

# Standard Form of a Linear Equation

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Score: \_\_\_\_\_ / 26

## Q Quick Review

**Standard form:**  $Ax + By = C$ , where  $A, B, C$  are integers (usually with  $A > 0$ ). It's the form most useful for finding intercepts and for problems where  $x$  and  $y$  are both "mixed in" (like "2 apples and 3 bananas cost \$7"). **To find the  $x$ -intercept:** set  $y = 0$  and solve. **To find the  $y$ -intercept:** set  $x = 0$  and solve. To convert from slope-intercept to standard form: move the  $x$ -term to the left side, clear any fractions, and make  $A$  positive. To convert standard form to slope-intercept: solve for  $y$ . Both forms describe the same line; choose whichever's easier for the task.

## PRACTICE

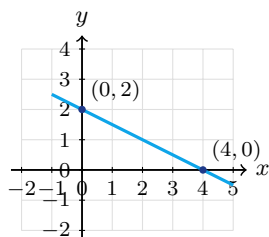
Find intercepts, convert forms, or write in standard form.

- |  |       |  |       |
|--|-------|--|-------|
| 1. $2x + 3y = 12$ ; $x$ -int             | _____ | 11. $6x - 3y = 18$ ; slope               | _____ |
| 2. $2x + 3y = 12$ ; $y$ -int             | _____ | 12. $2x + y = 0$ ; slope-intercept form  | _____ |
| 3. $x - y = 5$ ; $x$ -int                | _____ | 13. Convert $y = \frac{3}{4}x - 2$       | _____ |
| 4. $x - y = 5$ ; $y$ -int                | _____ | 14. $x + y = 7$ ; slope                  | _____ |
| 5. $5x + 2y = 10$ ; slope-intercept form | _____ | 15. $x = 4$ ; intercepts                 | _____ |
| 6. Convert $y = 2x - 3$                  | _____ | 16. $y = -2$ ; intercepts                | _____ |
| 7. Convert $y = -\frac{1}{2}x + 4$       | _____ | 17. $7x - 2y = 14$ ; $x$ -int            | _____ |
| 8. $3x - y = 9$ ; slope-intercept form   | _____ | 18. $7x - 2y = 14$ ; $y$ -int            | _____ |
| 9. $4x + 5y = 20$ ; $x$ -int             | _____ | 19. Through $(2, 0), (0, 3)$ in std form | _____ |
| 10. $4x + 5y = 20$ ; $y$ -int            | _____ | 20. Convert $2y - 6 = 4x$                | _____ |

## ◆ VISUAL PRACTICE

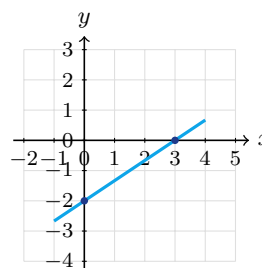
Use the graph, table, chart, or diagram to answer the question.

21. The line has intercepts  $(4, 0)$  and  $(0, 2)$ . Write its equation in standard form.



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

22. The line has intercepts  $(3, 0)$  and  $(0, -2)$ . Write its equation in standard form.



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



**◆ Word Problems**

23. Apples cost \$2 each and bananas \$1 each. You spent \$10. Write the equation in standard form, then find how many apples if you bought 4 bananas.

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

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

24. A worker earns \$15 per hour at job A and \$20 per hour at job B. They earned \$240 total. Write the equation and find one possible combination.

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

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

25. A line has an  $x$ -intercept of 5 and a  $y$ -intercept of  $-2$ . Use the intercepts to write the equation in standard form.

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

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

26. A car wash sells regular for \$8 and deluxe for \$15. They made \$300 one day. Write the equation.

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

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



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## Answer Keys

- |   |   |
|---|---|
| <p>1. <span style="border: 1px solid black; border-radius: 5px; padding: 2px 5px;">6</span></p> <p>2. <span style="border: 1px solid black; border-radius: 5px; padding: 2px 5px;">4</span></p> <p>3. <span style="border: 1px solid black; border-radius: 5px; padding: 2px 5px;">5</span></p> <p>4. <span style="border: 1px solid black; border-radius: 5px; padding: 2px 5px;">-5</span></p> <p>5. <span style="border: 1px solid black; border-radius: 5px; padding: 2px 5px;"><math>y = -\frac{5}{2}x + 5</math></span></p> <p>6. <span style="border: 1px solid black; border-radius: 5px; padding: 2px 5px;"><math>2x - y = 3</math></span></p> <p>7. <span style="border: 1px solid black; border-radius: 5px; padding: 2px 5px;"><math>x + 2y = 8</math></span></p> <p>8. <span style="border: 1px solid black; border-radius: 5px; padding: 2px 5px;"><math>y = 3x - 9</math></span></p> <p>9. <span style="border: 1px solid black; border-radius: 5px; padding: 2px 5px;">5</span></p> <p>10. <span style="border: 1px solid black; border-radius: 5px; padding: 2px 5px;">4</span></p> <p>11. <span style="border: 1px solid black; border-radius: 5px; padding: 2px 5px;">2</span></p> <p>12. <span style="border: 1px solid black; border-radius: 5px; padding: 2px 5px;"><math>y = -2x</math></span></p> <p>13. <span style="border: 1px solid black; border-radius: 5px; padding: 2px 5px;"><math>3x - 4y = 8</math></span></p> | <p>14. <span style="border: 1px solid black; border-radius: 5px; padding: 2px 5px;">-1</span></p> <p>15. <span style="border: 1px solid black; border-radius: 5px; padding: 2px 5px;"><math>x</math>-int 4, no <math>y</math>-int</span></p> <p>16. <span style="border: 1px solid black; border-radius: 5px; padding: 2px 5px;"><math>y</math>-int -2, no <math>x</math>-int</span></p> <p>17. <span style="border: 1px solid black; border-radius: 5px; padding: 2px 5px;">2</span></p> <p>18. <span style="border: 1px solid black; border-radius: 5px; padding: 2px 5px;">-7</span></p> <p>19. <span style="border: 1px solid black; border-radius: 5px; padding: 2px 5px;"><math>3x + 2y = 6</math></span></p> <p>20. <span style="border: 1px solid black; border-radius: 5px; padding: 2px 5px;"><math>4x - 2y = -6</math> or <math>2x - y = -3</math></span></p> <p>21. <span style="border: 1px solid black; border-radius: 5px; padding: 2px 5px;"><math>x + 2y = 4</math></span></p> <p>22. <span style="border: 1px solid black; border-radius: 5px; padding: 2px 5px;"><math>2x - 3y = 6</math></span></p> <p>23. <span style="border: 1px solid black; border-radius: 5px; padding: 2px 5px;"><math>2a + b = 10</math>; <math>a = 3</math></span></p> <p>24. <span style="border: 1px solid black; border-radius: 5px; padding: 2px 5px;"><math>15a + 20b = 240</math>; e.g. <math>a = 8, b = 6</math></span></p> <p>25. <span style="border: 1px solid black; border-radius: 5px; padding: 2px 5px;"><math>2x - 5y = 10</math></span></p> <p>26. <span style="border: 1px solid black; border-radius: 5px; padding: 2px 5px;"><math>8r + 15d = 300</math></span></p> |
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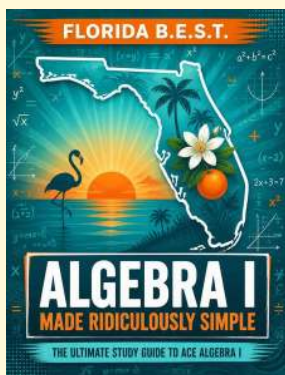
### Step-by-Step Tutor Notes

1. For a table question, slow down and locate the exact row, column, or cell before calculating.  $y = 0 \Rightarrow 2x = 12 \Rightarrow x = 6$ . This gives 6.
2. Use the labels on the display first; they tell you which count or total belongs in the answer.  $x = 0 \Rightarrow 3y = 12 \Rightarrow y = 4$ . This gives 4.
3. Use the labels on the display first; they tell you which count or total belongs in the answer.  $y = 0 \Rightarrow x = 5$ . This gives 5.
4. Read the table by matching the correct row and column first, then use the count or total that fits the question.  $x = 0 \Rightarrow -y = 5 \Rightarrow y = -5$ . This gives -5.
5. For a table question, slow down and locate the exact row, column, or cell before calculating.  $2y = -5x + 10 \Rightarrow y = -\frac{5}{2}x + 5$ . This gives  $y = -\frac{5}{2}x + 5$ .
6. Move carefully through the arithmetic; one clean operation usually unlocks the next one. Subtract  $y$ :  $0 = 2x - y - 3$ . Add 3:  $2x - y = 3$ . After simplifying, the answer is  $2x - y = 3$ .
7. Move carefully through the arithmetic; one clean operation usually unlocks the next one. Multiply by 2:  $2y = -x + 8$ . Add  $x$ :  $x + 2y = 8$ . After simplifying, the answer is  $x + 2y = 8$ .
8. Work one inverse operation at a time and keep both sides balanced. Subtract  $3x$ :  $-y = -3x + 9$ . Multiply by  $-1$ :  $y = 3x - 9$ . After simplifying, the answer is  $y = 3x - 9$ .
9. Read the table by matching the correct row and column first, then use the count or total that fits the question.  $y = 0 \Rightarrow 4x = 20$ . This gives 5.
10. Read the table by matching the correct row and column first, then use the count or total that fits the question.  $x = 0 \Rightarrow 5y = 20$ . This gives 4.
11. Use the labels on the display first; they tell you which count or total belongs in the answer.  $-3y = -6x + 18 \Rightarrow y = 2x - 6$ . Slope = 2. This gives 2.
12. Use the clue in the question first, then let the arithmetic finish the job.  $y = -2x$ . Through origin. So the answer is  $y = -2x$ .
13. Move carefully through the arithmetic; one clean operation usually unlocks the next one. Multiply by 4:  $4y = 3x - 8$ . Rearrange:  $3x - 4y = 8$ . After simplifying, the answer is  $3x - 4y = 8$ .
14. Compare the change in output to the change in input, because slope is a rate of change.  $y = -x + 7$ . Slope = -1. So the requested value is -1.
15. Focus on the main idea of the problem, then simplify carefully. Vertical line. Crosses  $x$ -axis at 4, never the  $y$ -axis. So the answer is  $x$ -int 4, no  $y$ -int.
16. Start with the definition the problem is testing, then apply it directly. Horizontal line. Crosses  $y$ -axis at -2, parallel to  $x$ -axis. So the answer is  $y$ -int -2, no  $x$ -int.
17. Read the table by matching the correct row and column first, then use the count or total that fits the question.  $y = 0 \Rightarrow 7x = 14$ . This gives 2.
18. Read the table by matching the correct row and column first, then use the count or total that fits the question.  $x = 0 \Rightarrow -2y = 14 \Rightarrow y = -7$ . This gives -7.
19.  $y$ -int 3,  $x$ -int 2. Slope-int:  $y = -\frac{3}{2}x + 3$ . Standard:  $3x + 2y = 6$ .
20. Move  $4x$  left:  $-4x + 2y = 6$ . Multiply by  $-1$ :  $4x - 2y = -6$ . Or divide by 2:  $2x - y = -3$ .
21. Using intercept form,  $\frac{x}{4} + \frac{y}{2} = 1$ . Multiply by 4 to get  $x + 2y = 4$ .
22. The intercept form is  $\frac{x}{3} + \frac{y}{-2} = 1$ . Multiplying by 6 gives  $2x - 3y = 6$ .
23. Use the labels on the display first; they tell you which count or total belongs in the answer.  $2a + b = 10$ . With  $b = 4$ :  $2a + 4 = 10 \Rightarrow 2a = 6 \Rightarrow a = 3$  apples. This gives  $2a + b = 10$ ;  $a = 3$ .
24.  $15a + 20b = 240$ . One solution:  $a = 8, b = 6$ :  $15(8) + 20(6) = 120 + 120 = 240$ . ✓.
25. Points (5, 0) and (0, -2). Slope:  $\frac{-2-0}{0-5} = \frac{2}{5}$ .  $y = \frac{2}{5}x - 2$ . Multiply by 5:  $5y = 2x - 10$ . Rearrange:  $2x - 5y = 10$ .
26.  $r$  regulars and  $d$  deluxes contribute  $8r$  and  $15d$  dollars:  $8r + 15d = 300$ . Many integer solutions exist; this is the constraint.



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