

When the Earth is at its closest to the Sun it is called:

When the Earth is at its farthest from the Sun it is called:

What is referred as the “zenith” in astronomy:

What is referred as “meridian” in astronomy:

The term “azimuth” means:

The term “nadir” means:

Using the Earth as a frame of reference, light from the Sun takes approximately: _____ to reach the Earth.

Astronomically speaking one AU consists of:

On Earth, 0° degrees longitude is also known as the:

On Earth 0° degrees latitude is known as the:

The visible region of the sun is called:

At sea level, atmospheric pressure is:

One Btu is the energy needed to raise the temperature of one pound of water by:

The measure of the position of the sun from the horizontal plane (*horizon*) is:

What color would you select for a container that will hold ice cubes such that the ice is preserved the longest?

PV stands for:

What is the approximate wavelength of deep red light?

Hot bodies or objects emit _____ (*colour*) light.

List electromagnetic radiations from short to long wavelengths.

Bio-Mass is a the term given to plants which we can burn as fuel. The sun provided the energy to grow. The plants utilize this energy through a process called photosynthesis.

Electro-Magnetic radiation to which the human eye is sensitive to is called visible spectrum

Solar Flares when directed towards Earth can disrupt telecommunications because of their electromagnetic pulses.

Our Sun will become a Red Giant in approximately 4×10^9 years.

Einstein proposed that light existed as discrete bundles of energy called photons.

One calorie is the energy needed to raise the temperature of one gram of water by 1°C .

Sources such as water, wind, solar, and biomass are examples of renewable forms of energy.

Heat is the energy transferred between bodies due to a temperature difference.

Heat energy will spontaneously always flow in the direction of a lower temperature.

The predominant method of heat transfer to a cold drink held in an evacuated bottle (*a thermos*) is via radiation.

Hot water in a black container will cool off faster than hot water in any other color container.

The primary method by which the water in a pot is heated is by convection.

The heat required to melt a solid is called fusion.

The heat required to change the phase of a solid to a gaseous form bypassing the liquid phase is called sublimation.

One advantage of using air as the working fluid in a solar collector is that freezing will not be a problem.

One can increase the “insolation” upon a one ft^2 horizontal PV plate by adding reflectors around the plate.

Solar energy is compatible for a major part of the U.S. because our major energy needs are for thermal energy.

An effective way to passively cool a house is to use a light colored roofing material.

The physics of solar cells is based on the same semiconductor principles as diodes and transistors.

Solar cells do not store electricity, but cells (*batteries*) can be used to store energy.

When light is incident on liquids or metal surfaces, electrons are released.

Most solar cells are constructed from semiconductor material such as silicon.

Metals such as Au, Co, & Fe, which have loosely bound electrons in the outer shell or orbit of their atomic configuration, are known as conductors.

Doping implies impregnation of silicon by positive and negative agents, such as phosphor and boron. Phosphor creates a free electron that produces the so-called N-type material.

Boron creates a “hole” or a shortage of an electron, which produces the so-called P-type material.

Photovoltaic energy conversion efficiency is dependent on the wavelength of the impinging light.

Fraction of radiation reflected by the clouds in the atmosphere & by the surface of the Earth back into outer space is called albedo.

Refractive optics is used to concentrate the sun’s irradiance unto solar cells.

The power output from the Sun is approximately $4 \times 10^{26} \text{ W}$

An air panel collector powered by difference in pressures between solar heated air & cooler room air entering from the bottom is called thermo siphoning.

Earth’s Polar circumference is about 40,008 km.

Earth’s Equatorial circumference is about: 40,075 km.

Latitude is an angular distance north or south of the equator, measured from the center of Earth.

A line connecting all points along the same latitudinal angle is called a parallel.

Tropic of Cancer is (+23.5 degrees) and is the most extreme *northern parallel* that experiences perpendicular rays of the Sun at local noon. When the Sun arrives overhead at this location, it marks the first day of summer in each hemisphere.

Tropic of Capricorn is (-23.5 degrees) and is the most extreme *southern parallel* that experiences perpendicular rays of the Sun at local noon. When the Sun arrives overhead at this location, it marks the first day of summer in each hemisphere.

During the northern hemisphere’s summer the Antarctic experiences 24 hours of uninterrupted night.

Longitude is an angular distance E or W of a point on Earth’s surface, measured from the center of the Earth.

A line connecting all points along the same longitude is called a meridian.

A “great circle” is any circle of Earth’s circumference whose center coincides with the center of the Earth.

In contrast to meridians, only one parallel is a great circle which is the equatorial parallel.

The imaginary sphere of the sky, on which stars lie is called the celestial sphere.

An imaginary line in the sky, directly above the Earth's equator is called the celestial equator.

The ecliptic is the line that the Sun traces across the celestial sphere.

The Earth's motion around the Sun causes the change of the constellations with the seasons.

The phrase "angular size" is how big an object looks, expressed as an angle.

Latitude, time of night, & the time of the year affect the appearance of the sky.

At a latitude of 30 degrees S, the south celestial pole would be 30 degrees above the southern horizon.

The wobbling of the Earth in space is termed as precession.

The Earth's north and south poles describe a large circle on the sky, taking about 26,000 years to return to their starting places.

Celestial equivalent of latitude is called declination, and the equivalent of longitude is called right ascension.

The Sun is composed of about 71% H and 27% He plus 2% other elements.

Gravitational force holds the Sun together.

The surface of the Sun is about 6000 K and its core is about 15,000,000 K.

The proton-proton chain is the specific 3-step energy generating process in the Sun.

The sun's energy comes from the conversion of mass into energy.

The photosphere is the visible surface of the Sun.

The corona is the Sun's outermost atmosphere.

Sunspots appear dark on the surface of the Sun because they are cooler than the surrounding gas.

A prominence is a huge plume of glowing gas trapped in the Sun's magnetic field; a flare is a brief, bright eruption in the chromosphere.

Neutrinos give information about the nuclear reactions in the Sun's core.

Solar seismology is the study of the Sun's interior by analyzing waves in the Sun's atmosphere.

The Maunder minimum - a period of abnormally low sunspot numbers - coincided with abnormally cold northern winters is evidence that solar activity affects Earth's climate.

In the interior of a star such as the Sun, the outward pressure of hot gas balances the inward pull of gravity. Such state is known as hydrostatic equilibrium.

Sunspots typically measure about 10,000 km across – about the size of the Earth. At any given instant, the Sun may have hundreds of these, or it may have none at all.

The polarity of a sunspot simply indicates which way its magnetic field is directed.

Sometimes (*but not always*) a flare or a prominence is associated with a coronal mass ejection (*cme*). This giant magnetic “bubble” of ionized gas separates from the rest of the solar atmosphere and escapes into interplanetary space.

The lightest and most common element in the universe is hydrogen, and it is the fusion of H nuclei (*protons*) to form nuclei of helium, the next lightest element, that powers the Sun.

According to Wien's Law, a hotter object will radiate more strongly at shorter wavelengths than a cooler object.

The difference between emission and absorption in an atom is that in emission, the electron goes from a higher to a lower orbit.

Water vapor in the Earth's atmosphere strongly absorbs infrared radiation.

Ozone and oxygen in the Earth's atmosphere strongly absorb ultraviolet radiation.

A continuous spectrum is emitted by a heated solid object (*such as the filament of an incandescent bulb*).

Photons produce light when striking the retina, thus releasing energy causing a chemical change in the photoreceptor cells.

Colour is determined by light's wavelength.

An atom can absorb a photon if its energy matches the energy required for an electron to jump to a higher orbital. Thus it is called absorption.

Energy is released when an electron drops from an upper to a lower orbital, causing the atom to emit electromagnetic radiation. Thus it is called emission.

Blue light carries more energy than red light.

Deep blue has a wavelength of approximately 400 nm.