

Slope and Rate of Change

Algebra 1 • Section 5.1

Name: _____

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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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