

Name: Key

## Algebra 1

### Mid- Unit 2 Study Guide

#### Linear Equations, Inequalities, and Systems

Below is a list of topics you will need to understand in order to prepare for your unit exam:

- Modeling a situation with an equation
  - State what the variables represent
  - One-variable situations
  - Two-variable situations
- Rearranging Equations to Isolate a Variable
- Graphing Equations in Two Variables
  - Slope-intercept form  $y = mx + b$
  - Standard Form  $Ax + By = C$
  - x- and y-intercepts
    - x-intercept  $y = 0$
    - y-intercept  $x = 0$
- Solving a System of Linear Equations
  - Graphing
  - Substitution
  - Elimination
  - Justify Reasoning

## Practice Problems

1. Solve each equation.

a.  $3x = 12$

a)  $\frac{3x}{3} = \frac{12}{3}$   
 $x = 4$

b.  $-3x = 9$

b)  $\frac{-3x}{-3} = \frac{9}{-3}$   
 $x = -3$

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

c)  $\frac{3x}{3} = \frac{-\frac{1}{2}}{3}$

d.  $\frac{1}{2}x = 12$

d)  $\frac{1}{2}x = 12 \cdot 2$   
 $1x = 24$

$x = \frac{-\frac{1}{2}}{3} = -\frac{1}{6}$

2. Select **all** the expressions that are equivalent to  $\frac{-6x-4}{2}$ .

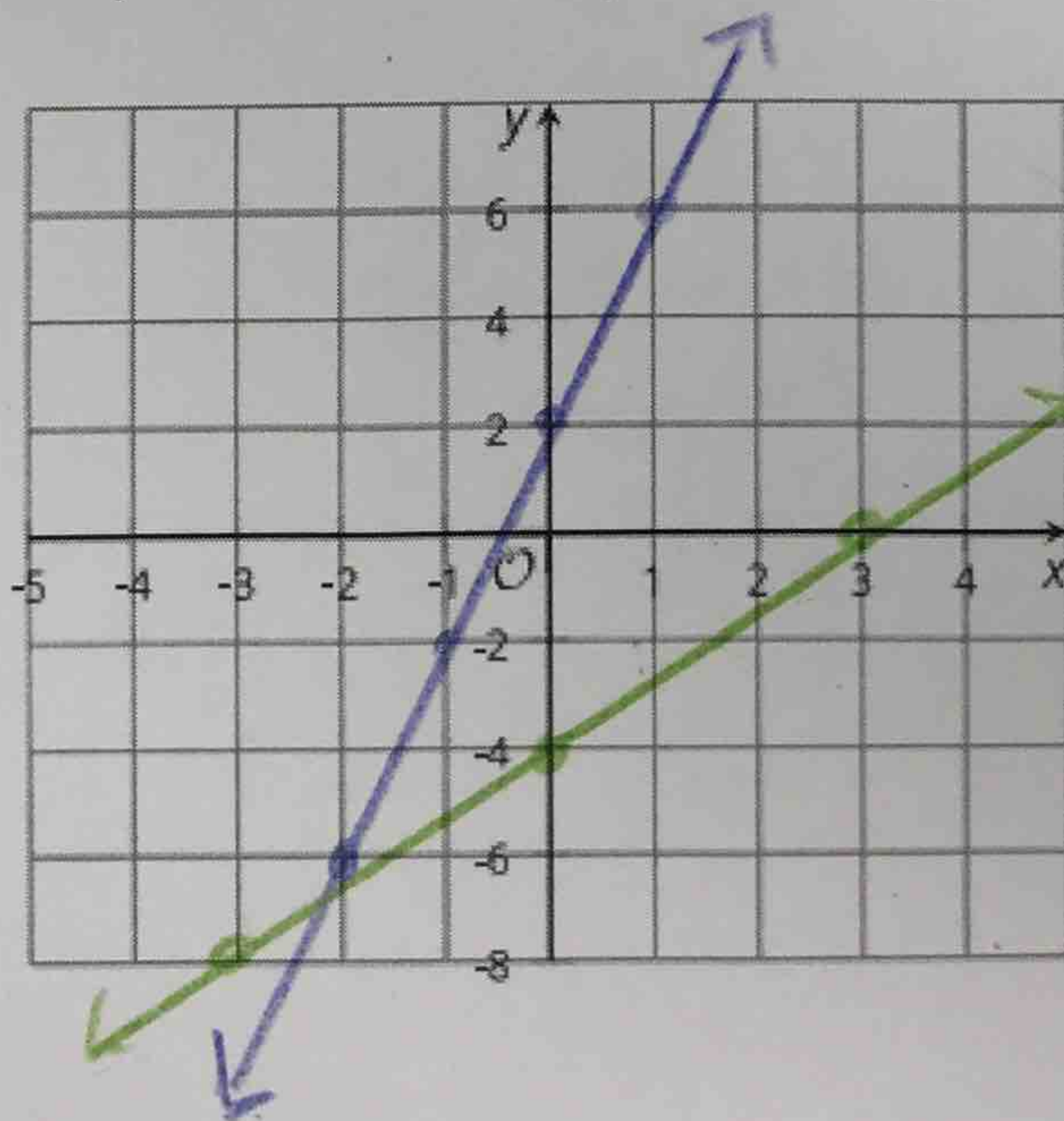
a.  $-3x - 2$

b.  $3x + 2$

c.  $-\frac{6x+4}{2}$

d.  $-\frac{1}{2}(6x+4)$

e.  $\frac{1}{2}(-3x-2)$

3. Graph the equations  $y = 4x + 2$  and  $4x - 3y = 12$  on the grid. Label each graph.

$4x - 3y = 12$

y-int  $\frac{4(0) - 3y}{-3} = \frac{12}{-3}$   
 $x = 0$

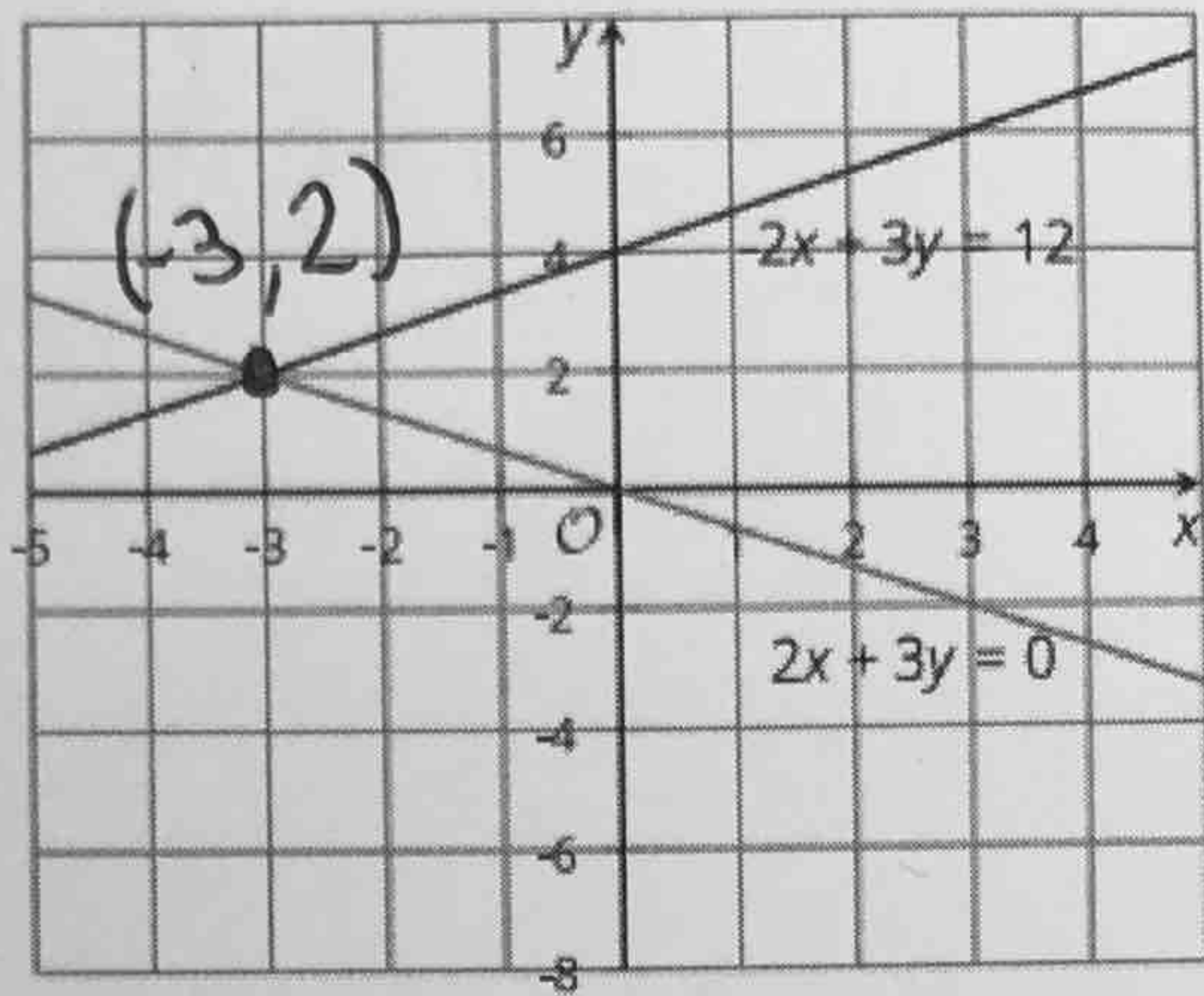
$y = -4$   
 $(0, -4)$

x-int  $\frac{4x - 3(0)}{4} = \frac{12}{4}$   
 $y = 0$

$x = 3$   
 $(3, 0)$

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4. The graphs represent a system of equations:  $\begin{cases} -2x + 3y = 12 \\ 2x + 3y = 0 \end{cases}$



Solve by elimination

$$\begin{array}{r} -2x + 3y = 12 \\ + 2x + 3y = 0 \\ \hline 6y = 12 \\ \frac{6y}{6} = \frac{12}{6} \\ y = 2 \end{array}$$

$2x + 3(2) = 0$        $(-3, 2)$   
 $2x + 6 = 0$   
 $2x = -6$   
 $x = -3$

Solve the system of equations. Explain or show your reasoning.

$(-3, 2)$

The solution to a system is the point of intersection.

5. Solve the system of equations without graphing. Explain or show your reasoning.

$$\begin{cases} y = -2x + 1 \\ 4x + y = 9 \end{cases}$$

Substitution

$$4x + (-2x + 1) = 9$$

$$4x - 2x + 1 = 9$$

$$2x + 1 = 9$$

$$2x = 8$$

$$x = 4$$

$$\begin{aligned} y &= -2x + 1 \\ y &= -2(4) + 1 \\ y &= -8 + 1 \\ y &= -7 \end{aligned}$$

Solution  $(4, -7)$

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6. Rewrite the expression as an equivalent expression with fewer terms:

$$3x - 4 - (5x + 7)$$

$$\begin{array}{l} 3x - 4 - 1(5x + 7) \\ \boxed{3x} - \boxed{4} - \boxed{5x} - \boxed{7} \\ -2x - 11 \end{array}$$

7. Solve the equation  $\frac{3x-2}{4} = 2x-8$ . Show your reasoning.

$$\cancel{4} \cdot \frac{3x-2}{\cancel{4}} = (2x-8)\cancel{4}$$

$$\begin{array}{r} 3x - 2 = 8x - 32 \\ -3x \quad -3x \end{array}$$

$$\begin{array}{r} -2 = 5x - 32 \\ +32 \quad +32 \end{array}$$

$$\frac{30}{5} = \frac{5x}{5}$$

$$6 = x$$