5-2 Direct Variation

Name _____ Date _____

Explain whether each equation represents a direct variation. If so, name the constant of variation.

$5y + 2x = 0$ ← Solve the equation for y.

$5y + 2x - 2x = 0 - 2x$ ← Subtract $2x$ from both sides.

$5y = -2x$

$\frac{5y}{5} = -\frac{2x}{5}$ ← Divide both sides by 5.

$y = -\frac{2}{5}x$

The equation is a direct variation, with a constant of variation of $-\frac{2}{5}$.

$3y - 7x = 11$ ← Solve the equation for y.

$3y - 7x + 7x = 11 + 7x$ ← Add $7x$ to both sides.

$3y = 7x + 11$

$\frac{3y}{3} = \frac{7x + 11}{3}$ ← Divide both sides by 3.

$y = \frac{7}{3}x + \frac{11}{3}$ ← not in the form $y = kx$

The equation is not a direct variation because it cannot be written in the form $y = kx$.

Explain whether each relation represents a direct variation. If so, make a graph and state the constant of variation.

1.

x	y
3	12
−5	−20
7	28

$k = \frac{y}{x} = \frac{12}{3} = \frac{-20}{-5} = \frac{28}{7} = 4$

yes; $k = 4$

2.

x	y
−3	−18
2	12
8	48

3.

x	y
−8	−23
5	14
9	26

4.

x	y
−11	−14
6	3
12	9

5.

x	y
−2	−8.8
3	13.2
10	44

6.

x	y
−5	−16
2	6.4
7	22.4

Explain whether each relation represents a direct variation. If so, state the constant of variation.

7. $y + 8x = 0$

$y = -8x$

Yes, the equation can be written in the form $y = kx$, where $k = -8$.

8. $y + 11x = 0$

9. $2y + 3x = 2.5$

10. $4y - 2x = 1.8$

11. $-3.8x = \frac{1}{2}y$

12. $-11.4x = -\frac{3}{4}y$

Solve. Show your work.

13. The value of y varies directly with x, and $y = 5$ when $x = 7$. Find x when $y = 2$.

$k = \frac{y}{x} = \frac{5}{7} = \frac{2}{x}$; $14 = 5x$; $x = 2.8$

14. The value of y varies directly with x, and $y = 4.1$ when $x = 3.4$. Find y when $x = 5.1$.

15. The value of y varies directly with x, and $y = -\frac{3}{8}$ when $x = \frac{1}{2}$. Find x when $y = 4$.

16. The value of y varies directly with x, and $y = \frac{2}{3}$ when $x = 5\frac{1}{4}$. Find y when $x = \frac{5}{8}$.

17. Geometry The area of a rectangle varies directly with its width. If the area is 30 square feet when its width is 8 feet, find the area when the width is 12 feet.

18. The distance traveled varies directly with the travel time. If 280 miles is traveled in 4 hours, find the travel time when the distance is 665 miles.

19. Currency The value of the U.S. dollar varies directly with the value of the Euro. If 14 U.S. dollars is worth about 9.11 Euros, about how many dollars are worth 100 Euros?

20. Physics *Hooke's Law* for an elastic string states that the distance a spring stretches varies directly as the force is applied. If a force of 250 Newtons (N) stretches a spring 8 cm, how much force (in N) is required to stretch the same spring 7.2 cm?

21. The cost of a pie dish varies directly as the square of its radius. If a pie dish has a diameter of 12 in. and costs \$7.99, how much will a pie dish with a diameter of 9 in. cost?

TEST PREPARATION

22. What is the constant of variation in the equation $-7y + 2\frac{1}{3} = 5x + \left|-2\frac{1}{3}\right|$?

A. $-\frac{7}{5}$ **B.** $-\frac{5}{7}$ **C.** $\frac{5}{7}$ **D.** $\frac{7}{5}$

23. The value of y varies directly with x, and $y = -\frac{1}{2}$ when $x = \frac{3}{10}$. What is y if $x = 7$?

F. $\frac{35}{3}$ **G.** $\frac{3}{35}$ **H.** $-\frac{3}{35}$ **J.** $-\frac{35}{3}$