

# 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).<br>_____              | 6. Find the slope of $y = -4x + 9$ .<br>_____          |
| 2. Find the slope through (-2, 7) and (4, -5).<br>_____             | 7. Find the slope of $3x + 2y = 12$ .<br>_____         |
| 3. Find the slope of a horizontal line $y = 8$ .<br>_____           | 8. Find the slope between (0, -1) and (8, 3).<br>_____ |
| 4. Find the slope of a vertical line $x = -3$ .<br>_____            | 9. Which is steeper: slope -5 or slope 2?<br>_____     |
| 5. A table changes from (2, 10) to (6, 22). Find the rate.<br>_____ | 10. Find the slope through (3, 3) and (9, 3).<br>_____ |

### ◆ 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

- |   |  |
|---|--|
| <p>1. <input type="text" value="2"/></p> <p>2. <input type="text" value="-2"/></p> <p>3. <input type="text" value="0"/></p> <p>4. <input type="text" value="Undefined"/></p> <p>5. <input type="text" value="3"/></p> <p>6. <input type="text" value="-4"/></p> | <p>7. <input type="text" value="-3/2"/></p> <p>8. <input type="text" value="1/2"/></p> <p>9. <input type="text" value="Slope -5"/></p> <p>10. <input type="text" value="0"/></p> <p>11. <input type="text" value="8"/></p> <p>12. <input type="text" value="-6 gallons per hour"/></p> |
|---|--|

### Step-by-Step Explanations

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



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