

# Slope-Intercept Form

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Score: \_\_\_\_\_ / 30

## Quick Review

**Slope-intercept form:**  $y = mx + b$ , where  $m$  is the slope and  $b$  is the  $y$ -intercept (where the line crosses the  $y$ -axis). The two numbers tell you everything you need to graph the line: start at  $(0, b)$ , then use the slope to step to the next point. The line  $y = 2x + 3$  starts at  $(0, 3)$  with slope 2 — go up 2, right 1, plot a point, and connect. To write a line in this form, you need either the slope and  $y$ -intercept, or enough info to compute them. Lines parallel to the  $x$ -axis are  $y = b$  (slope 0); lines parallel to the  $y$ -axis are  $x = a$  (undefined slope, not slope-intercept form).

## PRACTICE

Write or identify in slope-intercept form.

- A line has slope 2 and  $y$ -intercept 5. Write its equation. \_\_\_\_\_
- A line has slope  $-1$  and passes through the origin. Write its equation. \_\_\_\_\_
- A line has slope  $\frac{1}{2}$  and  $y$ -intercept  $-3$ . Write its equation. \_\_\_\_\_
- Identify  $m, b$  in  $y = 4x - 9$  \_\_\_\_\_
- Identify  $m, b$  in  $y = -\frac{2}{3}x + 1$  \_\_\_\_\_
- Slope of  $y = 7$  \_\_\_\_\_
- For the line  $y = -x + 4$ , what is the  $y$ -intercept? \_\_\_\_\_
- Line through  $(0, 2)$  with slope 3 \_\_\_\_\_
- A horizontal line crosses the  $y$ -axis at  $-5$ . Write its equation. \_\_\_\_\_
- Rewrite  $2x + y = 8$  in slope-intercept form. \_\_\_\_\_
- Rewrite  $4y = 12x - 8$  in slope-intercept form. \_\_\_\_\_
- Convert  $3x - y = 6$  \_\_\_\_\_
- Line through  $(2, 5)$  with  $m = 3$  \_\_\_\_\_
- A line passes through  $(0, -4)$  and has slope  $-1$ . Write its equation. \_\_\_\_\_
- For  $y = -\frac{1}{2}x + 9$ , identify the slope. \_\_\_\_\_
- Convert  $y - 3 = 2(x + 1)$  \_\_\_\_\_
- A line has slope  $-3$  and  $y$ -intercept  $\frac{1}{2}$ . Write its equation. \_\_\_\_\_
- Slope of  $x = 4$  \_\_\_\_\_
- Convert  $5x + 10y = 20$  \_\_\_\_\_
- A line goes through the origin and has slope  $\frac{2}{3}$ . Write its equation. \_\_\_\_\_

## VISUAL PRACTICE

Use the graph, table, chart, or diagram to answer the question.

21. Identify the slope and  $y$ -intercept of the graphed line.



Answer: \_\_\_\_\_

22. Identify the slope and  $y$ -intercept of the graphed line.



Answer: \_\_\_\_\_



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**◆ Word Problems**

23. A taxi charges \$3 to start plus \$2 per mile. Write the cost as a function of miles.

Model: \_\_\_\_\_

Answer: \_\_\_\_\_

24. A phone plan starts at \$25 per month plus \$0.10 per text. Write the cost function.

Model: \_\_\_\_\_

Answer: \_\_\_\_\_

25. A water tank holds 500 gallons and drains at 25 gallons per hour. Write volume after  $t$  hours.

Model: \_\_\_\_\_

Answer: \_\_\_\_\_

26. A line passes through  $(0, 10)$  and  $(4, 2)$ . Write its equation in slope-intercept form and identify the starting value.

Model: \_\_\_\_\_

Answer: \_\_\_\_\_

27. A gym charges an \$18 sign-up fee and \$22 each month. Write the total cost after  $m$  months.

Model: \_\_\_\_\_

Answer: \_\_\_\_\_

28. A candle is 12 inches tall and burns down 0.5 inch each hour. Write its height after  $t$  hours.

Model: \_\_\_\_\_

Answer: \_\_\_\_\_

29. A line crosses the  $y$ -axis at  $-6$  and passes through  $(3, 0)$ . Write its equation.

Model: \_\_\_\_\_

Answer: \_\_\_\_\_

30. Jada starts with \$75 saved and adds \$15 each week. Write a function for her savings after  $w$  weeks.

Model: \_\_\_\_\_

Answer: \_\_\_\_\_



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## Answer Keys

- |  |  |
|--|--|
| <p>1. <math>y = 2x + 5</math></p> <p>2. <math>y = -x</math></p> <p>3. <math>y = \frac{1}{2}x - 3</math></p> <p>4. <math>m = 4, b = -9</math></p> <p>5. <math>m = -\frac{2}{3}, b = 1</math></p> <p>6. <math>0</math></p> <p>7. <math>4</math></p> <p>8. <math>y = 3x + 2</math></p> <p>9. <math>y = -5</math></p> <p>10. <math>y = -2x + 8</math></p> <p>11. <math>y = 3x - 2</math></p> <p>12. <math>y = 3x - 6</math></p> <p>13. <math>y = 3x - 1</math></p> <p>14. <math>y = -x - 4</math></p> <p>15. <math>-\frac{1}{2}</math></p> | <p>16. <math>y = 2x + 5</math></p> <p>17. <math>y = -3x + \frac{1}{2}</math></p> <p>18. undefined</p> <p>19. <math>y = -\frac{1}{2}x + 2</math></p> <p>20. <math>y = \frac{2}{3}x</math></p> <p>21. <math>m = 2, b = 1</math></p> <p>22. <math>m = -1, b = 3</math></p> <p>23. <math>C = 2m + 3</math></p> <p>24. <math>C = 0.10t + 25</math></p> <p>25. <math>V = 500 - 25t</math></p> <p>26. <math>y = -2x + 10</math></p> <p>27. <math>C = 22m + 18</math></p> <p>28. <math>h = -0.5t + 12</math></p> <p>29. <math>y = 2x - 6</math></p> <p>30. <math>S = 15w + 75</math></p> |
|--|--|

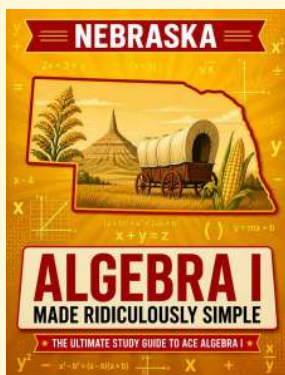
### Step-by-Step Tutor Notes

1. Slope-intercept form is  $y = mx + b$ . With  $m = 2$  and  $b = 5$ , the equation is  $y = 2x + 5$ .
2. Passing through the origin means the  $y$ -intercept is 0. In  $y = mx + b$ , use  $m = -1$  and  $b = 0$ , so  $y = -x$ .
3. Use  $m = \frac{1}{2}$  and  $b = -3$  in  $y = mx + b$ . Fractional slopes work the same way as whole-number slopes.
4. Compare the change in output to the change in input, because slope is a rate of change. Coefficient of  $x$  is the slope; constant is the  $y$ -intercept. So the requested value is  $m = 4, b = -9$ .
5. Think of slope as the amount the output changes for each 1-unit change in the input. Negative fractional slope;  $y$ -intercept at 1. So the requested value is  $m = -\frac{2}{3}, b = 1$ .
6. Think of slope as the amount the output changes for each 1-unit change in the input.  $y = 7$  is a horizontal line. Slope is 0. So the requested value is 0.
7. In slope-intercept form, the constant term is the  $y$ -intercept. Here that constant is 4.
8. Use the clue in the question first, then let the arithmetic finish the job.  $(0, 2)$  is the  $y$ -intercept, so  $b = 2$ . So the answer is  $y = 3x + 2$ .
9. A horizontal line keeps the same  $y$ -value everywhere. Since it crosses at  $-5$ , the equation is  $y = -5$ .
10. Work one inverse operation at a time and keep both sides balanced. Move the  $2x$  term to the other side by subtracting  $2x$ :  $y = -2x + 8$ . After simplifying, the answer is  $y = -2x + 8$ .
11. Divide every term by 4. That gives  $y = 3x - 2$ , with slope 3 and intercept  $-2$ .
12. Work one inverse operation at a time and keep both sides balanced. Subtract  $3x$ :  $-y = -3x + 6$ . Multiply by  $-1$ :  $y = 3x - 6$ . After simplifying, the answer is  $y = 3x - 6$ .
13. Use the labels on the display first; they tell you which count or total belongs in the answer.  $y - 5 = 3(x - 2) \Rightarrow y = 3x - 6 + 5 = 3x - 1$ . This gives  $y = 3x - 1$ .
14. The point  $(0, -4)$  is the  $y$ -intercept, so  $b = -4$ . With slope  $-1$ , the equation is  $y = -x - 4$ .
15. The slope is the coefficient of  $x$  in slope-intercept form, so the slope is  $-\frac{1}{2}$ .
16. Focus on the main idea of the problem, then simplify carefully. Distribute:  $y - 3 = 2x + 2$ , so  $y = 2x + 5$ . So the answer is  $y = 2x + 5$ .
17. Use  $y = mx + b$  with  $m = -3$  and  $b = \frac{1}{2}$ . That gives  $y = -3x + \frac{1}{2}$ .
18. Think of slope as the amount the output changes for each 1-unit change in the input. Vertical line — not a function, slope is undefined. So the requested value is undefined.
19. Keep the order of operations in view, then simplify without skipping the sign check. Subtract  $5x$ :  $10y = -5x + 20$ . Divide by 10:  $y = -\frac{1}{2}x + 2$ . After simplifying, the answer is  $y = -\frac{1}{2}x + 2$ .
20. The origin gives  $b = 0$ . With slope  $\frac{2}{3}$ , the equation is  $y = \frac{2}{3}x$ .
21. The line crosses the  $y$ -axis at 1 and rises 2 for each 1 step right.
22. The line crosses the  $y$ -axis at 3 and drops 1 for each step right, so  $m = -1$  and  $b = 3$ .
23. \$3 is the starting cost (the  $y$ -intercept); \$2 per mile is the rate (slope).  $C = 2m + 3$ .
24. Think of slope as the amount the output changes for each 1-unit change in the input.  $b = 25$  (flat fee),  $m = 0.10$  (per-text rate).  $C = 0.10t + 25$ . So the requested value is  $C = 0.10t + 25$ .
25. Compare the change in output to the change in input, because slope is a rate of change. Starts at 500 (intercept); drops by 25 per hour (slope  $-25$ ).  $V = -25t + 500$ . So the requested value is  $V = 500 - 25t$ .
26. Think of slope as the amount the output changes for each 1-unit change in the input.  $(0, 10)$  gives  $b = 10$ . Slope:  $\frac{2-10}{4-0} = -2$ . So  $y = -2x + 10$ . So the requested value is  $y = -2x + 10$ .
27. The monthly charge is the slope, 22. The one-time sign-up fee is the  $y$ -intercept, 18. So  $C = 22m + 18$ .
28. The starting height is 12, and the height drops by 0.5 each hour. That gives  $h = -0.5t + 12$ .
29. The  $y$ -intercept is  $-6$ . Slope from  $(0, -6)$  to  $(3, 0)$  is  $\frac{0 - (-6)}{3 - 0} = 2$ , so  $y = 2x - 6$ .
30. The starting amount is 75, and the weekly rate is 15. In slope-intercept form,  $S = 15w + 75$ .



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