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.

1. Find a line through $(1, 4)$ and $(4, 10)$.

2. Find an equation for a table with points $(0, 5), (2, 11), (4, 17)$.

3. Write a line with slope -1 through $(3, 8)$.

4. Find the equation through $(-2, 1)$ and $(2, 9)$.

5. Find b if $y = 4x + b$ goes through $(5, 17)$.

6. A line has intercept 6 and slope $\frac{1}{2}$. Write the equation.

7. Find the equation through $(0, -4)$ and $(3, 5)$.

8. Find the slope from table changes: x increases by 5, y decreases by 15.

9. Write an equation for y values $2, 6, 10$ when $x = 0, 1, 2$.

10. Find the missing output in $y = 7 - 2x$ when $x = 4$.

Word Problems

11. A plumber charges $\$45$ plus $\$30$ per hour. Write the linear model.

12. A candle starts at 12 inches and burns 0.5 inch per hour. Write the model.

Answer Keys

1. $\boxed{y = 2x + 2}$
2. $\boxed{y = 3x + 5}$
3. $\boxed{y = -x + 11}$
4. $\boxed{y = 2x + 5}$
5. $\boxed{b = -3}$
6. $\boxed{y = \frac{1}{2}x + 6}$
7. $\boxed{y = 3x - 4}$
8. $\boxed{-3}$
9. $\boxed{y = 4x + 2}$
10. $\boxed{-1}$
11. $\boxed{y = 30x + 45}$
12. $\boxed{y = 12 - 0.5x}$

Step-by-Step Explanations

1. Slope first: $6/3 = 2$. Then anchor it with a point — $4 = 2(1) + b$ gives $b = 2$.
2. The y-values climb 6 for every 2 in x, so slope is 3, and $x = 0$ shows the intercept is 5.
3. With the slope known, the point fills in the rest: $8 = -3 + b$, so $b = 11$.
4. The slope is $8/4 = 2$; plug $(-2, 1)$ back in and you find $b = 5$.
5. Substitute the point: $17 = 20 + b$, so b has to be -3 to balance it.
6. You already have both pieces — just set them into $y = mx + b$ and you're finished.
7. The point at $x = 0$ hands you intercept -4, and the slope is $(5 + 4)/3 = 3$.
8. Slope is the y-change over the x-change: $-15/5 = -3$, negative since y is falling.
9. Each step bumps y by 4, that's the slope, and the value at $x = 0$ gives intercept 2.
10. Substitute $x = 4$ and compute: $7 - 2(4) = 7 - 8 = -1$.
11. The $\$30$ per hour repeats, making it the slope, while the flat $\$45$ fee is the intercept.
12. Start the height at 12, and since it shrinks each hour, subtract $0.5x$ as time passes.

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