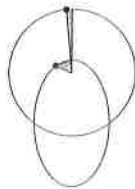


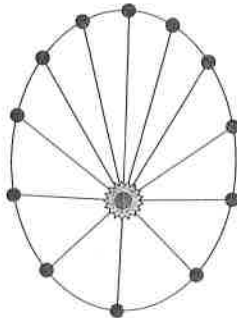
## KEPLER'S LAWS OF PLANETARY MOTION Knowledge Builder

### Planetary Motion



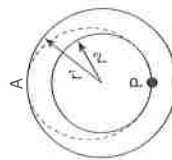
**First Law:** The orbit of a planet about the sun is an ellipse (an oval) with the sun at one focus.

**Example:** The center of the sun becomes the focus for a planet orbiting the sun.



**Second Law:** A line joining a planet and the sun sweeps out equal areas in equal intervals of time.

**Example:** When a planet orbits the sun, the line joining it to the sun sweeps over equal areas in equal periods of time. Therefore, the speed of a planet changes, depending on its distance from the center of the sun. Speed is greatest at the point in the orbit closest to the sun and is slowest at the point farthest from the sun.



**Third Law:** The square of the time it takes a planet to move around the sun is directly proportional to the cube of the average distance of the planet from the sun.

**Example:** The farther a planet is from the sun, the longer it will take to complete an orbit, the greater the distance it will travel to complete an orbit, and the slower its average speed will be.



Name: \_\_\_\_\_

Date: \_\_\_\_\_

## KEPLER'S LAWS OF PLANETARY MOTION Apply

### Matching

1. Nicolaus Copernicus a. path
  2. Johannes Kepler b. center
  3. focus c. an oval
  4. ellipse d. described planetary motions
  5. orbit e. more precisely with his three Laws
- proposed that the sun, not the earth, was the object around which all heavenly bodies in our solar system turned



### Fill in the Blanks

1. The physicist \_\_\_\_\_ was able to connect Kepler's Laws to his own observations on force and motion.
2. Kepler wrote \_\_\_\_\_, a story about an imaginary trip to the moon, which was most likely the first science-fiction story ever written.
3. The speed of a planet changes, depending on its \_\_\_\_\_ from the center of the sun.
4. The center of the sun becomes the \_\_\_\_\_ for a planet orbiting the sun.
5. A planet will move more quickly when it is \_\_\_\_\_ to the sun and more \_\_\_\_\_ when it is farther away.

### Multiple Choice

1. Kepler's three Laws explain \_\_\_\_\_.
  - a. force and motion
  - b. the relationship between mass and weight
  - c. planetary motion
  - d. the sun is center of solar system
2. What shape is the orbit of planets around the sun?
  - a. circle
  - b. oval
  - c. straight line
  - d. irregular shaped

### Critical Thinking

Why was the work of Johannes Kepler important to astronomy?

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