

# Slope and Rate of Change

## Algebra 1 • Section 5.1

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.

1. Find the slope through (1, 3) and (5, 11). \_\_\_\_\_

6. Find the slope of  $y = -4x + 9$ . \_\_\_\_\_

2. Find the slope through (-2, 7) and (4, -5). \_\_\_\_\_

7. Find the slope of  $3x + 2y = 12$ . \_\_\_\_\_

3. Find the slope of a horizontal line  $y = 8$ . \_\_\_\_\_

8. Find the slope between (0, -1) and (8, 3). \_\_\_\_\_

4. Find the slope of a vertical line  $x = -3$ . \_\_\_\_\_

9. Which is steeper: slope -5 or slope 2? \_\_\_\_\_

5. A table changes from (2, 10) to (6, 22). Find the rate. \_\_\_\_\_

10. Find the slope through (3, 3) and (9, 3). \_\_\_\_\_

### ◆ Word Problems

11. A runner goes from 2 miles at 10 minutes to 5 miles at 34 minutes. Find minutes per mile. \_\_\_\_\_

12. A tank drops from 90 gallons to 54 gallons in 6 hours. Find the rate of change. \_\_\_\_\_



## Answer Keys

- |              |                         |
|--------------|-------------------------|
| 1. 2         | 7. $-\frac{3}{2}$       |
| 2. -2        | 8. $\frac{1}{2}$        |
| 3. 0         | 9. Slope -5             |
| 4. Undefined | 10. 0                   |
| 5. 3         | 11. 8                   |
| 6. -4        | 12. -6 gallons per hour |

### Step-by-Step Explanations

- Slope is rise over run, so stack the differences:  $\frac{11-3}{5-1} = \frac{8}{4} = 2$ .
- Subtract carefully:  $\frac{-5-7}{4-(-2)} = \frac{-12}{6} = -2$ . The negative just means the line heads downhill.
- Walk along this line and  $y$  never budges — zero rise means the slope is flat 0.
- There's no run at all here, and you can't divide by zero, so we say the slope is undefined.
- The output jumped 12 while the input only moved 4, so each step is worth  $12/4 = 3$ .
- When it's already  $y = mx + b$ , the number riding with  $x$  is your slope — that's  $-4$ .
- Get  $y$  alone first:  $2y = -3x + 12$  becomes  $y = -\frac{3}{2}x + 6$ , and the slope pops right out.
- Climbing 4 over a run of 8 means you only rise half a unit per step:  $\frac{1}{2}$ .
- Steepness ignores direction — compare sizes. Since 5 beats 2, the  $-5$  line is steeper.
- Both points share the same height, so there's nothing to rise — the slope is 0.
- That's 24 extra minutes spread over 3 miles, so the pace works out to  $24/3 = 8$  minutes each mile.
- Losing 36 gallons across 6 hours means  $-36/6 = -6$  — negative because the tank is emptying.



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