Name

2-9B Lesson Master

Questions on SPUR Objectives
See Student Edition pages 143–147 for objectives.

SKILLS Objective A

In 1–5, write the statement as a variation equation.

1. The area A of an ellipse varies jointly as its major semiaxis b and its minor semiaxis h. _____

2. The cost C of a square oak butcher block varies jointly as its thickness t and the square of a side length s. _____

3. The load L which will buckle a column is inversely proportional to the square of its length ℓ and directly proportional to the fourth power of its radius r. _____

4. In the middle 1800s, the French scientist Jean Poiseuille found that the rate r at which a fluid flows through a small tube varies jointly as the pressure p acting on the fluid and the fourth power of the diameter d of the tube. _____

5. The speed S of a 10-speed bike varies directly as the number of revolutions r per minute and as the number of teeth f on the front sprocket, and inversely as the number of teeth b on the back sprocket. _____

6. **Fill in the Blanks** In the formula $A = \pi ab$, A varies

   _____ as the product of ____

   and ____.

7. **Fill in the Blanks** If $g = \frac{2d}{t^2}$, g varies _____

   as d, and _____ as ____.

SKILLS Objective B

8. a varies directly as b and inversely as the square of c. When $b = -8$ and $c = 2$, $a = -6$.

   a. Find a when $b = 4$ and $c = -2$. _____

   b. Give the constant of variation. _____

9. m varies jointly as n and the cube of p. When $n = 3$ and $p = -2$, $m = -48$.

   a. Find m when $n = -4$ and $p = 5$. _____

   b. Give the constant of variation. _____

Name

USES Objective G

10. The kinetic energy of an object varies jointly as its mass and the square of its velocity. The kinetic energy of an object with mass 12 kilograms moving at 8 meters per second is 384 joules. Find the kinetic energy of an object with mass 8 kilograms moving at 12 meters per second. _____

11. The wind force F on a sail varies jointly as the area A of the sail and the square of the wind speed W. The force on a sail with area 500 square feet is 100 pounds when the wind speed is 20 miles per hour.

    a. What would the force be with a 30-mile-per-hour wind? _____

    b. What would the force be if the sail is a triangle 20 feet high and 20 feet at the base and the windspeed is 40 miles per hour? _____

In 12 and 13, use this information: The speed s at which water flows through a pipe is directly proportional to the pressure p exerted by a pump and the fourth power of the radius r.

12. What effect will lime deposits on the inside of a pipe have on the speed of the water, if the pressure remains constant? _____

13. If the speed of the water through a pipe of radius 2.5 centimeters is 600 centimeters per second when the pressure is 4 kilograms per square centimeter,

    a. what would be the speed if the pressure is doubled? _____

    b. what would be the speed if the radius is 5 centimeters? _____

14. Bridge columns of a new material are 10 inches in diameter and 10 ft high. These columns are able to support up to 40 tons without collapsing. The weight w that collapses a column varies directly as the fourth power of its diameter d and inversely as the square of its height h. Give the maximum weight each column of this material with the given dimensions can support.

    a. diameter, 20 inches; height, 10 feet _____

    b. diameter, 10 inches; height, 20 feet _____

    c. diameter, 20 inches; height, 20 feet _____