Astronomy Aotearoa

Student glossary

This glossary supports students who study astronomy using the *Astronomy Aotearoa* resources. **Go to www.astronomyaotearoa.net**

Absolute zero

The temperature when all movement within atoms ceases. See Zero Kelvin.

Accretion

Accumulation of dust and gas into larger bodies such as stars, planets, and moons.

Aerosol

A sol (particles evenly dispersed in a solution) in which the dispersion medium is a gas. The pressure of the gas provides for a spray effect when released.

Akebono

A Japanese scientific studies satellite that became operational in 1989.

Almanac

A set of tables giving the positions of the Sun, moon, and planets at different times. In addition, there can be other astronomical information.

Alpha Centauri

The closest star system to the Sun. A triple star system.

Alpha particle

A helium nucleus given out in the radioactive decay of heavy elements.

Altitude

The angle between an object and the horizon directly below the object.

Andromeda Galaxy (M31)

The closest spiral galaxy to the Milky Way galaxy.

Aphelion

The point in a planets orbit when it is farthermost away from the Sun. (Opposite is perihelion)

Aperture

Hole or gap. The size of a lens or mirror, meaning its diameter.

Apogee

The point in a satellites' orbit when it is at its greatest distance from Earth. (Opposite is perigee)

Asteroid

A medium-sized rocky object orbiting the Sun. There are many such objects between Mars and Jupiter. In total over 40,000 such objects have been identified. They are sometimes called Minor Planets.

Asteroid belt

The region between Mars and Jupiter that contains the majority of asteroids.

Asteroid number

Asteroids are assigned a serial number when they are discovered.

Astrology

A mixture of mysticism, psychology, hocus pocus, and pseudo-science. Today it is an industry that takes millions of dollars from gullible people.

Astronometry

The accurate measurement of the positions of astronomical objects.

Astronomical unit (AU)

The approximate distance from the Sun to the Earth which is about 150,000,000 kilometres. Strictly speaking, it is the mean radius of the Earth's orbit around the Sun.

Astrophysics

The branch of astronomy that deals with the physics of stars and similar things. Atmosphere the layers of gases which surround a star, like our sun, or a planet, like our earth.

Atmosphere

The envelope of gas around a planet. Sometimes, the visible layer of a star.

Atmospheric pressure

The pressure at sea level on Earth, which is about 14.7 pounds per square inch. This value is called one atmosphere.

Atom

The smallest particle of an element.

Aurora

Latin for "dawn". A glow in a planet's ionosphere caused its magnetic field and charged particles from the Sun (Solar wind). These are concentrated at the Earth's magnetic poles.

Aurora borealis

The "northern lights".

Aurora australis

The "southern lights".

Axis

An imaginary straight line around which an object rotates.

Bacteria

Living things that have only one cell.

Basalt

A dark, fine-grained rock that comes from volcanoes. This is an igneous rock. It makes up much of the Earth's lower crust.

Betelgeuse

A red supergiant star.

Big bang theory

A theory which states that the universe began to expand after a super powerful explosion of concentrated matter and energy. More correctly, the big bang model.

Big bang model

The big bang model is a model of the origin, growth and evolution of the Universe. Evidence for the big bang theory comes includes the composition of the Universe, the large scale structure of the Universe, and the existence of the cosmic microwave background.

Binary system

When two stars orbit each other they are known as a binary system. They are bound together by the force of gravity. Binary systems are common.

Biodiversity

The range of kinds of living things.

Black hole

The leftover core of a massive star after a supernova. Light and everything else is trapped by gravity within its dense core.

Black dwarf

The cold remains of a white dwarf after all its thermal energy has been exhausted.

Bohr model of the atom

A simple mode of an atom in which there are electrons in orbits about the nucleus.

Blueshift

The decrease in the wavelength of radiation that comes for an approaching celestial body. It is the result of the Doppler Effect. See redshift.

Carbon

Common element found in all organic compounds. Common in diamonds, graphite (lead pencils), and petrol. Chains of carbon atoms are the basis of life on Earth.

Carbon dioxide

A colourless and odourless gas. Plants on Earth need it to live.

Cartographic

About the science and art of producing maps and charts.

Celestial equator

A projection of the Earth's equator into outer space. It divides the sky into the northern and southern hemispheres.

Celestial sphere

An imaginary sphere in the sky. It is centred on the Earth The positions of objects in the sky are described by reference to this sphere.

Celsius or Centigrade

A temperature scale on a thermometer. The interval between the boiling point and the freezing point of water is divided into 100 degrees. Freezing point is represented by 0 degrees and boiling point is represented by 100 degrees.

Ceres

The first observed asteroid, discovered by Father Giuseppe Piazzi in 1801.

CETI

Communication with extraterrestrial intelligence.

Charged particles

Electrons, protons, ions.

Charon

Moon of Pluto.

Chromosphores

Groups of atoms or molecules that produce colour.

Circumpolar stars

For an observer south of the equator these are stars that never set below the southern horizon. They appear to circle round a fixed point during the night.

Coma

The bright visible head of a comet.

Comet

Frozen masses of gas and dust which have a definite orbit through the solar system. These are objects left over from the the formation of planets.

Conjunction

The alignment of two planets (or other celestial objects) so that they appear to be in the same, or nearly the same, place in the sky.

Constellations

A group of stars forming a recognizable pattern that is traditionally named after its apparent shape or identified with a mythological figure. Different cultures have identified different constellations. They have no astronomical significance.

Core of the Earth

The central region of the Earth. It is of high density and is probably liquid iron and iron alloys.

Corona

The very hot outer layer of a star's atmosphere.

Cosmic microwave background

Radiation that comes to us from the time when the Universe was forming. At that time the Universe was a uniform mixture of matter and energy. It is "black body" radiation, with a temperature of about 2.7 degrees Kelvin.

Cosmic rays

Charged atomic particles moving in space. They have very high energies and travel close to the speed of light.

Cosmonaut

An astronaut from the former Soviet Union or the current Republic of Russia.

Cosmology

In Western science, the study of the history, structure, and changes in the universe.

Crab Nebula

A supernova remnant. Located in the constellation of Tarus. The supernova explosion was visible from Earth in the year 1054.

Crater

Bowl-shaped pit, cavity or hole formed by the explosive release of energy (often when something hits the ground). Also, the same sort of cavity formed by a volcano.

Crust

The thin, outermost surface layer of a planet. On Earth it is composed of basaltic and granitic rocks.

Culmination

The highest altitude reached by an astronomical object.

Decaying orbit

A path around an object which decreases in size with time. for example, when a satellite enters a decaying orbit above earth, its orbit size decreases to the point that it enters earth's atmosphere where it burns up.

Declination

The angular distance of a point north or south of the celestial equator. The declination is in space similar to the latitude on Earth. Compare with right ascension and celestial latitude.

Deep Space Network (DSN)

A worldwide effort, coordinated by NASA, that communicates with spacecraft in an Earth orbit at any time in that spacecraft's orbital period. There are several ground stations in the Deep Space Network, each at a different place on the globe so that they can each reach a spacecraft when it is over a different position on the Earth.

Degree

Measure of angle. A right angle has 90 degrees. A circle 360 degrees.

Density

The mass per unit of volume of a substance.

Dobsonion

A newtonian telescope with a simple mounting, originally home made.

Doppler shift

An apparent shift in the frequency of a wave. For example, when someone is listening to the sound of a train, and that person is staying still but train is going by, the person will hear a change in pitch of the sound. That change in pitch is caused by the doppler effect. The frequency of a sound wave determines the pitch, and the distance of the source of the sound from the sound's observer determines the amount that the frequency seems to have shifted, known as the doppler shift.

Double star

Two stars that appear close together when viewed from Earth. They may be a binary system or they may just line up with the Earth.

Dust

Not the dust one finds around the house, which is typically fine bits of fabric, dirt, or dead skin cells. Dust grains in space are much smaller clumps (a fraction of a micron across), irregularly shaped, and composed of carbon and silicates.

Earth

Our home planet.

Eccentricity

A measure of the lack of circularity of an elliptical orbit. If the value is zero the orbit is circular.

Ecliptic

The apparent path of the Sun against the background of stars. The Sun's track. (Remember, you do not see the stars during the day because the Sun is so bright - but the stars are still there.)

Electromagnetic spectrum

The entire range of the different types of electromagnetic radiation, or waves. it goes from the very long wave, low frequency, radio waves through infrared waves and visible light waves to the very high frequency and short waves of the gamma-rays and x-rays.

Those wavelengths in the visible light range have a specific colour associated with them when they pass through a prism. The lower frequency, longer wavelengths

produce a red while those with higher frequency, shorter wavelengths produce a violet. those wavelengths which fall somewhere in between these two points produce the orange, yellow, green, and blue also found in a spectrum.

Electromagnetic wave

A wave of electric and magnetic energy that is generated when an electric charge is accelerated.

Electron

A small charged particle with a negative charge. Every atom has electrons. The number of electrons is different in every element. A transfer of electrons produces electricity.

Elliptical

Shaped like an elongated closed curve. Egg-shaped.

Energy

Usable heat or power. In physics, energy is the capacity of a physical system to perform work.

Escape speed

The speed a body must have to achieve to break from the gravity of another body. Applies to rockets.

Euclidean (flat) geometry

The geometry most commonly taught in schools. Parallel lines never meet and the angles of a triangle add up to 180 degrees. It is not, however, the only kind of geometry.

Equinox

The moment when the Sun crosses the celestial equator. Occurs around 21 March and 21 September each year. At these times day and night are of equal length everywhere.

Equatorial

Imaginary circle that separates the northern and southern hemispheres of the Earth. This refers to a co-ordinate system based on the axis of rotation of the Earth.

ESA

European Space Agency. Established in 1975, is an inter-governmental organization dedicated to the exploration of space, currently there are 17 member states.

Exoplanet

A planet that orbits a star outside of our Solar system.

Fahrenheit

A scale on a thermometer where the freezing point of water is represented by 32 degrees and the boiling point is represented by 212 degrees.

Focal ratio

The ratio between the focal length and aperture. Divide focal length by the diameter of the lens.

Focal length

The distance a mirror or lens takes to bring incoming parallel light rays to focus.

Focus

The pont at which rays meet.

Fusion

A nuclear reaction in which an element with small atoms fuses to form an element with larger atoms, releasing large amounts of energy. g galaxy a cluster of stars, dust, and gas held together by gravity.

Galaxy

A system of millions or billions of stars, together with gas and dust, held together by gravitational attraction. Our galaxy is the Milky Way. There are three main types of galaxies, elliptical, spiral and irregular.

Galileo (NASA)

A NASA space exploration satellite that was launched on October 18, 1989. Galileo was sent to Jupiter to study the planet's atmosphere, moons, and surrounding magnetosphere, for 2 years starting in December 1995. It was named for the Italian Renaissance scientist who discovered Jupiter's major moons in 1610 with the first astronomical telescope.

Galilean moons

The four largest satellites of Jupiter were discovered by Galileo with his telescope. They are Io, Europa, Ganymede, and Callisto.

Gamma-rays

Penetrating, short wave electromagnetic radiation of very high frequency.

Gas giants

The outer solar system planets: Jupiter, Saturn, Uranus, and Neptune. They are composed mostly of hydrogen, helium, and methane gas. They do not have solid surfaces.

Geosynchronous

An orbit in which a satellite's rate of revolution matches the earth's rate of rotation. this allows the satellite to stay over the same site on the earth's surface at all times.

Giant molecular clouds

These are clouds of gas of up to ten light years in diameter. They are found in the spiral arms of galaxies. They are the site of massive star formation (birth).

Global Positioning System (GPS)

A satellite technology that uses mathematics to calculate the position in three dimensions (latitude, longitude, and altitude) of something on the Earth by measuring the time it takes for the satellite's radio transmissions, traveling at the speed of light, to reach the a receiver on the ground.

Globular cluster

A cluster of stars held together by gravity. Generally, there are hundreds of thousands of members. The originate from the earliest time of star formation. There are about 200 globular clusters in the Milky Way.

Gravitational field

The volume over which an object exerts a gravitational pull. gravitational force see gravity gravitational pull see gravity.

Gravity

The force of attraction between two objects which is influenced by the mass of the two objects and the distance between the two objects. This is actually Newton's definition. See Inverse Square Law and Universal Gravitation. For objects moving at

high speed, or for very massive and dense objects, Einstein's general theory of relativity is more accurate than Newton's theory. This describes gravity as a curvature of space-time by a massive object.

Gyroscope

A heavy wheel or disk mounted so that its axis can turn freely in one or more directions. a spinning gyroscope tends to resist change in the direction of its axis.

Habitat

The place in which an organism lives and obtains the materials it needs in order to survive.

Heliocentric

Having the sun as a centre. Our solar system is heliocentric.

Homo sapiens

Humankind. Because it is a biological name, write in italics.

Hubble Space Telescope (HST)

Launched in 1990 by NASA this telescope orbits the Earth.

Impact crater

Craters which are the result of a collision between a large body, such as a planet or satellite, and a smaller body such as an asteroid or meteorite.

Inclination

The inclination of a planets's orbit is the angle between the plane of its orbit and the ecliptic. The "tilt" of a planet.

Infrared waves

Electromagnetic radiation with long wavelengths which is found in the invisible part of the spectrum. Human beings experience infrared waves as heat.

Inverse square law

This states that the force of gravity between two objects is proportional to the square of the distance between them. See universal gravitation.

Ion

An electrically charged particle. Ions may be negatively or positively charged.

Joule

A unit of work or energy. Equal to the work done by a force of one newton when its point of application moves one metre in the direction of action of the force, equivalent to one 3600th of a watt-hour.

Jovian planets

Planets with physical characteristics similar to Jupiter: large mass and radius, low density, mostly a liquid interior.

Kelvin

A scale for measuring temperature where 0 kelvin is equal to -273.16 degrees celsius. Zero kelvin is referred to as absolute zero, the point at which all motion within molecules comes to a stop.

Kilo

One thousand, 1,000.

Kilogram

1000grams. A kilogram equals 2.2 pounds.

Kilometre

1000 meters. A kilometre equals 0.6214 miles.

Kuiper - Edgeworth belt

A zone of icy planetoids beyond Jupiter. The objects within the Kuiper Belt, together with the members of the scattered disk extending beyond, are collectively referred to as trans-Neptunian, along with any Hills cloud and Oort cloud objects.

Large Magellanic Cloud (LMC)

A small galaxy relatively close to the Milky Way.

Latitude

Angular distance north or south of the equator.

Lens

A curved piece of glass used to bring light rays into focus.

Light year

The distance light travels in one year through space. This is about 9,500,000,000,000 kilometres. The light year is used as a measure of distance for objects outside of our solar system.

Longitude

Angular distance, east or west, along the equator. On Earth the reference longitude is an imaginary line drawn through Greenwich, England.

Lunar

Related to the Earth's moon.

Magellan

A NASA space exploration satellite that was launched from the Atlantis space shuttle in May 1989. Magellan produced photograph-like images of Venus' surface using a radar system that could see through Venus' many clouds.

Magnetic field

The area in which an attractive or repelling force exists between two magnets or in association with the element iron. The earth's magnetic field is thought to be due to the liquid iron-nickel which is in its core. This magnetic field protects earth from constant bombardment by high-energy charged particles.

Magnetosphere

The space around the Earth in which ions (charged particles) are controlled by the Earth's own magnetic field.

Magnitude

A scale for the brightness of stars. The brightest stars are of magnitude 1. The faintest stars seen with the naked eye are magnitude 6.

Mantle

The middle layer of a planet located between the crust, or surface, and the core.

Mariner 2

A NASA space exploration satellite that measured the temperatures of the clouds and surface of Venus. It was launched on August 27, 1962.

Mars

Fourth planet from the Sun. Named after the Roman god of war because it looks red.

Mars Observer

A NASA space probe launched September 1992 to study Mars.

Mass

Measure of the amount of matter in an object.

Metal

Used in astrophysics to refer to all elements except hydrogen and helium. Note that this is different from the chemist's definition which is more usual.

Methane

Colourless, odourless, gas that can burn. Used for heating homes and cooking.

Matter

Anything which has mass and occupies space.

Meridian lines

The imaginary lines that were drawn on the globe for navigational purposes. Meridian lines mark longitude and run through both the north and the south poles. They separate the Earth into time zones and they are used to indicate a coordinate on the Earth. The Greenwich meridian is the central meridian line from which all time zones are set.

Messier catalog

List of about 100 of the brightest galaxies, star clusters, and nebulas.

Meteorologist

Someone who studies the weather. Often, the person on the evening news who talks about the weather forecast is a meteorologist.

Meteor

Meteoroids which burn up in the atmosphere of a space body, such as the earth, prior to impacting on the surface.

Meteor shower

Many meteors that appear to come from one area of the sky.

Meteorite

Fragments of material that fall from space and impact on other larger space bodies.

Meteoroid

Fragments of material which vaporize when they have a close encounter with a space body which has an atmosphere.

Meter

The basic unit for measuring length in the International System of Units (SI).

Microwave

A form of electromagnetic radiation that is beyond the range of the visible light spectrum. Microwaves have very high frequencies and wavelengths of 1 mm to 50 cm.

Manned Manoeuvring Unit (MMU)

Astronauts on board a NASA space shuttle can strap on this large rocket backpack and manoeuvre during a space walk (officially known as an Extra Vehicular Activity) instead of remaining tethered to the shuttle.

Micrometeoroid

Very small pieces of matter which are encountered in space.

Microwave

Electromagnetic radiation which has a long wavelength (between 1 mm and 30 cm). Microwaves can be used to study the universe, and to communicate.

Milky Way

The galaxy in which we exist. A medium sized spiral galaxy. At the centre there is a black hole. The older stars are towards the centre and new stars are being born in the spiral arms. The Milky Way is about 71% hydrogen, 27% helium and 2% "metals" (all the other elements that exist).

Molecule

Two or more atoms bound together electorally. The smallest part of a compound that has the properties of the substance.

Mylar

Tough polyester material used as an insulator.

NASA

National Aeronautics and Space Administration. The main United States space agency funded by the federal government. Established on July 29, 1958, by the National Aeronautics and Space Act, its annual funding for year 2007 amounts to about US$16.3 billion. In addition to the space program, it is also responsible for long-term civilian and military aerospace research. Since February 2006 NASA's self-described mission statement is to "pioneer the future in space exploration, scientific discovery, and aeronautics research".

Nebula

Latin for "cloud". A low density cloud of gas and dust in which new stars may be born.

Neutron star

The result of a supernova. It is a cold and spins, gradually slowing down. This is one of the possible endpoints of stellar (star) evolution.

Newton

A unit of force in the S.I. system. Defined as the force which will accelerate a mass of 1 kilogram at one meter per second.

Newtonian

A simple form of reflecting telescope invented by Newton. it uses a parabolic mirror and a flat secondary mirror. Mirrors do not distort light the the extent that lenses distort light.

Noon

Midday. Half way between sunrise and sunset. The Sun is at its highest point for the day.

Nova

Latin for "new". A "new star". Results from an explosion. On a long time scale, centuries or millennia. See supernova.

Nuclear fusion.

A nuclear process. Small particles combine and the combined mass is slightly less than the mass of those that combine. Some of the mass is turned to energy. The amount of energy produced is shown by Einstein's equation (Energy equals mass times the speed of light squared).

Obliquity of the ecliptic

The angle between the ecliptic and the celestial equator. It is equal to the angle of the tilt of the Earth's axis of rotation. About 23.5 degrees.

Occultation

The blocking of light from a distant object when and another larger object moves in front of it. Asteroids occult stars. The Moon occults stars and planets.

Olympus

At its launch on July 12,1989, the largest civilian telecommunications satellite in the world. Olympus was an experimental satellite built for the European Space Agency (ESA) by British Aerospace.

Oort cloud

A huge cloud which is thought to surround our solar system and reach over halfway to the nearest star. The theory is that comets originate in the Oort cloud. The Oort cloud is thought to be a remnant of the original solar nebula that collapsed to form the Sun and planets approximately 4.6 billion years ago, and is loosely bound to the solar system.

Opposition

The instant when the Sun and an object are 180 degrees apart on the sky. Effectively, the object rises as the Sun sets.

Optics

The manipulation of light by reflection or refraction.

Orbit

A path followed by one body around another.

Organic

Relating to the branch of chemistry that deals with the carbon compounds of living creatures.

Parallax

The effect whereby the position or direction of an object appears to differ when viewed from different positions. For example, through the viewfinder and the lens of a camera.

Particle

A very small piece of matter that moves and has energy. Particles are the fundamental things that make up the universe.

Parsec

The standard astronomical measure of distance. It is the distance by which an object appears to move by one arc second against the background of distant stars.

Payload bay

Main body of the space shuttle.

Perigee

The point in a satellite's orbit when it is closest to Earth. Compare apogee.

Photometry

The measurement of the brightness of an astronomical object. A technology or instrument.

Photosphere

The visible surface of the Sun.

Physics

The science of matter and energy. Work of physicist.

Plains

Vast, flat areas with low elevation.

Planck's constant

Usually given the symbol, h. This is a physical constant that is used to describe the sizes of quanta. It plays a central role in the theory of quantum mechanics, and is named after Max Planck, one of the founders of quantum theory.

Planet

Greek for "wanderer". A large object that orbits a star which is not a star itself. The definition of what is a planet is controversial. The traditional planets of our Sun are Mercury, Venus, Earth, Mars, Jupiter, Saturn, with Uranus added in 1741, Neptune in 1846, and Pluto in 1935. Pluto was removed from the list in 2006.

Planetary nebula

These are not planets although people once thought they might be. They are red giants with their shells of gas expanding. They collapse to become white dwarfs.

Plasma

Gas that has very high numbers of ions (charged particles). In a plasma, the number of free electrons is almost the same as the number of positive ions.

Polar

Satellite launched on February 24, 1996 by NASA. Polar is an atmospheric studies satellite in polar orbit. One purpose of Polar is to gather information that will help scientists protect future satellites from radiation and other atmospheric dangers.

Polar orbit

Usually has an angle of inclination of 90 degrees to the equator. On every pass around the Earth, it passes over both the north and south poles. Therefore, as the Earth rotates to the east underneath the satellite which is traveling north and south, it can cover the entire Earth's surface. A polar orbiting satellite covers the entire globe every 14 days.

Polarisation

The result of light being passed through a filter that makes the light travel in all different directions, therefore making different rays of the light behave differently from one another. The filter is called a polarizing filter. Some sun glasses are polarised.

Precession

The axis of the Earth's orbit wobbles. This is a bit like the slowing of a spinning top. The wobble takes place once every 25,800 years.

Probes

Unmanned spacecraft. Launched into space to collect data about the solar system and beyond. Space probes are not necessarily designed to return to earth.

Protogalaxies

Clouds of gas and dust with so much mass that they will contract (because of gravity) to become galaxies.

Pulsar

A radio source that emits signals in very short, regular bursts. Thought to be a highly magnetic rotating neutron star. The central core of a supernova.

Quantum mechanics

A theory in physics which is based on 2 ideas: (1) light can be emitted or absorbed only in discrete quantities called quanta, whose energy is proportional to their wavelength; and (2) you can never be exactly sure of the position and velocity of a particle, the more accurately you know the one, the less accurately you can know the other.

Quasar

QSO - Quasi Stellar Object. A distant energy source which gives off vast amounts of radiation. Although their exact nature is controversial, they are commonly considered to be extremely distant, unusually bright nuclei of galaxies. If so, then the light we see from them would have been emitted when the universe was a fraction of its present age.

Radio astronomy

Radio telescopes detect radio waves that come from outer space. Because radio waves are not blocked by dust in our galaxy, radio telescopes can view distant galaxies not observable at visible wavelengths.

Radio waves

A type of electromagnetic radiation which has the lowest frequency, the longest wavelength.

Raw data

Original data before it is processed in any way.

Reconnaissance satellite

Also called a spy satellite. Used to spy on various countries. It can provide intelligence information on military activities, detect missile launches or nuclear explosions, and pick up and record radio and radar transmissions while passing over a country. It can also be used as an orbital weapon.

Red giant

A large, cool, star that is very bright.

Redshift

The increase in the wavelength of radiation that comes for an approaching celestial body. It is the result of the Doppler Effect. See blueshift.

Reflecting telescope

Telescope that has a uniformly curved mirror as its primary light gatherer.

Refracting telescope

A telescope that uses glass lenses to gather light.

Refraction

Bending of the direction of a light wave as it crosses the interface between two media such as air and glass.

Relativity

Two theories developed by Albert Einstein. The special theory of relativity describes the motion of non-accelerated objects. The general theory of relativity is a theory of gravitation. It supercedes Newton's theory of gravitation for some purposes.

Repeater

An instrument that receives and re-transmits signals anytime the satellite is close enough to be in contact with a ground station.

Retrograde

Having a direction which is opposite that of similar bodies.

Retrograde motion

This refers to the apparent "backward" motion of a planet that occurs from time to time. All stars move in one direction.

Revolution

The circling of a smaller object around a larger object.

Right ascension

The equivalent of longitude for positions on the celestial sphere. Measured in hours, minutes and seconds of arc from the First Point in Aries.

Rotation

The spinning of an object on its axis.

Rover

A six-wheeled solar powered vehicle. "Spirit" and "Opportunity" are rovers that were placed on Mars by NASA.

SALT

The Southern African Large Telescope. The University of Canterbury is one of the partners in this project.

Satellite

An object that revolves around (orbits) a larger body. Satellites are naturally occurring, such as the Moon, or they may be man-made, such as the hubble space telescope and the compton gamma-ray observatory.

Scientific notation

The system used when talking about very small or very large quantities. In scientific notation there is always a base unit, for example metre, Hertz, gram. Instead of using lots of zeros, scientific notation uses prefixes to indicate multiples of ten. Below is a chart of these prefixes, what they mean, and what they might measure:

* 10 to the power of 9 - giga - the number of Hertz at which satellites transmit signals

* 10 to the power of 6 - mega - the distance around the Earth

* 10 to the power of 3 - kilo - a person's weight

* 10 to the power of 2 - centi - the width of a computer monitor

* 10 to the power of 3 - milli - the head of a pin

* 10 to the power of 6 - micro - -the width of human tissue

* 10 to the power of 9 - nano - the wavelength of visible light * 10 -12 pico - the width of a virus.

SI (International System of Units)

This system is the official international system of measurement used in physics. The metre and the Hertz are among the units used in this system. Units like pound and foot are not a part of it.

Silicon

A chemical element. Silicon is not a metal.

Slingshot

The process by which many space exploration satellites and probes get into deep space. A space exploration satellite can enter the gravitational field of a large planetary body like the Earth or Mars, and use the force of that planet's gravity to give the satellite momentum. Basically, the satellite swings around a planet and uses the energy from the planet's gravitational pull to send it into space. This uses the planet's gravitational pull like a slingshot.

Solar eclipse

A shadow which falls on an area of Earth when the moon moves between the Sun and Earth.

Solar flares

A magnetic storm on the Sun's surface which shows up as a sudden increase in brightness.

Solar prominence

Gases trapped at the edge of the sun which appear to shoot outward from the sun's surface. s

Solar system

Our Sun and all of the planets, comets, planetoids, dust and gas (everything) which revolves around it. All the objects are held in place by the Sun's gravity.

Solar wind

A continuous stream of charged particles which are released from the sun and hurled outward into space at speeds up to 800 kilometres per second. Solar winds are very prominent after solar flare activity.

Solar wings / Solar panel

A panel of solar cells which converts sunlight into electrical energy.

Space

The physical universe beyond the earth's atmosphere. Also known as outer space.

Space exploration satellite

Technically a space probe because it is sent deep into space and does not necessarily orbit anything. These are not satellites because the definition of a satellite is something that is in orbit around something else. However, space exploration satellites are similar to orbiting satellites in design and function. They study faraway planets and stars.

Space probe

A space exploration satellite.

Space-time

A four dimensional model. Three dimensions are of space and one is of time. Effectively, space-time tells massive objects how to curve or bend. Curved space-time tells massive objects how to move. This is an idea from Einstein' general theory of relativity.

Spectrograph

The image of the electromagnetic spectrum produced by a spectroscope.

Spectrometer / Spectroscope

An instrument used to study the electromagnetic spectrum. An instrument which separates visible light into its various wavelengths. Each wavelength corresponds to a specific colour in the spectrum.

Spectrum

A band of colours which forms when visible light passes through a prism. The band ranges in colour from violet (shorter wavelength) to red (longer wavelength).

Spiral arms

The "arms" of galaxies. They are marked by new star formation and more massive stars often shine brightly in the arms.

Star

A fixed bright point in the night sky which is a large body like our Sun. Stars radiate. That means they give out light and heat energy, and other forms of radiation. Their energy comes from nuclear fusion. In nuclear fusion light elements are converted to heavier elements. Different reactions take place at different times during the star's life cycle.

Steady-state model

A theory of the Universe base on the perfect cosmological principle. This states that the Universe looks basically the same to all observers at all times. Largely discredited.

Stellar evolution

Stars are born, then they develop, and finally they die. Stellar evolution is the study of the process.

Sun

Our local star. It is about 4,500 million years old and about half way through its life.

Sunspot

A magnetic storm on the the sun's surface which appears as a dark area. a sunspot is approximately 1500 degrees celsius cooler than it's surrounding material. the number of sunspots we see on the sun at any given time appears to cycle every 11 years.

Supernova

A supernova is seen when there is a sudden, massive explosion. This is either a single older star or a close binary system. A supernova produces either a neutron star or a black hole.

Swedish Viking

A scientific satellite launched in February 1986. Viking carried the Canadian Space Agency's Ultraviolet Auroral Imager which provided important new information about the aurora borealis.

Tectonic activity

A shifting of an object's surface due to changes in the material underlying the surface.

Telescope

Any of various devices, sometimes made with an arrangement of lenses, mirrors, or both, used to detect and observe distant objects by their emission, transmission, reflection, or other interaction with invisible radiation. telescope: Most telescopes use lenses and mirrors to magnify light coming from objects deep in space. This makes the objects look bigger and closer. Newer telescopes, however, are using radio waves, infrared light, laser, and radar technologies.

Temperature

The degree of hotness or coldness. The measure of the average energy in the movement of particles.

Terrestrial planets

Planets similar in composition and size to the Earth. They will be made mainly of rocks and metals. They include Mercury, Venus, Mars, and our Moon.

Thermometer

An instrument for measuring temperature.

Thruster

A way of controlling a satellite's attitude. Thrusters usually contain compressed gas that when sent out of the end of the thruster will move the satellite in space. The force of the compressed gas (the action) causes the satellite to move in the opposite direction (the reaction).

Transponder

An instrument used on communications satellites that receives a signal from a station on Earth at one frequency, amplifies it, and shifts it to a new frequency.

Transit

When one object travels in front of another. Both Mercury and Venus transit the Sun occasionally. More frequently seen are transit of the moons of Jupiter.

Trigonometry

An area of mathematics involving triangles. Trigonometric calculations use the relationships between the sides and the angles of triangles to calculate position, distance, speed, and many other things.

Troposphere

The lowest layer of the atmosphere. The troposphere has distinctive winds and cloud formations, and it has a very marked drop in temperature with altitude. It is 10 - 16 km from the surface of the Earth.

Ulysses

A NASA space probe that is studying the sun. In its passes over the polar regions of the Sun in 1994 and 1995, Ulysses revealed the existence of fast solar winds coming from the poles. Ulysses returned to the Sun in the year 2000 after making a slingshot around Jupiter.

Ultraviolet rays (UV light)

Invisible electromagnetic radiation which is comprised of very short wavelengths. This radiation is of a shorter wavelength than blue light. Human beings get a sunburn from the ultraviolet rays emitted by the Sun.

Universal gravitation

The idea that there is a force of gravity between all objects. This was a major discovery made by Newton in calculations over a period of about twenty years and published in his famous work. Initially, he and many others were concerned about what held the Sun, the planets and the Moon together.

Universe

The vast expanse of space which contains all of the matter and energy in existence.

Uranus

The seventh planet from the Sun. Third largest planet in the solar system.

Van Allen radiation belts

Belts of charged particles (from the Sun) concentrated and trapped in the Earth's lower magnetosphere.

Variable star

Any star whose brightness (luminosity) changes over a short period of time.

Velocity

The measure of how fast an object is moving in a particular direction. Speed in a given direction.

Viking

A NASA space probe that gave us the first close look at Mars. Viking was made up of an Orbiter and a Lander, which was sent down to Mars to study its soil and atmosphere.

Virgo cluster

The nearest large cluster of galaxies. Appears to lie in the constellation of Virgo.

Visible spectrum

Visible light makes up only a small part of the electromagnetic spectrum. The visible light spectrum can be divided into different wavelengths of light. The wavelength of the light determines the colour of that light. The light spectrum goes from violet to red where red is the longest wavelength.

Volcanic

Related to material that comes from in side the Earth and volcanoes.

Voyager

Launched in 1977, NASA's two Voyager space probes studied the outer planets before continuing on into deep space.

Watt

Unit of power, equivalent to one joule of energy per second.

Wavelenght of light

The distance between successive crests of a wave.

Weather satellite

A satellite used to give meteorologists information about the weather. Weather satellites take pictures of cloud cover, monitor threatening weather systems like hurricanes, measure temperatures of the air and the sea.

White dwarf

The end state for most stars. Their nuclear fuel has been exhausted. This will be the end state for our Sun. The whole of the solar system will be compressed into an object about the size of our Earth. The white dwarf will cool for all eternity. Your atoms will be there.

X-rays

Penetrating (high energy) electromagnetic radiation which has an extremely short wavelength.

Year

The time for the Earth to orbit the sun.

Zenith

The apparent pont on the celestial sphere which is directly overhead at any instant.

Zero Kelvin

Another name for absolute zero, the point at which all motion within molecules comes to a stop.

Zodiac

The 12 constellations that lie along the ecliptic. Of no astronomical significance.

Zodiacal light

A faint glow of light scattered off of interplanetary dust along the plane of the ecliptic.