the sun lead to considerable energy fluctuations, causing the wide range of temperatures observed throughout the sun. The core of the sun has the highest temperature, approximately 10 million Kelvin, as a result of the incessantly thermonuclear fusion processes that produce the energy the sun relies on. In general, the temperature decreases from the core to the photosphere and then increases towards the corona; however, the abnormally high temperature of the corona (~1 million kelvin) is still a mystery. One interesting thing is that some colleagues compare the sun to fried ice cream, indicating the solar corona is much hotter than the solar surface, but this is not very accurate because the core of the sun is the hottest. The Parker Solar ProbeThe Parker Solar Probe, launched in August 2018, is currently orbiting and observing our star. One of its aims is to investigate why the corona defies stellar dynamic models by having a temperature greater than the photosphere.The craft flies through the sun's atmosphere, withstanding violent temperatures, often coming as close to its surface as 3.8 million miles (6.1 million kilometers). As it does this it will collect measurements of the corona and essential data on solar winds, also taking images of the star. In 2021 the probe became the fastest craft created by humans, passing the sun at 364,621 mph (692,018 kph). When it is closest to the sun, the Parker Solar Probe travels at 430,000 mph (700,000 kph), according to NASA's Parker Solar Probe page.NASA's Parker Solar Probe launched on August 12, 2018 on a mission to study the sun. (Image credit: NASA/Johns Hopkins APL/Steve Gribben)how does our sun's temperature compare to other stars?Stars come in a variety of sizes and colors so it should be no surprise that they have different temperatures too. Astronomers can tell a lot about the temperature of a star by its color, or its spectral type. There are 7 spectral types designated by the letters O, B, A, F, G, K, and M. The hottest stars are O and B stars which shine mostly blue light with a great deal of their light in the ultraviolet spectrum. M-type stars are the coolest class more prominent in red wavelengths but also emitting a lot of infrared light. Blue stars have estimated surface temperatures of 25,000 kelvin (K) (44,540 degrees F/ 24,726 degrees C), while red stars are much cooler at around 3,000 K (4,940 degrees F/ 2,726 degrees C), according to the University of Central Florida. In between these are white stars with temperatures of around 10,000 K (17,540 degrees F/ 9,726 degrees C), yellow stars, like the sun, at 6,000 K (10,340 degrees F/ 5,726 degrees C), and cooler orange stars with temperatures in the region of 4,000 K (6,740 degrees F/ 3,726 degrees C).Additional resourcesYou can explore the sun in more detail with NASA's Solar Dynamics Observatory or keep up to date with the latest findings from NASA's Parker Solar Probe on its mission to "touch" the sun. If you want to improve your knowledge and understanding of the sun check out this free course courtesy of the Open University. Read about energy from the sun and how we can make use of it in this informative guide from the National Energy Education Development Project (NEED). Bibliography Breaking space news, the latest updates on rocket launches, skywatching events and more! The Sun's core is the central region where nuclear reactions consume hydrogen to form helium. These reactions release the energy that ultimately leaves the surface as visible light. These reactions are highly sensitive to temperature and density. The individual hydrogen nuclei must collide with enough energy to give a reasonable probability of overcoming the repulsive electrical force between these two positively charged particles. The temperature at the very center of the Sun is about 15,000,000° C (27,000,000° F) and the density is about 150 g/cm^3 (approximately 10 times the density of gold, 19.3 g/cm^3 or lead, 11.3 g/cm^3). Both the temperature and the density decrease as one moves outward from the center of the Sun. The nuclear burning is almost completely shut off beyond the outer edge of the core (about 25% of the distance to the surface or 175,000 km from the center). At that point the temperature is only half its central value and the density drops to about 20 g/cm^3. The Sun is the star at the center of our solar system. The Sun's temperature varies across regions, including its core, photosphere, and corona. The Sun's surface, known as the photosphere, exhibits a temperature range. Learn about the Sun's temperature measurements in both Fahrenheit and Celsius scales. The Sun's heat influences the entire solar system and plays a crucial role in supporting life on Earth.The Sun's temperature varies across its layers. The Sun's core reaches 27 million degrees Fahrenheit or 15 million degrees Celsius. The photosphere, which is the Sun's surface, maintains a temperature of 10,000 degrees Fahrenheit or 5,500 degrees Celsius. Temperature variations exist within the photosphere itself, ranging from 7,460°F (4,125°C) at the top to 10,000°F (5,540°C) at the bottom.The Sun's maximum temperature is found in its core. Nuclear fusion reactions in the core generate heat, with temperatures estimated at 27,000,000°F (15,000,000°C). Pressure and density cause the core's higher temperature compared to other regions of the Sun. Temperature decreases from the core outward through the radiative and convective zones.The Sun's corona, its outer atmosphere, exhibits high temperatures. Corona temperatures range from 1.8 million to 3.6 million degrees Fahrenheit (1 million to 2 million degrees Celsius). During intense solar events, corona temperatures spike to 72 million degrees Fahrenheit (40 million degrees Celsius). The corona's heat, hotter than the solar surface, presents a puzzle known as the coronal heating problem.The Sun's temperature dwarfs that of Earth. While the Sun's core reaches 15 million degrees Celsius, Earth's temperature ranges from 14-16°C (57.2-60.8°F). Earth's temperatures range between -89.3°C (-128.7°F) and 56.7°C (134.1°F), cooler than the Sun's surface temperature of 5,500 degrees Celsius (9,932 degrees Fahrenheit).The Sun has temperatures varying across its layers. The core reaches 27 million degrees Fahrenheit (15 million Celsius), while the surface maintains 10,000 Fahrenheit (5,500 Celsius). The corona exceeds 1 million degrees Celsius.The Sun's surface, known as the photosphere, maintains a temperature of 5,500-5,800°C (10,000°F). Scientists estimate the surface temperature to be around 5,800 K. The photosphere emits most of the Sun's light and energy.The Sun's core reaches temperatures of 15,000,000°C (27,000,000°F). Nuclear fusion reactions in the core generate this heat. Scientists estimate the core temperature to be 10,000,000 K. The core's temperature is higher than the surface temperature due to the immense pressure and density at the Sun's center. Temperature decreases from the core outward through the radiative and convective zones.The surface temperature of the Sun is 5,500 degrees Celsius or 10,000 degrees Fahrenheit. The Sun's photosphere, its surface, maintains this temperature. Temperature rises inward towards the core and outward into the corona, reaching millions of degrees.The average temperature of the Sun's photosphere is 5,600°C (10,832°F) or 10,000°F (5,537.78°C). Measurements have recorded temperatures as high as 5,727°C (10,340°F) in areas of the Sun's surface. Analyses have refined the estimate to about 5,800 K (5,800°C) or 10,472°F at the photosphere. The Kelvin scale is used in contexts, with 6,000 K being a reference point for the Sun's surface temperature. A general scientific consensus places the Sun's surface temperature at around 6,000°C (10,832°F), serving as an accepted estimate. Astronomers utilize the solar spectrum to determine these temperatures. The Sun's surface temperature varies depending on the layer observed and measurement technique employed. Researchers continue to study and refine these measurements to gain a precise understanding of the Sun's composition and behavior.The temperature of the Sun's core is 27 million degrees Fahrenheit (15 million degrees Celsius). NASA confirms this core temperature which generates solar energy and maintains the Sun's structure. Nuclear fusion reactions occur in the core, causing its heat.The cited temperature for the Sun's core is 15 million Kelvin. This temperature equates to 27 million degrees Fahrenheit or 15 million degrees Celsius. Some sources provide a precise measurement of 15.7 million Kelvin for the Sun's core temperature. An estimate of 10 million Kelvin exists in certain scientific literature. These temperatures in the Sun's core enable nuclear fusion reactions to occur. The proton-proton chain reaction and the CNO cycle take place at these temperatures, converting hydrogen nuclei into helium nuclei. The Sun's core temperature powers its brilliance and maintains its heat through ongoing nuclear fusion processes.The Sun can get hot to reach 27 million degrees Fahrenheit (15 million degrees Celsius) at its core. The surface temperature is 10,000 degrees Fahrenheit (5,500 degrees Celsius), while the corona reaches 3.6 million degrees Fahrenheit (2 million degrees Celsius).The Sun's temperature varies across its different layers. The core reaches 27,000,000°F (15,000,000°C), making it the hottest part of the Sun. Nuclear fusion reactions occur in the core, generating heat and energy. The surface, known as the photosphere, has an average temperature of 10,000°F (5,600°C). The range of the photosphere reaches 11,000°F (6,200°C). Scientists measure the Sun's surface black body temperature at 6,000 K. The Sun's outer atmosphere, called the corona, becomes hot, reaching temperatures of 3,600,000°F (2,000,000°C). The hottest areas of the outer atmosphere soar to 20,000,000°C (36,000,000°F). These temperature variations highlight the Sun's complex nature and the ongoing scientific research to understand its heating mechanisms.We know the temperature of the Sun through different methods. Scientists analyze the Sun's light spectrum using spectroscopy. Wien's law determines surface temperature, while helioseismology measures core temperature. Spectroscopic techniques assess corona and solar flare temperatures. Spectroscopy is a technique for determining solar temperatures. Scientists analyze the Sun's light spectrum using spectrometers. These instruments examine the color and intensity of emitted light. The spectrum follows principles of blackbody radiation emission. Researchers compare observed spectrum emission and absorption lines to theoretical models. Planck's law relates wavelength distribution to temperature. The Stefan-Boltzmann law connects emitted energy to temperature. Light analysis involves measuring intensity, color, and wavelength distribution.The Sun's surface temperature is 5,500 degrees Celsius. Scientists measure the photosphere temperature by analyzing its visible light spectrum. Brightness measurements and photometry techniques aid in estimating surface temperature. The Sun's core temperature is estimated to be 15 million degrees Celsius. Helioseismology techniques analyze oscillations in the Sun's interior. Sound waves traveling through the Sun reveal its internal structure and dynamics.The corona temperature reaches 1 million degrees Celsius. Spectroscopy methods examine light emitted by the corona. Solar flares reach temperatures up to 10 million degrees Celsius. X-ray spectroscopy measures the temperatures of solar flares. Researchers analyze the composition of different atmospheric layers to understand temperature variations.Telescopes collect data on the Sun's light intensity and wavelength distribution. Solar observatories gather information on spectrum emission and absorption lines. Specialized equipment for solar studies enables continuous monitoring and data gathering. Photometry measures the brightness of different solar layers. Scientists combine multiple observational techniques to build temperature models of the Sun.The temperature of the Sun changes across its layers and over time. The core reaches 15 million degrees Celsius, while the surface is 5,800 degrees Celsius. The corona is hotter at 1 million degrees Celsius. Sunspot cycles cause fluctuations in solar energy output.The Sun's core maintains a temperature of 15 million degrees Celsius. Nuclear reactions in the core generate the Sun's energy through fusion processes. Surface solar activity changes over the 11-year solar cycle. Magnetic field variations cause sunspots and surface phenomena, with sunspots appearing as cooler regions on the Sun's surface. The surface temperature remains around 5,500 degrees Celsius despite these fluctuations.Solar cycles affect the Sun's energy output and surface activity. The Sun's total energy output varies by 0.1 percent over the 11-year cycle, measuring 1,361 watts per square meter. NASA research has shown an increase in the Sun's energy output during the 20th century. Long-term monitoring of solar variations reveals these changes in energy output. Temperature measurement techniques employed by NASA allow for data collection on solar temperature variations. The Sun's energy variations do not indicate changes in its internal or surface temperature.The Sun's corona has temperatures between 1.8 million and 3.6 million degrees Fahrenheit. Corona temperatures reach up to 72 million degrees Fahrenheit during intense solar events. Corona is hotter than the Sun's surface, which is 10,000 degrees Fahrenheit.The Sun's corona maintains a temperature of 1 million °C. Temperature ranges in the corona vary from 2 million °F (1.1 million °C) to 3.6 million °F (2 million °C). Extreme solar events cause the corona's temperature to spike up to 72 million °F (40 million °C). Temperature estimates for the corona range from a lower estimate of 1 million K to an upper estimate of 3 million K. The corona is much hotter than the solar surface, which has a temperature of about 10,000 °F (5,500 °C). Scientists continue to study this temperature disparity, known as the coronal heating problem. The Parker Solar Probe, launched in 2018, flies through the corona to gather data on its temperatures and conditions. Understanding the corona's heating mechanisms remains crucial for explaining solar activity.The radiative zone of the Sun has temperatures ranging from 2 million to 7 million degrees Celsius. Temperatures are highest near the core at 7 million degrees Celsius and decrease to 2 million degrees Celsius in outer regions.The radiative zone exhibits temperature variations across its extent. The region outside the core maintains temperatures around 7,000,000°C (12,000,000°F). Temperatures decrease as distance from the core increases. The average temperature within the radiative zone is 7,000,000°F (4,000,000°C). Outer regions of the radiative zone reach temperatures of about 4,000,000°F (2,000,000°C).The Sun's core reaches temperatures of 15,500,000 K at its center. The base of the convection zone, bordering the radiative zone, has a temperature of around 2,000,000°C (1,500,000 K). The Sun's surface temperature is cooler at 5,800 K. The radiative zone extends from about 0.25 to 0.7 solar radii, playing a role in energy transport from the core to the surface.The Sun's plasma has temperatures varying across layers. Core plasma reaches 15 million degrees Celsius. Radiative zone plasma is around 7 million degrees Celsius. Convective zone plasma is 2 million degrees Celsius. Surface plasma is 5,500 degrees Celsius.The Sun's core reaches a temperature of 15,000,000°C (27,000,000°F) at its center. Nuclear fusion reactions generate this heat, powering the Sun's energy output. The convection zone experiences temperatures of about 2,000,000°C (4,000,000°F) in its lower regions. Plasma circulates within this layer, transferring heat towards the surface. The top of the convective zone cools to 5,700°C (10,290°F). Surface temperatures decrease to around 6,000°C (10,832°F). The photosphere, the outer layer of the Sun, maintains a temperature of 5,540°C (10,000°F). Plasma continues to heat up above the surface. Temperatures rise to 1,000,000°C (1,832,992°F) a few thousand kilometers into the corona. Solar physicists consider this temperature inversion a mystery in solar physics.The chromosphere of the Sun has temperatures varying from 4,000 K to 8,000 K. Chromosphere temperature increases with distance from the Sun's surface. Lower regions reach 7,200°F (4,000°C), while other regions reach 14,000°F (7,760°C).The chromosphere exhibits a temperature gradient from its lower to upper boundaries. The lower boundary starts at 6,000°C (11,000°F), while the upper boundary reaches temperatures up to 20,000°C. Temperature variation occurs throughout the chromosphere's thickness. The region nearest the photosphere has temperatures around 11,000°F (6,100°C), increasing with distance from the Sun's surface. The inner portion of the chromosphere maintains temperatures of 4,400 K).The chromosphere's hottest region reaches 14,000°F (14,000°F), marking the range of temperatures in this layer. The transition region between the chromosphere and corona experiences higher temperatures, reaching up to 25,000 K. In contrast, the coolest part of the photosphere has temperatures of 4,800 K. The chromosphere's temperature distribution causes hydrogen to emit red light, giving it a distinctive reddish color observed during solar eclipses. Scientists study the chromosphere's temperature variations to understand solar heating mechanisms and the Sun's atmospheric structure.The Sun is hotter than Earth. The Sun's core temperature reaches 15 million degrees Celsius, while its photosphere is 5,500 degrees Celsius. Earth's average temperature ranges from 14-16°C (57.2-60.8°F), with extreme temperatures between -89.3°C (-128.7°F) and 56.7°C (134.1°F). Will KalifWill Kalif is an amateur astronomer at TelescopeNerd.com. Will is an author of the book "See It With A Small Telescope". Will Kalif has been passionate about telescopes and the wonders of the night sky ever since he received his first telescope as a teenager. And for several decades now he has been making and using his own telescopes and helping other people to also enjoy the various things that can be seen on a dark and starry night. The solar wind is the stream of particles (protons, electrons, neutrinos, etc), energy, and radiation from the sun. The solar wind is caused by the release of energy and particles from the sun's surface. It travels past us at a rate between 300 and 800 Km/s and varies day to day with the change in the sun's activity. The solar wind is the cause of a comet's tail and also the cause of the auroras (northern or southern lights). Earth would be more affected by the solar wind were it not for the magnetic field that surrounds us. The magnetic field causes the charged particles from the sun to flow around the Earth barely showing any effects at all, usually. There have been cases where there is a Coronal Mass Ejection and that can overwhelm our magnetic field for a short period of time causing problems with satellites and communications. Current wind speed The sun — the most massive object in the solar system — is a population I yellow dwarf star. It's at the heavier end of its class of stars, and its population I status means it contains heavy elements. The only elements in the core, however, are hydrogen and helium; hydrogen is the fuel for nuclear fusion reactions that continuously produce helium and energy. At present, the sun has burned about half of its fuel. According to the nebular hypothesis, the sun came into being as a result of the gravitational collapse of a nebula — a large cloud of space gas and dust. As this cloud attracted more and more matter to its core, it began to spin on an axis, and the central part began to heat up under the enormous pressures created by the addition of more and more dust and gases. At a critical temperature — 10 million degrees Celsius (18 million degrees Fahrenheit) — the core ignited. The fusion of hydrogen into helium created an outward pressure that counteracted gravity to produce a steady state that scientists call the "main sequence." The sun looks like a featureless yellow orb from Earth, but it has discrete internal layers. The central core, which is the only place that nuclear fusion happens, extends to a radius of 138,000 kilometers (86,000 miles). Beyond that, the radiative zone extends nearly three times as far, and the convective zone reaches to the photosphere. At a radius of 695,000 kilometers (432,000 miles) from the center of the core, the photosphere is the deepest layer that astronomers can observe directly, and is the closest the sun has to a surface. The temperature at the sun's core is around 15 million degrees Celsius (28 million degrees Fahrenheit), which is almost 3,000 time higher than at the surface. The core is 10 times as dense as gold or lead, and the pressure is 340 billion times the atmospheric pressure on Earth's surface. The core and radiative zones are so dense that photons produced by reactions in the core take a million years to reach the convective layer. At the beginning of that semi-opaque layer, temperatures have cooled enough to allow heavier elements, such as carbon, nitrogen, oxygen and iron to retain their electrons. The heavier elements trap light and heat, and the layer ultimately "boils," transferring energy to the surface by convection. Deziel, Chris. "Facts About The Sun's Core" sciencing.com, . 24 April 2017. APA Deziel, Chris. (2017, April 24). Facts About The Sun's Core. sciencing.com. Retrieved from Chicago Deziel, Chris. Facts About The Sun's Core last modified March 24, 2022. AnswerVerifiedHint: The temperature of the Core of the sun is approximately 15 million degree Celsius. There are many ways for calculating the temperature of the sun's core such by using a pyrometer and by using conventional methods of measuring sun rays falling on the earth's surface.Complete step by step answer:The temperature of the sun's core is estimated to be 15 million degree Celsius. Which is being estimated by the radiant energy reaches the Earth's surface from 149 km, while allowing the Earth's surface to absorb the radiation; a square centimeter of the Earth's surface perpendicular to sun ray's in one minute receives enough energy to raise the temperature of 1.94gm of water by one degree Celsius. Now taking this solar constant we will multiply this constant by the value of the surface of the sphere with a diameter of 1390600km, we can determine the total radiation of the sun. This value is calories per minute.Nowadays, the study of spectrograph is used to measure the temperature of the sun's core. The mass of Earth and sun, distance between the Earth and the sun, radius of Earth and the sun are all approximated and are nearly close to the exact values but are not 100 % correct. In the similar manner the temperature of the Sun's core is also an approximated value which is very near to accuracy but not exactly accurate.Note: Various other methods used to measure the temperature of the core of the sun's surface are, spectrograph method ; we look at sun using spectrograph and find the spectrum of something glowing hot, second method of measuring temperature is by measuring the frequency and wavelength of light which obtained from nuclear reactions being takes place inside the core of the sun.