Writing Linear Equations

Name: _____	Date: _____	Score: _____ / 18

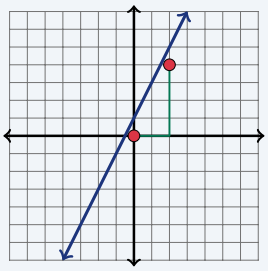
Quick Review and Helpful Hints

To write a line as $y = mx + b$: first find the *slope* $m = \dfrac{y_2 - y_1}{x_2 - x_1}$ 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 $m = \dfrac{9-3}{2-0} = \dfrac{6}{2} = 3$. 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 $(1, 5)$ _____
2. through $(0, -1)$ and $(2, 3)$ _____
3. through $(0, 4)$ and $(1, 1)$ _____
4. through $(0, 0)$ and $(2, 6)$ _____
5. through $(0, 5)$ and $(5, 0)$ _____
6. through $(1, 3)$ and $(2, 5)$ _____
7. through $(1, 2)$ and $(3, 8)$ _____
8. through $(2, 1)$ and $(4, 7)$ _____
9. slope 2 through $(0, 4)$ _____
10. slope -1 through $(0, -3)$ _____
11. slope 4 through $(1, 6)$ _____
12. slope -2 through $(3, 1)$ _____
13. Table: x: $0, 1, 2$ / y: $3, 5, 7$ _____
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. _____
16. A 12 cm candle burns down 2 cm each hour. Write its height y after x hours. _____
17. A line passes through $(0, -6)$ and $(3, 0)$. Write its equation. _____
18. A gym charges a $\$20$ joining fee plus $\$15$ per month. Write the total y after x months. _____

Answer Keys

1. $y = 3x + 2$	**7.** $y = 3x - 1$	**13.** $y = 2x + 3$
2. $y = 2x - 1$	**8.** $y = 3x - 5$	**14.** $y = -3x + 1$
3. $y = -3x + 4$	**9.** $y = 2x + 4$	**15.** $y = 40x + 50$
4. $y = 3x$	**10.** $y = -x - 3$	**16.** $y = -2x + 12$
5. $y = -x + 5$	**11.** $y = 4x + 2$	**17.** $y = 2x - 6$
6. $y = 2x + 1$	**12.** $y = -2x + 7$	**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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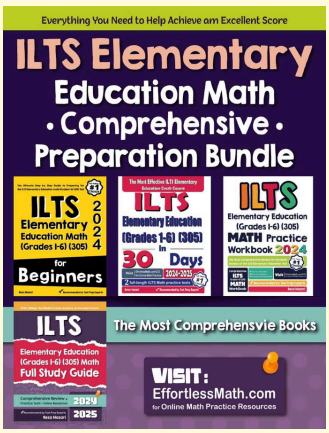

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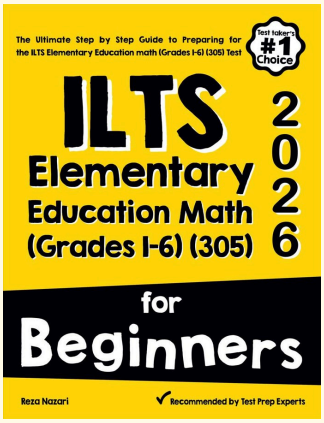

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