Introduction.

1. Most scientific and scholarly works were published in Latin until the mid-18th century. (a) Why was Latin used? (b) Why did publications change from Latin to the language of origin in the 1700's?

2. A standard sheet of paper measures $8\frac{1}{2}$ in × 11 in. (a) Find the area of a single sheet of paper in m^2. A second of sheet of paper is half as long and half as wide as the one given in part (a). (b) By what factor is its area less than that found in part (a)?

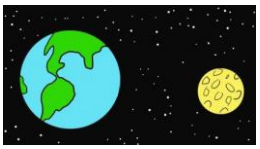
3. Assume you are standing on the surface of the Moon. (a) Describe the motion of the Earth over the course of one month. (b) Which direction would it appear to travel (with respect to the Sun)? (c) Would you see phases of the Earth? Why or why not?

4. Approximately how many golf balls would it take to entirely fill the Pontiac Silverdome?

5. The period T of a simple pendulum is the amount of time required for it to undergo one complete oscillation. If the length of the pendulum is L and the acceleration due to gravity is g, then T is given by

$$T = 2\pi L^m g^n.$$

Find the powers m and n required for dimensional consistency.



6. About how many centimeters is it from the Earth to the Moon?

7. Type A nerve fibers in a human being are able to send an electrical impulse that can travel approximately 140 m/s. How fast is that in (a) ft/s? (b) mi/h? (c) km/h?

8. You've just won the $4 million Michigan Lottery™. Rather than receive a monthly check for the next twenty years, you decide to collect all your winnings at once (the Internal Revenue Service will get their share later). How much does the cash weigh if you request payment in unmarked $1 bills?

9. (a) How long does it take for light to reach the Earth from the Sun? (b) How long would it take a spaceship traveling at 34,500 mi/h to reach the Sun?

10. One equation describing linear motion in the x-direction is given by

$$x = x_o + v_o t + \tfrac{1}{2}at^2.$$

Solve this equation for t.

11. Despite the works of Galileo Galilei and Johannes Kepler, few people believed the idea that the Earth was in orbit around the Sun. Even after Isaac Newton published the *Principia* in 1687, it would take another hundred years before it was considered true. Why was it so difficult for most people to accept that the Earth was not the center of the solar system?

12. A severe storm on January 10, 1992, caused a cargo ship near the Aleutian Islands to spill 29,000 rubber ducks and other bath toys into the ocean. Ten months later, hundreds of rubber ducks began to appear along the shoreline near Sitka, Alaska, roughly 1,600 mi away. (a) What was the approximate average speed in mi/h of the ocean current that carried the ducks to shore? (b) What was the speed in m/s?