



## 6th Grade Astronomy Unit *Our Solar System*

### **Benchmarks**

#### **Chapter 1: The Nature of Science**

##### **The Scientific World View**

1A(6-8)#1: When similar investigations give different results, the scientific challenge is to judge whether the differences are trivial or significant, and it often takes further studies to decide. Even with similar results, scientists may wait until an investigation has been repeated many times before accepting the results as correct.

##### **Scientific Inquiry**

1B (6-8) #2: If more than one variable changes at the same time in an experiment, the outcome of the experiment may not be clearly attributed to any one of the variables...

#### **Chapter 4: The Physical Setting**

##### **The Universe**

4A(3-5)#1: The patterns of stars in the sky stay the same, although they appear to move across the sky nightly, and different stars can be seen in different seasons.

4A(3-5)#4: The earth is one of several planets that orbit the sun, and the moon orbits around the earth.

4A (6-8) #1: The sun is a medium-sized star located near the edge of a disk -shaped galaxy of stars, part of which can be seen as a glowing band of light that spans the sky on a very clear night. The universe contains many billions of galaxies, and each galaxy contains many billions of stars. To the naked eye, even the closest of these galaxies is no more than a dim, fuzzy spot.

4A (6-8) #3: Nine planets of very different size, composition, and surface features move around the sun in nearly circular orbits. Some planets have a great variety of moons and even flat rings of rock and ice particles orbiting around them. Some of these planets and moons show evidence of geologic activity. The earth is orbited by one moon, many artificial satellites, and debris.

Chapter titles and headers correlate with *Benchmarks for Science Literacy* by Project 2061. To fully understand the context and intent of the benchmarks, essays within each chapter and section of *Benchmarks* must reviewed.

4A (6-8) #4: Large numbers of chunks of rock orbit the sun. Some of those that the earth meets in its yearly orbit around the sun glow and disintegrate from friction as they plunge through the atmosphere and sometimes impact the ground. Other chunks of rocks mixed with ice have long, off-center orbits that carry them close to the sun, where the sun's radiation (of light and particles) boils off frozen material from their surfaces and pushes it into a long, illuminated tail.

## **The Earth**

4B (3-5) #2: Like all planets and stars, the earth is approximately spherical in shape. The rotation of the earth on its axis every 24 hours produces the night-and-day cycle. To people on earth, this turning of the planet makes it seem as though the sun, moon, planets, and stars are orbiting the earth once a day.

4 B (6-8) #1: We live on a relatively small planet, the third from the sun in the only system of planets definitely known to exist (although other, similar systems may be discovered in the universe).

4B (6-8) #2: The earth is mostly rock. Three-fourths of its surface is covered by a relatively thin layer of water (some of it frozen), and the entire planet is surrounded by a relatively thin blanket of air. It is the only body in the solar system that appears able to support life. The other planets have compositions and conditions very different from the earth's.

4B (6-8) #3: Everything on or anywhere near the earth is pulled toward the earth's center by gravitational force.

4B(6-8)#4: Because the earth turns daily on an axis that is tilted relative to the plane of the earth's yearly orbit around the sun, sunlight falls more intensely on different parts of the earth during the year. The difference in heating of the earth's surface produces the planet's seasons and weather patterns.

4B(6-8)#5: The moon's orbit around the earth once in about 28 days changes what part of the moon is lighted by the sun and how much of that part can be seen from the earth—the phases of the moon.

## **Processes that Shape the Earth**

4C (6-8) #5: Thousands of layers of sedimentary rock confirm the long history of the changing surface of the earth and the changing life forms whose remains are found in successive layers. The youngest layers are not always found on top, because of folding, breaking, and uplift of layers.

## **Motion**

4F (6-8) #3: An unbalanced force acting on an object changes its speed or direction of motion, or both. If the force acts toward a single center, the object's path may curve into an orbit around the center.

## **Forces of Nature**

4G (6-8) #1: Every object exerts gravitational force on every other object. The force depends on how much mass the objects have and how far apart they are. The force is hard to detect unless at least one of the objects has a lot of mass.

4G (6-8) #2: The sun's gravitational pull holds the earth and other planets in their orbits, just as the planets' gravitational pull keeps their moons in orbit around them.

## **Chapter 5: The Living Environment**

### **Evolution of Life**

5F (6-8) #3: Many thousands of layers of sedimentary rock provide evidence for the long history of the earth and for the long history of changing life forms whose remains are found in the rocks. More recently deposited rock layers are more likely to contain fossils resembling existing species.

## **Chapter 10: Historical Perspectives**

### **Displacing the Earth from the Center of the Universe**

10 A (6-8) #1: The motion of an object is always judged with respect to some other object or point so the idea of absolute motion or rest is misleading.

10 A (6-8) #2: Telescopes reveal that there are many more stars in the night sky than are evident to the unaided eye, the surface of the moon has many craters and mountains, the sun has dark spots, and Jupiter and some other planets have their own moons.

## **Chapter 11: Common Themes**

### **Models**

11B(6-8)#2: Mathematical models can be displayed on a computer and then modified to see what happens.

## **Chapter 12: Habits of Mind**

### **Communication Skills**

12D(6-8)#1: Organize information in simple tables and graphs and identify relationships they reveal.

12D(6-8)#2: Read simple tables and graphs produced by others and describe in words what they show.