Astronomy Lesson 3

Objects In

the

Solar System

Quiz Date:

Vocabulary:

Moons

* Satellites are natural or artificial bodies that revolve around larger bodies like planets.
* Except for Mercury and Venus, all of the planets have natural satellites called moons.

Luna: The Moon of Earth

* The moon is much less dense than Earth.
* The composition of the moon is similar to that of the Earth’s mantle.
* The moon has no atmosphere.
* The surface of the moon preserves a record of almost all the impacts it has had with other objects.
* By knowing the rate of cratering, scientists are able to use the number of craters on the surface of any body to estimate how old its surface is.

Lunar Origins

* Before samples were brought back from the moon, there were three possible explanations for the formation of the moon.
* It was a separate body captured by Earth’s gravity.
* It formed at the same time and with the same materials as Earth.
* Earth was spinning so fast that a piece flew off and became the moon.
* If the moon were captured by Earth’s gravity, it would have a completely different composition from that of Earth, which is not the case.
* On the other hand, if the moon formed at the same time as the Earth or as a spin off of the Earth, the moon would have exactly the same composition as Earth, which it doesn’t.
* The current theory is that a large, Mars-sized object collided with Earth while the Earth was still forming.
* The collision was so violent that part of Earth’s mantle was blasted into orbit around Earth.
* Once in orbit, art of the Earth’s mantle materials and debris from the impacting body eventually joined to form the moon.
* The moon would then be a combination of Earth’s mantle and the impacting body.
* This theory is consistent with the composition of the lunar rocks brought back by the Apollo missions.

Phases of the Moon

* From Earth, one of the most noticeable aspects of the moon is its continually changing appearance.
* Within a month, its Earthward face changes from a fully lit circle to a thin crescent and the back to a circle.
* These different appearances of the moon result from its changing position with respect to the Earth and the sun.
* As the moon revolves around the Earth, the amount of sunlight on the side of the moon that faces the Earth changes.
* The different appearances of the moon due to its changing position are called phases.
* When the moon is waxing, it means that the sunlit fraction we can see from Earth is getting larger.
* When it is waning, the sunlit fraction is getting smaller.
* Half the moon is always in sunlight, just as half the Earth is always in sunlight
* But because the period of rotation for the moon is the same as its period of revolution, on Earth we always see the same side of the moon.
* If you lived on the far side of the moon, you would see the sun for half of each lunar day, but you would never see the Earth.

Eclipse

* An eclipse occurs when the shadow of one celestial body falls on another.
* A lunar eclipse happens when the Earth comes between the sun and the moon and the shadow of Earth falls on the moon.
* A solar eclipse happens when the moon comes between the Earth and the sun, and the shadow of the moon falls on part of Earth.
* The moon appears to be the same size as the sun because it is much closer to Earth.
* So during a solar eclipse, the disk of the moon almost always covers the disk of the sun.
* However, because the moon’s orbit is not completely circular, sometimes the moon is farther way from the Earth, and a thin ring of sunlight shows around the outer edge of the moon.
* This type of solar eclipse is called an annular eclipse.
* During the hours of total lunar eclipse, the moon often appears to turn a deep red color.
* Earth’s atmosphere acts like a lens and bends some of the sunlight into the Earth’s shadow cause the red color.
* Why don’t we see a solar and lunar eclipses every month?
* The moon’s orbit around the Earth is tilted by about 5 degrees with respect to the orbit of the Earth around the sun.
* This tilt of the moon’s orbit is enough to place the moon out of Earth’s shadow for most full moons and the Earth out of the moon’s shadow for most new moons.

Small Bodies in the Solar System

* In addition to planets and moons, the solar system contains many other types of objects, including comets, asteroids and meteoroids.
* A comet is a small body of ice, rock and cosmic dust loosely packed together. Because of their composition, some scientists refer to comets as “dirty snowballs.”
* Unlike planets, comets are very small and originate from the cold, outer solar system.
* Comets are leftovers from the process of planet formation.
* When a comet passes close enough to the sun, solar radiation heats the water ice so that the comet gives off gas and dust in the form of a long tail.
* Sometimes this process can give a comet two tails an ion tail and a dust tail.
* The ion tail consist of electrically charged particles that are blown directly away from the sun by solar wind.
* The solid center of a comet is called its nucleus.
* Comet nuclei can range in size from less than half a kilometer to more than 100 km in diameter.
* All orbits are ellipses—circles that are somewhat stretched out of shape.
* Whereas the orbits of most planets are nearly circular, comet orbits hare highly elliptical—they are very elongated.
* When a body such as a comet, is at the point in its orbit closest to the sun, it is said to be at perihelion.
* The point in an orbit farthest from the sun is called the aphelion.
* The comets ion tail always points directly away from the sun because of the solar wind.
* Comets come from the Oort cloud, a spherical region that surrounds the solar system.
* When the gravity of a passing planet or star disturbs part of this cloud, comets can be pulled in toward the sun.

Asteroids

* Asteroids are small, rocky bodies in orbit around the sun.
* They range in size from a few meters to more than 900 km in diameter.
* Asteroids have irregular shapes, although some of the larger ones are spherical.
* Most asteroids orbit the sun in a wide region between the orbits of Mars and Jupiter, called the asteroid belt.
* Asteroids can have a variety of compositions, depending on where they are located within the asteroid belts.
* In the outer most region of the asteroid belt, asteroids have dark reddish brown to black surfaces, which may indicate that they are rich in organic materials.
* A little closer to the sun, asteroids have dark gray surfaces, indicating that they are rich in carbon.
* In the innermost part of the asteroid belt are light gray asteroids that have either a stony or metallic composition.
* Like comets, asteroids are thought to be material left over from the formation of the solar system.

Meteoroids

* A meteoroid is a small, rocky body orbiting the sun.
* Meteoroids are similar to asteroids, but they are much smaller.
* Most meteoroids pro ably come from asteroids.
* If a meteoroid enters Earth’s atmosphere and strikes the ground, it is then called a meteorite.
* When a meteoroids falls into Earth’s atmosphere, it is usually traveling at such a high speed that its surface heats up and melts.
* As it burns up, the meteoroid glows and gives off an enormous amount of light and heat.
* From the ground, we see a spectacular streak of light or a shooting star.
* The bright streak of light is called a meteor.
* At certain times of year, you can see large numbers of meteors.
* These events are called meteor shows.
* Meteor showers occur when Earth passes through the dusty debris left behind in the orbit of a comet.
* Meteorites have a variety of compositions.
* There are three major types of meteorites—stony, metallic and stony-iron.