

# Point-Slope Form

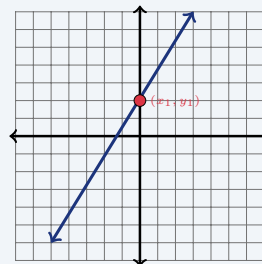
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## Quick Review and Helpful Hints

Point-slope form is  $y - y_1 = m(x - x_1)$ , where  $m$  is the slope and  $(x_1, y_1)$  is a known point. Substitute the slope and point, then distribute and simplify to slope-intercept form  $y = mx + b$  if needed.

▶ **Example:** Write the line through  $(2, 5)$  with slope 3. **Work:** Point-slope:  $y - 5 = 3(x - 2)$ . Distribute:  $y - 5 = 3x - 6$ . Add 5:  $y = 3x - 1$ .

★ **Answer:**  $y = 3x - 1$



$y - y_1 = m(x - x_1)$

### Practice Problems

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

- |  |   |
|--|---|
| <p>1. slope 2 through <math>(1, 4)</math> _____</p> <p>2. slope 3 through <math>(2, 5)</math> _____</p> <p>3. slope <math>-1</math> through <math>(0, 3)</math> _____</p> <p>4. slope 4 through <math>(1, 1)</math> _____</p> <p>5. slope <math>-2</math> through <math>(3, 0)</math> _____</p> <p>6. slope 1 through <math>(2, 5)</math> _____</p> <p>7. slope 5 through <math>(0, -2)</math> _____</p> | <p>8. slope <math>-3</math> through <math>(1, 4)</math> _____</p> <p>9. slope 2 through <math>(-1, 3)</math> _____</p> <p>10. slope <math>\frac{1}{2}</math> through <math>(4, 5)</math> _____</p> <p>11. slope <math>-1</math> through <math>(5, 2)</math> _____</p> <p>12. slope 3 through <math>(-2, -1)</math> _____</p> <p>13. slope 2 through <math>(0, 0)</math> _____</p> <p>14. slope <math>-4</math> through <math>(1, -2)</math> _____</p> |
|--|---|

### Word Problems

15. A line has slope 2 and passes through  $(3, 7)$ . Write its equation in slope-intercept form. \_\_\_\_\_
16. A delivery fee is linear. The cost is \$2 for 1 mile and \$6 for 3 miles. Write the equation of the line through these points. \_\_\_\_\_
17. A line passes through  $(2, -3)$  with slope  $-1$ . Write its equation. \_\_\_\_\_
18. A plumber charges a base fee of \$5 and then \$4 per hour. Write the linear equation with slope 4 and point  $(0, 5)$ . \_\_\_\_\_



## Answer Keys

1.  $y = 2x + 2$

2.  $y = 3x - 1$

3.  $y = -x + 3$

4.  $y = 4x - 3$

5.  $y = -2x + 6$

6.  $y = x + 3$

7.  $y = 5x - 2$

8.  $y = -3x + 7$

9.  $y = 2x + 5$

10.  $y = \frac{1}{2}x + 3$

11.  $y = -x + 7$

12.  $y = 3x + 5$

13.  $y = 2x$

14.  $y = -4x + 2$

15.  $y = 2x + 1$

16.  $y = 2x$

17.  $y = -x - 1$

18.  $y = 4x + 5$

### Step-by-Step Explanations

1. Start by naming the process: Start with point-slope form, distribute if needed, and isolate  $y$  to write the final equation. The setup/work is  $y - 4 = 2(x - 1) = 2x - 2$ , so  $y = 2x + 2$ . So the final answer is  $y = 2x + 2$ .

2. A good way to think about this is: Start with point-slope form, distribute if needed, and isolate  $y$  to write the final equation. The setup/work is  $y - 5 = 3(x - 2) = 3x - 6$ , so  $y = 3x - 1$ . So the final answer is  $y = 3x - 1$ .

3. Step by step: Start with point-slope form, distribute if needed, and isolate  $y$  to write the final equation. The setup/work is  $y - 3 = -1(x - 0) = -x$ , so  $y = -x + 3$ . So the final answer is  $y = -x + 3$ .

4. Take it one move at a time: Start with point-slope form, distribute if needed, and isolate  $y$  to write the final equation. The setup/work is  $y - 1 = 4(x - 1) = 4x - 4$ , so  $y = 4x - 3$ . So the final answer is  $y = 4x - 3$ .

5. Start by naming the process: Start with point-slope form, distribute if needed, and isolate  $y$  to write the final equation. The setup/work is  $y - 0 = -2(x - 3) = -2x + 6$ , so  $y = -2x + 6$ . So the final answer is  $y = -2x + 6$ .

6. A good way to think about this is: Start with point-slope form, distribute if needed, and isolate  $y$  to write the final equation. The setup/work is  $y - 5 = 1(x - 2) = x - 2$ , so  $y = x + 3$ . So the final answer is  $y = x + 3$ .

7. Step by step: Start with point-slope form, distribute if needed, and isolate  $y$  to write the final equation. The setup/work is  $y + 2 = 5(x - 0) = 5x$ , so  $y = 5x - 2$ . So the final answer is  $y = 5x - 2$ .

8. Take it one move at a time: Start with point-slope form, distribute if needed, and isolate  $y$  to write the final equation. The setup/work is  $y - 4 = -3(x - 1) = -3x + 3$ , so  $y = -3x + 7$ . So the final answer is  $y = -3x + 7$ .

9. Start by naming the process: Start with point-slope form, distribute if needed, and isolate  $y$  to write the final equation. The setup/work is  $y - 3 = 2(x + 1) = 2x + 2$ , so  $y = 2x + 5$ . So the final answer is  $y = 2x + 5$ .

10. A good way to think about this is: Start with point-slope form, distribute if needed, and isolate  $y$  to write the final equation. The setup/work is  $y - 5 = \frac{1}{2}(x - 4) = \frac{1}{2}x - 2$ , so  $y = \frac{1}{2}x + 3$ . So the final answer is  $y = \frac{1}{2}x + 3$ .

11. Step by step: Start with point-slope form, distribute if needed, and isolate  $y$  to write the final equation. The setup/work is  $y - 2 = -1(x - 5) = -x + 5$ , so  $y = -x + 7$ . So the final answer is  $y = -x + 7$ .

12. Take it one move at a time: Start with point-slope form, distribute if needed, and isolate  $y$  to write the final equation. The setup/work is  $y + 1 = 3(x + 2) = 3x + 6$ , so  $y = 3x + 5$ . So the final answer is  $y = 3x + 5$ .

13. Start by naming the process: Start with point-slope form, distribute if needed, and isolate  $y$  to write the final equation. The setup/work is  $y - 0 = 2(x - 0) = 2x$ , so  $y = 2x$ . So the final answer is  $y = 2x$ .

14. A good way to think about this is: Start with point-slope form, distribute if needed, and isolate  $y$  to write the final equation. The setup/work is  $y + 2 = -4(x - 1) = -4x + 4$ , so  $y = -4x + 2$ . So the final answer is  $y = -4x + 2$ .

15. Step by step: Start with point-slope form, distribute if needed, and isolate  $y$  to write the final equation. The setup/work is  $y - 7 = 2(x - 3) = 2x - 6$ , so  $y = 2x + 1$ . So the final answer is  $y = 2x + 1$ .

16. Take it one move at a time: Start with point-slope form, distribute if needed, and isolate  $y$  to write the final equation. The setup/work is Slope =  $\frac{6-2}{3-1} = 2$ . Then  $y - 2 = 2(x - 1)$ , so  $y = 2x$ . So the final answer is  $y = 2x$ .

17. Start by naming the process: Start with point-slope form, distribute if needed, and isolate  $y$  to write the final equation. The setup/work is  $y + 3 = -1(x - 2) = -x + 2$ , so  $y = -x - 1$ . So the final answer is  $y = -x - 1$ .

18. A good way to think about this is: Start with point-slope form, distribute if needed, and isolate  $y$  to write the final equation. The setup/work is  $y - 5 = 4(x - 0) = 4x$ , so  $y = 4x + 5$ . So the final answer is  $y = 4x + 5$ .



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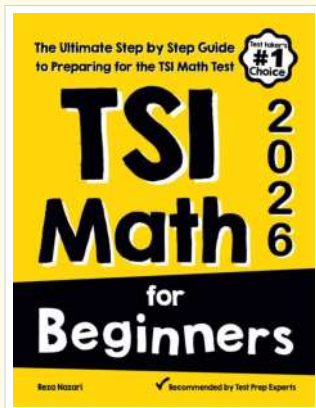
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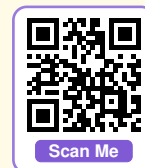
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