UNIT 6 LESSON 6: INVERSE VARIATION

DIRECT VARIATION	The variables x and y vary directly if for a constant k $\frac{y}{x} = k$, or $y = kx$, $k \neq 0$.	y = kx $k > 0$
INVERSE VARIATION	The variables x and y vary inversely if for a constant k $xy = k$, or $y = \frac{k}{x}$, $k \neq 0$.	$x = \frac{k}{x}$
The number	k is the constant of variation.	x>0

Direct Variation –

Inverse Variation -

EXAMPLE

Suppose *y* varies inversely as *x* and y = 18 when x = -2. Find *y* when x = 9.

EXAMPLE

The number of painters needed to paint the Pioneer Inn, an apartment building for retired citizens, varies inversely as the number of days needed to complete the project. Suppose 3 painters can paint the building in 21 days. How many days will it take 7 painters to paint the building? Assume that they all work at the same rate.

EXAMPLE

In the formula d = rt, the time *t* varies inversely as the rate *r*. Two of the world's slowest creatures are spiders and chickens. Suppose a spider traveled at its maximum speed of 1.2 miles per hour for 3 hours. Find the maximum speed of a chicken if it traveled the same distance in 24 minutes at its maximum speed.

Graded Practice: INVERSE VARIATION

The variables *x* and *y* vary inversely. Use the given values to write an equation that relates *x* and *y*. (Find k to write the equation)

1. x = 2, y = 52. x = 3, y = 73. x = 16, y = 1

- 4. Suppose that *y* varies inversely as *x* and that y = 8 when x = 3.
 - a) Find an equation relating *x* and *y*.
 - b) Calculate the value of *y* when x = 10.

5. The frequency of a vibrating guitar string varies inversely as its length. Suppose a guitar string 0.65 meters long vibrates 4.3 times per second. What frequency would a string 0.5 meters long have?

6. The current in a simple electrical circuit is inversely proportional to the resistance. If the current is 80 amps when the resistance is 50 ohms, find the current when the resistance is 22 ohms.

7. The intensity of light produced by a light source varies inversely as the square of the distance from the source. If the intensity of light produced 3 feet from a light source is 750 foot-candles, find the intensity of light produced 5 feet from the same source.

8. To balance a seesaw, the distance, d (in feet), a person is from the fulcrum is inversely proportional to his or her weight, w (in pounds). Roger, who weighs 120 pounds, is sitting 6 feet away from the fulcrum. Ellen weighs 108 pounds. How far from the fulcrum must she sit to balance the seesaw?

- 9. Heart rates and life spans of most mammals are inversely related. A cat lives for about 15.2 years on average and has a heart rate of 126 beats per minute.
 - a. What is the constant of variation?
 - b. A hamster has a heart rate of about 634 beats per minute. About how long will a hamster live?
 - c. An elephant lives for about 70 years. About how many times per minute does an elephant's heart beat?

12. The grade you earn in math varies inversely with the number of minutes per night you watch television. If you watch 90 minutes per night, you get a 60 in math.

- a. What is the constant of variation?
- b. How much television can you watch if you want to make a 70?
- c. You cut back on your television to only 75 minutes a night, what grade will you make in math?
- d. What is the maximum amount of television you can watch and still make a 100?