

# Writing Linear Equations

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Score: \_\_\_\_\_ / 18

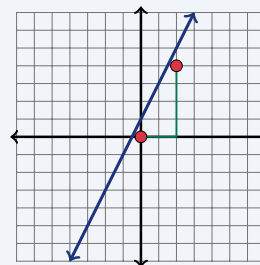
## Quick Review and Helpful Hints

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.

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

### Word Problems

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



## 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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