

Writing Linear Equations

Name: _____ Date: _____ Score: _____ / 18

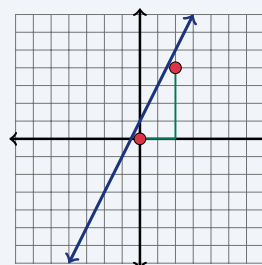
Quick Review and Helpful Hints

To write a line as $y = mx + b$: first find the *slope* $m = \frac{y_2 - y_1}{x_2 - x_1}$ from two points (or the steady change in a table). Then find b , the y -value when $x = 0$. If you have a point and the slope, substitute them into $y = mx + b$ and solve for b .

▶ **Example:** Write the equation of the line through $(0, 3)$ and $(2, 9)$.

Work: Slope $m = \frac{9 - 3}{2 - 0} = \frac{6}{2} = 3$. The point $(0, 3)$ gives $b = 3$.

★ **Answer:** $y = 3x + 3$



slope = $\frac{\text{rise}}{\text{run}}$; b is the y -intercept.

Practice Problems

Write each line in $y = mx + b$ form.

- | | | | |
|-----------------------------------|-------|--|-------|
| 1. through $(0, 2)$ and $(1, 5)$ | _____ | 8. through $(2, 1)$ and $(4, 7)$ | _____ |
| 2. through $(0, -1)$ and $(2, 3)$ | _____ | 9. slope 2 through $(0, 4)$ | _____ |
| 3. through $(0, 4)$ and $(1, 1)$ | _____ | 10. slope -1 through $(0, -3)$ | _____ |
| 4. through $(0, 0)$ and $(2, 6)$ | _____ | 11. slope 4 through $(1, 6)$ | _____ |
| 5. through $(0, 5)$ and $(5, 0)$ | _____ | 12. slope -2 through $(3, 1)$ | _____ |
| 6. through $(1, 3)$ and $(2, 5)$ | _____ | 13. Table: $x: 0, 1, 2 / y: 3, 5, 7$ | _____ |
| 7. through $(1, 2)$ and $(3, 8)$ | _____ | 14. Table: $x: 0, 1, 2 / y: 1, -2, -5$ | _____ |

Word Problems

- | | | | |
|--|-------|---|-------|
| 15. A plumber charges \$50 to come out plus \$40 per hour. Write the cost y for x hours. | _____ | 17. A line passes through $(0, -6)$ and $(3, 0)$. Write its equation. | _____ |
| 16. A 12 cm candle burns down 2 cm each hour. Write its height y after x hours. | _____ | 18. A gym charges a \$20 joining fee plus \$15 per month. Write the total y after x months. | _____ |



Answer Keys

1. $y = 3x + 2$

2. $y = 2x - 1$

3. $y = -3x + 4$

4. $y = 3x$

5. $y = -x + 5$

6. $y = 2x + 1$

7. $y = 3x - 1$

8. $y = 3x - 5$

9. $y = 2x + 4$

10. $y = -x - 3$

11. $y = 4x + 2$

12. $y = -2x + 7$

13. $y = 2x + 3$

14. $y = -3x + 1$

15. $y = 40x + 50$

16. $y = -2x + 12$

17. $y = 2x - 6$

18. $y = 15x + 20$

Step-by-Step Explanations

1. Start by naming the process: Find the slope first, then use the intercept or a point to write the equation in the requested form. The setup/work is Slope = $\frac{5-2}{1-0} = 3$; the point (0, 2) gives $b = 2$: $y = 3x + 2$. So the final answer is $y = 3x + 2$.

2. A good way to think about this is: Find the slope first, then use the intercept or a point to write the equation in the requested form. The setup/work is Slope = $\frac{3-(-1)}{2-0} = 2$; $b = -1$: $y = 2x - 1$. So the final answer is $y = 2x - 1$.

3. Step by step: Find the slope first, then use the intercept or a point to write the equation in the requested form. The setup/work is Slope = $\frac{1-4}{1-0} = -3$; $b = 4$: $y = -3x + 4$. So the final answer is $y = -3x + 4$.

4. Take it one move at a time: Find the slope first, then use the intercept or a point to write the equation in the requested form. The setup/work is Slope = $\frac{6-0}{2-0} = 3$; the line passes through the origin so $b = 0$: $y = 3x$. So the final answer is $y = 3x$.

5. Start by naming the process: Find the slope first, then use the intercept or a point to write the equation in the requested form. The setup/work is Slope = $\frac{0-5}{5-0} = -1$; $b = 5$: $y = -x + 5$. So the final answer is $y = -x + 5$.

6. A good way to think about this is: Find the slope first, then use the intercept or a point to write the equation in the requested form. The setup/work is Slope = $\frac{5-3}{2-1} = 2$. Use (1, 3): $3 = 2(1) + b$, so $b = 1$: $y = 2x + 1$. So the final answer is $y = 2x + 1$.

7. Step by step: Find the slope first, then use the intercept or a point to write the equation in the requested form. The setup/work is Slope = $\frac{8-2}{3-1} = 3$. Use (1, 2): $2 = 3 + b$, so $b = -1$: $y = 3x - 1$. So the final answer is $y = 3x - 1$.

8. Take it one move at a time: Find the slope first, then use the intercept or a point to write the equation in the requested form. The setup/work is Slope = $\frac{7-1}{4-2} = 3$. Use (2, 1): $1 = 6 + b$, so $b = -5$: $y = 3x - 5$. So the final answer is $y = 3x - 5$.

9. Start by naming the process: Find the slope first, then use the intercept or a point to write the equation in the requested form. The setup/work is The point (0, 4) gives $b = 4$: $y = 2x + 4$. So the final answer is $y = 2x + 4$.

10. A good way to think about this is: Find the slope first, then use the intercept or a point to write the equation in the requested form. The setup/work is The point (0, -3) gives $b = -3$: $y = -x - 3$. So the final answer is $y = -x - 3$.

11. Step by step: Find the slope first, then use the intercept or a point to write the equation in the requested form. The setup/work is Substitute (1, 6): $6 = 4(1) + b$, so $b = 2$: $y = 4x + 2$. So the final answer is $y = 4x + 2$.

12. Take it one move at a time: Find the slope first, then use the intercept or a point to write the equation in the requested form. The setup/work is Substitute (3, 1): $1 = -2(3) + b$, so $b = 7$: $y = -2x + 7$. So the final answer is $y = -2x + 7$.

13. Start by naming the process: Find the slope first, then use the intercept or a point to write the equation in the requested form. The setup/work is y goes up 2 each time x goes up 1, so $m = 2$; at $x = 0$, $y = 3$: $y = 2x + 3$. So the final answer is $y = 2x + 3$.

14. A good way to think about this is: Find the slope first, then use the intercept or a point to write the equation in the requested form. The setup/work is y drops 3 each step, so $m = -3$; at $x = 0$, $y = 1$: $y = -3x + 1$. So the final answer is $y = -3x + 1$.

15. Step by step: Find the slope first, then use the intercept or a point to write the equation in the requested form. The setup/work is The \$50 fee is b and \$40 per hour is the slope: $y = 40x + 50$. So the final answer is $y = 40x + 50$.

16. Take it one move at a time: Find the slope first, then use the intercept or a point to write the equation in the requested form. The setup/work is It starts at 12 ($b = 12$) and decreases 2 per hour ($m = -2$): $y = -2x + 12$. So the final answer is $y = -2x + 12$.

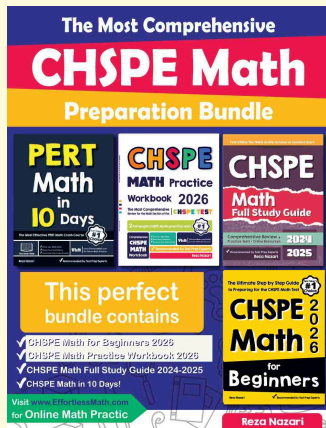
17. Start by naming the process: Find the slope first, then use the intercept or a point to write the equation in the requested form. The setup/work is Slope = $\frac{0-(-6)}{3-0} = 2$; $b = -6$: $y = 2x - 6$. So the final answer is $y = 2x - 6$.

18. A good way to think about this is: Find the slope first, then use the intercept or a point to write the equation in the requested form. The setup/work is The \$20 fee is b and \$15 per month is the slope: $y = 15x + 20$. So the final answer is $y = 15x + 20$.



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