Name _____ Class _____ Date _____

CHAPTER 29 STUDY GUIDE FOR CONTENT MASTERY

Our Solar System

SECTION 29.1 *Overview of Our Solar System*

In your textbook, read about early ideas.
Write the letter of the term from Column B next to its matching item in Column A.

Column A		Column B
_____	**1.** Motion of a planet moving in the opposite direction of the normal direction of planetary motion as observed from Earth	**a.** aphelion
_____	**2.** Point in a planet's orbit when it is farthest from the Sun	**b.** astronomical unit
_____	**3.** Nicolaus Copernicus's model of the solar system in which the planets orbit the Sun	**c.** eccentricity
_____	**4.** Oval shape centered on two points instead of one point	**d.** ellipse
_____	**5.** Point in a planet's orbit when it is closest to the Sun	**e.** heliocentric
_____	**6.** Defines a planet's elliptical orbit as the ratio of the distance between the foci and the length of the major axis	**f.** perihelion
_____	**7.** Unit of measure that is the average distance between the Sun and Earth (1.4960×10^8 km)	**g.** retrograde

In your textbook, read about gravity and orbits.
Use each of the terms below just once to complete the passage.

acceleration	**center of mass**	**distance**	**force**
Isaac Newton	**masses**	**Moon**	**universal gravitation**

English scientist **(8)** _____ developed an understanding of gravity by observing the motion of the **(9)** _____, the orbits of the planets, and the **(10)** _____ of falling objects on Earth. He learned that two bodies attract each other with a **(11)** _____ that depends on their **(12)** _____ and the **(13)** _____ between the bodies. This is called the law of **(14)** _____. He also determined that each planet orbits a point between itself and the Sun. That point is called the **(15)** _____.

Thinking Critically

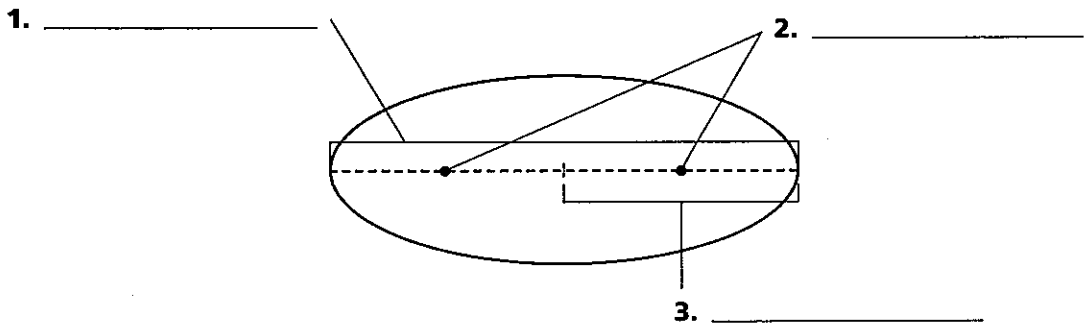
Planetary Motion

Kepler's laws of planetary motion demonstrate that each planet's orbit around the Sun sweeps out in a shape called an ellipse, rather than a circle. This means that a planet does not maintain a constant distance from the Sun. Kepler found that an imaginary line between the Sun and a planet sweeps out equal amounts of area in equal amounts of time. Kepler also discovered a mathematical relationship between the size of a planet's ellipse and its orbital period.

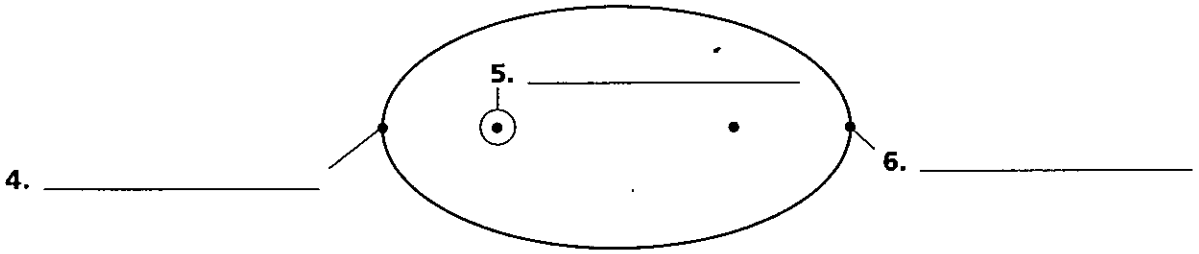
Use the terms below to label the two diagrams.

foci	**semimajor axis**	**perihelion**
major axis	**aphelion**	**Sun**

Elliptical Orbit of a Planet



Orbit of Pluto

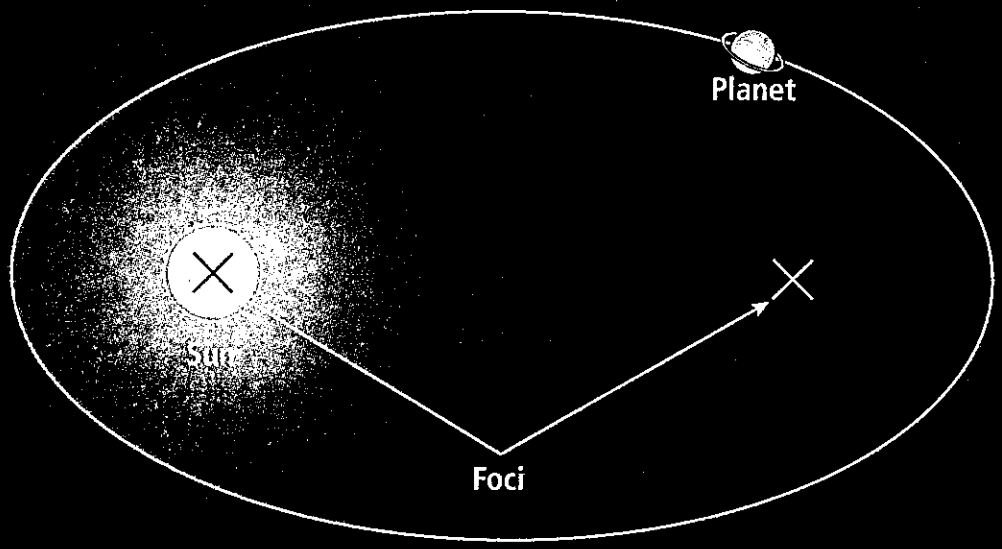


7. How does a model of the solar system in which the planets have elliptical orbits explain the difference in the speed of the planets?

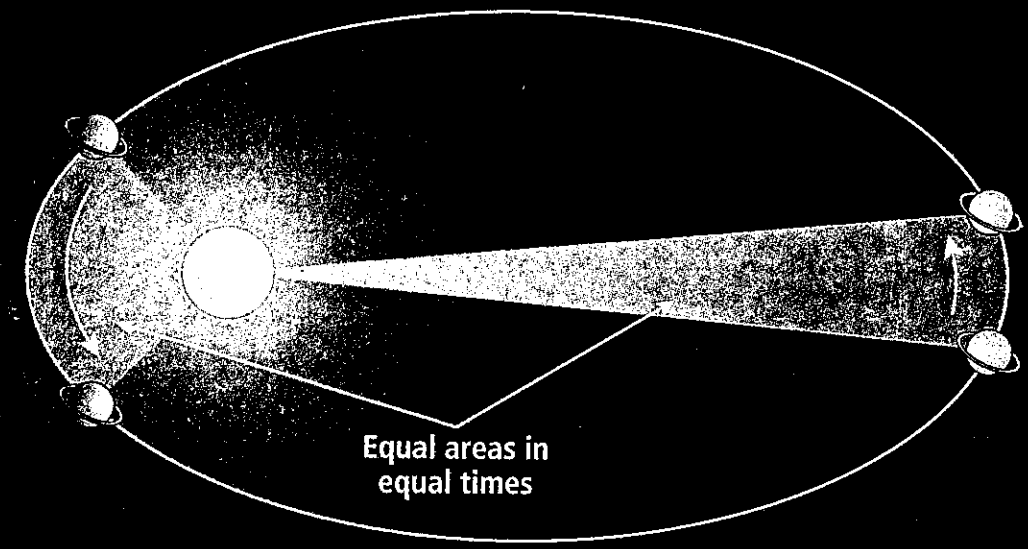
Use with Chapter 29
Section 29.1

Kepler's Laws

Kepler's First Law. The orbits of the planets are ellipses, with the Sun at one focus of the ellipse.



Kepler's Second Law. The line joining a planet to the Sun sweeps out equal areas in equal times as the planet travels around the ellipse.



Kepler's Third Law. The square of a planet's orbital period equals the cube of the semimajor axis of the orbital ellipse.

$$P^2 = a^3$$

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Use with Chapter 29
Section 29.1

Kepler's Laws

1. Name and describe the orbital shape expressed in Kepler's first law.

2. What are the center points of the orbital shape expressed in Kepler's first law called? How are they related to the Sun?

3. What are the major axis and semimajor axis of the orbital shape expressed in Kepler's first law?

4. What is eccentricity, and how is its value determined?

5. Explain Kepler's second law.

6. Explain Kepler's third law.

7. What can the relationship described in Kepler's third law be used to predict?