

NAME \_\_\_\_\_

**Module 16** Solving Rational Equations  
**Lesson 3** Solving Problems Using Inverse Variation



**additional practice**

Does  $y$  vary inversely as  $x$ ? If so, find the constant of variation and write an equation for the inverse variation.

1.

$x$	$y$
-2	-27
3	18
6	9

**yes;  $k = 54$ ;  $xy = 54$**

2.

$x$	$y$
-1	-5
1	5
2	10

**no**

3.

$x$	$y$
-6	5
2	-15
15	-2

**yes;  $k = -30$ ;  $xy = -30$**

4.

$x$	$y$
$-\frac{3}{4}$	$\frac{4}{9}$
9	$-\frac{1}{27}$
$\frac{3}{5}$	$-\frac{5}{9}$

**yes;  $k = -\frac{1}{3}$ ;  $xy = -\frac{1}{3}$**

5. The variable  $y$  varies inversely as  $x$ :  $y$  is 12 when  $x$  is 3. Find  $x$  when  $y$  is 9.

**$x = 4$**

6. The variable  $y$  varies inversely as  $x$ :  $y$  is 10 when  $x$  is -3. Find  $y$  when  $x$  is 5.

**$y = -6$**

7. The variable  $y$  varies inversely as  $x$ :  $y$  is 1.3 when  $x$  is -0.4. Find  $x$  when  $y$  is 0.26.

**$x = -2$**

8. The variable  $y$  varies inversely as  $x$ :  $y$  is  $1\frac{2}{3}$  when  $x$  is  $-\frac{3}{5}$ . Find  $y$  when  $x$  is  $\frac{3}{7}$ .

**$y = -\frac{7}{3}$**

9. The time it takes to clean the house varies inversely with the number of people cleaning. If it takes 1 person 4 hours to clean the house, how long will it take 3 people?

**1.33 hours or 1 hour 20 minutes**

10. The time needed to rake the leaves varies inversely as the number of people raking. If 5 people rake the leaves in 2 hours, how long will it take for 4 people?

**2.5 hours or 2 hours 30 minutes**

11. A rectangle has a length of 10 cm and a width of 4 cm. A second rectangle with the same area has a length 8 cm. What is the width of the second rectangle?

**5 cm**

12. The volume of a gas varies inversely as applied pressure. If the pressure acting on  $45 \text{ m}^3$  of a gas is lowered from 3 atmospheres to 2 atmospheres, what new volume does the gas occupy?

**$67.5 \text{ m}^3$**

13. The frequency of a vibrating string varies inversely as its length. If a 30-inch guitar string vibrates at a frequency of 440 cycles per second, find the frequency of a 32-inch string.

**412.5 cycles per second**

15. As oxygen is heated, its density varies inversely as its volume. The density of 2.4 m<sup>3</sup> of oxygen at 0°C is 1.6 kg/m<sup>3</sup>. When the oxygen is heated, it expands to a volume of 3.6 m<sup>3</sup>. What is the approximate density of the heated oxygen?

**1.07 kg/m<sup>3</sup>**

17. Time varies inversely as the rate of travel. If Jennifer drove 13 hours at an average rate of 54 mi/h, how long would the trip take at a rate of 65 mi/h?

**10.8 hours or 10 hours 48 minutes**

19. Mass,  $m$ , varies inversely as acceleration,  $a$ . The constant of variation is force,  $f$ . Write an equation to express this relationship.

**$f = ma$**

14. The frequency of a vibrating string varies inversely as its length. If a 40 cm violin string vibrates at a frequency of 660 cycles per second, how long is a string that vibrates at 440 cycles per second?

**60 cm**

16. The time it takes to complete a given trip varies inversely as the speed traveled. If it takes Tim 10 hours to travel from Cleveland to Albany at 42 mi/h, how long will it take him to make the trip at 60 mi/h?

**7 hours**

18. Rita rode her bicycle to Mallory's house at a rate of 10 mi/h. She returned home at a rate of 6 mi/h. The first leg of the trip took 45 minutes. How long did the second leg of the trip take?

**1.25 hours or 1 hour 15 minutes**

20. Area,  $a$ , varies inversely as pressure,  $p$ . The constant of variation is force,  $f$ . Write an equation to express this relationship.

**$f = pa$**