2.5 – Direct Variation

The equation $y = ax$ represents direct variation between x and y, and y is said to vary directly with x. The nonzero constant a is called the constant of variation.

$$y = ax$$

Example 1 Write and graph a direct variation equation that has $(-4, 8)$ as a solution.
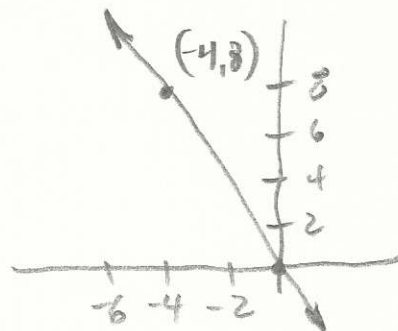
$$y = ax \quad (-4, 8)$$
$$(x, y)$$

$$\frac{8}{-4} = \frac{a(-4)}{-4}$$

$$a = -2 \implies \boxed{y = -2x}$$

You Try: 1. (3, -9) 2. (-7, 4)
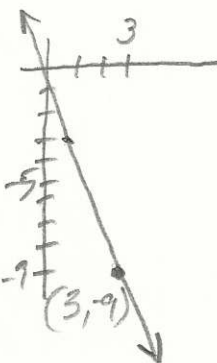
① $y = ax$

$$\frac{-9}{3} = \frac{a(3)}{3}$$

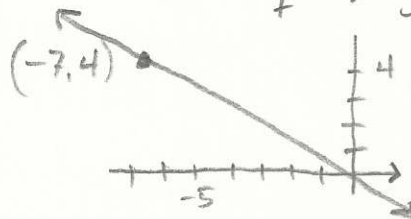$$a = -3 \implies y = -3x$$

② $y = ax$

$$4 = a(-7)$$

$$a = -\frac{4}{7} \implies y = -\frac{4}{7}x$$

WRITING AND GRAPHING Write and graph a direct variation equation that has the given ordered pair as a solution.

3. (2, 6)   4. (−3, 12)   5. (6, −21)   6. (4, 10)

7. (−5, −1)   8. (24, −8)   9. $\left(\frac{4}{3}, -4\right)$ 10. (12.5, 5)

WRITING AND EVALUATING The variables x and y vary directly. Write an equation that relates x and y. Then find y when $x = 12$.

11. $x = 4, y = 8$ 12. $x = -3, y = -5$ 13. $x = 35, y = -7$

14. $x = -18, y = 4$ 15. $x = -4.8, y = -1.6$ 16. $x = \frac{2}{3}, y = -10$

17. ★ **MULTIPLE CHOICE** Which equation is a direct variation equation that has (3, 18) as a solution?

Ⓐ $y = 2x^2$ Ⓑ $y = \frac{1}{6}x$ Ⓒ $y = 6x$ Ⓓ $y = 4x + 6$

IDENTIFYING DIRECT VARIATION Tell whether the equation represents direct variation. If so, give the constant of variation.

18. $y = -8x$ 19. $y - 4 = 3x$ 20. $3y - 7 = 10x$

21. $2y - 5x = 0$ 22. $5y = -4x$ 23. $6y = x$