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I. Model Problems.
II. Practice
III. Challenge Problems
VI. Answer Key

Graph Paper Maker (free): www.mathworksheetsgo.com/paper/

Online Graphing Calculator(free): www.mathworksheetsgo.com/calculator/

I. Model Problems

The **"standard" form** of a line is given by the formula $Ax + By = C$, where A and B are both not equal to zero.

Standard form is useful for finding x- and y-intercepts.

Example 1 What is the x-intercept of the line with equation $3x + 4y = 12$?

$3x + 4y = 12$	Write the equation of the line.
$3x + 4(0) = 12$	Substitute $y = 0$ to find the x-intercept.
$3x = 12$	Simplify.
$x = 4$	Divide.

The x-intercept is 4, or the point (4, 0).
The answer is (4, 0).

Example 2 What is the y-intercept of the line with equation $3x + 4y = 12$?

$3x + 4y = 12$	Write the equation of the line.
$3(0) + 4y = 12$	Substitute $x = 0$ to find the y-intercept.
$4y = 12$	Simplify.
$y = 3$	Divide.

The y-intercept is 3, or the point (0, 3).
The answer is (0, 3).

The x-intercept of a line in form $Ax + By = C$ is equal to C/A.
The y-intercept of a line in form $Ax + By = C$ is equal to B/A.

Equations written in standard form are typically written using integer coefficients for x and y. This means the values of A and B are usually integers.

Converting to standard form from slope-intercept form is a useful skill.

Example 3 Write $y = \frac{3}{2}x + 10$ in standard form using integer coefficients.

$y = \frac{3}{2}x + 10$	Write the equation of the line.
$-\frac{3}{2}x + y = 10$	Subtract $\frac{3}{2}x$ to get the x and y on the same side of the equation.
$2 \cdot (-\frac{3}{2}x + y) = 2 \cdot 10$	Multiply each side by 2.
$-3x + 2y = 20$	Simplify.

The answer is $-3x + 2y = 20$.

Sometimes you will need to graph a line in standard form.

Example 4 Graph the line with equation $2x + 8y = 16$.

Calculate the x- and y- intercepts as shown in Example 1 and Example 2:

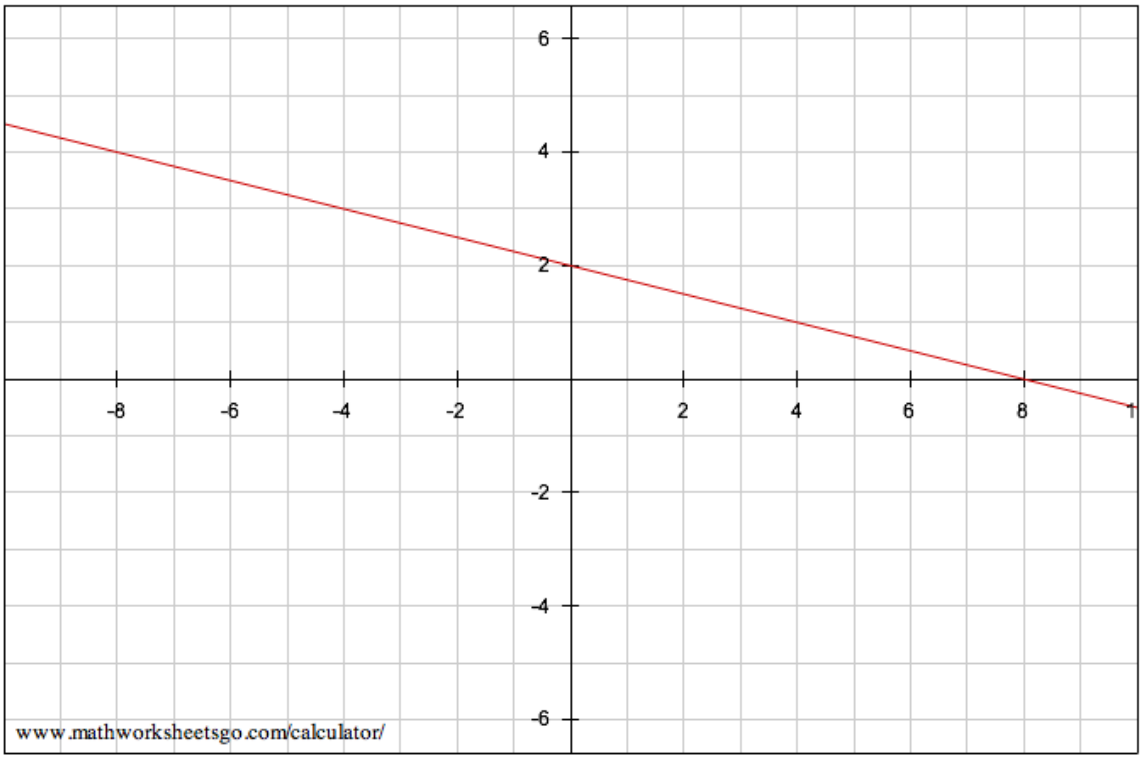
$2x + 8y = 16$	Write the equation of the line.
$2x + 8(0) = 16$	Substitute $y = 0$ to find the x-intercept.
$2x = 16$	Simplify.
$x = 8$	Divide.

The x-intercept is (8, 0).

$2x + 8y = 16$	Write the equation of the line.
$2(0) + 8y = 16$	Substitute $x = 0$ to find the y-intercept.
$8y = 16$	Simplify.
$y = 2$	Divide.

The y-intercept is (0, 2).

Plot the points (8, 0) and (0, 2). Draw the line between the two points. The graph is shown:



II.

Practice

Find the *x*- and *y*- intercepts of the given lines in standard form.

1. $2x + 5y = 10$

2. $3x + 8y = 24$

3. $-2x + 7y = 14$

4. $-9x - 2y = 18$

5. $4x - 5y = 8$

6. $25x + 100y = 200$

7. $8x + 11y = 92$

8. $12x - 36y = 72$

9. $-70x + 90y = 630$

10. $-10x + 5y = 45$

Write each equation in standard form using integer coefficients for *A*, *B* and *C*.

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

12. $y = -\frac{1}{4}x + 2$

13. $y = -\frac{7}{3}x + 5$

14. $y = 5x + 8$

15. $y = \frac{5}{6}x - 7$

16. $y = \frac{1}{3}x - \frac{2}{3}$

17. $y = -\frac{8}{15}x + \frac{1}{20}$

18. $y = \frac{2}{5}x + \frac{5}{6}$

19. $y = -\frac{3}{8}x + \frac{2}{15}$

20. $y = -\frac{6}{7}x + \frac{1}{9}$

21. $y = -\frac{14}{17}x + \frac{15}{17}$

22. $y = \frac{1}{12}x + \frac{1}{3}$

Graph each line using intercepts.

23. $3x + 5y = 15$

24. $7x - 3y = 21$

25. $8x + 7y = 56$

26. $-5x - 4y = 40$

27. $-6x + 9y = 54$

28. $9x - 10y = 90$

29. $5x - 7y = 42$

30. $-5x - 2y = 18$

31. $9x + 11y = 88$

32. $10x - 6y = 35$

33. $12x + 5y = 144$

34. $15x - 30y = 60$

III. Challenge Problems

35. Explain why it's sometimes helpful to use the standard form instead of the slope-intercept form of a line.

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_____

36. Write $y - j = m(x - k)$ in standard form.

_____

37. Correct the Error

Question: Write $y = -\frac{1}{5}x + \frac{3}{4}$ in standard form using integer coefficients for A, B and C.

Solution:

$$y = -\frac{1}{5}x + \frac{3}{4}$$

$$y + \frac{1}{5}x = \frac{3}{4}$$

$$5y + x = \frac{3}{4}$$

$5y + 4x = 3$, or $4x + 5y = 3$

The equation of the line is $4x + 5y = 3$.

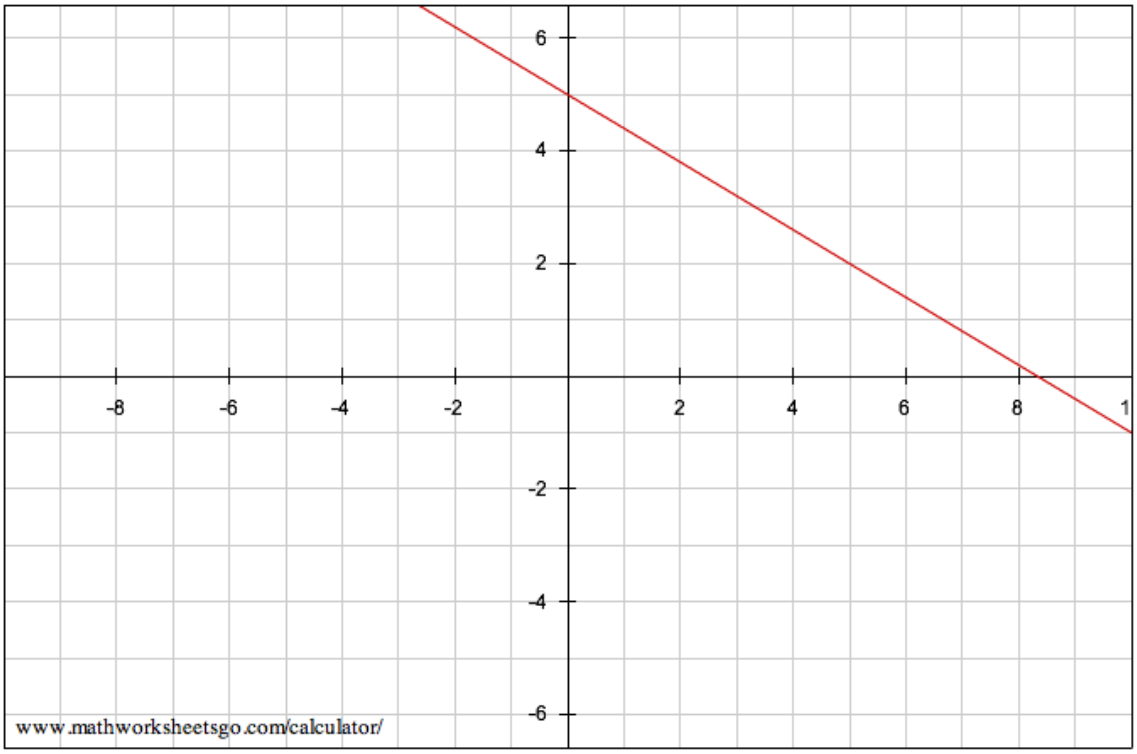
What is the error? Explain how to solve the problem.

_____

_____

IV. Answer Key

1. x-intercept = (5, 0); y-intercept = (0, 2)
2. x-intercept = (8, 0); y-intercept = (0, 3)
3. x-intercept = (-7, 0); y-intercept = (0, 2)
4. x-intercept = (-2, 0); y-intercept = (0, -9)
5. x-intercept = (2, 0); y-intercept = (0, -8/5)
6. x-intercept = (8, 0); y-intercept = (0, 2)
7. x-intercept = (92/8, 0); y-intercept = (0, 92/11)
8. x-intercept = (6, 0); y-intercept = (0, -2)
9. x-intercept = (-9, 0); y-intercept = (0, 7)
10. x-intercept = (-45/10, 0); y-intercept = (0, 9)
11. $-3x + 2y = 20$
12. $x + 4y = 8$
13. $7x + 3y = 15$
14. $-5x + y = 8$
15. $5x – 6y = 42$
16. $x – y = 2$
17. $160x + 300y = 15$
18. $12x – 30y = -25$
19. $45x + 90y = 16$
20. $54x + 63y = 1$
21. $14x + y = 15$
22. $x – 12y = -4$
23.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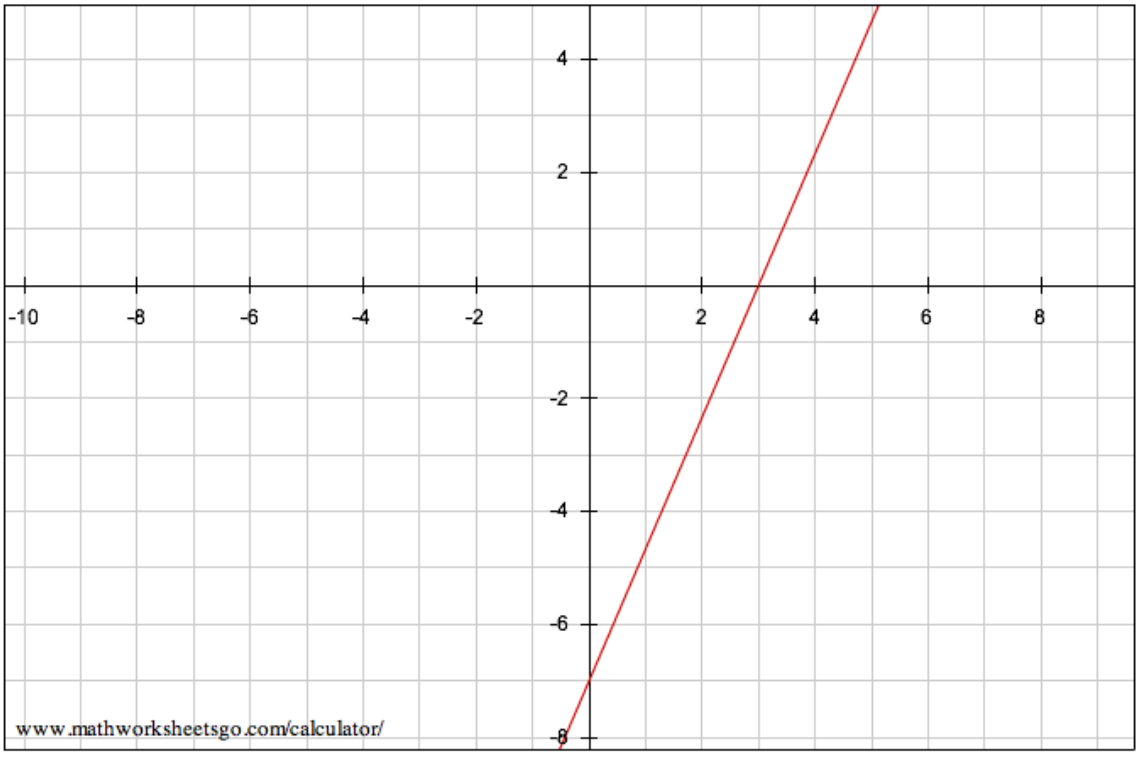
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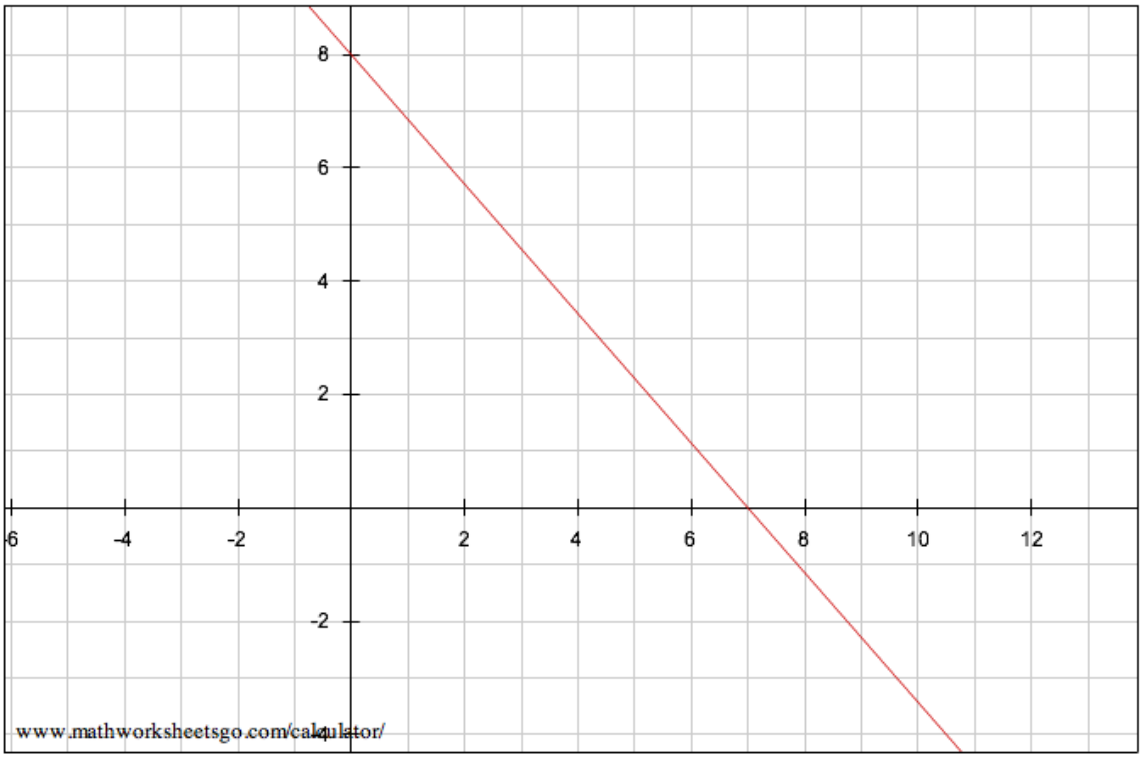
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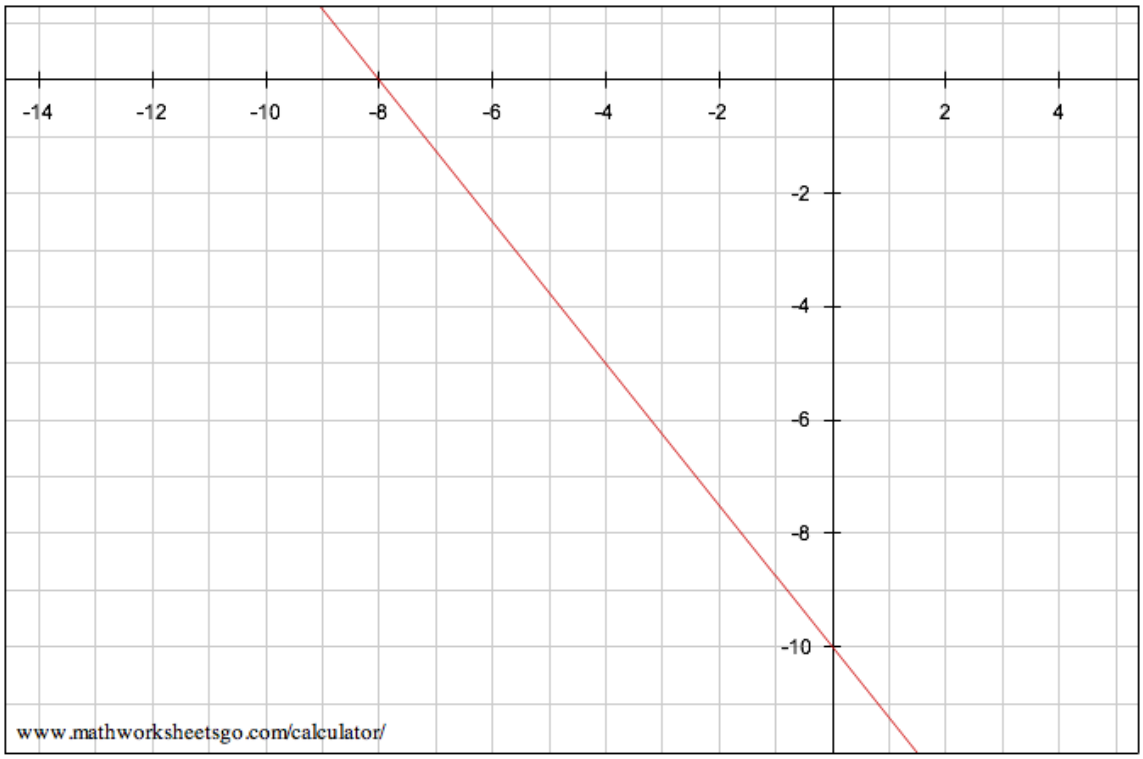
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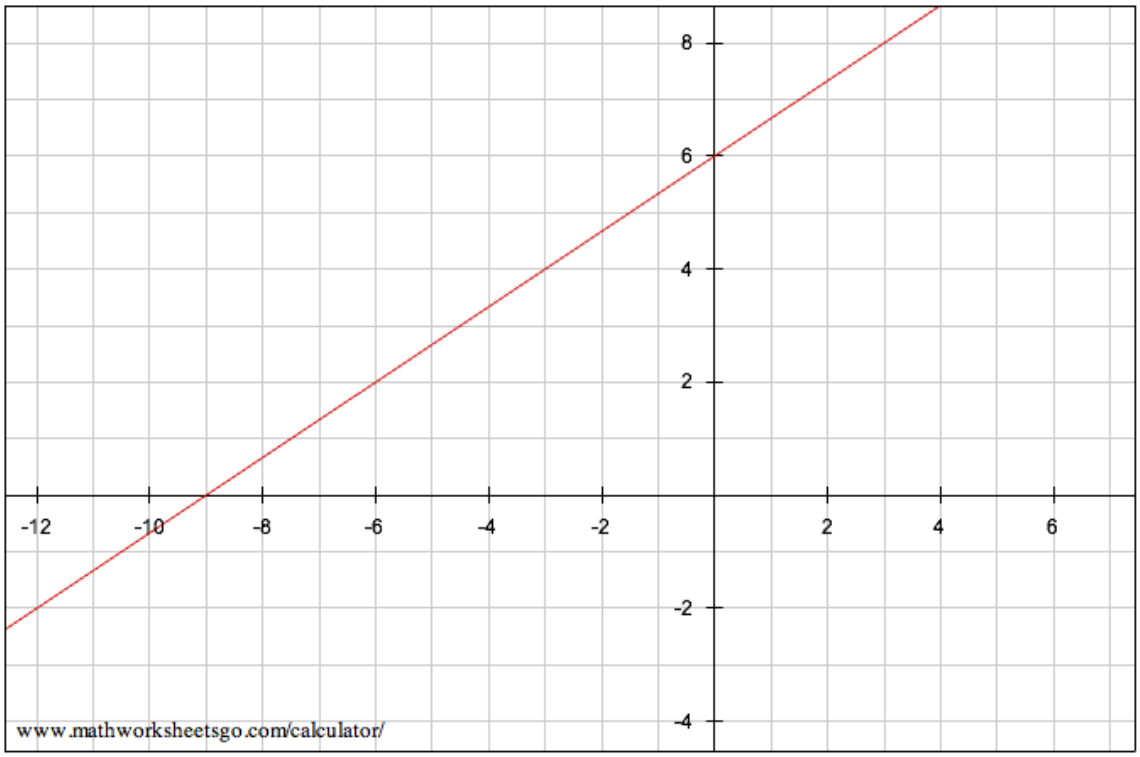
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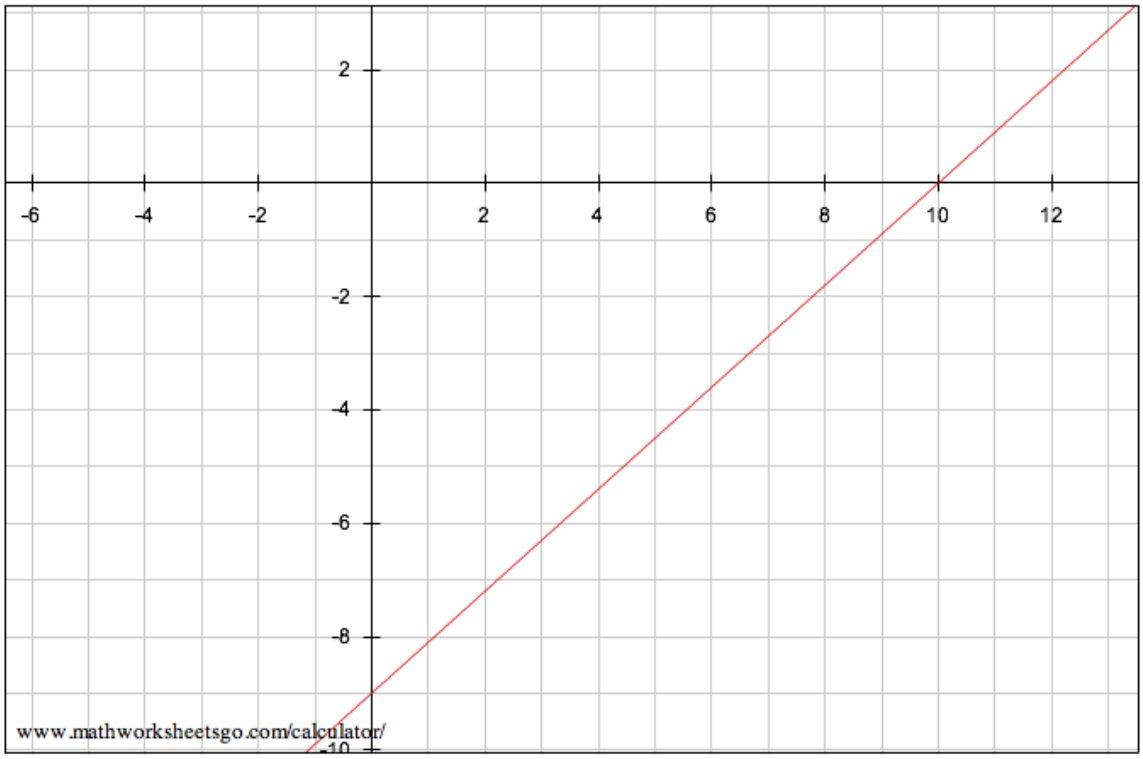
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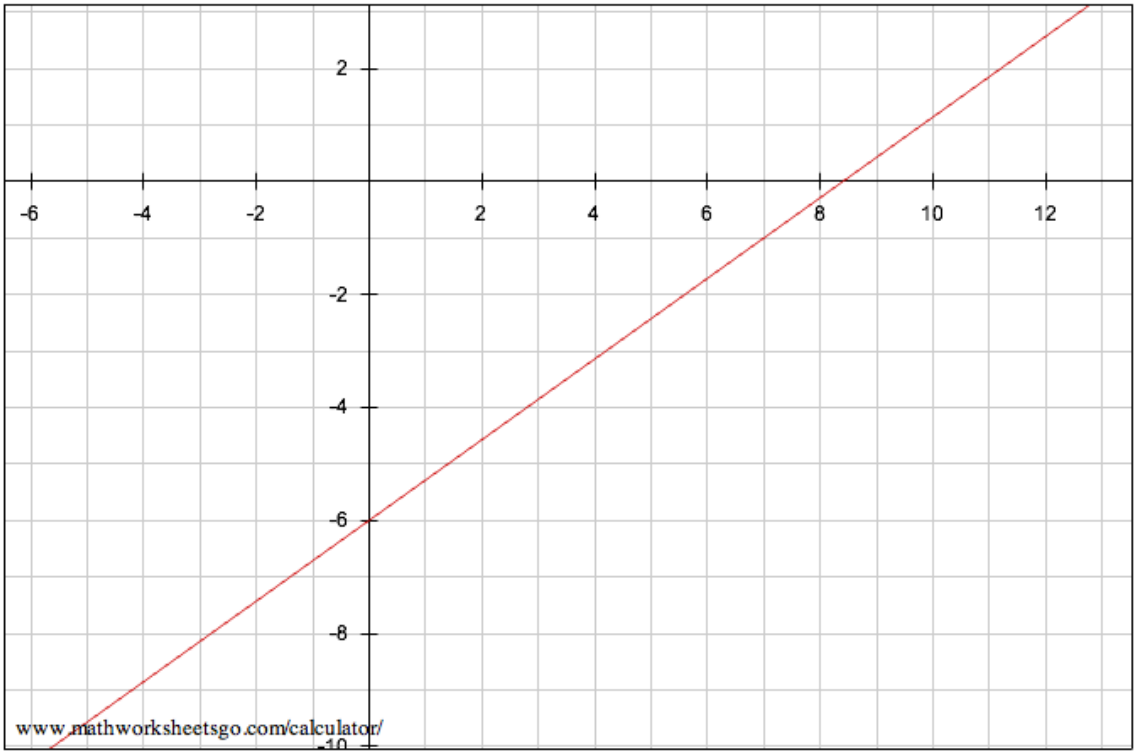

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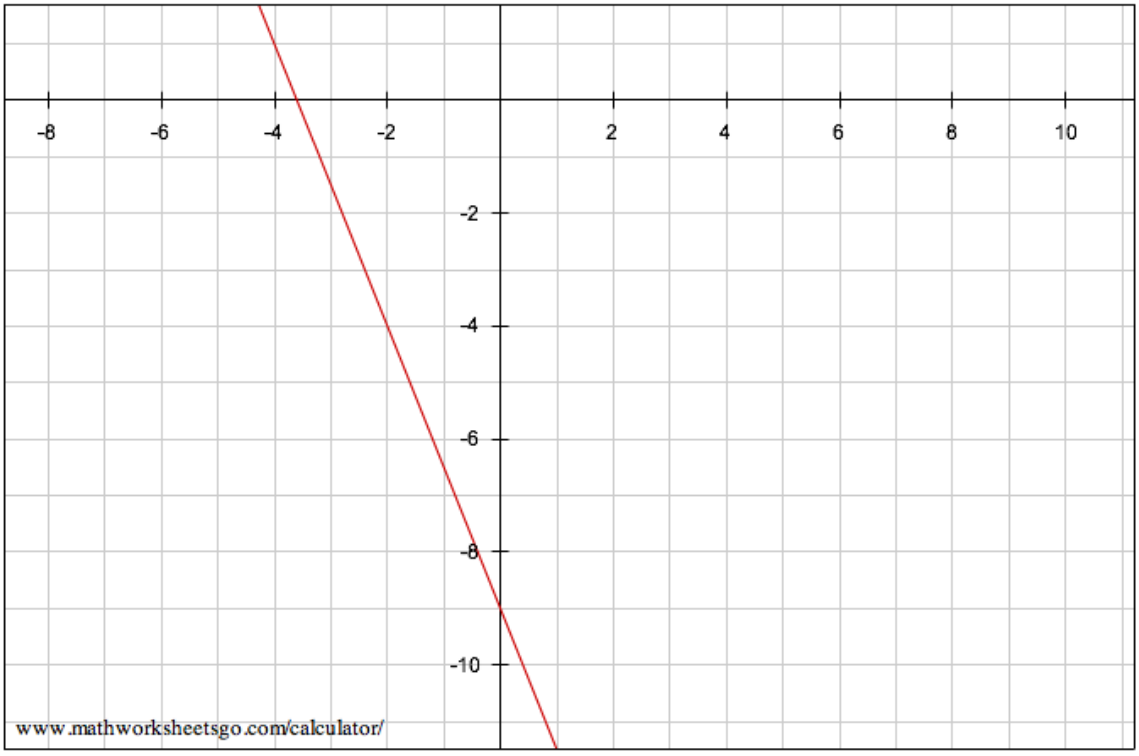

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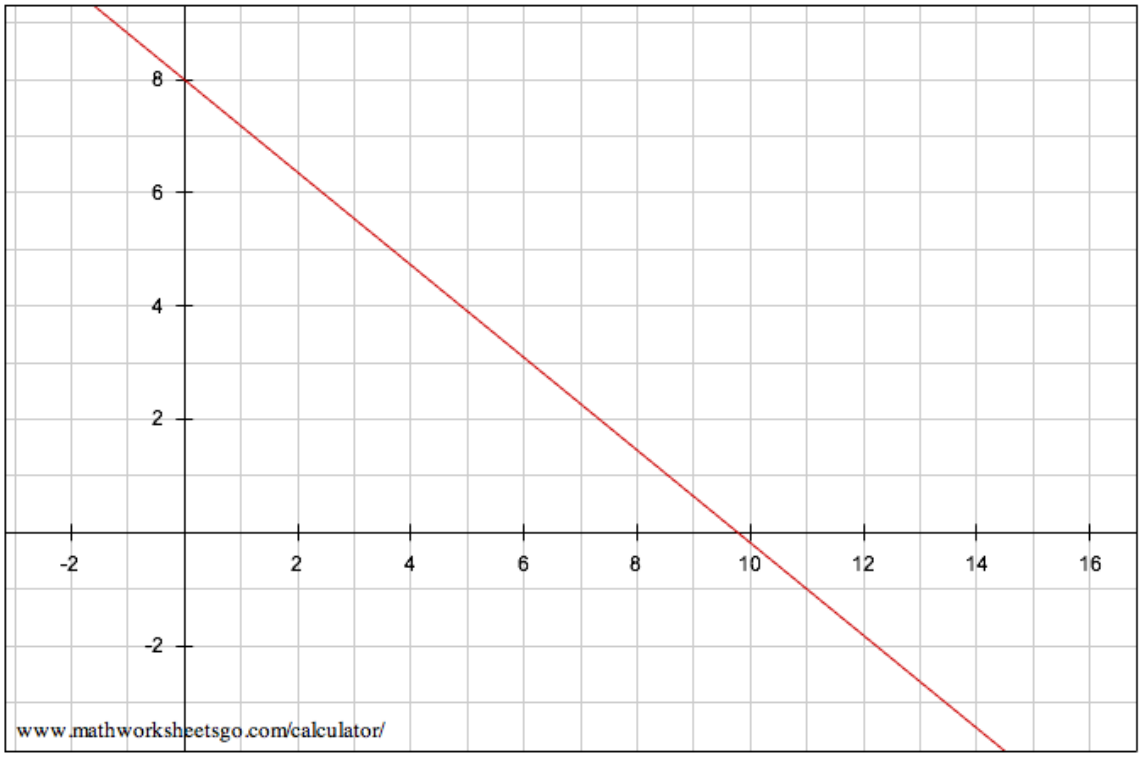
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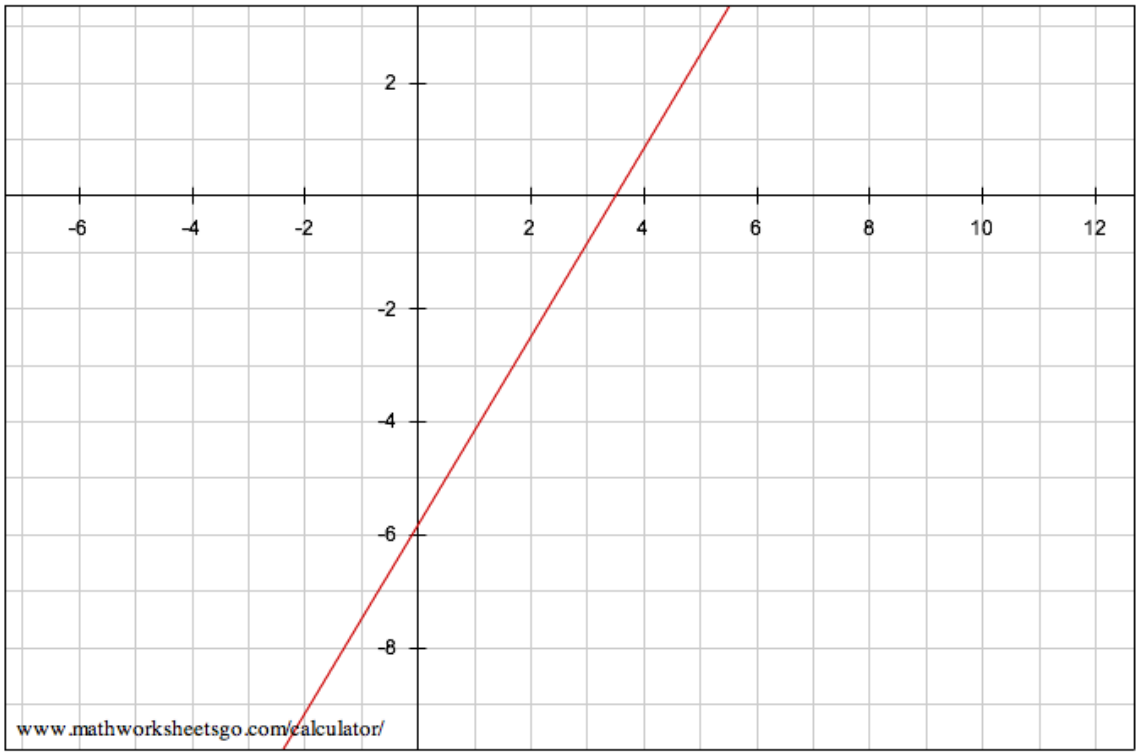
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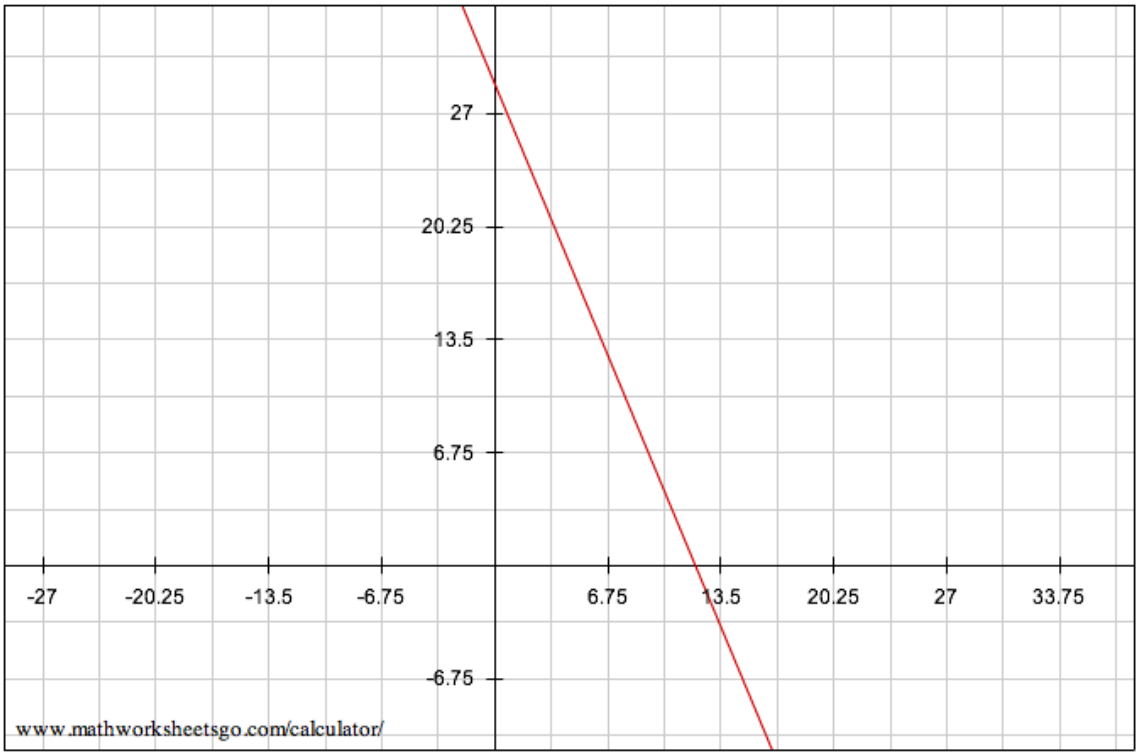

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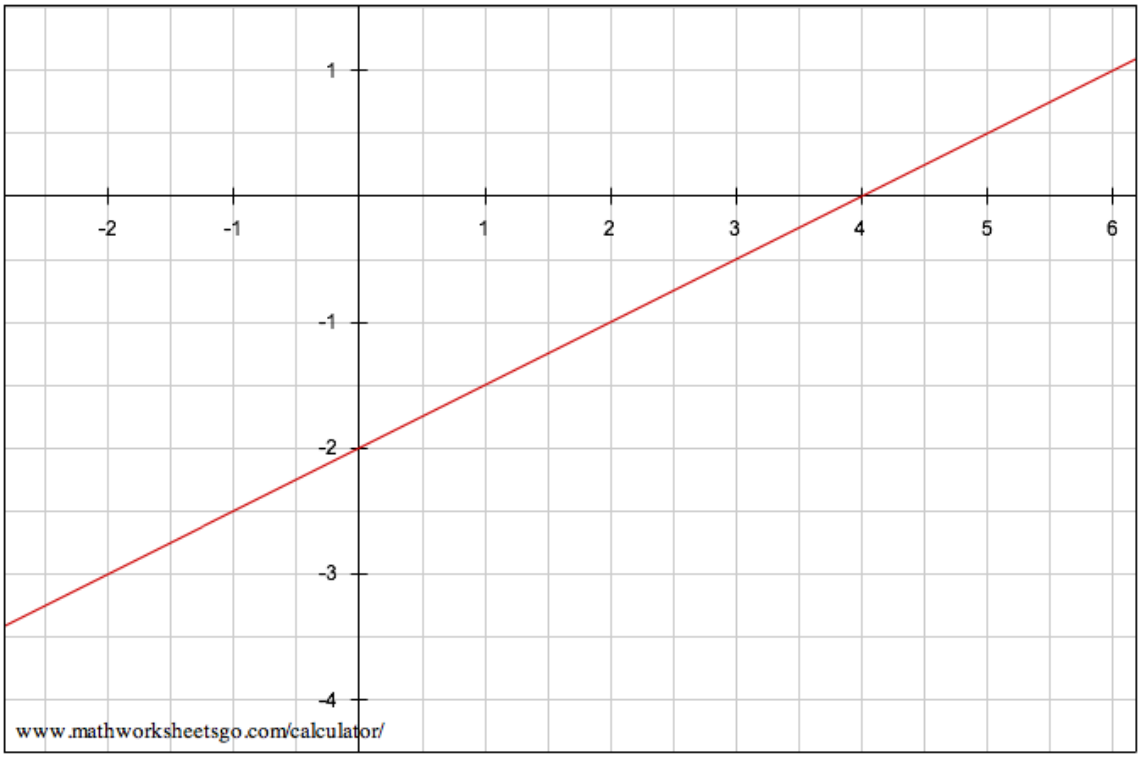

35. The standard form makes it easier to calculate the *x*- and *y*-

intercepts.
36. $mx - y = mk - j$
37. The student did not multiply the 4 each term in the last line; the correct answer is $4x + 20y = 3$.