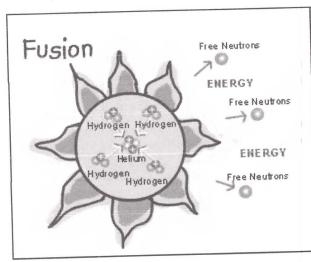
THE ASTRONOMY TOPICS UNIT ANSWER KEY

Due: Use this space to describe the order and names of planets and other bodies in our MY Mercury solar system. Distance, Relative Size, is always important when possible. Venus **VERY** Earth FAGER MOTHER Mars Sun -Asteroid JUST Jupiter Saturn SERVED Earth . Venus Mercury Uranus US Mors NACHOS Neptune Pluto

Please list ten factoids about the sun around or on in the picture below. Color to taste

The Sun is by far the largest object in the solar system. It contains more than 99.8% of the total mass of the Solar System. All energy for our solar system comes from the sun. Check out the Corona Ejections

The Sun is, at present, about 70% hydrogen and 28% helium by mass everything else ("metals") amounts to less than 2%. The sun is approximately 93 million miles from Earth.

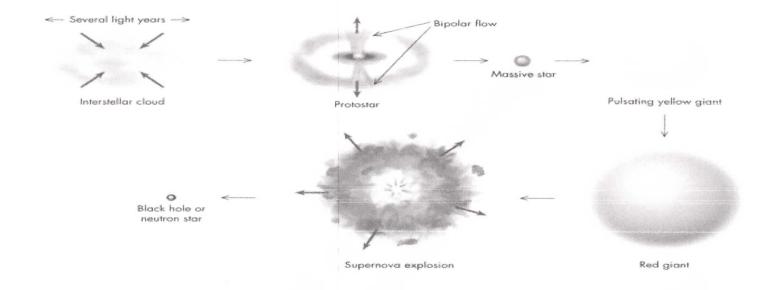


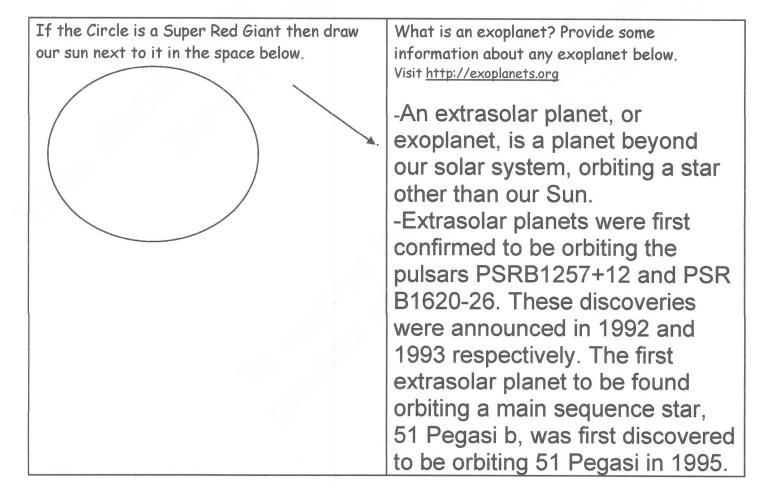
Where does the energy in our solar system come from? A strong answer will use the picture on the right for details.

Name:

Nuclear Fusion between hydrogen and helium releases particles that become energy in massive nuclear reactions at enormous temperatures and pressures.

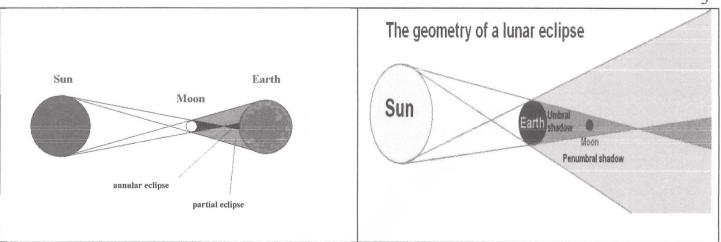
Use the boxes below to describe the life cycle of a generic star. You can pick its future





Please use your knowledge of a solar and lunar eclipse to describe the boxes below.

Solar Eclipse Lunar Eclipse



Provide information about the inner planets below next to each planet. Size, Composition, Rotational Period, Year, Moons, Temperature, and other neat facts that you know.

Mercury is a small, rocky planet. ~ Mercury has been visited by the Mariner 10 spacecraft. Mariner 10 has mapped a little less than half (45%) of Mercury's surface. ~ Scientists think that there may be *volcanic activity* on Mercury. They are still studying information sent to Earth from the Mariner spacecraft to make sure. ~ The temperature on Mercury ranges from 90 K to 700 K. ~ It was once believed that there was no water on Mercury, but this turned out to be false. Recent radar information shows evidence of <u>ice</u> at Mercury's north pole! The ice hasn't melted because it is protected from the Sun's heat by shadows of some craters. ~ Unlike many of our nine planets, Mercury has no moons.

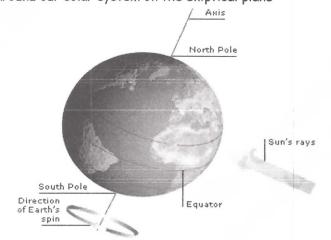
Venus is a <u>small, rocky planet</u> blanketed in a thick layer of yellowish clouds. These clouds are not made of water (like the ones here on <u>Earth</u>). Instead, they are formed from a poison called sulfuric acid. ~ Venus' surface is very hot - about 400 degrees Celsius! ~ Even though Venus is very cloudy, it's simply *too hot* for rain to form. ~ The first spacecraft to visit Venus was Mariner 2 in 1962. Venus has since been visited by more than 20 spacecraft in all so far! Some of these visiting spacecraft include: Pioneer Venus, Venera 7, Venera 9 and Magellan.

Earth is a small, rocky planet which supports a variety of life! As far as we know, Earth is unique from all other planets in this respect. ~ Temperatures at the Earth's center (called the "core") may be as high as 7500 K - That's hotter than the surface of the Sun! ~ The Earth is the densest major body in the solar system. This means that it's

the most "compact" of all the planets. For example, you have two loaves of bread, both of the same amount. You smash one loaf of bread flat. Even though both loaves are of the same amount, the smashed bread is *denser* because it is more compact. The Earth is 4.5 to 4.6 <u>billion</u> years old, but the oldest known rocks are less than 4 billion years old. Rocks older than 3 <u>billion</u> years are rare. The oldest fossils of living organisms are less than 3.9 billion years old! ~ The Earth is orbited by one moon.

Mars is a <u>small, rocky planet</u> which is cold and lifeless. ~ The first spacecraft to visit Mars was Mariner 4 in 1965. Several others followed including the two Viking landers in 1976. After a long break, Mars Pathfinder landed successfully on Mars on July 4, 1997. ~ Mars has permanent ice caps at both poles made up mostly of solid carbon dioxide. We know this as "dry ice." ~ Very strong winds and vast dust storms sometimes blow through the entire planet for months! ~ Mars has two tiny moons which orbit very close to the surface. Their names are Phobos and Deimos.

Please draw the axis of the earth below as it spins around our solar system on the elliptical plane



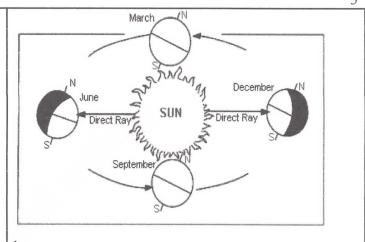
Provide some information about our home planet earth below.

See any of the facts about Earth.

Why does this axis cause the changes in season in New Hampshire? Use the picture to help you.

The tilt of the earth on its axis. When it is tiled one way, the sun hits more directly. When it is tilted the other way, it is more spread out.

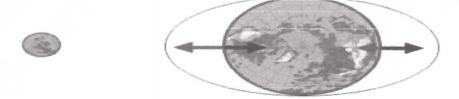
Against what you may think, the earth is actually closer to the sun in the winter than in the summer.



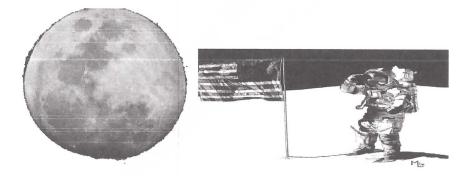
Please describe how the earth, moon, and sun create tides. How many tides doe we have a day? The picture below can help you. What will the tide be at 12:00 PM on the day this OFE is due?

Tides are the rising of Earth's ocean surface caused by the gravitational forces of the Moon and the Sun acting on the oceans.

-Two high tides, and two low tides per day. Equals one tidal cycle per day. - - Separated by about 12:34 hours. Visit – a tide chart. http://www.maineboats.com/tide-charts.



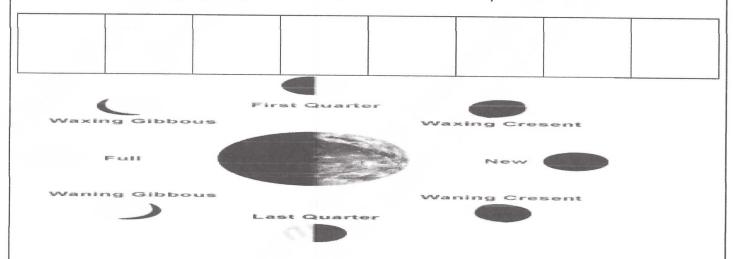
Use the space below to discuss phases of the moon. Shade in a section and label it, work in the margins, Don't forget to mention a bit about the Apollo Missions.



• The distance between the Earth and its moon averages about 238,900 miles (384,000 kilometers). The diameter of the moon is 2,160 miles (3,476 kilometers). The moon's mass—the amount of material that makes up the moon—is about one-eightieth of the Earth's mass.

- Because the force of gravity at the surface of an object is the result of the object's mass and size, the surface gravity of the moon is only one-sixth that of the Earth. The force gravity exerts on a person determines the person's weight. Even though your mass would be the same on Earth and the moon, if you weigh 132 pounds (60 kilograms) on Earth, you would weigh about 22 pounds (10 kilograms) on the moon.
- The rotation of the moon—the time it takes to spin once around on its own axis—takes the same amount of time as the moon takes to complete one orbit of the Earth, about 27.3 days. This means the moon's rotation is synchronized in a way that causes the moon to show the same face to the Earth at all times. One hemisphere always faces us, while the other always faces away. The lunar far side (aka the dark side) has been photographed only from spacecraft.

The Apollo program was designed to land humans on the Moon and bring them safely back to Earth. Six of the missions (Apollos 11, 12, 14, 15, 16, and 17) achieved this goal. Apollos 7 and 9 were Earth orbiting missions to test the Command and Lunar Modules, and did not return lunar data. Apollos 8 and 10 tested various components while orbiting the Moon, and returned photography of the lunar surface. Apollo 13 did not land on the Moon due to a malfunction, but also returned photographs. The six missions that landed on the Moon returned a wealth of scientific data and almost 400 kilograms of lunar samples. Experiments included soil mechanics, meteoroids, seismic, heat flow, lunar ranging, magnetic fields, and solar wind experiments.



What phase will the moon be On July 4th of this year?

Visit - kalender-365.de/lunar-calendar.php or other calendar.

Tell me all that know about this planet and these pictures





Mars is the fourth planet from the sun. The planet is one of Earth's "next-door neighbors" in space. Earth is the third planet from the sun, and Jupiter is the fifth. Like Earth, Jupiter, the sun, and the remainder of the solar system, Mars is about 4.6 billion years old.

Mars is named for the ancient Roman god of war. The Romans copied the Greeks in naming the planet for a war god; the Greeks called the planet Ares (AIR eez). The Romans and Greeks associated the planet with war because its color resembles the color of blood. Viewed from Earth, Mars is a bright reddish-orange. It owes its color to iron-rich minerals in its soil. This color is also similar to the color of rust, which is composed of iron and oxygen.

Scientists have observed Mars through telescopes based on Earth and in space. Space probes have carried telescopes and other instruments to Mars. Early probes were designed to observe the planet as they flew past it. Later, spacecraft orbited Mars and even landed there. But no human being has ever set foot on Mars.

Scientists have found strong evidence that water once flowed on the surface of Mars. The evidence includes channels, valleys, and gullies on the planet's surface. If this interpretation of the evidence is correct, water may still lie in cracks and pores in subsurface rock. A space probe has also discovered vast amounts of ice beneath the surface, most of it near the south pole.

In addition, a group of researchers has claimed to have found evidence that living things once dwelled on Mars. That evidence consists of certain materials in meteorites found on Earth. But the group's interpretation of the evidence has not convinced most scientists.

The Martian surface has many spectacular features, including a canyon system that is much deeper and much longer than the Grand Canyon in the United States. Mars also has mountains that are much higher than Mount Everest, Earth's highest peak.

Above the surface of Mars lies an atmosphere that is about 100 times less dense than

the atmosphere of Earth. But the Martian atmosphere is dense enough to support a weather system that includes clouds and winds. Tremendous dust storms sometimes rage over the entire planet.

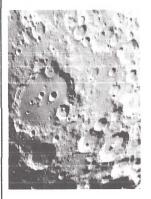
Mars is much colder than Earth. Temperatures at the Martian surface vary from as low as about -195 degrees F (-125 degrees C) near the poles during the winter to as much as 70 degrees F (20 degrees C) at midday near the equator. The average temperature on Mars is about -80 degrees F (-60 degrees C).

Mars is so different from Earth mostly because Mars is much farther from the sun and much smaller than Earth. The average distance from Mars to the sun is about 141,620,000 miles (227,920,000 kilometers). This distance is roughly 1 1/2 times the distance from Earth to the sun. The average radius (distance from its center to its surface) of Mars is 2,107 miles (3,390 kilometers), about half the radius of Earth

NASA's Mars Exploration Rover Mission (MER), is an ongoing robotic space mission involving two rovers, Spirit and Opportunity, exploring the planet Mars. It began in 2003 with the sending of the two rovers — MER-A *Spirt* and MER-B *Opportunity*— to explore the Martian surface and geology.

The mission's scientific objective was to search for and characterize a wide range of rocks and soils that hold clues to past water activity on Mars. The mission was part of NASA's Mars Exploration Program which includes three previous successful landers: the two Viking program landers in 1976 and Mars Pathfinder probe in 1997.

Why doesn't the Earth have as many craters as other planets?



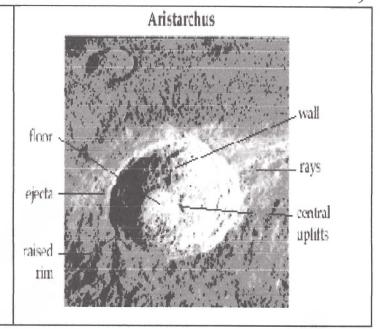
The earth doesn't have as many craters as the moon because rain and wind weather the craters away. The earth also

Please provide some technical information about the crater below. How do mass and speed affect impact size?



The larger the meteorite and faster it is going increase the size of the crater (force of impact)

has an atmosphere which burns up many of the meteors before the reach the surface.



Describes earth's violent past with regard to impact events, what may the future bring us, What is the difference between an asteroid, meteor, and meteorite?

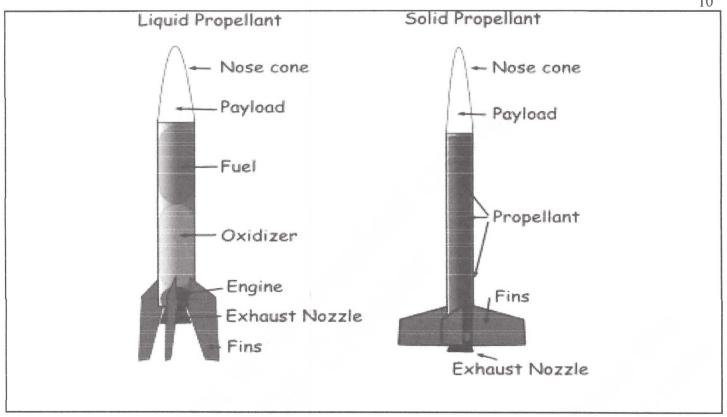
Throughout earth's history, impact events have affected the planet and the organisms on it. It is not a matter of if, but when another large impact event will occur.

Asteroids are rocky and metallic objects that orbit the Sun but are too small to be considered planets.

Meteorite – Space matter that has fallen to the earth's surface from outer space.

Meteoroid – Small (dust size to coin) piece of matter that hits the earth's atmosphere (burns up)

Please describe the parts of a rocket below. What are some parts of a basic rocket and how do they work?



Please provide some information about the outer planets below. Size, rotational period, year, moons, composition, temp. and other neat things learned.



Jupiter is the fifth and largest planet in our solar system. This gas giant has a thick atmosphere, 39 known moons, and a dark, barely-visible ring. Its most prominent features are bands across its latitudes and a great red spot (which is a storm). Jupiter is composed mostly of gas. This enormous planet radiates twice as much heat as it absorbs from the Sun. It also has an extremely strong magnetic

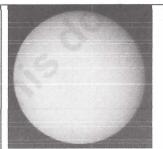


Saturn is the sixth planet from the sun in our solar system. It is the second-largest planet in our solar system (Jupiter is the largest). It has beautiful rings that are made mostly of ice chunks (and some rock) that range in size from the size of a fingernail to the size of a car. Saturn is made mostly of hydrogen and helium gas Saturn is about 74,898 miles

field. It is slightly flattened at its poles and it bulges out a bit at the equator.

Jupiter's diameter is 88,700 miles (142,800 km). This is a little more than 11 times the diameter of the Earth. Jupiter is so big that all the other planets in our Solar System could fit inside Jupiter (if it were hollow).

(120,536 km) in diameter (at the equator at the cloud tops). This is about 9.4 times the diameter of the Earth, 764 Earths could fit inside a hollowed-out Saturn. Saturn is the most oblate (flattened) planet in our Solar System. It has a equatorial diameter of 74,898 miles (120,536 km) (at the cloud tops) and a polar diameter of 67,560 miles (108,728 km). This is a difference of about 10% Saturn's flattened shape is probably caused by its fast rotation and its gaseous composition.



This is after Saturn but before Neptune

Uranus is the seventh planet from the sun in our solar system. This huge, icy planet is covered with clouds and is encircled by a belt of 11 rings and 22 known moons. Uranus' blue color is caused by the methane (CH₄) in its atmosphere; this molecule absorbs red light. Because of its almost-perpendicular axis

orientation, there is a debate over which of



Neptune is the eighth planet from the sun in our solar system. This giant, frigid planet has a hazy atmosphere and strong winds. This gas giant is orbited by eight moons and narrow, faint rings arranged in clumps. Neptune's blue color is caused by the methane (CH₄) in its atmosphere; this molecule absorbs red light.

Neptune cannot be seen using the eyes alone. Neptune was the first planet whose existence was predicted

Uranus' poles is its north pole. This debates leads to yet another: Is Uranus spinning in a retrograde orbit (like Venus) Uranus is about 31,690 miles (51,118 km) in diameter. This is about 4 times the diameter of the Earth.

This gas giant is the third-largest planet in our Solar System (after Jupiter and Saturn).

mathematically (the planet Uranus's orbit was perturbed by an unknown object which turned out to be another gas giant, Neptune).

Neptune is about 30,775 miles (49,528 km) in diameter. This is 3.88 times the diameter of the Earth. If Neptune were hollow, it could hold almost 60 Earths.

Neptune is the fourth largest planet in our Solar System (after Jupiter, Saturn, and Uranus).

Should Pluto be reinstated as a planet instead of a Dwarf Planet. Use your knowledge of the 70,000 objects in the Kuiper Belt within your answer.

Kuiper Belt (Pronounced Kyper)

- A disk-shaped region of minor planets outside the orbit of Neptune.
- 70, 000 minor planets, many like Pluto

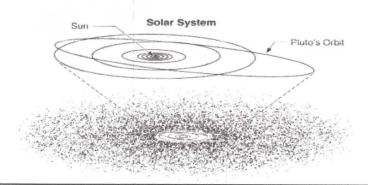
Pluto is a Dwarf Planet because

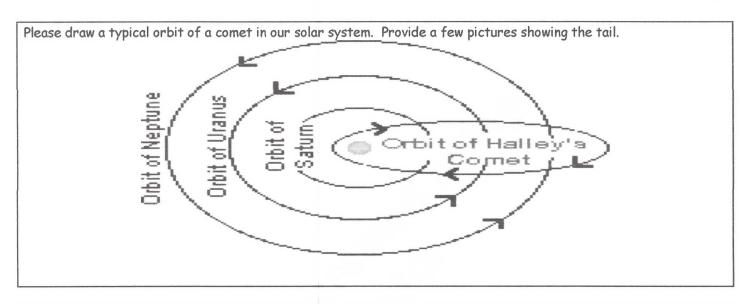
- Pluto is small and icy and now a Dwarf Planet.
- 44 other Dwarf planets in the same size or even larger exist in out solar system.

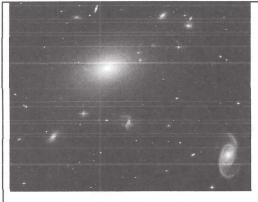
According to the new definition, a full-fledged planet is an object that orbits the sun and is large enough to have become round due to the force of its own gravity. In addition, a planet has to dominate the neighborhood around its orbit.

Pluto has been demoted because it does not dominate its neighborhood. Charon, its large "moon," is only about half the size of Pluto, while all the true planets are far larger than their moons.

In addition, bodies that dominate their neighborhoods, "sweep up" asteroids, comets, and other debris, clearing a path along their orbits. By contrast, Pluto's orbit is somewhat untidy.





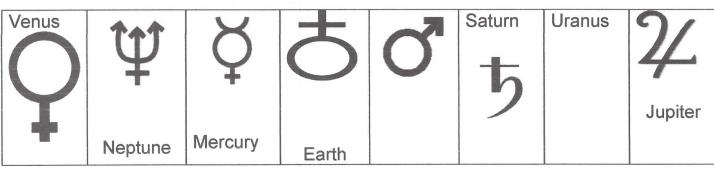


What is so mind blowing about this photograph that the Hubble Deep Space Telescope took just focusing on the areas of empty space.

This is a photograph of the Hubble Telescopes deep field. When the Hubble pointed at nothing in the sky for 10 ten days, images of the furthest humans have even seen came back. It showed how vast the universe is.

Draw and or describe the following terms

Draw and or describe the to	nowing rei ms.			
Quasar	Nebula	Spiral Galaxy	Black Hole	
Quasar – Gigantic grouping of powerful stars.	Nebula – Large cloud of gas and dust which can form stars and galaxies	Galaxy – Large group of stars, gas, and dust that constitute the universe. By a large group, we mean hundreds of billions.	Black Hole - a region of space resulting from the collapse of a star with an extremely high gravitational field.	



		Mars	0	17
			Uranus	

What is the Big Bang Theory? Use the picture below to help you.

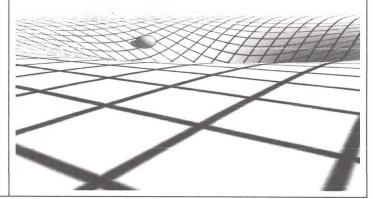


The Big Bang Theory - The cosmic explosion that is hypothesized to have marked the origin of the universe.

This picture shows an expanding universe. If the universe is expanding, it must have been together at one point. If the universe is traced backwards, it would have been condensed into a small space under enormous pressures until it exploded outward.

Describe the picture below as best as you can? Space-Time

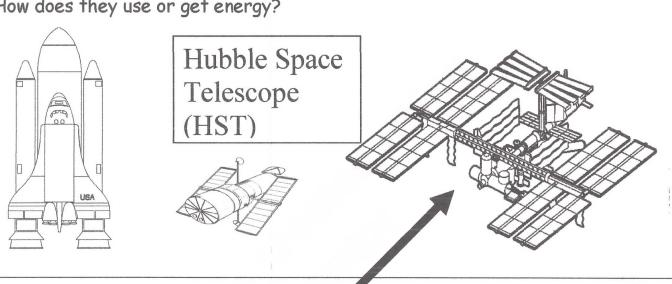
The combination of three spatial dimensions, length, width, and height, with time. The four together form the four-dimensional nature of our Universe. The effects of gravity can be regarded, as a result of the curving of space-time due to the presence of massive objects.



- ♦ Please name and provide information about the pictures below.
- ♦ Who owns them?
- ♦ What do they do?

International Space Station (ISS)

- ♦ What are some of their parts?
- ♦ How does they use or get energy?



The International Space Station (ISS) is an internationally developed research facility that is being assembled in low Earth orbit. On-orbit construction of the station began in 1998 and is scheduled for completion by 2011. The station is expected to remain in operation until at least 2015, and likely 2020. With a greater mass than that of any previous space station, the ISS can be seen from the Earth with the naked eye, and, as of 2010, is the largest artificial satellite orbiting the Earth. The ISS serves as a research laboratory that has a microgravity environment in which crews conduct experiments in biology, human biology, physics, astronomy and meteorology. The station has a unique environment for the testing of the spacecraft systems that will be required for missions to the Moon and Mars. The ISS is operated by Expedition crews, and has been continuously staffed since 2 November 2000. meaning the ISS programme has maintained an uninterrupted human presence in space for the past 9 years and 158 days, which is approaching the current record, set aboard Mir, of 9 years and 257 days. As of 18 March 2010, the crew of Expedition 23 is aboard.

The Hubble Space Telescope (HST) is a space telescope that was carried into orbit by a space shuttle in 1990. Although not the first space telescope. Hubble is one of the largest and most versatile, and is well-known as both a vital research tool and a public relations boon for astronomy. The HST was built by the United States space agency NASA, with contributions from the European Space Agency, and is operated by the Space Telescope Science Institute. It is named after the astronomer Edwin Hubble. The HST is one of NASA's Great Observatories, along with the Compton Gamma Ray Observatory, the Chandra X-ray Observatory, and the Spitzer Space Telescope

Space telescopes were proposed as early as 1923. Hubble was funded in the 1970s,

with a proposed launch in 1983, but the project was beset by technical delays, budget problems, and the *Challenger* disaster. When finally launched in 1990, scientists found that the main mirror had been ground incorrectly, severely compromising the telescope's capabilities. However, after a servicing mission in 1993, the telescope was restored to its intended quality. Hubble's orbit outside the distortion of Earth's atmosphere allows it to take extremely sharp images with almost no background light. Hubble's Ultra Deep Field image, for instance, is the most detailed visible-light image ever made of the universe's most distant objects. Many Hubble observations have led to breakthroughs in astrophysics, such as accurately determining the rate of expansion of the universe.

The **Space Shuttle**, part of the Space Transportation System (STS), is an American spacecraft operated by the National Aeronautics and Space Administration (NASA) for orbital human spaceflight missions. The first of four test flights occurred in 1981, which were followed by operational flights beginning in 1982. The system is scheduled to be retired from service in 2011 after 135 launches. Major missions have included launching numerous satellites and interplanetary probes, conducting space science experiments, and servicing and construction of space stations. The Shuttle has been used for orbital space missions by NASA, the U.S. Department of Defense, the European Space Agency, and Germany The United States funded STS development and shuttle operations.

At launch, the Space Shuttle consists of the shuttle stack which includes a dark orange-colored external tank two white, slender Solid Rocket Boosters (SRBs); and the STS Orbiter Vehicle (OV) which contains the crew and payload. The ET was painted white for the first 2 missions, but was discontinued to save weight. Payloads can be launched into higher orbits with either of two different booster stages developed for the STS (1 stage Payload Assist Module or 2 stage Inertial Upper Stage). The Space Shuttle is "stacked" in the Vehicle Assembly Building and the stack mounted on a mobile launch platform held down by four explosive bolts on each SRB which are detonated at launch.

The shuttle stack launches vertically, like a conventional rocket, from a mobile launch platform. It lifts off under the power of its two SRBs and the three main engines which are fueled by liquid hydrogen and liquid oxygen from the external tank. The Space Shuttle has a two stage ascent. The SRBs provide additional thrust during liftoff and first stage flight. About two minutes after liftoff explosive bolts are fired releasing the SRBs which parachute into the ocean to be retrieved by ships for refurbishment and reuse. The shuttle orbiter and external tank continue to ascend on an increasingly horizontal flight path under power from the three main engines. Upon reaching 17,500 mph (7.8 km/s), necessary for low Earth orbit, the main engines are shut down. The external tank is then jettisoned downward to burn up in the atmosphere. It is, however, possible for the external tank to be re-used in orbit. After jettisoning the external tank, the orbital maneuvering system (OMS) engines may be used to adjust

the orbit.

The orbiter carries astronauts and payload such as satellites or space station parts into low earth orbit, into the Earth's upper atmosphere or thermosphere. Usually, five to seven crew members ride in the orbiter. Two crew members, the Commander and Pilot, are sufficient for a minimal flight, as in the first four "test" flights, STS-1 through STS-4. A typical payload capacity is about 22,700 kilograms (50,000 lb), but can be raised depending on the choice of launch configuration. The orbiter carries the payload in a large cargo bay with doors that open along the length of its top, a feature which makes the Space Shuttle unique among present spacecraft. This feature made possible the deployment of large satellites such as the Hubble Space Telescope, and also to capture and return large payloads back to Earth.

Name the terms / planet / other associated	with the following words.
Phobos and DeimosMars	
Water Exists in all three states of matter	rEarth
Spirit and Opportunity are their	
lo and EuropaJupiter	
Giant Red SpotJupiter	
Giant Red SpotJupiter Hottest Planet in the Solar System	Venus
Tethys, Telesto, Calypso, Titan	Saturn
Symbol for MenMars	
Symbol for WomenVenus	
Olypmus MonsMars	
Valles MarinerisMars	
Has two Ice CapsEarth and Mars	
Apollo Missions visited hereMoon_	
A very long dayMercury	
Largest Planet in our Solar System	
Has the most moonsJupiter	
Is made up of 70,000 objectsKuiper	
Now considered a DwarfPluto	
Chunks of a comet recently hit this plan	
I am after Saturn but before Neptune	
I have a ring but I am not Saturn	_Neptune

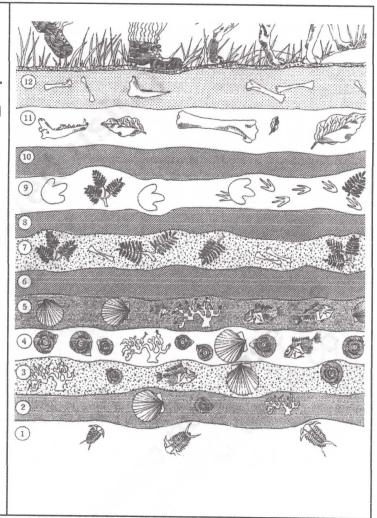
This photograph best represents what Principle? Please explain using some of the fossils on the right

Principle of superposition – Oldest rocks and fossil are on bottom, youngest on top.

Please circle the fossil that is older based on this principle

The fossils on the layers closest to the top are the youngest, and the fossil in the bottom layers are the youngest. When one first emerges is when the species first started.

What happened at number #10? A lack of fossil can sometimes mean that it is a period of time after a large extinction event.



Please record the name of time periods from earliest to latest in their chronological order below. Use the boxes beneath to group them according Era

H A P C O S D C P T J J D C D C P T J D C D C P R D D C D D D D D D D D D D D D D D D D

Eon Eon Period P

Precambrian

Paleozoic

Mesozoic

Cenozoic

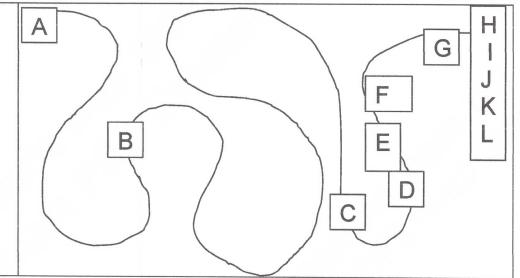
Many aspects of science including earth system history have Physical, Chemical and Biological components.

Uniformitarianism - Rules of nature do not change over time.

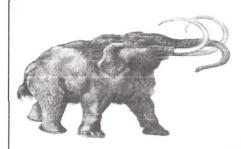
What percentage of all species that ever lived still exist today? .5% (Caution! Re-read Question)

Please use the line below as the history of the earth in actual time. Number when the following happened to the line.

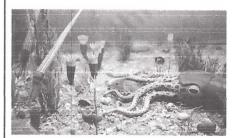
- A Formation of the Earth
- B- Moon Forms
- C Earliest Life Begins (Single Cell)
- D First Multicellular Life
- E Carbon Swamps
- F Dinosaurs Rule
- G K-T Mass Extinction Event
- H Earliest Mammals
- I Earliest Humans
- J Human Civilization
- K Age of Exploration
- L Computer Age



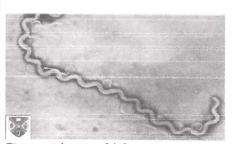
Please look at the pictures below and describe the best time period that each picture represent. Record some information about each photograph as well.



This is a Mammoth, it existed in the Cenozoic, near the last ice age (Pleistocene Epoch)

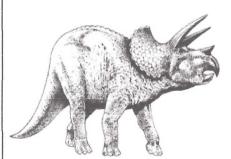


This represents the early Paleozoic Era, Possibly the Cambrian and Ordovician as I don't see any fish.

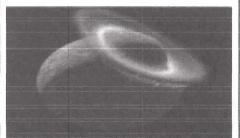


First evidence of life

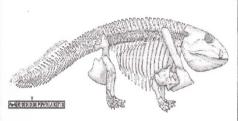
Archean Eon, 3.7 Billion years ago.



Dinosaurs dominated the earth during the Mesozoic Period.



Not K-T Mass Extinction
This represents the
Hadean Eon which is
when the earth was
forming and cooling.



First Amphibian
The Devonian Period is when the first fish became land dwelling amphibians.