

# Writing Linear Equations from Graphs and Tables

Algebra 1 • Section 5.5

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Score: \_\_\_\_\_ / 12

## Quick Review and Helpful Hints

Linear relationships have a constant rate of change. Use slope, intercepts, points, and context to move between equations, tables, graphs, and real-world meanings.

► **Example:** Write the line with slope 2 through (3, 11).

**Work:** Use  $y = 2x + b$ . Substitute the point:  $11 = 2(3) + b$ , so  $b = 5$ .

★ **Answer:**  $y = 2x + 5$

## Practice Problems

Solve each problem. Show enough work that another student could follow your thinking.

- Find a line through (1, 4) and (4, 10). \_\_\_\_\_
- Find an equation for a table with points (0, 5), (2, 11), (4, 17). \_\_\_\_\_
- Write a line with slope  $-1$  through (3, 8). \_\_\_\_\_
- Find the equation through  $(-2, 1)$  and  $(2, 9)$ . \_\_\_\_\_
- Find  $b$  if  $y = 4x + b$  goes through (5, 17). \_\_\_\_\_
- A line has intercept 6 and slope  $\frac{1}{2}$ . Write the equation. \_\_\_\_\_
- Find the equation through  $(0, -4)$  and  $(3, 5)$ . \_\_\_\_\_
- Find the slope from table changes:  $x$  increases by 5,  $y$  decreases by 15. \_\_\_\_\_
- Write an equation for  $y$  values 2, 6, 10 when  $x = 0, 1, 2$ . \_\_\_\_\_
- Find the missing output in  $y = 7 - 2x$  when  $x = 4$ . \_\_\_\_\_

## Word Problems

- A plumber charges \$45 plus \$30 per hour. Write the linear model. \_\_\_\_\_
- A candle starts at 12 inches and burns 0.5 inch per hour. Write the model. \_\_\_\_\_



## Answer Keys

1.  $y = 2x + 2$

2.  $y = 3x + 5$

3.  $y = -x + 11$

4.  $y = 2x + 5$

5.  $b = -3$

6.  $y = \frac{1}{2}x + 6$

7.  $y = 3x - 4$

8.  $-3$

9.  $y = 4x + 2$

10.  $-1$

11.  $y = 30x + 45$

12.  $y = 12 - 0.5x$

### Step-by-Step Explanations

- Slope first:  $6/3 = 2$ . Then anchor it with a point  $-4 = 2(1) + b$  gives  $b = 2$ .
- The  $y$ -values climb 6 for every 2 in  $x$ , so slope is 3, and  $x = 0$  shows the intercept is 5.
- With the slope known, the point fills in the rest:  $8 = -3 + b$ , so  $b = 11$ .
- The slope is  $8/4 = 2$ ; plug  $(-2, 1)$  back in and you find  $b = 5$ .
- Substitute the point:  $17 = 20 + b$ , so  $b$  has to be  $-3$  to balance it.
- You already have both pieces — just set them into  $y = mx + b$  and you're finished.
- The point at  $x = 0$  hands you intercept  $-4$ , and the slope is  $(5 + 4)/3 = 3$ .

- Slope is the  $y$ -change over the  $x$ -change:  $-15/5 = -3$ , negative since  $y$  is falling.
- Each step bumps  $y$  by 4, that's the slope, and the value at  $x = 0$  gives intercept 2.
- Substitute  $x = 4$  and compute:  $7 - 2(4) = 7 - 8 = -1$ .
- The \$30 per hour repeats, making it the slope, while the flat \$45 fee is the intercept.
- Start the height at 12, and since it shrinks each hour, subtract  $0.5x$  as time passes.



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