

# Standard Form of a Linear Equation

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

## Quick Review and Helpful Hints

Standard form is  $Ax + By = C$  with integer coefficients. To find the  $x$ -intercept, set  $y = 0$  and solve; for the  $y$ -intercept, set  $x = 0$  and solve. You can switch to slope-intercept form by solving the equation for  $y$ .

► **Example:** Find the intercepts of  $2x + 3y = 12$ . **Work:**  $x$ -intercept: set  $y = 0$ ,  $2x = 12$ ,  $x = 6 \rightarrow (6, 0)$ .  $y$ -intercept: set  $x = 0$ ,  $3y = 12$ ,  $y = 4 \rightarrow (0, 4)$ .  
 ★ **Answer:**  $(6, 0)$  and  $(0, 4)$



Set  $y=0$  and  $x=0$  for intercepts.

### Practice Problems

Find the intercept, convert form, or write standard form as directed.

- |                             |       |                                    |       |
|-----------------------------|-------|------------------------------------|-------|
| 1. $x$ -int of $x + y = 5$  | _____ | 8. $y$ -int of $x - 2y = 6$        | _____ |
| 2. $y$ -int of $x + y = 5$  | _____ | 9. Solve for $y$ : $2x + y = 7$    | _____ |
| 3. $x$ -int of $2x + y = 8$ | _____ | 10. Solve for $y$ : $x + 3y = 9$   | _____ |
| 4. $y$ -int of $2x + y = 8$ | _____ | 11. Solve for $y$ : $4x - 2y = 8$  | _____ |
| 5. $x$ -int of $3x - y = 9$ | _____ | 12. Solve for $y$ : $-x + y = 2$   | _____ |
| 6. $y$ -int of $3x - y = 9$ | _____ | 13. Standard form of $y = 2x + 5$  | _____ |
| 7. $x$ -int of $x - 2y = 6$ | _____ | 14. Standard form of $y = -3x + 1$ | _____ |

### Word Problems

- |  |       |  |       |
|--|-------|--|-------|
| 15. The line $4x + 2y = 20$ models a budget. Find its $x$ -intercept.  | _____ | 17. Convert $6x + 3y = 12$ to slope-intercept form.  | _____ |
| 16. A concession budget is modeled by $4x + 2y = 20$ , where $y$ is the dollars left after buying $x$ snack packs. What is the $y$ -intercept? | _____ | 18. A fundraiser goal is modeled by $x + y = 7$ , where $x$ and $y$ are two types of ticket bundles. Find both intercepts to graph the plan. | _____ |



## Answer Keys

1.  $(5, 0)$

2.  $(0, 5)$

3.  $(4, 0)$

4.  $(0, 8)$

5.  $(3, 0)$

6.  $(0, -9)$

7.  $(6, 0)$

8.  $(0, -3)$

9.  $y = -2x + 7$

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

11.  $y = 2x - 4$

12.  $y = x + 2$

13.  $2x - y = -5$

14.  $3x + y = 1$

15.  $(5, 0)$

16.  $(0, 10)$

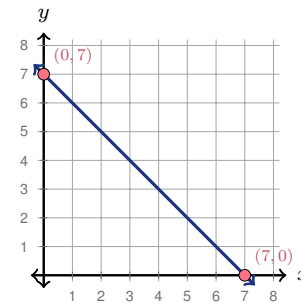
17.  $y = -2x + 4$

18.  $(7, 0)$  and  $(0, 7)$

### Graph Answer Sketch

The word problem in item 18 asks for intercepts so the plan can be graphed. The sketch below shows those intercepts on the line.

18. For  $x + y = 7$ , the intercepts are  $(7, 0)$  and  $(0, 7)$ . Plot both points, then draw the line through them.



### Step-by-Step Explanations

- Start by naming the process: To find an intercept, set the other variable equal to zero and solve the remaining equation. The setup/work is Set  $y = 0$ :  $x = 5$ , giving  $(5, 0)$ . So the final answer is  $(5, 0)$ .
- A good way to think about this is: To find an intercept, set the other variable equal to zero and solve the remaining equation. The setup/work is Set  $x = 0$ :  $y = 5$ , giving  $(0, 5)$ . So the final answer is  $(0, 5)$ .
- Step by step: To find an intercept, set the other variable equal to zero and solve the remaining equation. The setup/work is Set  $y = 0$ :  $2x = 8$ ,  $x = 4$ , giving  $(4, 0)$ . So the final answer is  $(4, 0)$ .
- Take it one move at a time: To find an intercept, set the other variable equal to zero and solve the remaining equation. The setup/work is Set  $x = 0$ :  $y = 8$ , giving  $(0, 8)$ . So the final answer is  $(0, 8)$ .
- Start by naming the process: To find an intercept, set the other variable equal to zero and solve the remaining equation. The setup/work is Set  $y = 0$ :  $3x = 9$ ,  $x = 3$ , giving  $(3, 0)$ . So the final answer is  $(3, 0)$ .
- A good way to think about this is: To find an intercept, set the other variable equal to zero and solve the remaining equation. The setup/work is Set  $x = 0$ :  $-y = 9$ ,  $y = -9$ , giving  $(0, -9)$ . So the final answer is  $(0, -9)$ .
- Step by step: To find an intercept, set the other variable equal to zero and solve the remaining equation. The setup/work is Set  $y = 0$ :  $x = 6$ , giving  $(6, 0)$ . So the final answer is  $(6, 0)$ .
- Take it one move at a time: To find an intercept, set the other variable equal to zero and solve the remaining equation. The setup/work is Set  $x = 0$ :  $-2y = 6$ ,  $y = -3$ , giving  $(0, -3)$ . So the final answer is  $(0, -3)$ .
- Start by naming the process: To find an intercept, set the other variable equal to zero and solve the remaining equation. The setup/work is Subtract  $2x$ :  $y = -2x + 7$ . So the final answer is  $y = -2x + 7$ .

- A good way to think about this is: To find an intercept, set the other variable equal to zero and solve the remaining equation. The setup/work is Subtract  $x$ :  $3y = -x + 9$ . Divide by 3:  $y = -\frac{1}{3}x + 3$ . So the final answer is  $y = -\frac{1}{3}x + 3$ .
- Step by step: To find an intercept, set the other variable equal to zero and solve the remaining equation. The setup/work is Subtract  $4x$ :  $-2y = -4x + 8$ . Divide by  $-2$ :  $y = 2x - 4$ . So the final answer is  $y = 2x - 4$ .
- Take it one move at a time: To find an intercept, set the other variable equal to zero and solve the remaining equation. The setup/work is Add  $x$  to both sides:  $y = x + 2$ . So the final answer is  $y = x + 2$ .
- Start by naming the process: To find an intercept, set the other variable equal to zero and solve the remaining equation. The setup/work is Move  $2x$  left:  $-2x + y = 5$ . Multiply by  $-1$ :  $2x - y = -5$ . So the final answer is  $2x - y = -5$ .
- A good way to think about this is: To find an intercept, set the other variable equal to zero and solve the remaining equation. The setup/work is Move  $-3x$  left:  $3x + y = 1$ . So the final answer is  $3x + y = 1$ .
- Step by step: To find an intercept, set the other variable equal to zero and solve the remaining equation. The setup/work is Set  $y = 0$ :  $4x = 20$ ,  $x = 5$ , giving  $(5, 0)$ . So the final answer is  $(5, 0)$ .
- Take it one move at a time: To find an intercept, set the other variable equal to zero and solve the remaining equation. The setup/work is Set  $x = 0$ :  $2y = 20$ ,  $y = 10$ , giving  $(0, 10)$ . So the final answer is  $(0, 10)$ .
- Start by naming the process: To find an intercept, set the other variable equal to zero and solve the remaining equation. The setup/work is Subtract  $6x$ :  $3y = -6x + 12$ . Divide by 3:  $y = -2x + 4$ . So the final answer is  $y = -2x + 4$ .
- A good way to think about this is: To find an intercept, set the other variable equal to zero and solve the remaining equation. The setup/work is Set  $y = 0 \rightarrow (7, 0)$  and  $x = 0 \rightarrow (0, 7)$ . So the final answer is  $(7, 0)$  and  $(0, 7)$ .



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