Chapter 3 Systems of Linear Equations and Inequalities

Ex 3.1

Answer 1e.

We know that a system that has at least one solution is consistent and a consistent system that has exactly one solution is independent.

Thus the given statement can be completed as
A consisten system that has exactly one solution is called **independent**.

Answer 1gp.

Number the equations.

$$3x + 2y = -4 \qquad (1)$$
$$x + 3y = 1 \qquad (2)$$

Write equation (1) in slope-intercept form. For this, subtract $3x$ from each side.

$$3x + 2y - 3x = -4 - 3x$$
$$2y = -4 - 3x$$

Divide each side by 2.

$$\frac{2y}{2} = \frac{-4 - 3x}{2}$$
$$y = -2 - \frac{3}{2}x \qquad (3)$$

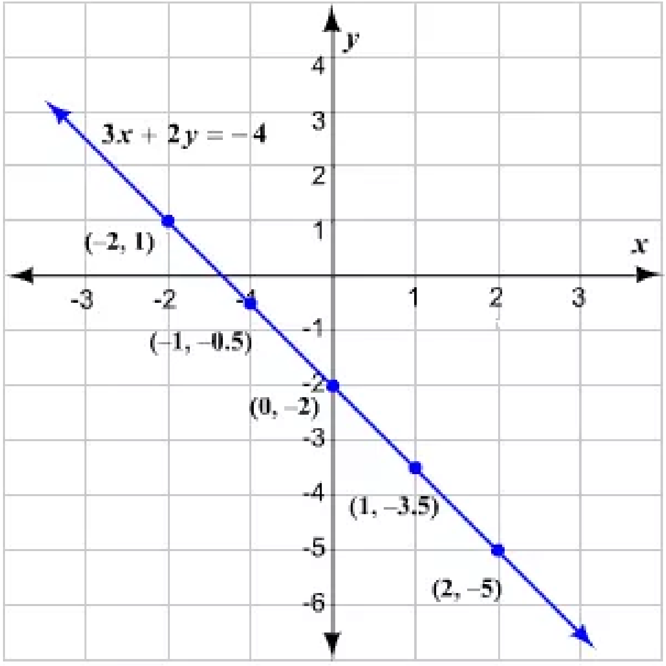
Find some points with coordinates that are solutions of equation (3). For this, choose some values for x and find the corresponding values of y.

Organize the results in a table.

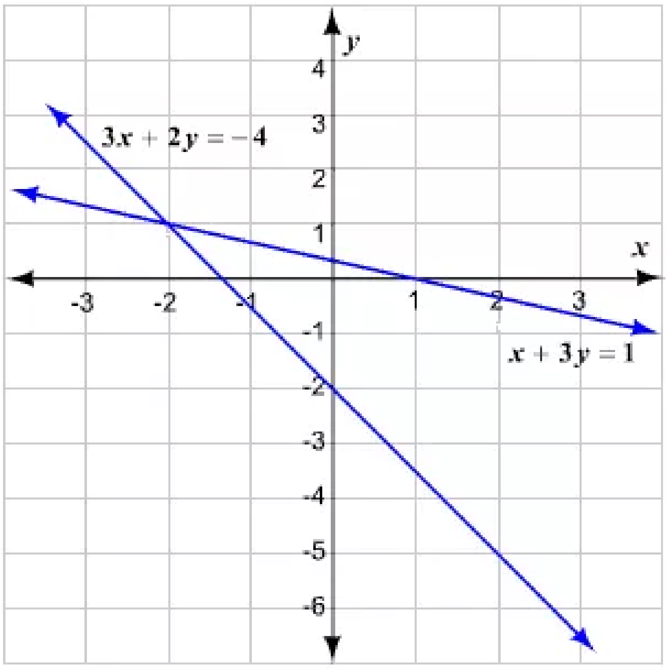
x	−2	−1	0	1	2
y	1	−0.5	−2	−3.5	−5

The points are (−2, 1), (−1, −0.5), (0, −2), (1, −3.5), and (2, −5).

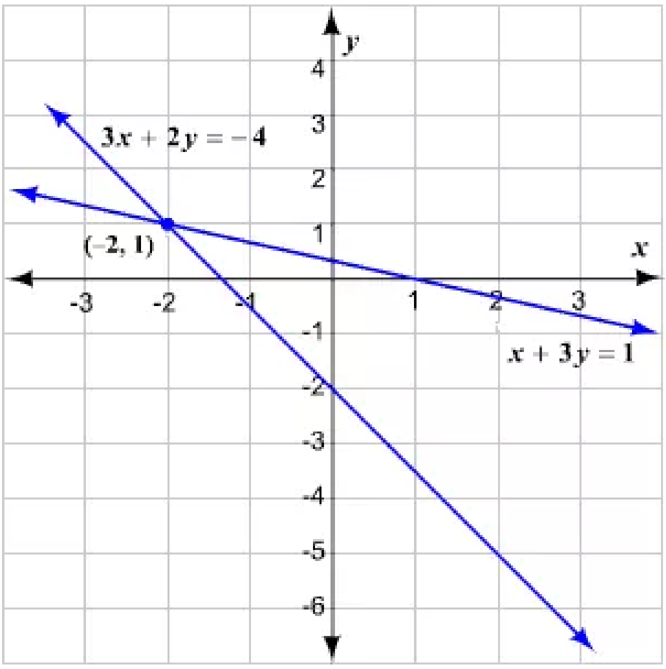
Now, plot the points on a coordinate plane and connect them with a straight line.



Similarly, graph equation (2) on the same set of axes.



Identify the point of intersection of the graphs.



From the graph, the lines appear to intersect at (−2, 1).

Check

In order to check the solution, substitute −2 for x, and 1 for y in equations (1) and (2).

$$\begin{aligned} 3x + 2y &= -4 \\ 3(-2) + 2(1) &\stackrel{?}{=} -4 \\ -6 + 2 &\stackrel{?}{=} -4 \\ -4 &= -4 \ \checkmark \end{aligned} \qquad \begin{aligned} x + 3y &= 1 \\ -2 + 3(1) &\stackrel{?}{=} 1 \\ -2 + 3 &\stackrel{?}{=} 1 \\ 1 &= 1 \ \checkmark \end{aligned}$$

Therefore, the solution is (−2, 1).

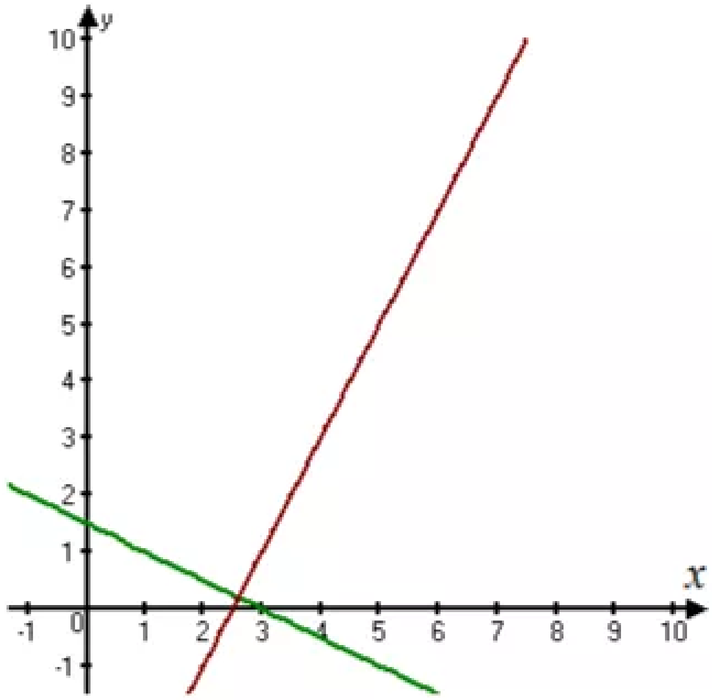
Answer 2e.

A system of two linear equations in two variables x and y consists of two equations written in the form

$$Ax + By = C$$
$$Dx + Ey = F$$

A solution of a system of linear equations in two variables is an ordered pair (x, y) that satisfies each equation.
Solutions correspond to points where the graphs of the equations in a system intersect.

For example, the solution of the system of equations $x+2y=3$ $2x-y=5$ is the intersection of their graphs.



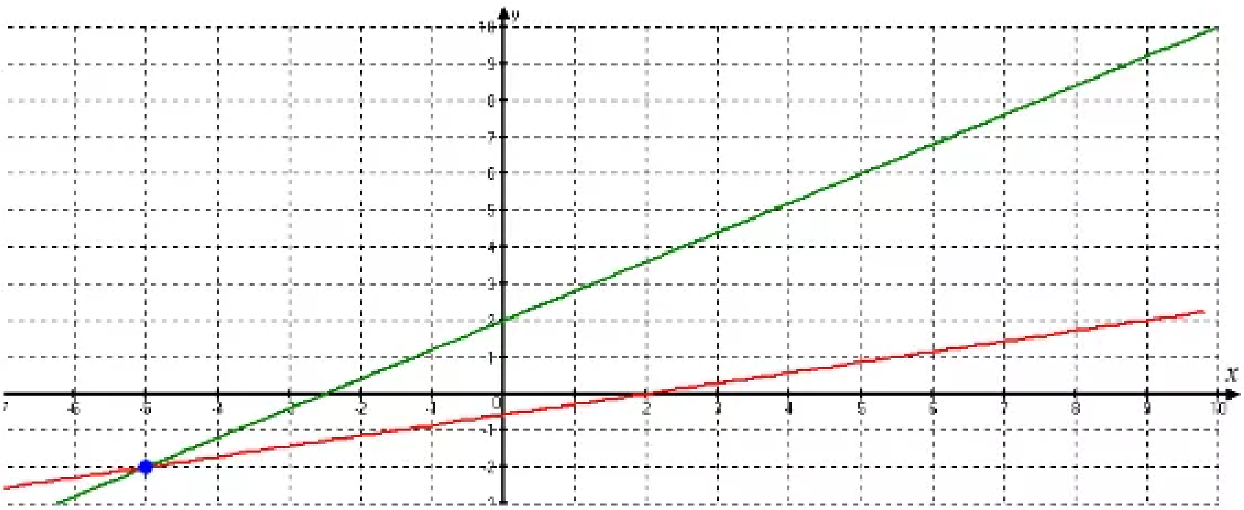
Answer 2gp.

To graph the following linear system and estimate the solution.

$$4x-5y=-10 \quad \ldots\ldots (1)$$

$$2x-7y=4 \quad \ldots\ldots (2)$$

We begin by graphing both equations.



From the graph, the lines appear to intersect at a point $(-5,-2)$.

We can check this algebraically as follows.

Equation (1): $4x-5y=-10$

$$4(-5)-5(-2)=-10 \qquad \text{Put } (x,y)=(-5,-2)$$
$$-20+10=-10$$
$$-10=-10 \qquad \text{True}$$

Equation (2): $2x-7y=4$

$$2(-5)-7(-2)=4 \qquad \text{Put } (x,y)=(-5,-2)$$
$$-10+14=4$$
$$4=4 \qquad \text{True}$$

Therefore, the solution is $\boxed{(-5,-2)}$.

Answer 3e.

Number the equations.

$y = -3x + 2 \qquad (1)$

$y = 2x - 3 \qquad (2)$

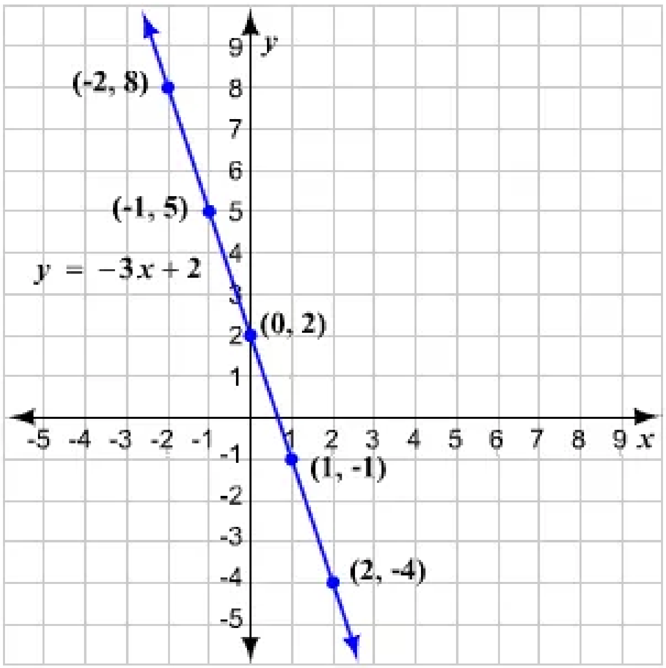
Find some points that are solutions of equation (1). For this, choose some values for x and find the corresponding values of y.

Organize the results in a table.

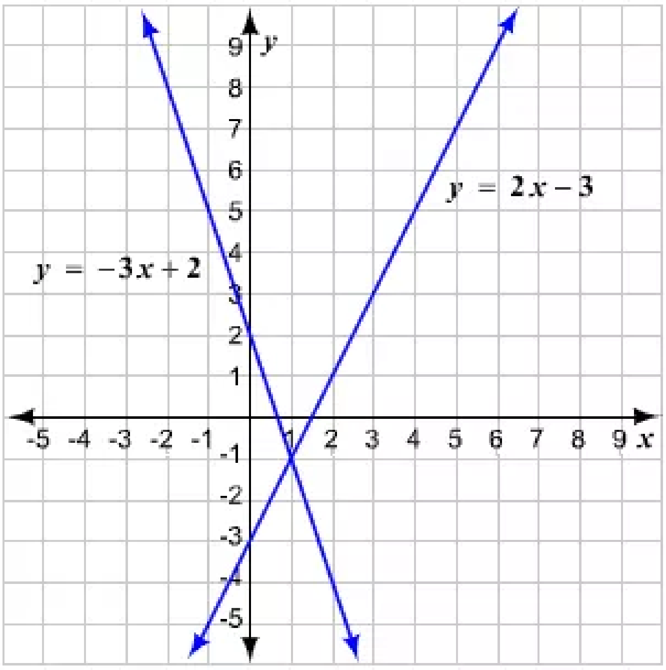
x	−2	−1	0	1	2
y	8	5	2	−1	−4

The points are (−2, 8), (−1, 5), (0, 2), (1, −1), and (2, −4).

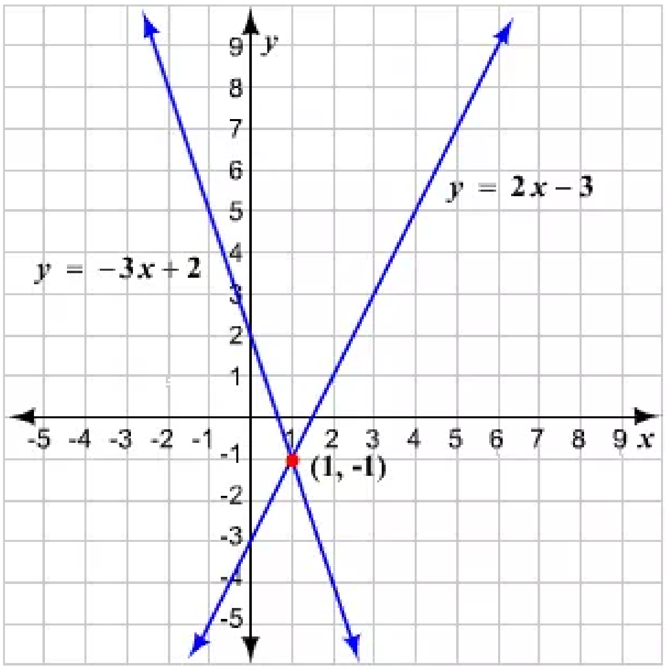
Now, plot the points on a coordinate plane and connect them with a straight line.



Similarly graph equation (2) on the same set of axes.



Identify the point of intersection of the graphs. From the graph, the lines appear to intersect at $(1, -1)$.



Check

In order to check the solution, substitute 1 for x, and -1 for y in equations (1) and (2).

$y = -3x + 2$	$y = 2x - 3$
$-1 \stackrel{?}{=} -3(1) + 2$	$-1 \stackrel{?}{=} 2(1) - 3$
$-1 \stackrel{?}{=} -3 + 2$	$-1 \stackrel{?}{=} 2 - 3$
$-1 = -1$ ✓	$-1 = -1$ ✓

Therefore, the solution is $(1, -1)$.

Answer 3gp.

Number the equations.

$$8x - y = 8 \qquad (1)$$

$$3x + 2y = -16 \qquad (2)$$

Write equation (1) in slope-intercept form. For this, subtract $8x$ from each side.

$$8x - y - 8x = 8 - 8x$$

$$-y = 8 - 8x$$

Divide each side by -1.

$$\frac{-y}{-1} = \frac{8 - 8x}{-1}$$

$$y = -8 + 8x \qquad (3)$$

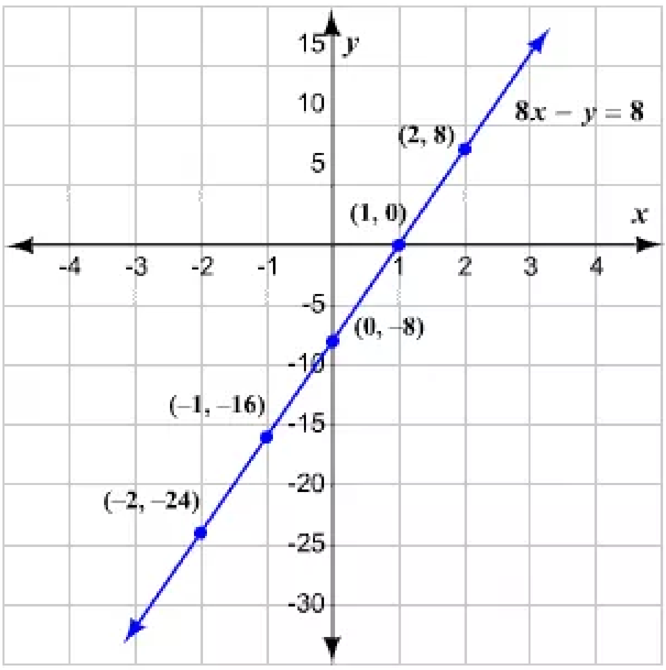
Find some points with coordinates that are solutions of equation (3). For this, choose some values for x and find the corresponding values of y.

Organize the results in a table.

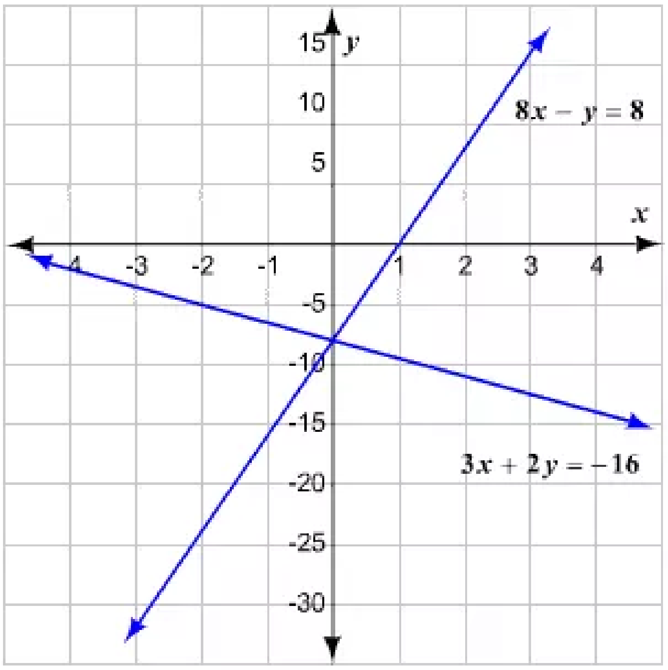
x	-2	-1	0	1	2
y	-24	-16	-8	0	8

The points are $(-2, -24)$, $(-1, -16)$, $(0, -8)$, $(1, 0)$, and $(2, 8)$.

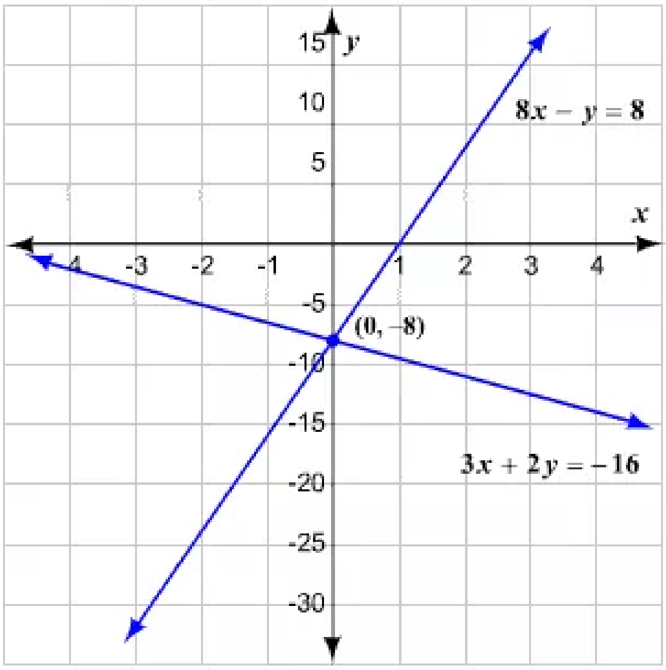
Now, plot the points on a coordinate plane and connect them with a straight line.



Similarly, graph equation (2) on the same set of axes.



Identify the point of intersection of the graphs.



From the graph, the lines appear to intersect at about (0, −8).

Check

In order to check the solution, substitute 0 for x, and -8 for y in equations (1) and (2).

$$\begin{aligned} 8x - y &= 8 \\ 8(0) - (-8) &\stackrel{?}{=} 8 \\ 0 + 8 &\stackrel{?}{=} 8 \\ 8 &= 8 \checkmark \end{aligned} \qquad \begin{aligned} 3x + 2y &= -16 \\ 3(0) + 2(-8) &\stackrel{?}{=} -16 \\ 0 - 16 &\stackrel{?}{=} -16 \\ -16 &= -16 \checkmark \end{aligned}$$

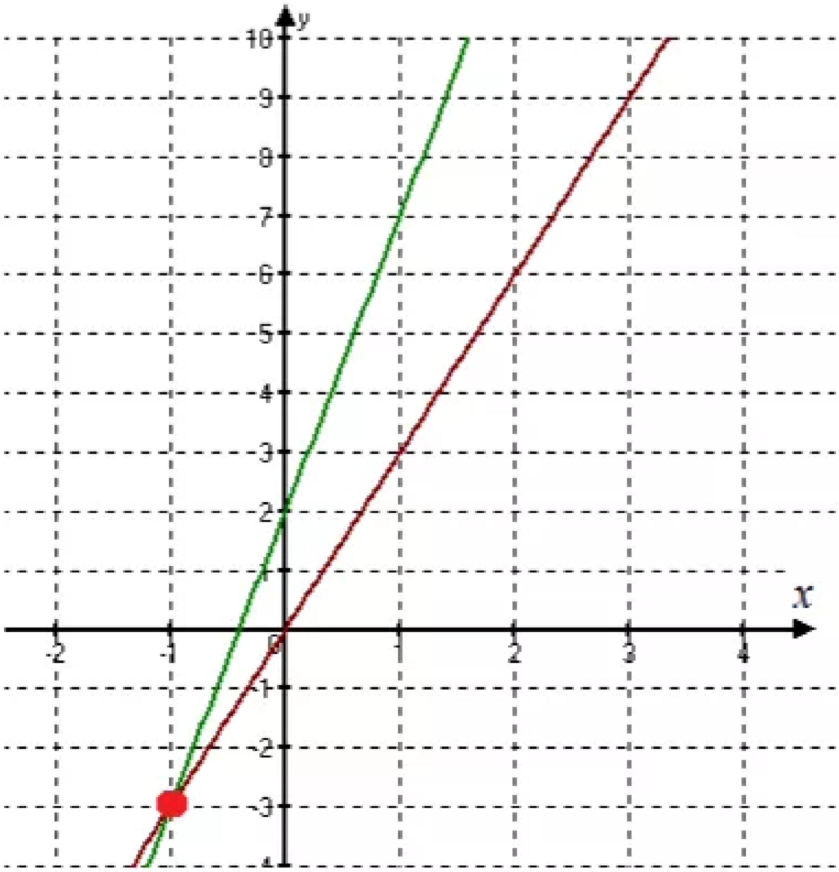
Therefore, the solution is $(0, -8)$.

Answer 4e.

To graph the linear system and estimate the solution.
Consider the following system

$$y = 5x + 2 \qquad \ldots\ldots (1)$$
$$y = 3x \qquad \ldots\ldots (2)$$

We begin by graphing both equations.



From the graph, the lines appear to intersect at the point $(-1,-3)$.

And we check this algebraically as follows:

Equation (1): $y=5x+2$

$-3=5(-1)+2$ Let $(x,y)=(-1,-3)$

$-3=-5+2$ Simplify

$-3=-3$ True

Equation (2): $y=3x$

$-3=3(-1)$ Let $(x,y)=(-1,-3)$

$-3=-3$ True

Therefore, the solution is $\boxed{(-1,-3)}$.

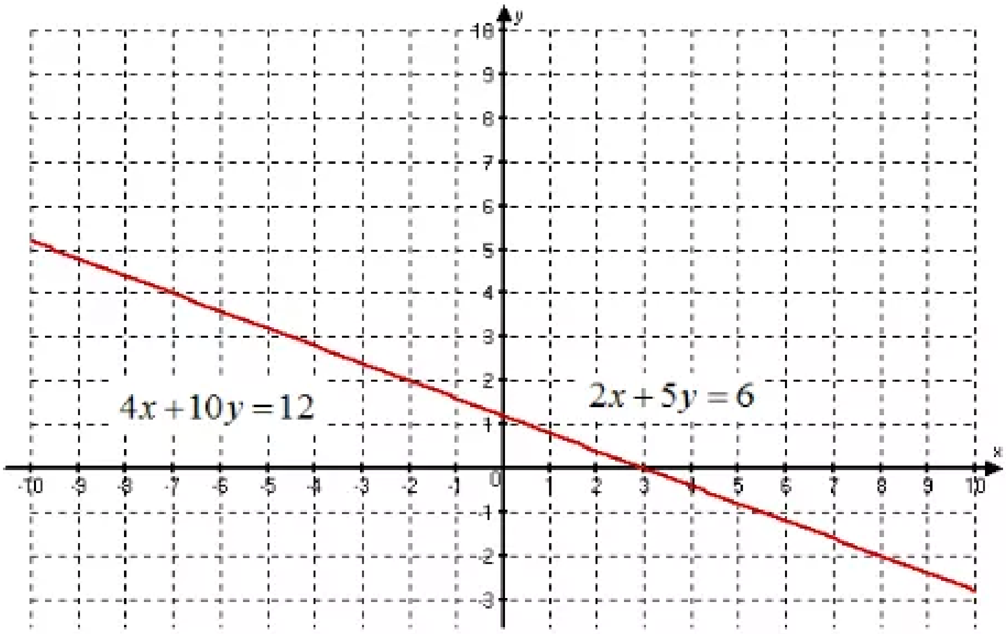
Answer 4gp.

To solve the following system, then classify.

$$2x+5y=6 \qquad \text{...... (1)}$$

$$4x+10y=12 \qquad \text{...... (2)}$$

We begin by graphing both equations.



We observe that, the graphs of both equations have the same line.

So, each point on the line is a solution, and the system has infinitely many solutions.

Therefore the system is $\boxed{\text{consistent and dependent}}$.

Answer 5e.

Number the equations.

$y = -x+3$ (1)

$-x-3y = -1$ (2)

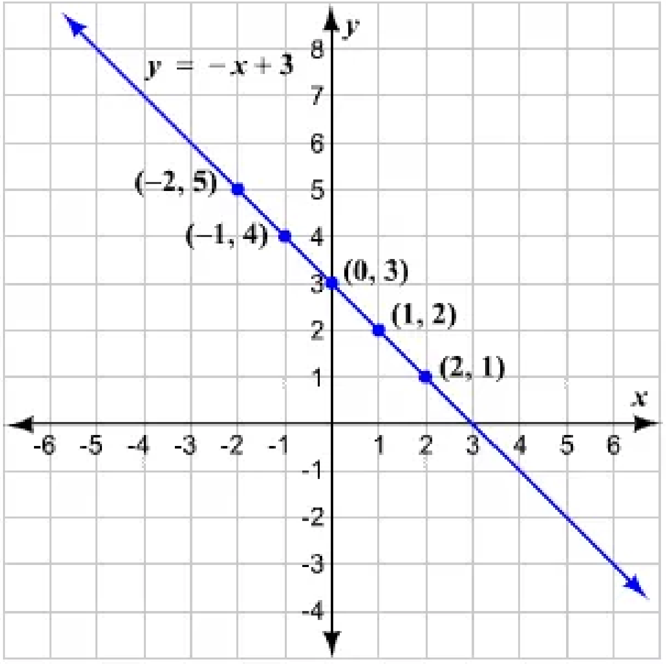
Find some points that are solutions of equation (1). For this, choose some values for x and find the corresponding values of y.

Organize the results in a table.

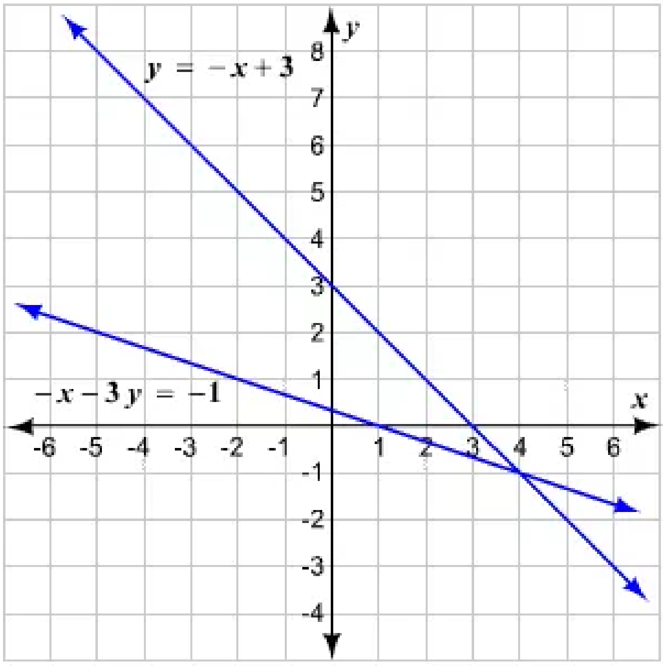
x	-2	-1	0	1	2
y	5	4	3	2	1

The points are (−2, 5), (−1, 4), (0, 3), (1, 2), and (2, 1).

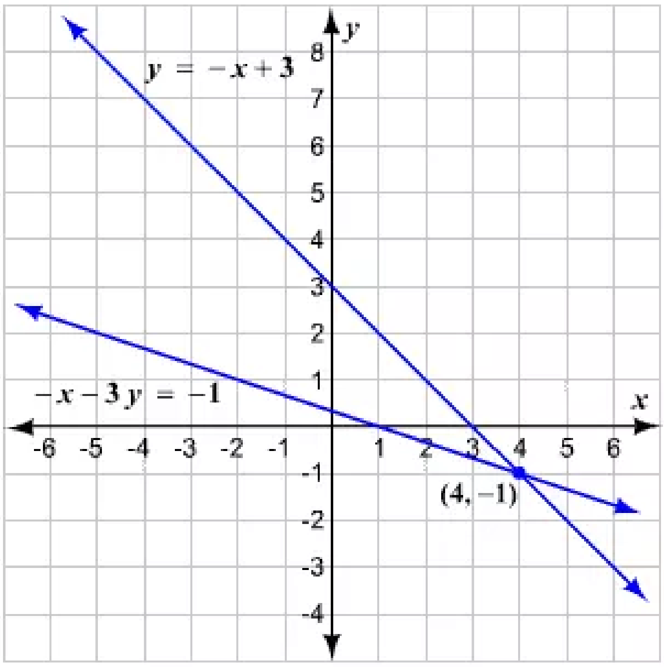
Now, plot the points on a coordinate plane and connect them with a straight line.



Similarly, graph equation (2) on the same set of axes.



Identify the point of intersection of the graphs.



From the graph, the lines appear to intersect at $(4, -1)$.

Check

In order to check the solution, substitute 4 for x, and -1 for y in equations (1) and (2).

$$\begin{aligned} y &= -x + 3 \\ -1 &\stackrel{?}{=} -4 + 3 \\ -1 &= -1 \quad \checkmark \end{aligned}$$

$$\begin{aligned} -x - 3y &= -1 \\ -4 - 3(-1) &\stackrel{?}{=} -1 \\ -4 + 3 &\stackrel{?}{=} -1 \\ -1 &= -1 \quad \checkmark \end{aligned}$$

Therefore, the solution is $(4, -1)$.

Answer 5gp.

Write equation (1) in slope-intercept form. For this, subtract $3x$ from each side first.

$$\begin{aligned} 3x - 2y - 3x &= 10 - 3x \\ -2y &= 10 - 3x \end{aligned}$$

Divide each side by -2.

$$\frac{-2y}{-2} = \frac{10 - 3x}{-2}$$

$$y = \frac{3}{2}x - 5 \qquad (3)$$

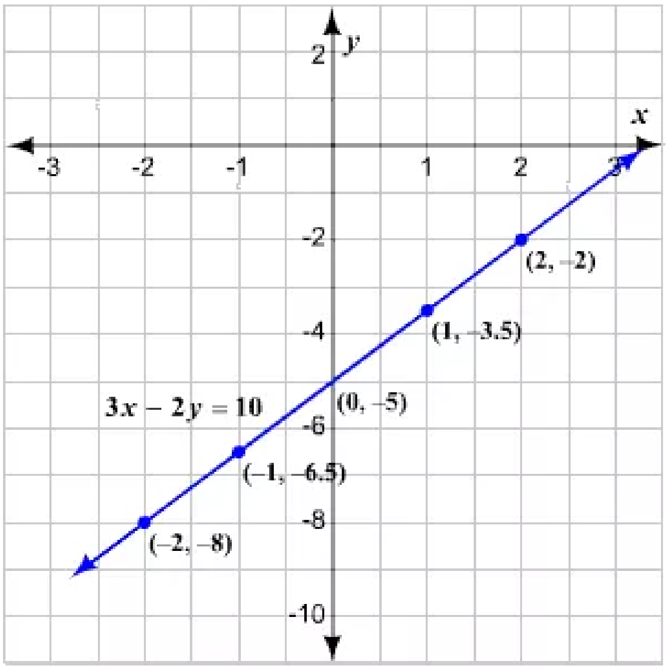
Find some points that are solutions of equation (3). For this, choose some values for x and find the corresponding values of y.

Organize the results in a table.

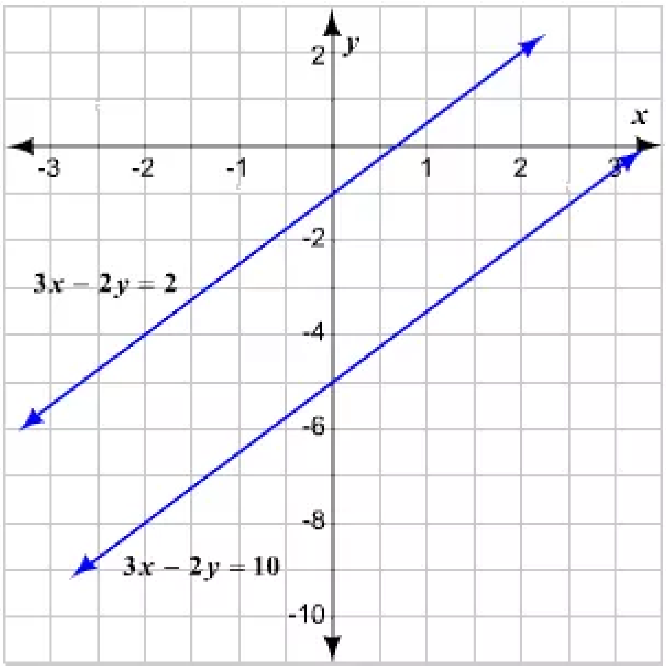
x	−2	−1	0	1	2
y	−8	−6.5	−5	−3.5	−2

The points are (−2, −8), (−1, −6.5), (0, −5), (1, −3.5), and (2, −2).

Now, plot the points on a coordinate plane and connect them with a straight line.



Similarly, graph equation (2) on the same set of axes.



Since the two lines have no point of intersection, the system has no solution.

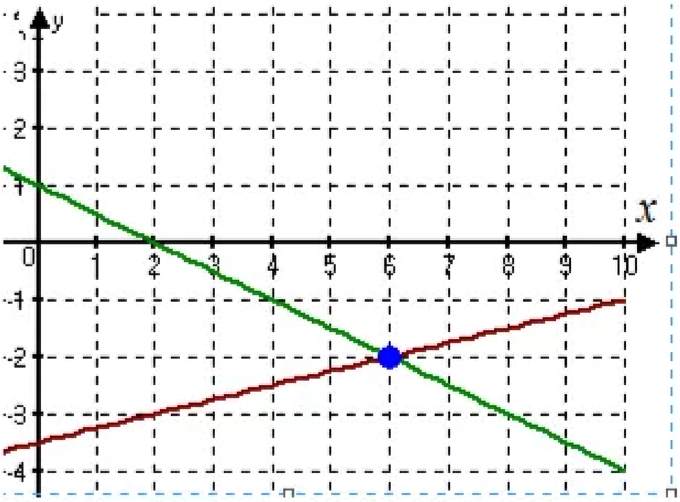
Therefore, the given system is inconsistent.

Answer 6e.

To graph the linear system and estimate the solution.
Consider the following system

$$x+2y=2 \qquad \text{...... (1)}$$
$$x-4y=14 \qquad \text{...... (2)}$$

We begin by graphing both equations.



From the graph, the lines appear to intersect at the point $(6,-2)$.

And we check this algebraically as follows:

Equation (1): $x+2y=2$

$6+2(-2)=2$ Let $(x,y)=(6,-2)$

$6-4=2$ Simplify

$2=2$ True

Equation (2): $x-4y=14$

$6-4(-2)=14$ Let $(x,y)=(6,-2)$

$14=14$ True

Therefore the solution is $\boxed{(6,-2)}$.

Answer 6gp.

To solve the following system and then classify.

$$-2x+y=5 \qquad \text{...... (1)}$$
$$y=-x+2 \qquad \text{...... (2)}$$

We begin by graphing both equations.

From the graph, the lines appear to intersect at the point $(-1, 3)$.

And we check this algebraically as follows:

Equation (1): $-2x + y = 5$

$-2(-1) + 3 = 5$ Let $(x, y) = (-1, 3)$

$2 + 3 = 5$ Simplify

$5 = 5$ True

Equation (2): $y = -x + 2$

$3 = -(-1) + 2$ Let $(x, y) = (-1, 3)$

$3 = 1 + 2$ Simplify

$3 = 3$ True

Therefore the solution is $(-1, 3)$.

Thus the system is **consistent and independent**.

Answer 7e.

Number the equations.

$y = 2x - 10$ (1)

$x - 4y = 5$ (2)

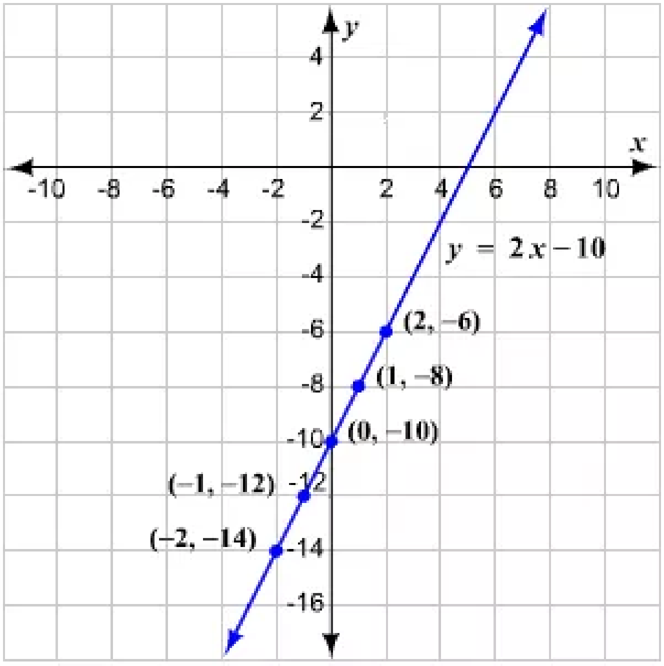
Find some points that are solutions of equation (1). For this, choose some values for x and find the corresponding values of y.

Organize the results in a table.

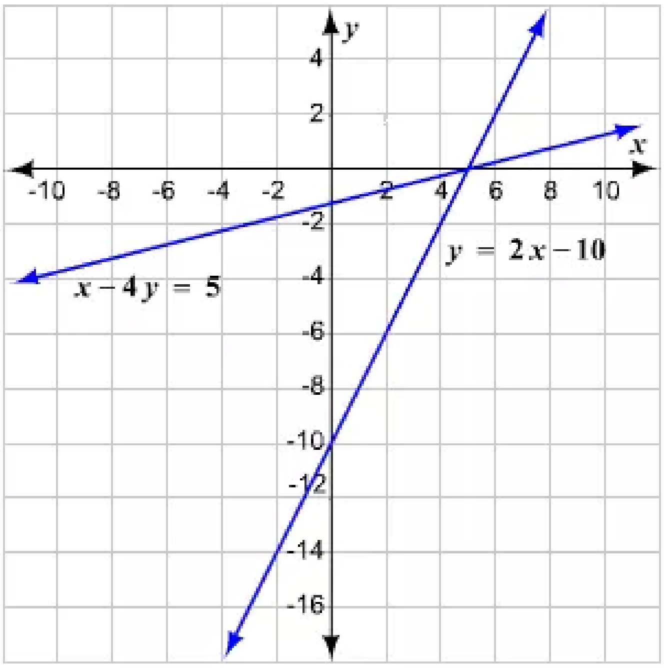
x	−2	−1	0	1	2
y	−14	−12	−10	−8	−6

The points are (−2, −14), (−1, −12), (0, −10), (1, −8), and (2, −6).

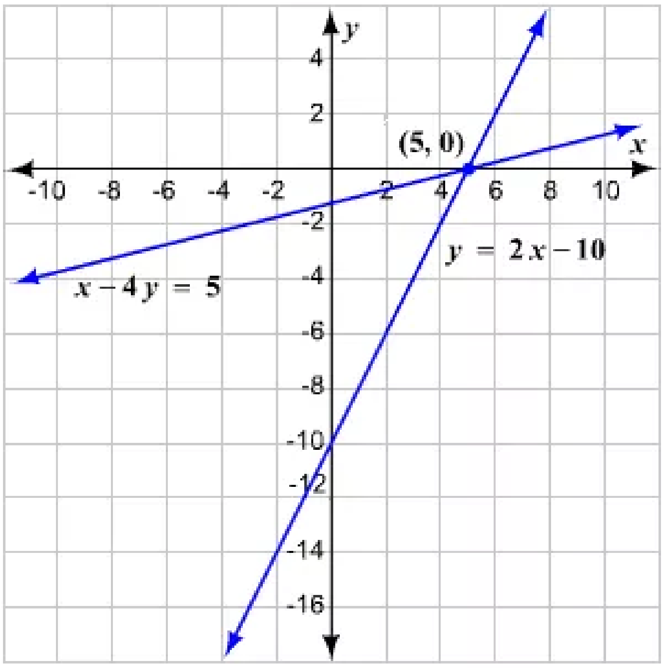
Now, plot the points on a coordinate plane and connect them with a straight line.



Similarly, graph equation (2) on the same set of axes.



Identify the point of intersection of the graphs.



From the graph, the lines appear to intersect at (5, 0).

Check

In order to check the solution, substitute 5 for x, and 0 for y in equations (1) and (2).

$y = 2x - 10$		$x - 4y = 5$	
$0 \stackrel{?}{=} 2(5) - 10$		$5 - 4(0) \stackrel{?}{=} 5$	
$0 \stackrel{?}{=} 10 - 10$		$5 - 0 \stackrel{?}{=} 5$	
$0 = 0$	✓	$5 = 5$	✓

Therefore, the solution is (5, 0).

Answer 7gp.

Let x be the number of rides and y be the total cost.

Write a verbal model to form an equation for Option A.

Total cost (dollars)	=	Cost per ride (dollars/ride)	·	Number of rides (rides)	+	Monthly fee (dollars)
⇓		⇓		⇓		⇓
y	=	1	·	x	+	36

An equation for the total cost of Option A is $y = x + 36$.

>

Now, write a verbal model form an equation for Option B.

Total cost (dollars)	=	Cost per ride (dollars/ride)	·	Number of rides (rides)
⇓		⇓		⇓
y	=	2.5	·	x

An equation for the total cost of Option B is $y = 2.5x$.

Number the equations.

$$y = x + 36 \qquad (1)$$

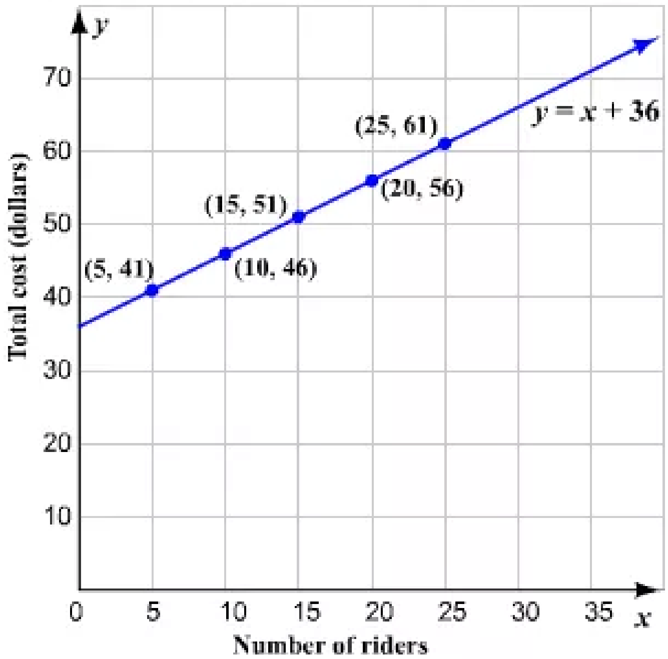
$$y = 2.5x \qquad (2)$$

Find some points with coordinates that are solutions of equation (1).
Choose some values for x and find the corresponding values of y.
Organize the results in a table.

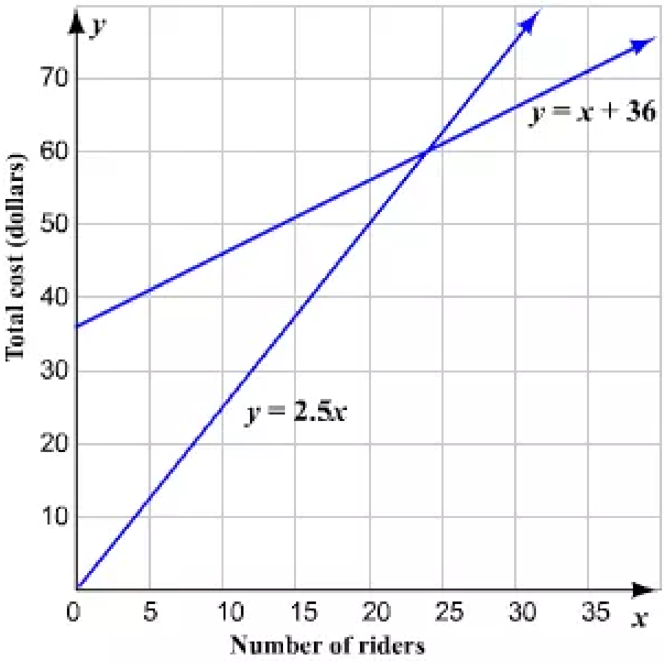
x	5	10	15	20	25
y	41	46	51	56	61

The points are (5, 41), (10, 46), (15, 51), (20, 56), and (25, 61).

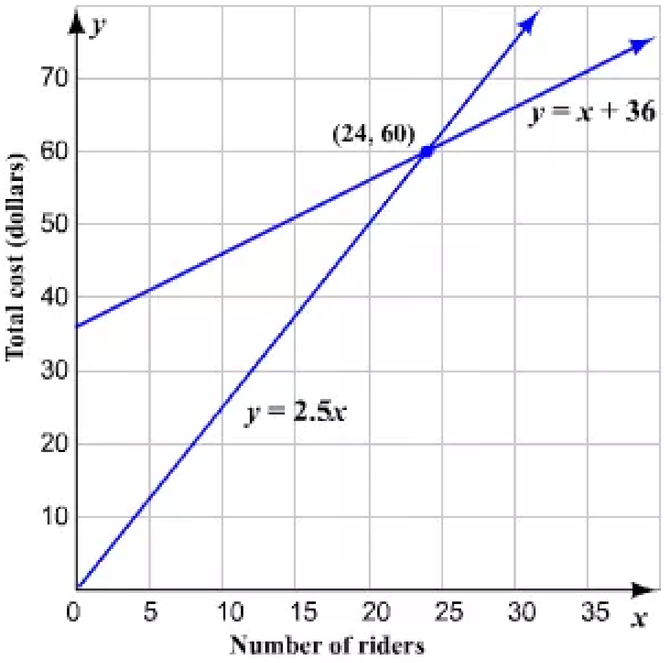
Plot the points on the coordinate plane and connect the points with a straight line.
Label the x-axis with "Number of rides" and the y-axis with "Total cost (dollars)."



Similarly, graph equation (2) on the same set of axes.



Identify the point of intersection of the graphs.



The lines appear to intersect at (24, 60). The solution is (24, 60).

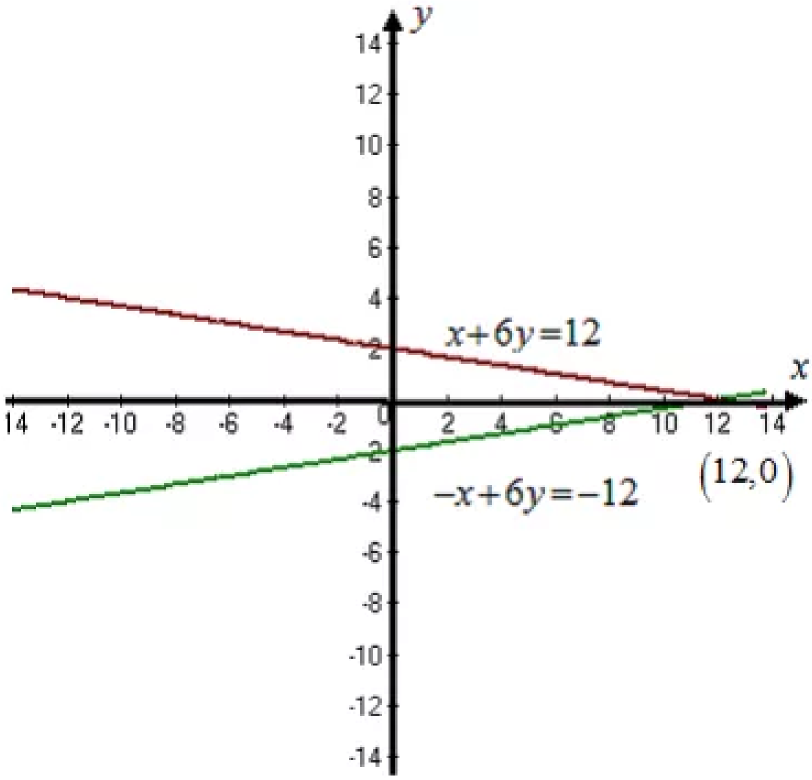
Thus, the total costs of the gym membership plans will be equal after 24 rides.

Answer 8e.

To graph the linear system and estimate the solution.
Consider the following linear system is

$$-x+6y=-12 \qquad \ldots\ldots (1)$$
$$x+6y=12 \qquad \ldots\ldots (2)$$

We begin by graphing both equations.



From the graph, the lines appear to intersect at the point $(12,0)$.

And we check this algebraically as follows:

Equation (1): $-x+6y=-12$

$-12+6(0)=-12$ Let $(x,y)=(-12,0)$

$-12+0=-12$ Simplify

$-12=-12$ True

Equation (2): $x+6y=12$

$12+6(0)=12$ Let $(x,y)=(12,0)$

$12+0=12$ Simplify

$12=12$ True

Therefore the solution is $\boxed{(12,0)}$.

Answer 9e.

Number the equations.

$y = -3x - 2$ (1)

$5x + 2y = -2$ (2)

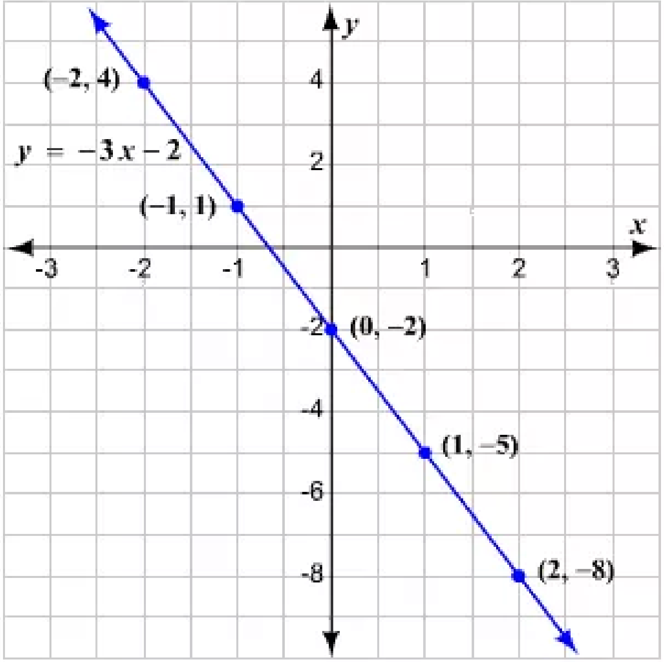
Find some points that are solutions of equation (1). For this, choose some values for x and find the corresponding values of y.

Organize the results in a table.

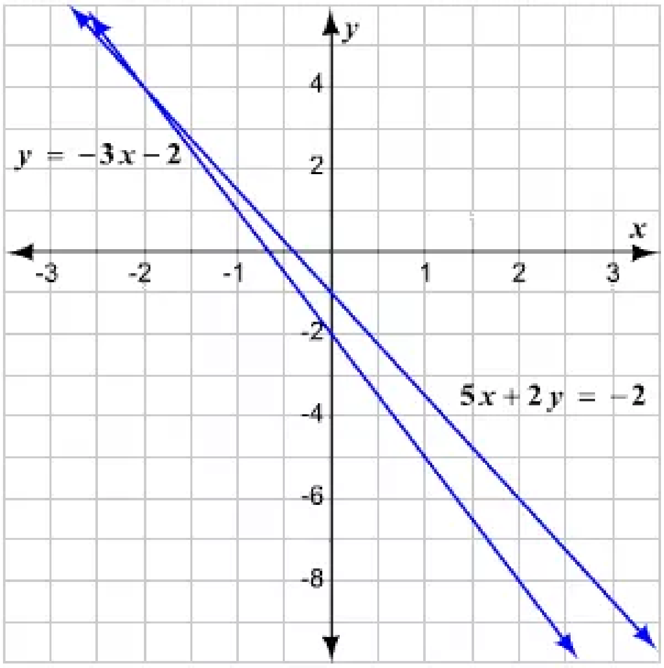
x	-2	-1	0	1	2
y	4	1	-2	-5	-8

The points are (−2, −4), (−1, 1), (0, −2), (1, −5), and (2, −8).

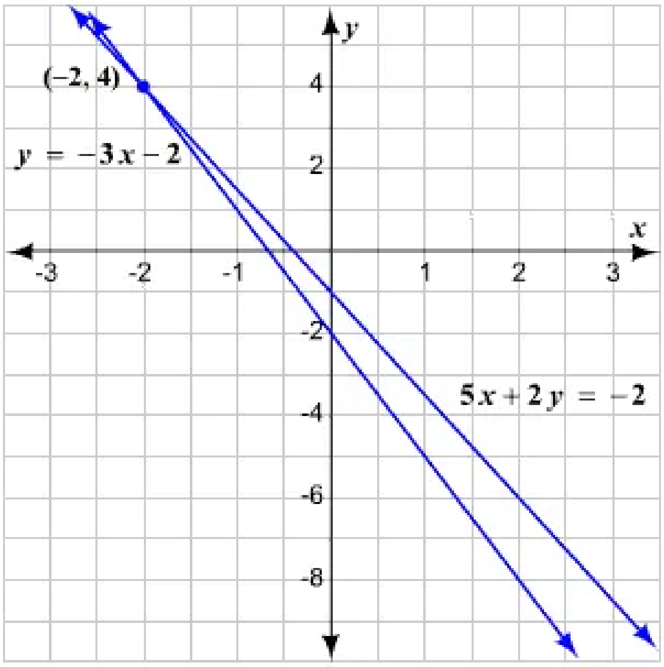
Now, plot the points on a coordinate plane and connect them with a straight line.



Similarly, graph equation (2) on the same set of axes.



Identify the point of intersection of the graphs.



From the graph, the lines appear to intersect at (−2, 4).

Check

In order to check the solution, substitute −2 for x, and 4 for y in equations (1) and (2).

$$y = -3x - 2 \qquad\qquad 5x + 2y = -2$$

$$4 \stackrel{?}{=} -3(-2) - 2 \qquad\qquad 5(-2) + 2(4) \stackrel{?}{=} -2$$

$$4 \stackrel{?}{=} 6 - 2 \qquad\qquad -10 + 8 \stackrel{?}{=} -2$$

$$4 = 4 \checkmark \qquad\qquad -2 = -2 \checkmark$$

Therefore, the solution is (−2, 4).

Answer 10e.

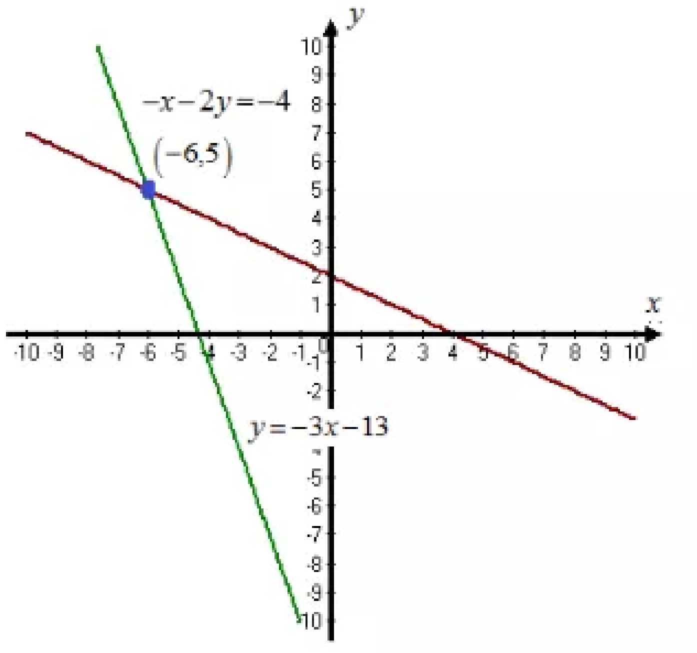
To graph the linear system and estimate the solution.

Consider the following system

$$y = -3x - 13 \qquad \ldots\ldots (1)$$

$$-x - 2y = -4 \qquad \ldots\ldots (2)$$

We begin by graphing both equations.



From the graph, the lines appear to intersect at the point $(-6,5)$.

And we check this algebraically as follows:

Equation (1): $y=-3x-13$

$5=-3(-6)-13$	Let $(x,y)=(-6,5)$
$5=18-13$	Simplify
$5=5$	True

Equation (2): $-x-2y=-4$

$-(-6)-2(5)=-4$	Let $(x,y)=(-6,5)$
$6-10=-4$	Simplify
$-4=-4$	True

Therefore the solution is $\boxed{(-6,5)}$.

Answer 11e.

Number the equations.

$$x-7y=6 \qquad (1)$$

$$-3x+21y=-18 \qquad (2)$$

Write equation (1) in the slope-intercept form. For this, subtract x from each side.

$$x-7y-x=6-x$$

$$-7y=6-x$$

Divide each side by -7.

$$\frac{-7y}{-7}=\frac{6-x}{-7}$$

$$y=-\frac{6}{7}+\frac{1}{7}x \qquad (3)$$

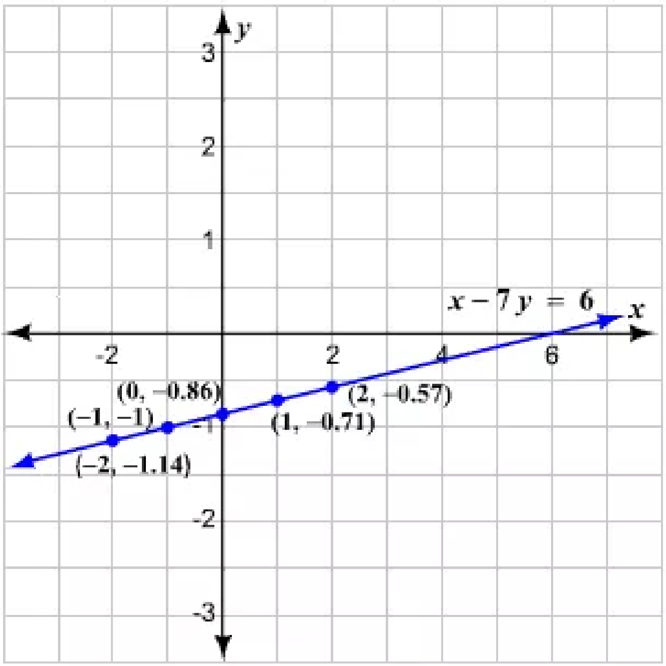
Find some points that are solutions of equation (3). For this, choose some values for x and find the corresponding values of y.

Organize the results in a table.

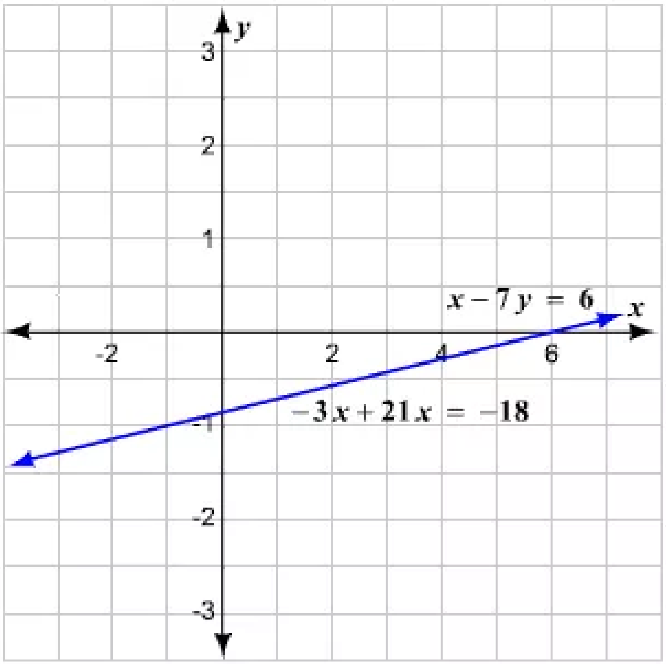
x	-2	-1	0	1	2
y	-1.14	-1	-0.86	-0.71	-0.57

The points are (–2, –1.14), (–1, –1), (0, –0.86), (1, –0.71), and (2, –0.57).

Now, plot the points on a coordinate plane and connect them with a straight line.



Similarly, graph equation (2) on the same set of axes.



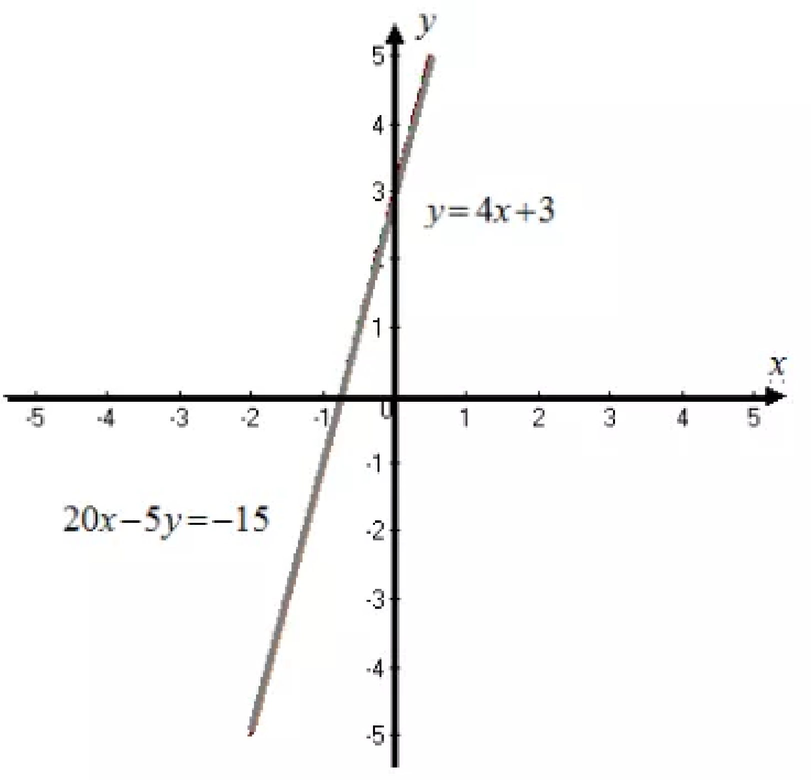
The graphs of the equations coincide. Thus, the given system has infinitely many solutions.

Answer 12e.

To graph the linear system and estimate the solution.
Consider the following system of equations

$$y = 4x + 3 \qquad \ldots\ldots (1)$$
$$20x - 5y = -15 \qquad \ldots\ldots (2)$$

We begin by graphing both equations.



We observe that, the graphs of the equations are the same line.
So, each point on the line is a solution, and the system has infinitely many solutions.

Answer 13e.

Number the equations.

$$5x - 4y = 3 \qquad (1)$$
$$3x + 2y = 15 \qquad (2)$$

Write equation (1) in slope-intercept form. For this, subtract $5x$ from each side.

$$5x - 4y - 5x = 3 - 5x$$
$$-4y = 3 - 5x$$

Divide each side by -4.

$$\frac{-4y}{-4} = \frac{3 - 5x}{-4}$$
$$y = -\frac{3}{4} + \frac{5}{4}x \qquad (3)$$

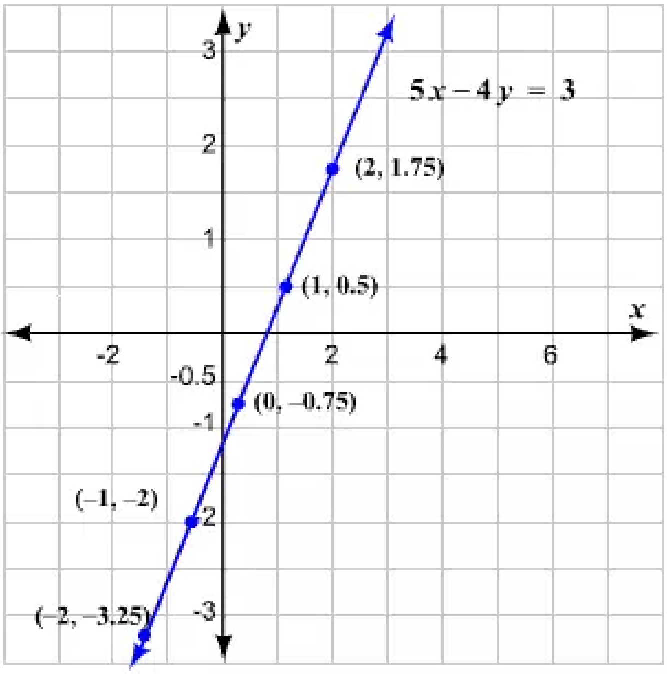
Find some points with coordinates that are solutions of equation (3). For this, choose some values for x and find the corresponding values of y.

Organize the results in a table.

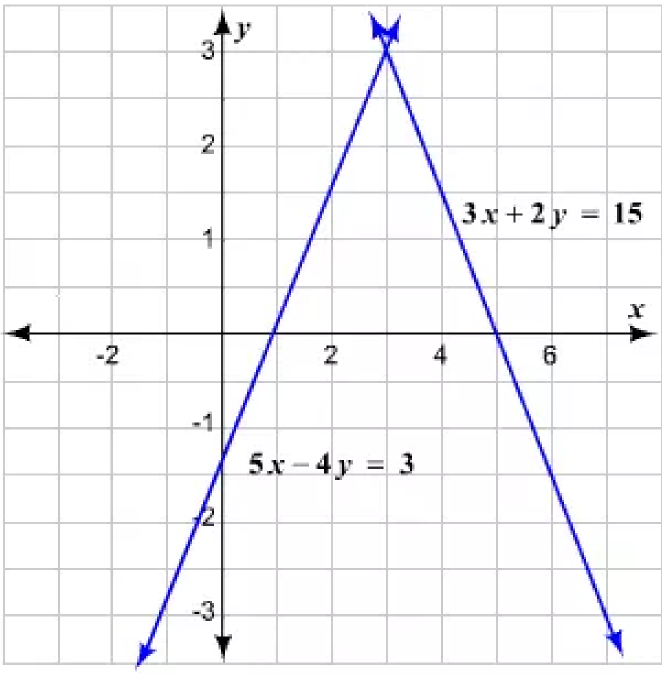
x	−2	−1	0	1	2
y	−3.25	−2	−0.75	0.5	1.75

The points are (−2, −3.25), (−1, −2), (0, −0.75), (1, 0.5), and (2, 1.75).

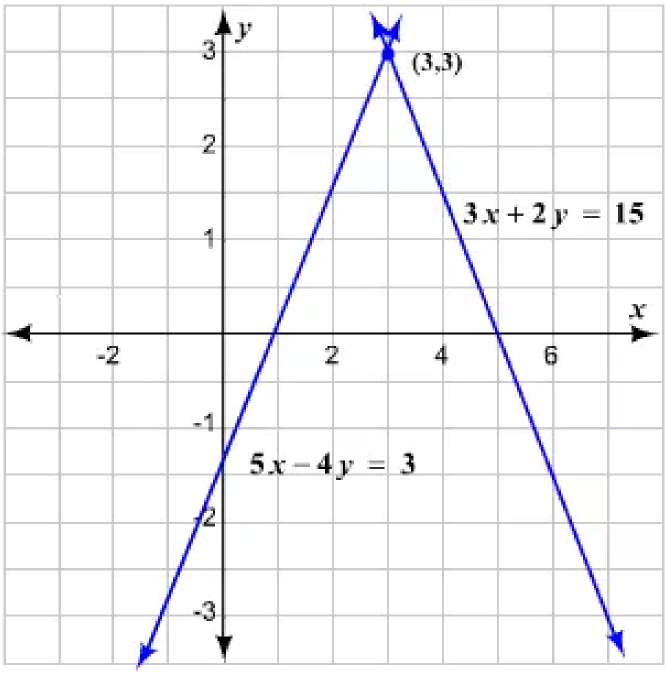
Now, plot the points on a coordinate plane and connect them with a straight line.



Similarly, graph equation (2) on the same set of axes.



Identify the point of intersection of the graphs.



From the graph, the lines appear to intersect at about (3, 3).

Check

In order to check the solution, substitute 3 for x, and 3 for y in equations (1) and (2).

$$5x - 4y = 3 \qquad\qquad 3x + 2y = 15$$
$$5(3) - 4(3) \stackrel{?}{=} 3 \qquad\qquad 3(3) + 2(3) \stackrel{?}{=} 15$$
$$15 - 12 \stackrel{?}{=} 3 \qquad\qquad 9 + 6 \stackrel{?}{=} 15$$
$$3 = 3 \ \checkmark \qquad\qquad 15 = 15 \ \checkmark$$

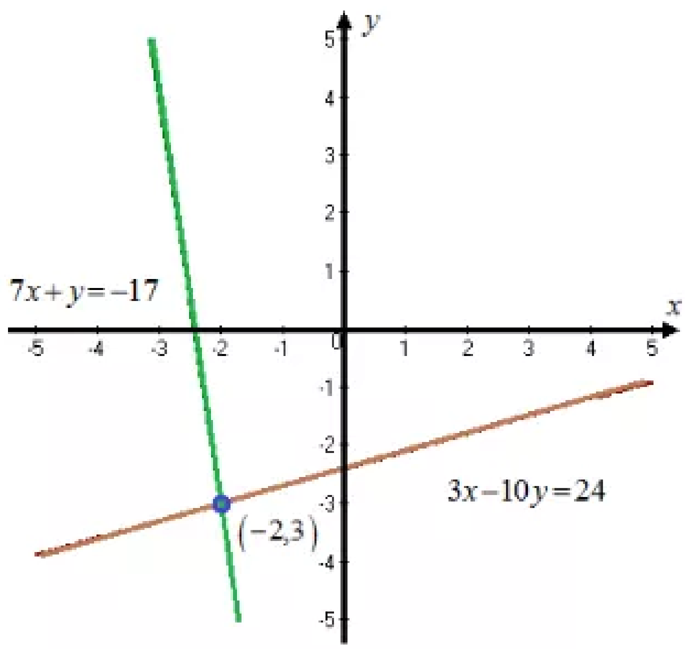
Therefore, the solution is (3, 3).

Answer 14e.

To graph the linear system and estimate the solution.
Consider the following system of equations

$$7x + y = -17 \qquad \ldots\ldots (1)$$
$$3x - 10y = 24 \qquad \ldots\ldots (2)$$

We begin by graphing both equations.



From the graph, the lines appear to intersect at the point $(-2,-3)$.

Now we can check this algebraically as follows.

Equation (1): $7x+y=-17$

$$\begin{aligned} 7(-2)+(-3)&=-17 && \text{Let } (x,y)=(-2,-3) \\ -14-3&=-17 && \text{Simplify} \\ -17&=-17 && \text{True} \end{aligned}$$

Equation (2): $3x-10y=24$

$$\begin{aligned} 3(-2)-10(-3)&=24 && \text{Let } (x,y)=(-2,-3) \\ -6+30&=24 && \text{Simplify} \\ 24&=24 && \text{True} \end{aligned}$$

Therefore the solution is $\boxed{(-2,-3)}$.

Answer 15e.

Number the equations.

$-4x - y = 2 \qquad (1)$

$7x + 2y = -5 \qquad (2)$

Write equation (1) in slope-intercept form. For this, add $4x$ to each side.

$$-4x - y + 4x = 2 + 4x$$
$$-y = 2 + 4x$$

Divide each side by -1.

$$\frac{-y}{-1} = \frac{2 + 4x}{-1}$$
$$y = -2 - 4x \qquad (3)$$

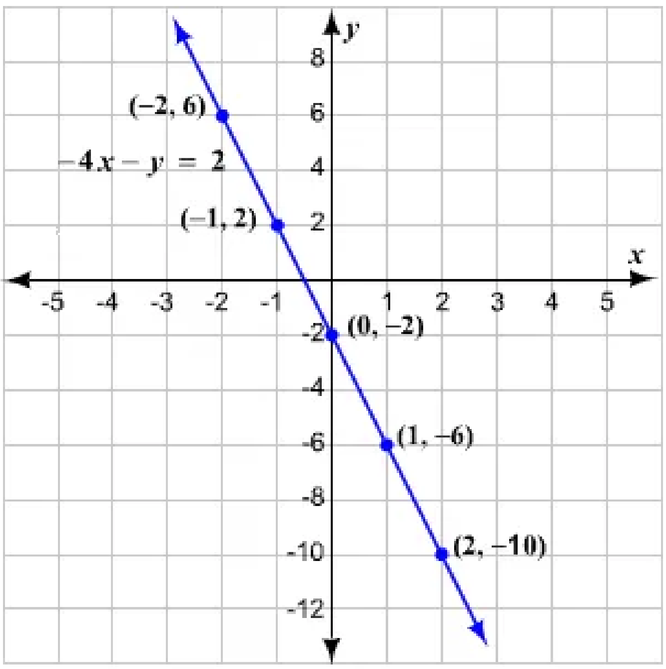
Find some points that are solutions of equation (3). For this, choose some values for x and find the corresponding values of y.

Organize the results in a table.

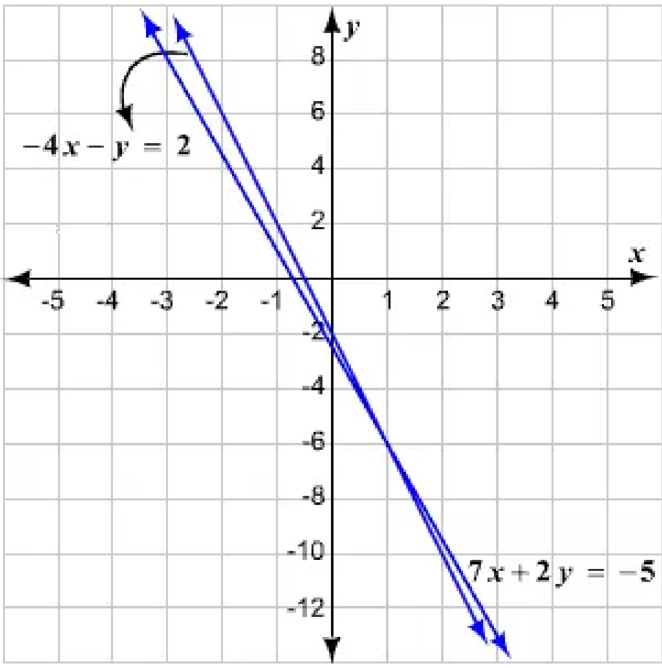
x	-2	-1	0	1	2
y	6	2	-2	-6	-10

The points are $(-2, 6)$, $(-1, 2)$, $(0, -2)$, $(1, -6)$, and $(2, -10)$.

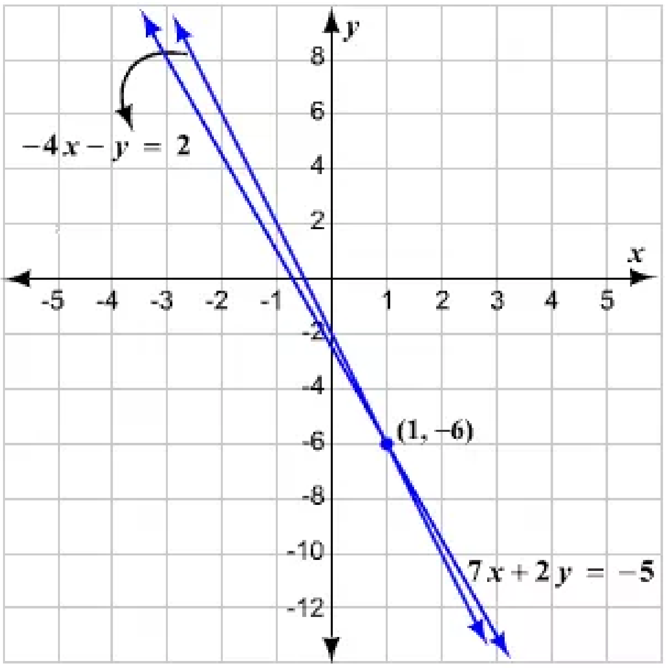
Now, plot the points on a coordinate plane and connect them with a straight line.



Similarly, graph equation (2) on the same set of axes.



Identify the point of intersection of the graphs.



From the graph, the lines appear to intersect at (1, −6).

Check

In order to check the solution, substitute 1 for x, and −6 for y in equations (1) and (2).

$$\begin{aligned} -4x - y &= 2 \\ -4(1) - (-6) &\stackrel{?}{=} 2 \\ -4 + 6 &\stackrel{?}{=} 2 \\ 2 &= 2 \quad \checkmark \end{aligned} \qquad \begin{aligned} 7x + 2y &= -5 \\ 7(1) + 2(-6) &\stackrel{?}{=} -5 \\ 7 - 12 &\stackrel{?}{=} -5 \\ -5 &= -5 \quad \checkmark \end{aligned}$$

The solution is (1, −6). Therefore, the correct answer is choice **C**.

Answer 16e.

Consider linear system $3x-2y=2$ ...... (1)

$x+2y=6$ ...... (2)

Also given that $(0,-1)$ is the solution of the given system.

Now check this algebraically as follows.

Equation (1): $3x-2y=2$

$3(0)-2(-1)=2$ Let $(x,y)=(0,-1)$

$0+2=2$ Simplify

$2=2$ True

Equation (2): $x+2y=6$

$0+2(-1)=6$ Let $(x,y)=(0,-1)$

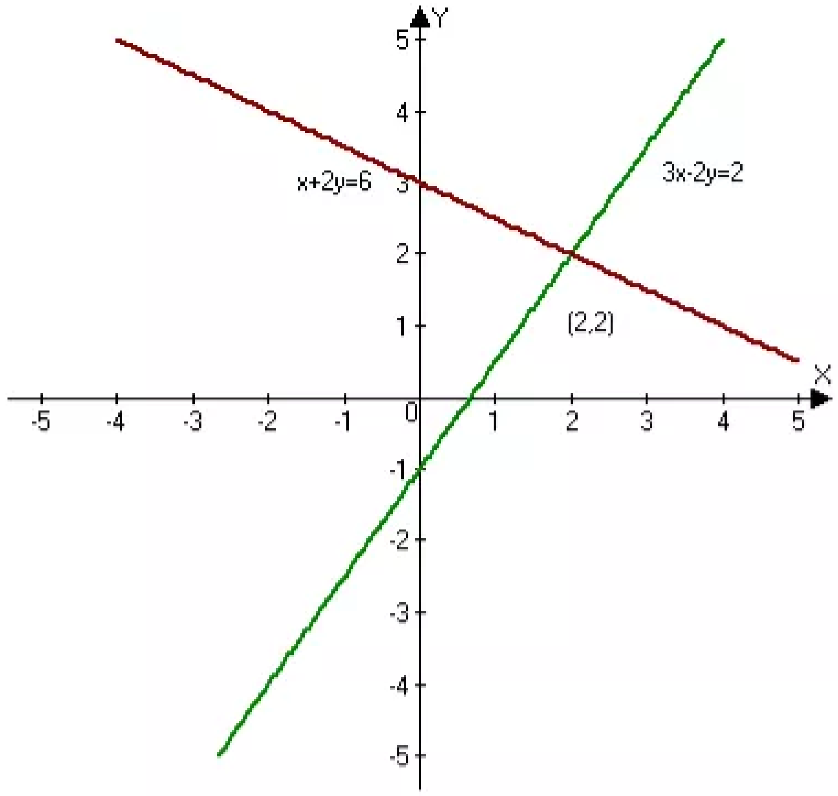
$0-2=6$ Simplify

$-2=6$ False

So, the point $(0,-1)$ does not satisfy the equation (2).

So, $(0,-1)$ is not the solution.

To find the correct solution, begin by graphing both the equations.



From the graph the lines appear to intersect at the point $(2,2)$.

Now check this algebraically as follows

Equation (1):	$3x-2y=2$	
	$3(2)-2(2)=2$	Let $(x,y)=(2,2)$
	$6-4=2$	Simplify
	$2=2$	True

Equation (2):	$x+2y=6$	
	$2+2(2)=6$	Let $(x,y)=(2,2)$
	$2+4=6$	Simplify
	$6=6$	True

Therefore the solution is $\boxed{(2,2)}$.

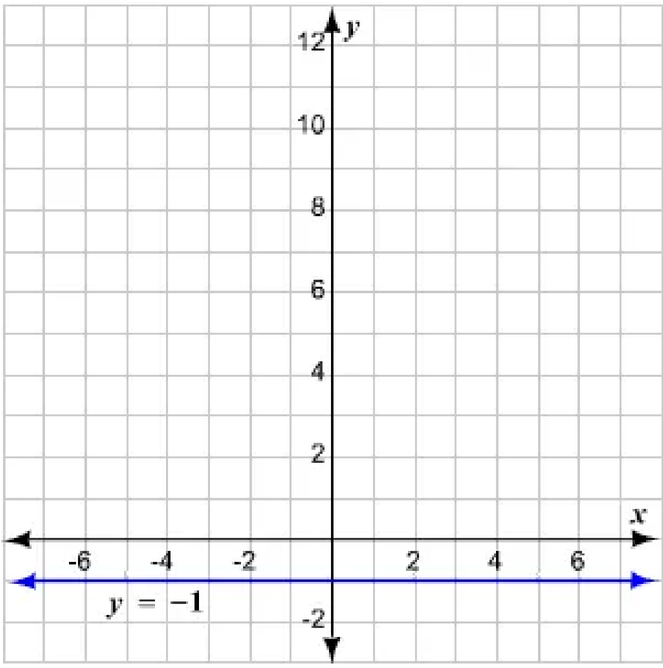
Answer 17e.

Number the equations.

$y = -1 \quad (1)$

$3x + y = 5 \quad (2)$

Graph equation (1). This graph is a horizontal line passing through (0, −1).



Write equation (2) in slope-intercept form. For this, subtract $3x$ from both the sides.

$3x + y - 3x = 5 - 3x$

$y = 5 - 3x \quad (3)$

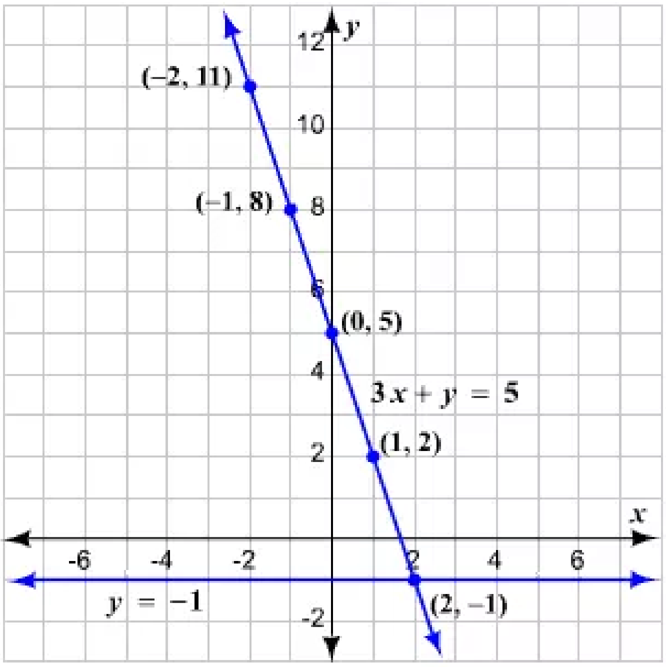
Find some points that are solutions of equation (2). For this, choose some values for x and find the corresponding values of y.

Organize the results in a table.

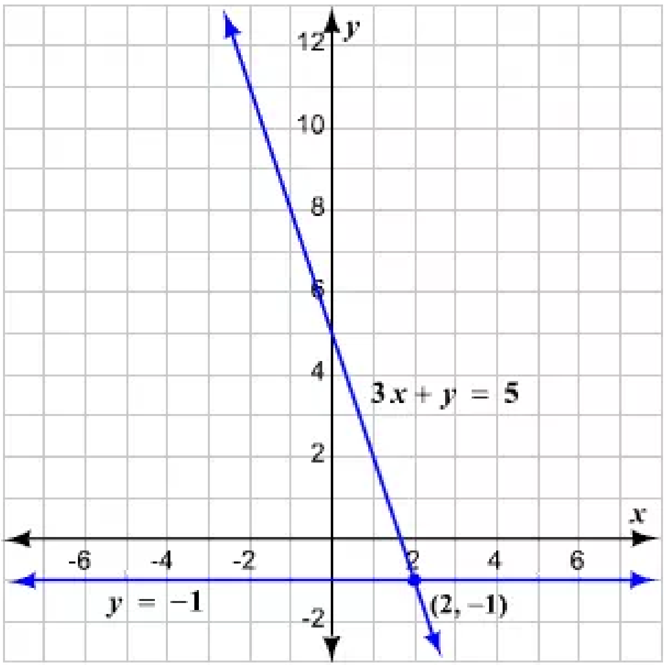
x	−2	−1	0	1	2
y	11	8	5	2	−1

The points are (−2, 11), (−1, 8), (0, 5), (1, 2), and (2, −1).

Now, plot the points on a coordinate plane and connect them with a straight line.



Identify the point of intersection of the graphs.



From the graph, the lines appear to intersect at $(2, -1)$. The system has exactly one solution. Thus, the given system is consistent and independent.

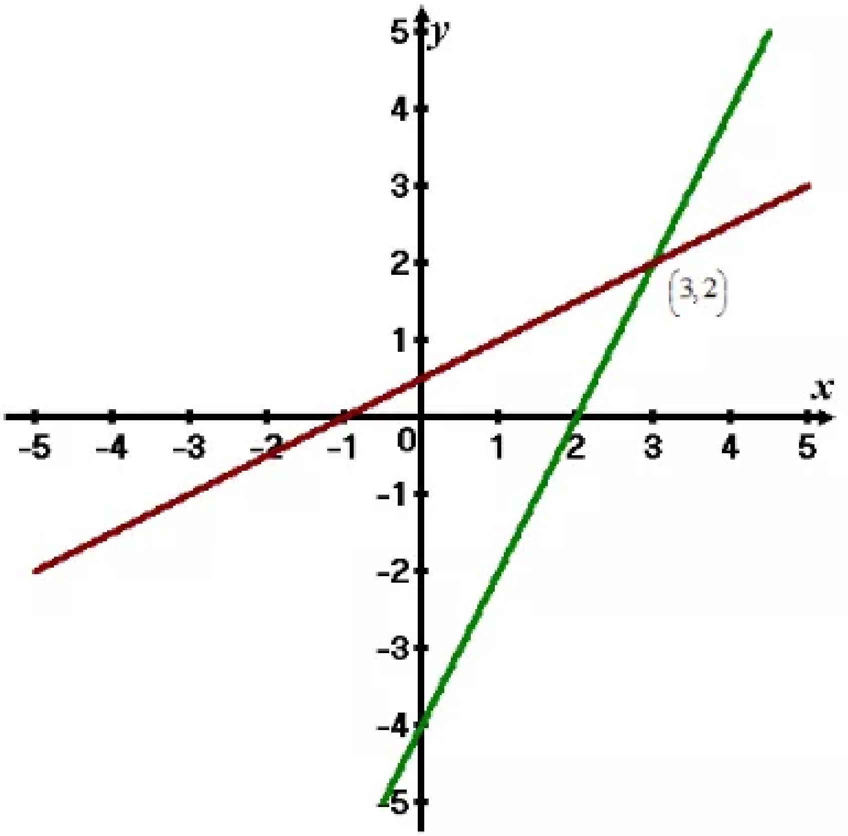
Answer 18e.

Consider linear system,

$2x - y = 4$

$x - 2y = -1$

The graphs of these equations are shown below:



The graph of the equations are intersect at a single point $(3,2)$.

Thus the system is consistent and independent.

Answer 19e.

Number the equations.

$y = 3x + 2 \quad (1)$

$y = 3x - 2 \quad (2)$

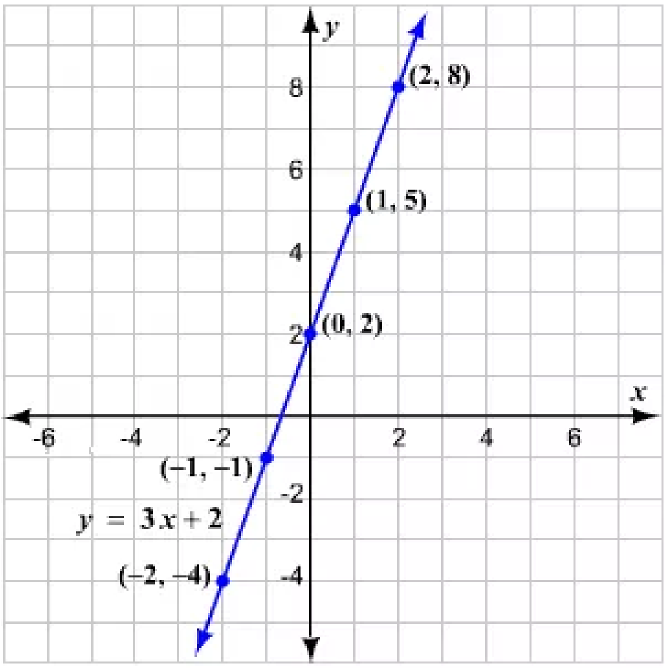
Find some points with coordinates that are solutions of equation (2). For this, choose some values for x and find the corresponding values of y.

Organize the results in a table.

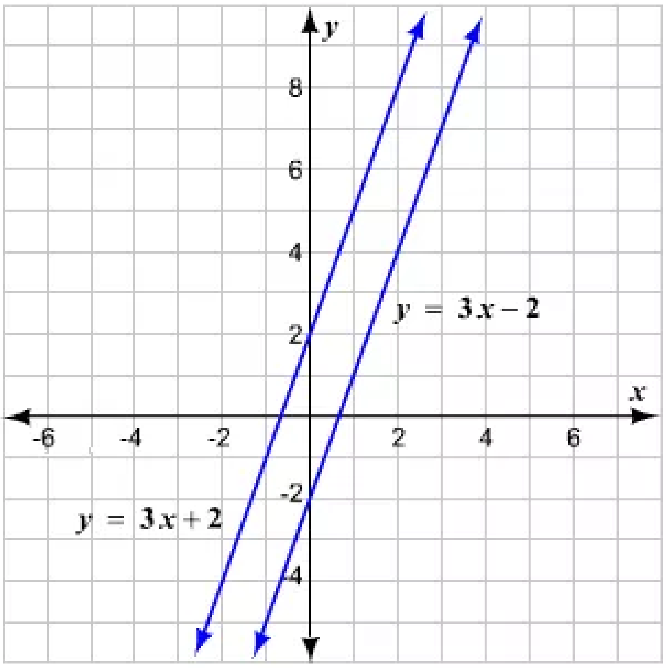
x	-2	-1	0	1	2
y	-4	-1	2	5	8

The points are (−2, −4), (−1, −1), (0, 2), (1, 5), and (2, 8).

Now, plot the points on a coordinate plane and connect them with a straight line.



Similarly, graph equation (2) on the same set of axes.



Since the two lines have no point of intersection, the system has no solution.

Therefore, the given system is inconsistent.

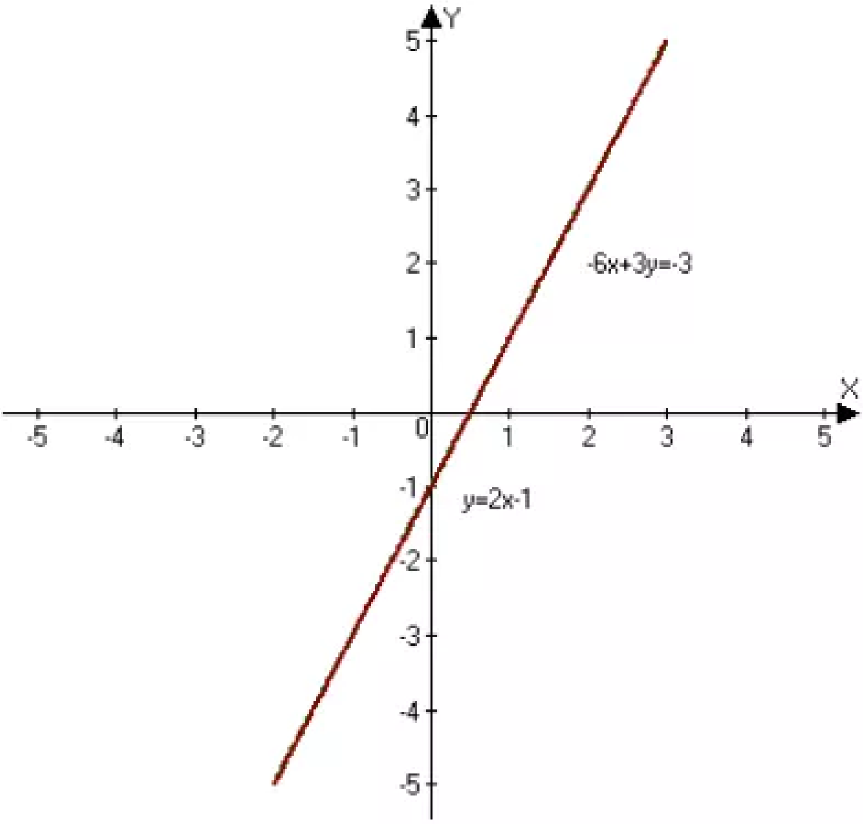
Answer 20e.

Consider the linear system,

$y = 2x - 1$

$-6x + 3y = -3$

The graphs of these lines are shown below:



From the graph, we observe that the graphs of the equations are the same line.
So, each point on the line is a solution and the system has infinitely many solutions.
Therefore the system is $\boxed{\text{consistent and dependent}}$.

Answer 21e.

Number the equations.

$$-20x + 12y = -24 \quad (1)$$

$$5x - 3y = 6 \quad (2)$$

Write equation (1) in slope-intercept form. For this, add 20x to each side first.

$$-20x + 12y + 20x = -24 + 20x$$

$$12y = -24 + 20x$$

Divide each side by 12.

$$\frac{12y}{12} = \frac{-24 + 20x}{12}$$

$$y = -2 + \frac{20}{12}x \quad (3)$$

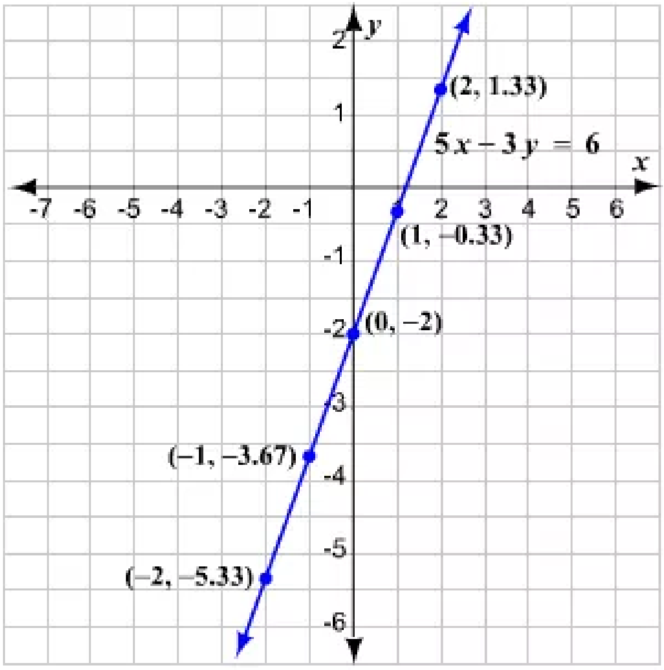
Find some points that are solutions of equation (3). For this, choose some values for x and find the corresponding values of y.

Organize the results in a table.

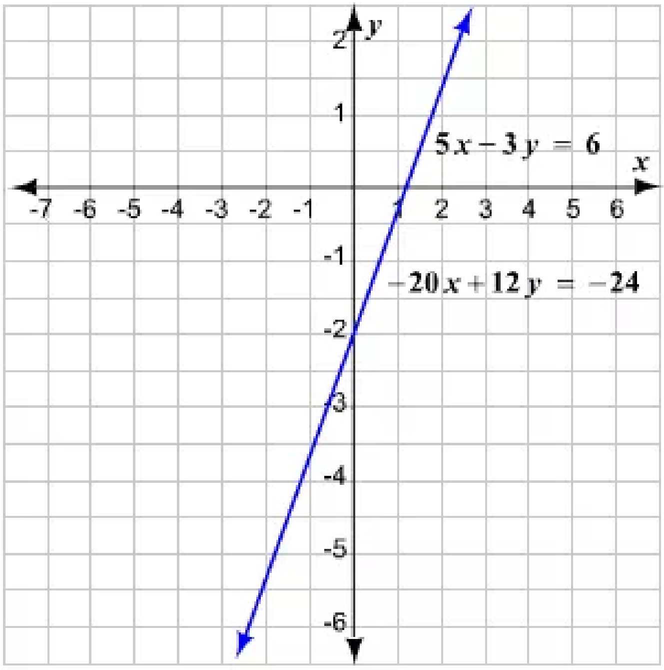
x	−2	−1	0	1	2
y	−5.33	−3.67	−2	−0.33	1.33

The points are (−2, −5.33), (−1, −3.67), (0, −2), (1, −0.33), and (2, 1.33).

Now, plot the points on a coordinate plane and connect them with a straight line.



Similarly, graph equation (2) on the same set of axes.



The two equations have the same graph. Thus, each point on the line is a solution and the system has infinitely many solutions.

Therefore, the given system is consistent and dependent.

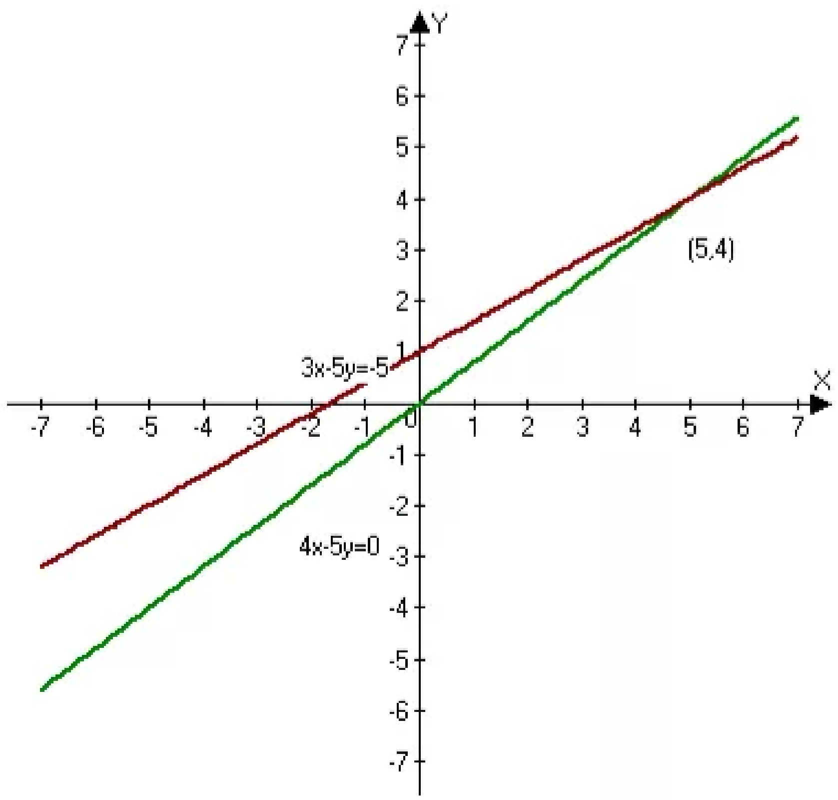
Answer 22e.

Consider linear system

$4x - 5y = 0$

$3x - 5y = -5$

Begin by graph both equations:



From the graph, we observe that the graphs of the equations intersect at a single point $(5,4)$.

Thus the system is consistent and independent.

Answer 23e.

Number the equations.

$$3x + 7y = 6 \qquad (1)$$

$$2x + 9y = 4 \qquad (2)$$

Write equation (1) in slope-intercept form. For this, subtract $3x$ from each side first.

$$3x + 7y - 3x = 6 - 3x$$

$$7y = -3x + 6$$

Divide each side by 7.

$$\frac{7y}{7} = \frac{-3x + 6}{7}$$

$$y = -\frac{3}{7}x + \frac{6}{7} \qquad (3)$$

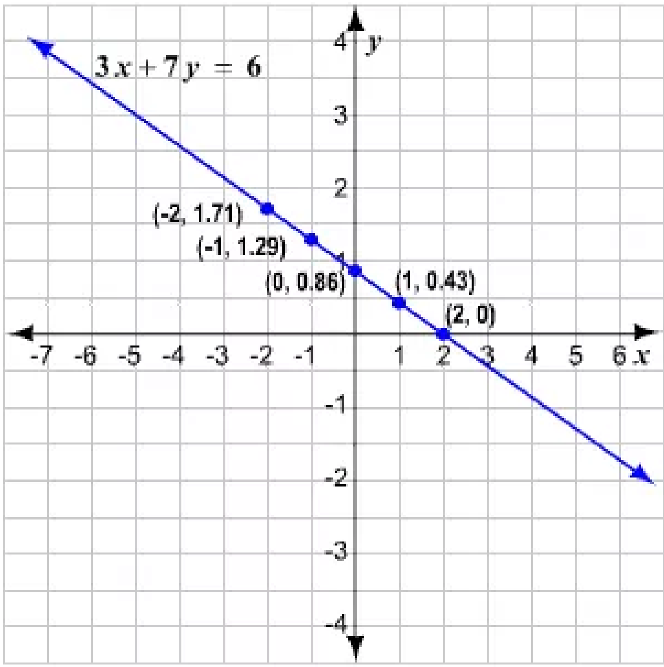
Find some points with coordinates that are solutions of equation (3). For this, choose some values for x and find the corresponding values of y.

Organize the results in a table.

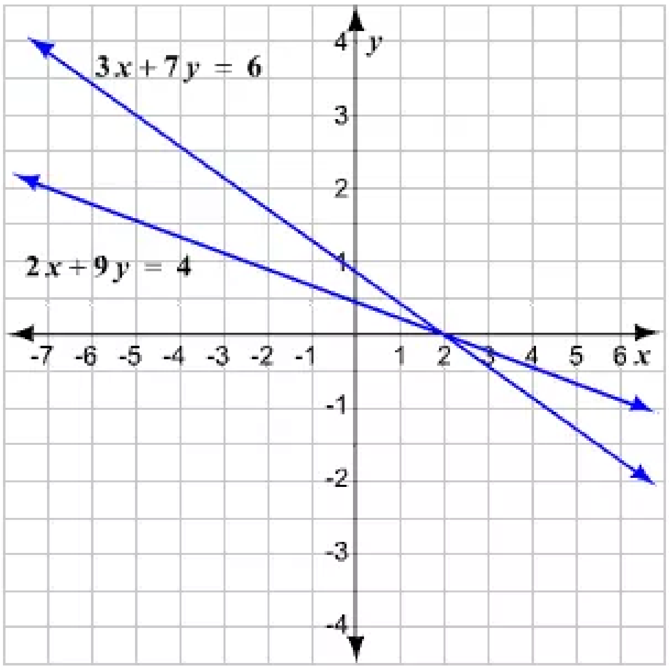
x	−2	−1	0	1	2
y	1.71	1.29	0.86	0.43	0

The points are (−2, 1.71), (−1, 1.29), (0, 0.86), (1, 0.43), and (2, 0).

Now, plot the points on a coordinate plane and connect them with a straight line.



Similarly, graph equation (2) on the same set of axes.



The graphs of the equations appear to intersect at (2, 0). Thus, the system has exactly one solution.

Therefore, the given system is consistent and independent.

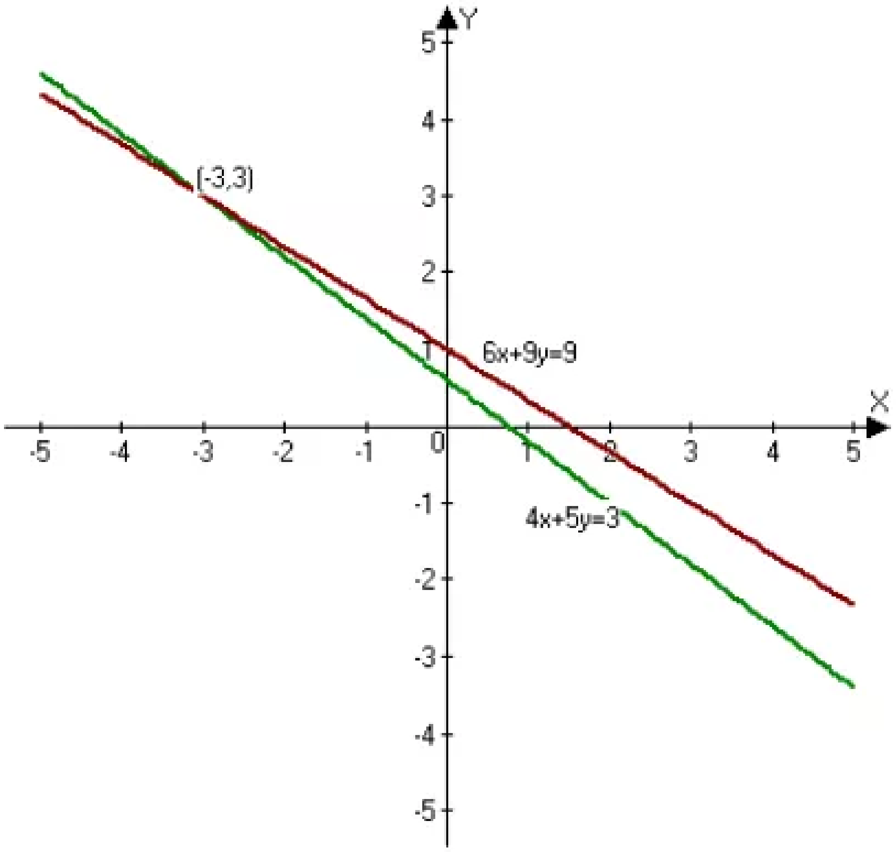
Answer 24e.

Consider the linear system

$4x+5y=3$

$6x+9y=9$

The graphs of these equations are shown below:



From the graph, we observe that the graphs of the equations intersect at a single point $(-3,3)$.

Thus the system is consistent and independent.

Answer 25e.

Number the equations.

$8x + 9y = 15 \quad (1)$

$5x - 2y = 17 \quad (2)$

Write equation (1) in slope-intercept form. For this, subtract $8x$ from each side first.

$$8x + 9y - 8x = 15 - 8x$$
$$9y = 15 - 8x$$

Divide each side by 9.

$$\frac{9y}{9} = \frac{15 - 8x}{9}$$
$$y = -\frac{8}{9}x + \frac{15}{9} \qquad (3)$$

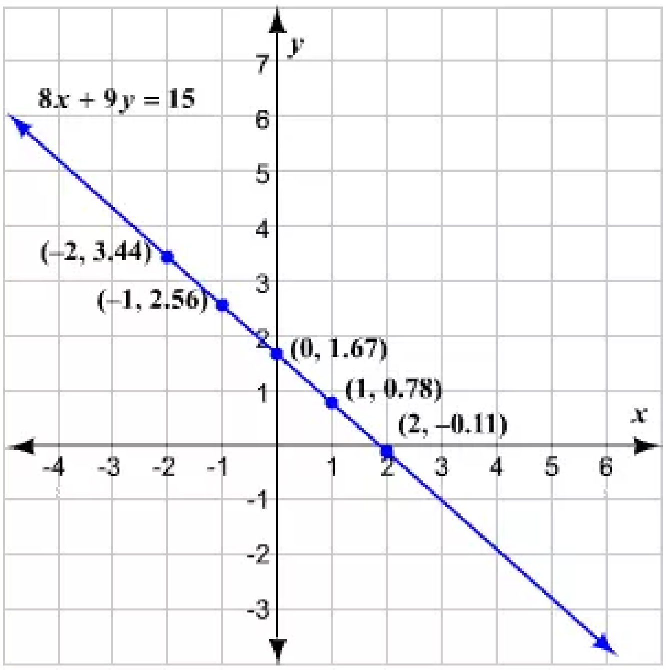
Find some points that are solutions of equation (3). For this, choose some values for x and find the corresponding values of y.

Organize the results in a table.

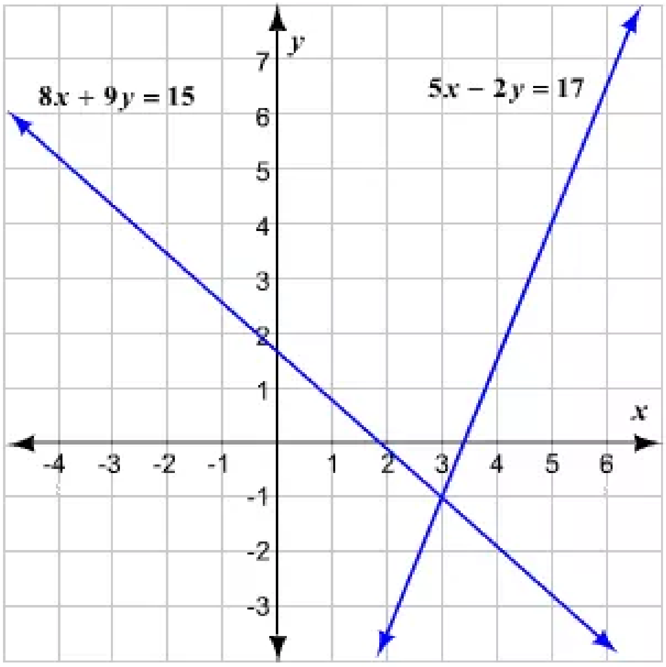
x	−2	−1	0	1	2
y	3.44	2.56	1.67	0.78	−0.11

The points are (–2, 3.44), (–1, 2.56), (0, 1.67), (1, 0.78), and (2, –0.11).

Now, plot the points on a coordinate plane and connect them with a straight line.



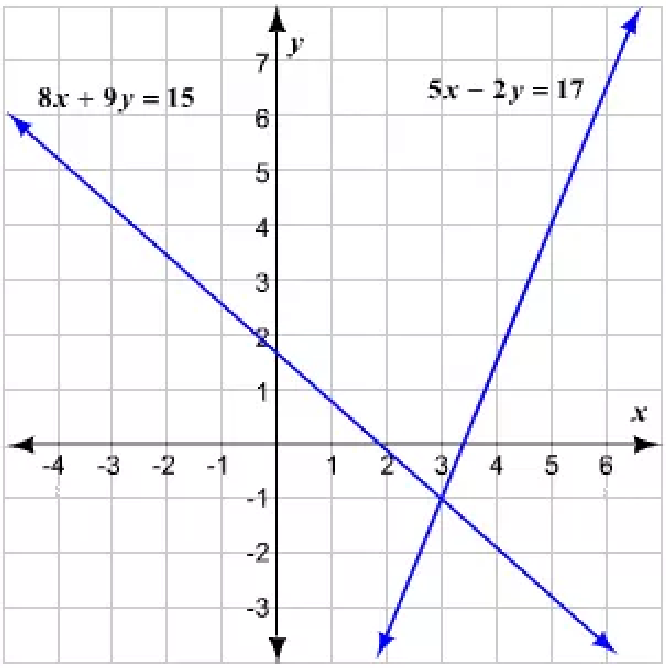
Similarly, graph equation (2) on the same set of axes.



The graphs of the equations appear to intersect at (3, −1). Thus, the system has exactly one solution.

Therefore, the given system is consistent and independent.

Similarly, graph equation (2) on the same set of axes.



The graphs of the equations appear to intersect at (3, −1). Thus, the system has exactly one solution.

Therefore, the given system is consistent and independent.

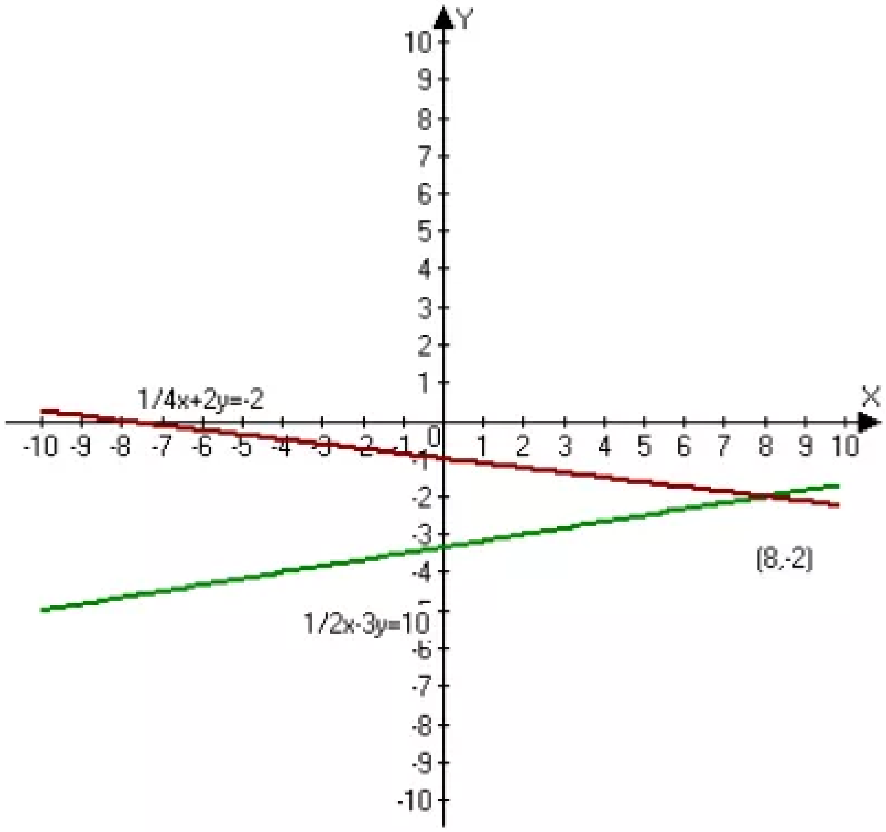
Answer 26e.

Consider the linear system,

$$\frac{1}{2}x - 3y = 10$$

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

The graphs of these equations are shown below:



From the graph, we observe that the graphs of the equations intersect at a single point $\boxed{(8,-2)}$.

Thus the system is $\boxed{\text{consistent and independent}}$.

Answer 27e.

Number the equations.

$$3x - 2y = -15 \qquad (1)$$

$$x - \frac{2}{3}y = -5 \qquad (2)$$

Write equation (1) in slope-intercept form. For this, subtract $3x$ from each side first.

$$3x - 2y - 3x = -15 - 3x$$

$$-2y = -15 - 3x$$

Divide each side by -2.

$$\frac{-2y}{-2} = \frac{-15 - 3x}{-2}$$

$$y = \frac{3}{2}x + \frac{15}{2} \qquad (3)$$

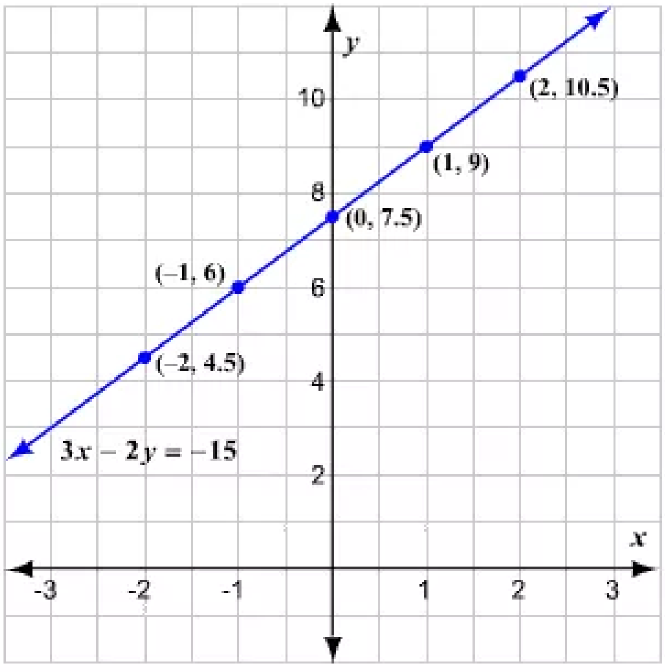
Find some points that are solutions of equation (3). For this, choose some values for x and find the corresponding values of y.

Organize the results in a table.

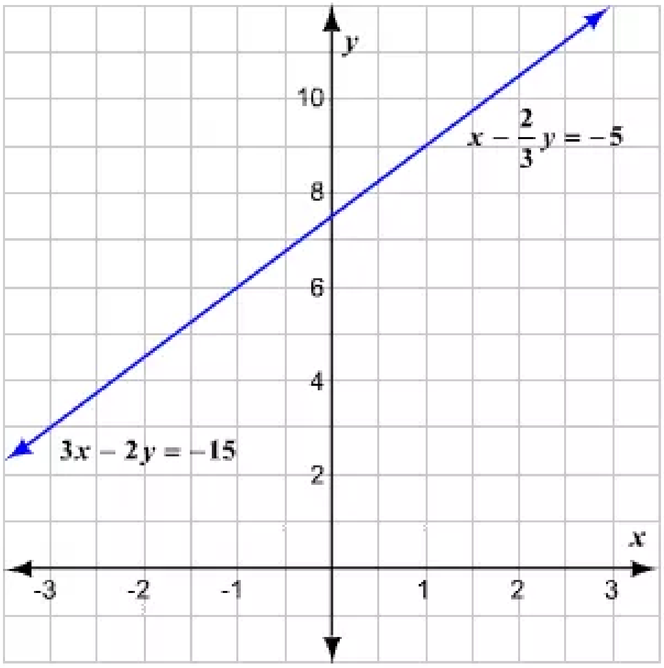
x	-2	-1	0	1	2
y	4.5	6	7.5	9	10.5

The points are (–2, 4.5), (–1, 6), (0, 7.5), (1, 9), and (2, 10.5).

Now, plot the points on a coordinate plane and connect them with a straight line.



Similarly, graph equation (2) on the same set of axes.



The two equations have the same graph. Thus, each point on the line is a solution and the system has infinitely many solutions.

Therefore, the given system is consistent and dependent.

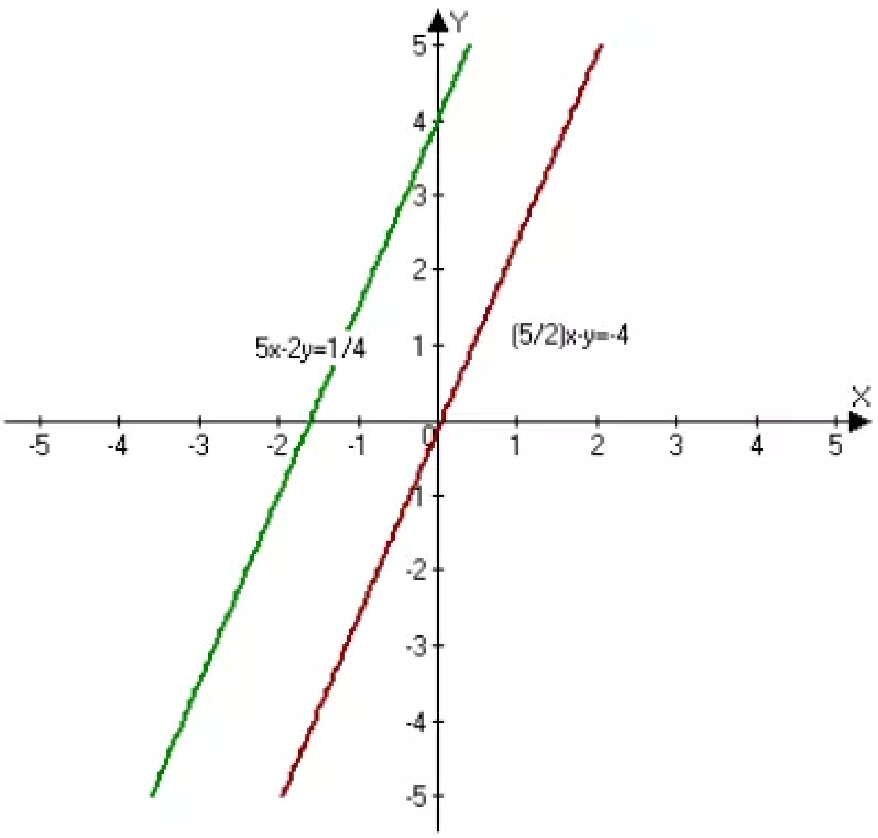
Answer 28e.

Consider the linear system,

$$\frac{5}{2}x-y=-4$$

$$5x-2y=\frac{1}{4}$$

The graphs of these equations are shown below:



From the graph, it is observed that the graphs of the equations are two parallel lines. Because the two lines have no point of intersection, the system has no solution. Therefore the system is $\boxed{\text{inconsistent}}$.

Answer 29e.

Number the equations.

$$-12x + 16y = 10 \qquad (1)$$

$$3x + 4y = -6 \qquad (2)$$

Write equation (1) in slope-intercept form. For this, add $12x$ to each side first.

$$-12x + 16y + 12x = 10 + 12x$$

$$16y = 10 + 12x$$

Divide each side by 16.

$$\frac{16y}{16} = \frac{10 + 12x}{16}$$

$$y = \frac{3}{4}x + \frac{5}{8} \qquad (3)$$

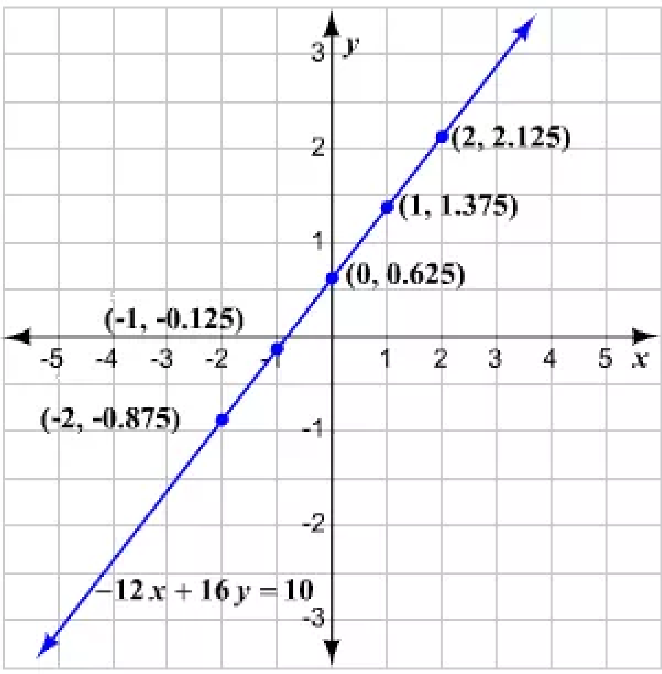
Find some points that are solutions of equation (3). For this, choose some values for x and find the corresponding values of y.

Organize the results in a table.

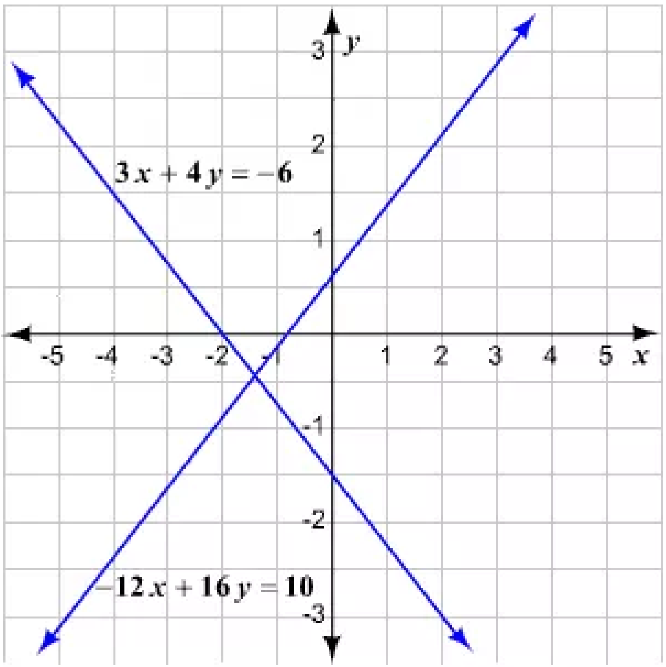
x	-2	-1	0	1	2
y	-0.875	-0.125	0.625	1.375	2.125

The points are (–2, –0.875), (–1, –0.125), (0, 0.625), (1, 1.375), and (2, 2.125).

Now, plot the points on a coordinate plane and connect them with a straight line.



Similarly, graph equation (2) on the same set of axes.



The graphs of the equations appear to intersect at a point. Thus, the system has exactly one solution. The given system is consistent and independent.

The correct answer is choice **A**.

Answer 30e.

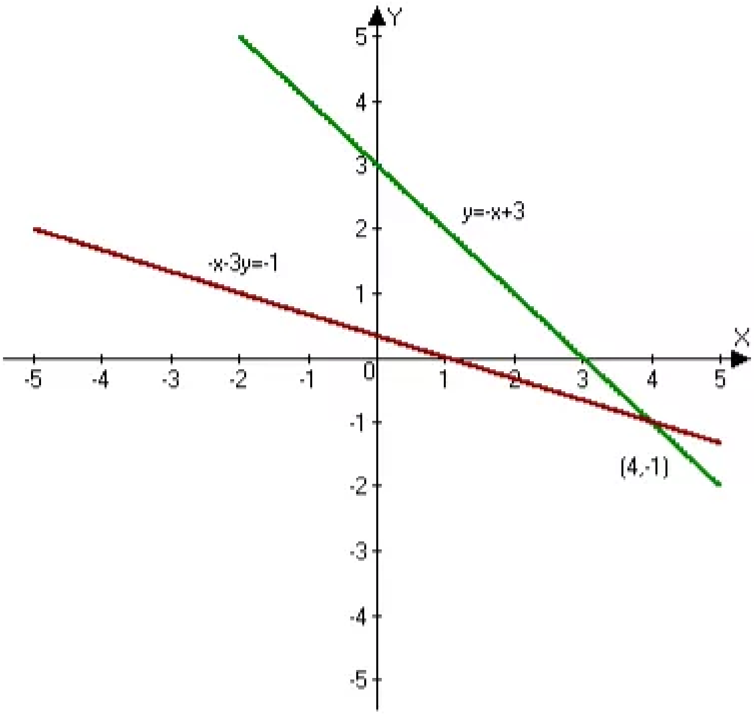
(a)

Consider the system

$y = -x + 3$

$-x - 3y = -1$

The graphs of these equations are shown below:



From the graph, it is observed that the graphs of the equations are intersect at a single point $\boxed{(4,-1)}$.

Thus the system of equations has only one solution.

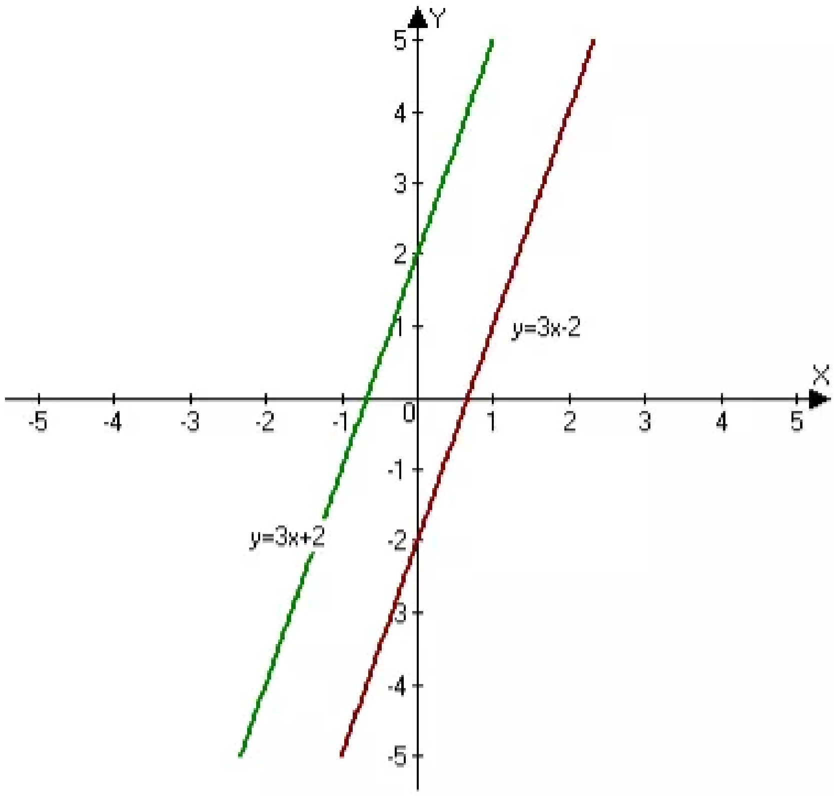
(b)

Consider the system

$y = 3x + 2$

$y = 3x - 2$

The graphs of these equations are shown below:



From the graph, it is observed that the graphs of the equations are two parallel lines. Because the two lines have no point of intersection, the system has no solution.

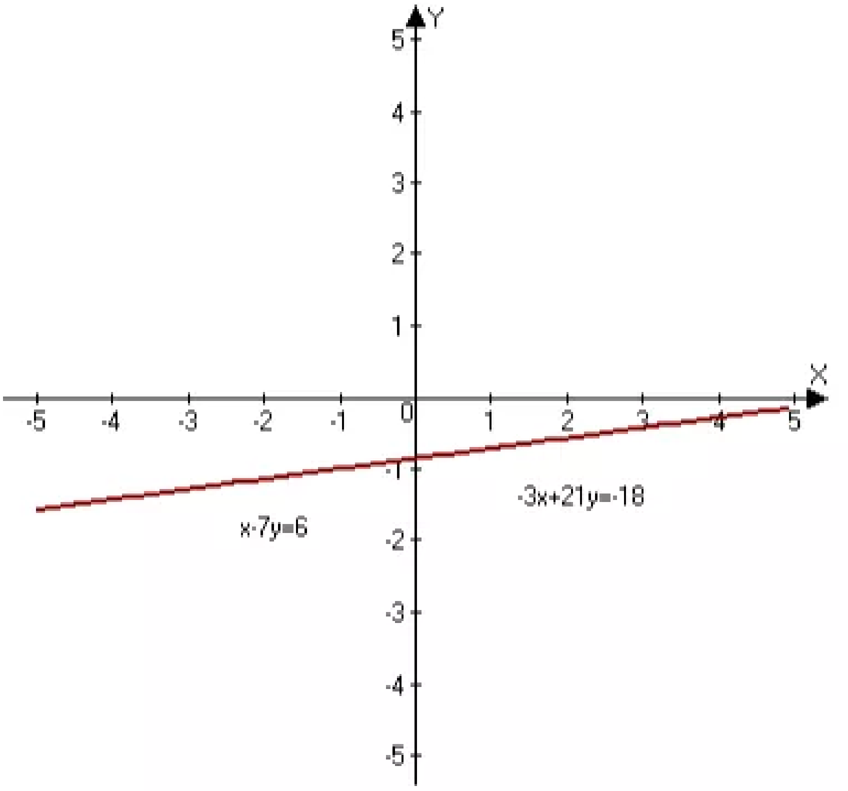
(c)

Consider the system

$x - 7y = 6$

$-3x + 21y = -18$

The graphs of these equations are shown below:



From the graph, we observe the graphs of the equations are the same line.
So, each point on the line is a solution, and the system has infinitely many solutions.

Answer 31e.

Number the equations.

$y = |x + 2|$ (1)

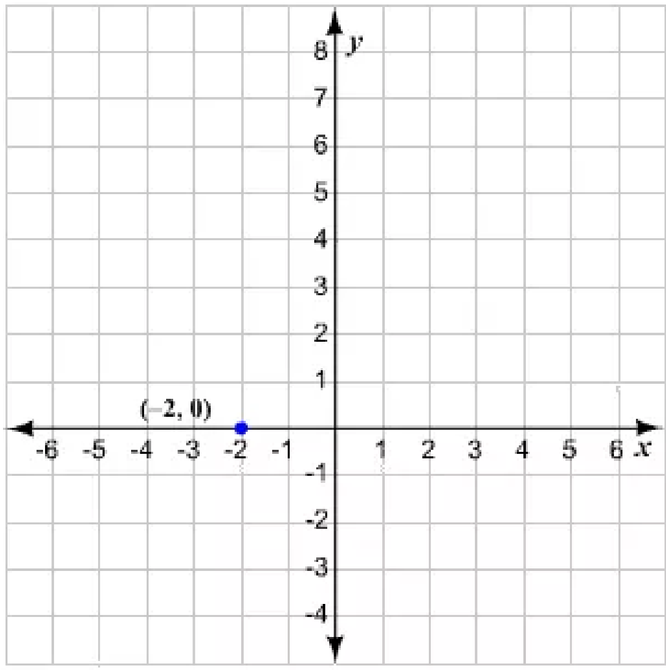
$y = x$ (2)

We have to graph equation (1). For this, identify the vertex of the graph of the equation.

The vertex of the graph of $y = |x - h| + k$ is (h, k). Compare the equation with the standard form. We get $h = -2$ and $k = 0$.

The vertex of $y = |x + 2|$ is $(-2, 0)$.

Plot the vertex on a coordinate plane.

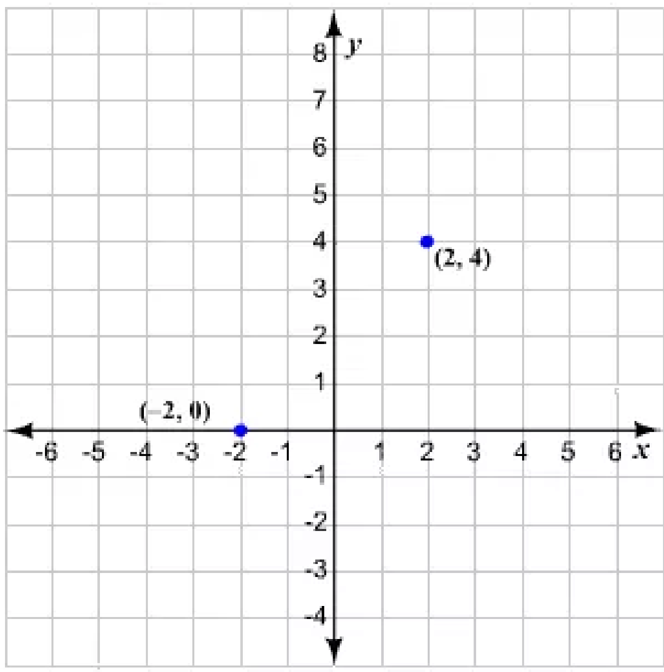


Now, find another point on the graph and plot it.
Substitute 2 for x in the equation.
$y = |2 + 2|$

Simplify.
$y = 4$

Thus, another point on the graph is (2, 4).

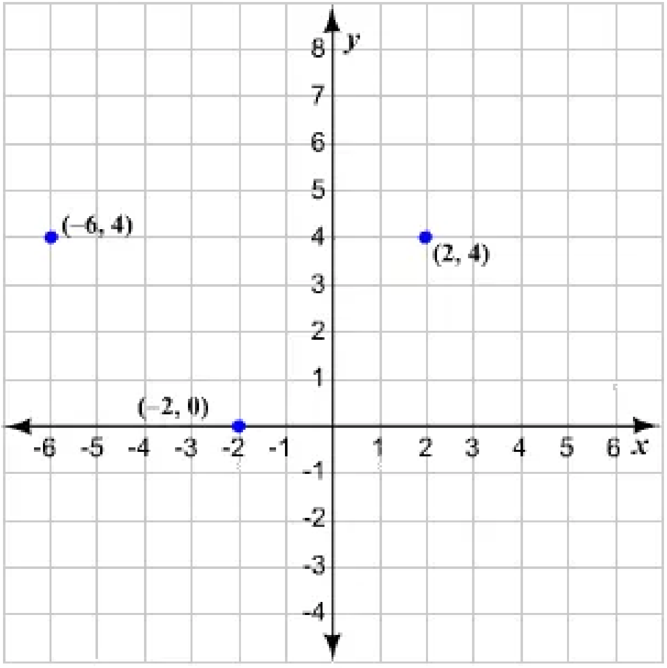
Now, plot the point (2, 4) on the graph.



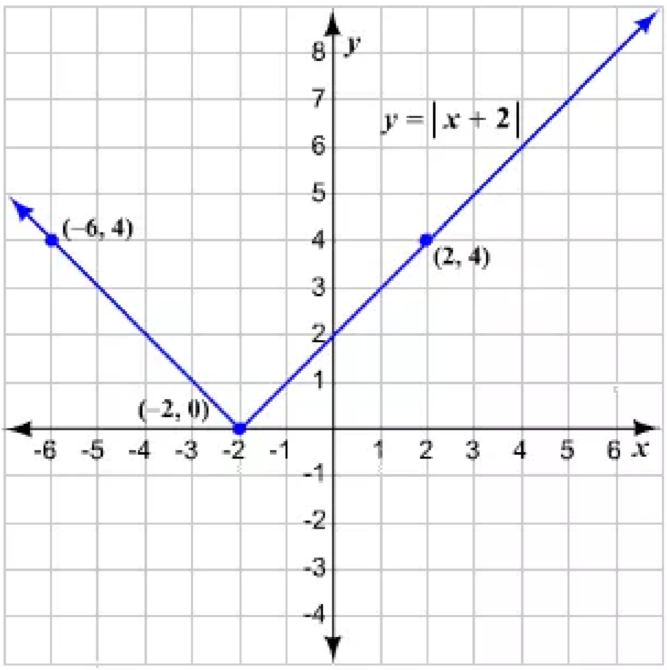
Use symmetry to find a third point on the graph and plot it. We know that the graph of an absolute value function is symmetric about the vertical line passing through the vertex.

Since the vertex of the graph of equation (1) is (−2, 0), the graph is symmetric about the line $x = -2$. The point (2, 4) is 4 units to the right of the line $x = -2$. Thus, by symmetry, a third point on the graph is (−2 − 4, 4) or (−6, 4).

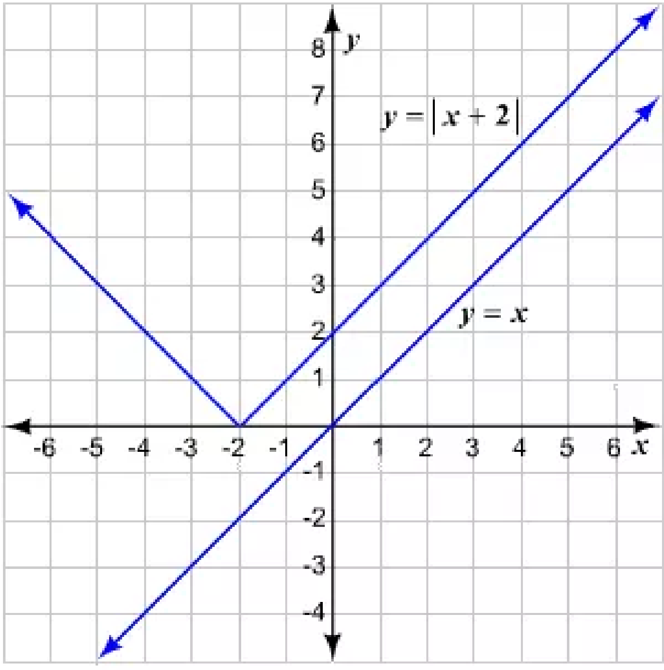
Plot the point (−6, 4) on the graph.



Connect the points with a V-shaped graph.



Graph equation (2) on the same axes. We know that the graph of $y = x$ is a straight line passing through the origin.



The graphs do not intersect at any point. Thus, the system has no solution.

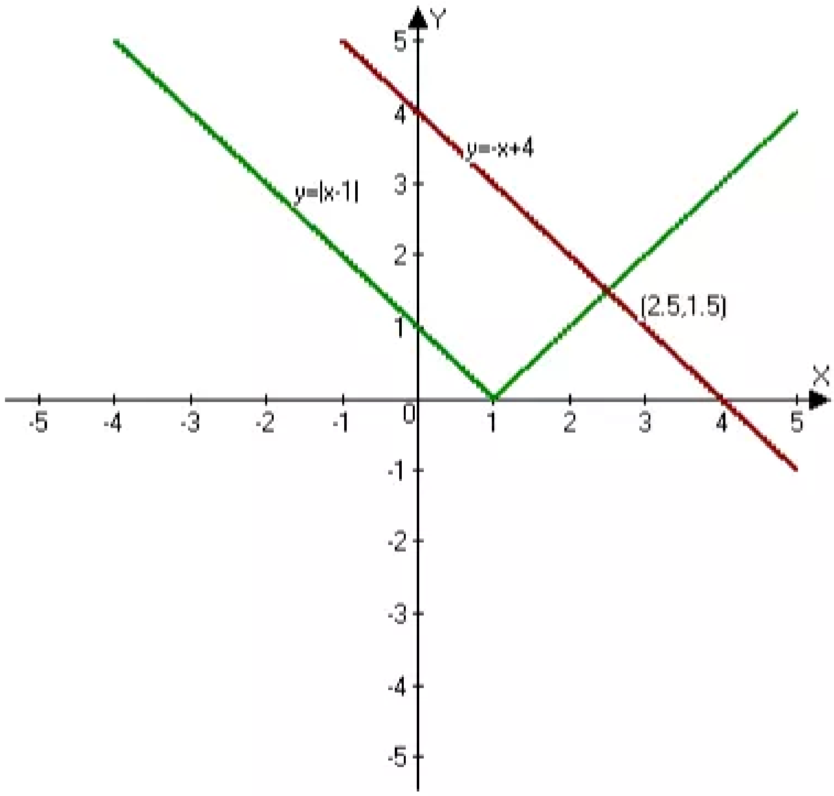
Answer 32e.

Consider the system

$y = |x - 1|$ .... (1)

$y = -x + 4$ .... (2)

The graphs of these equations are shown below:



From the graph, the lines appear to intersect at the point $(2.5, 1.5)$).
Check this algebraically as follows

Equation (1): $y = |x - 1|$

$1.5 = \|2.5 - 1\|$	Put $(x, y) = (2.5, 1.5)$
$1.5 = \|1.5\|$	Simplify
$1.5 = 1.5$	True

Equation (2): $y = -x + 4$

$1.5 = -2.5 + 4$	Put $(x, y) = (2.5, 1.5)$
$1.5 = 1.5$	True

Therefore the solution is $\boxed{(2.5, 1.5)}$.

Answer 33e.

Number the equations.

$y = |x| - 2 \quad (1)$

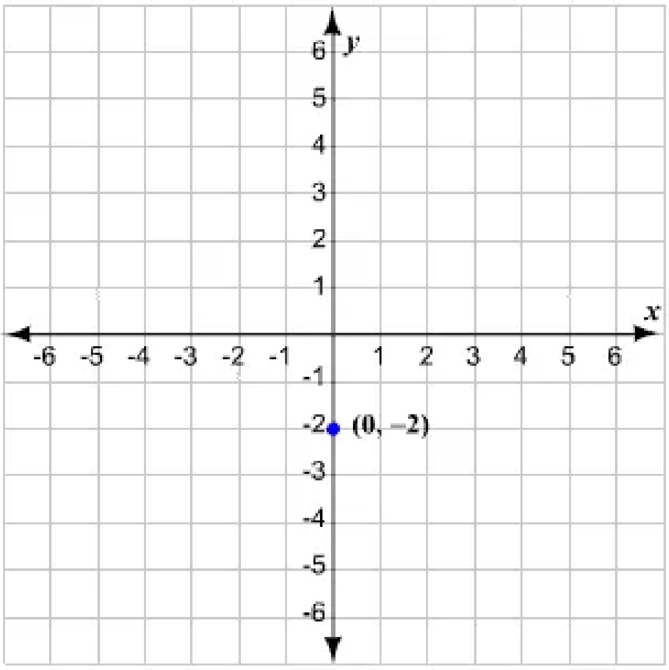
$y = 2 \quad (2)$

We have to graph equation (1). For this, identify the vertex of the graph of the equation.

The vertex of the graph of $y = |x - h| + k$ is (h, k). Compare the equation with the standard form. We get $h = 0$ and $k = -2$.

The vertex of $y = |x| - 2$ is $(0, -2)$.

Plot the vertex on a coordinate plane.



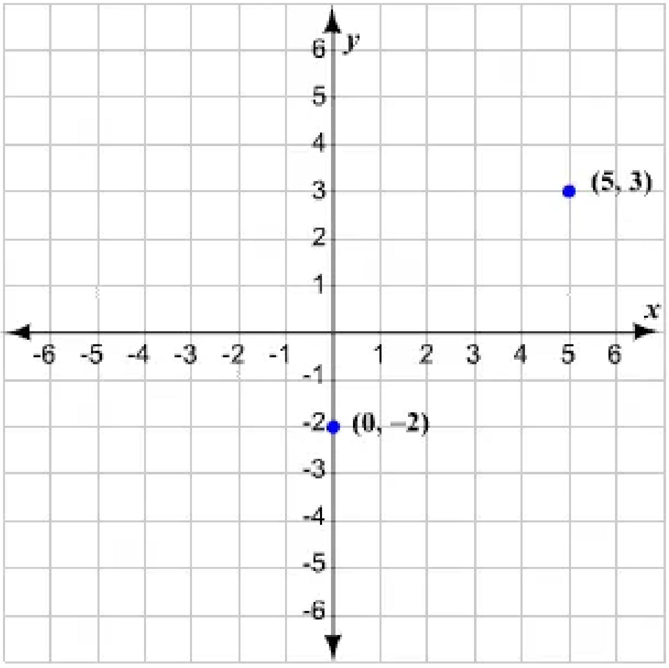
Now, find another point on the graph and plot it.

Substitute5 for x in the equation.
$y = |5| - 2$

Simplify.
$y = 3$

Thus, another point on the graph is (5, 3).

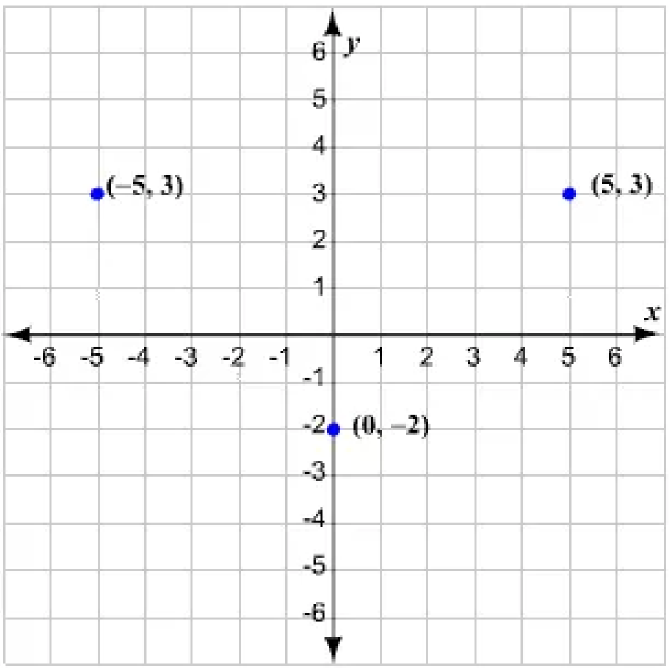
Now, plot the point (5, 3) on the graph.



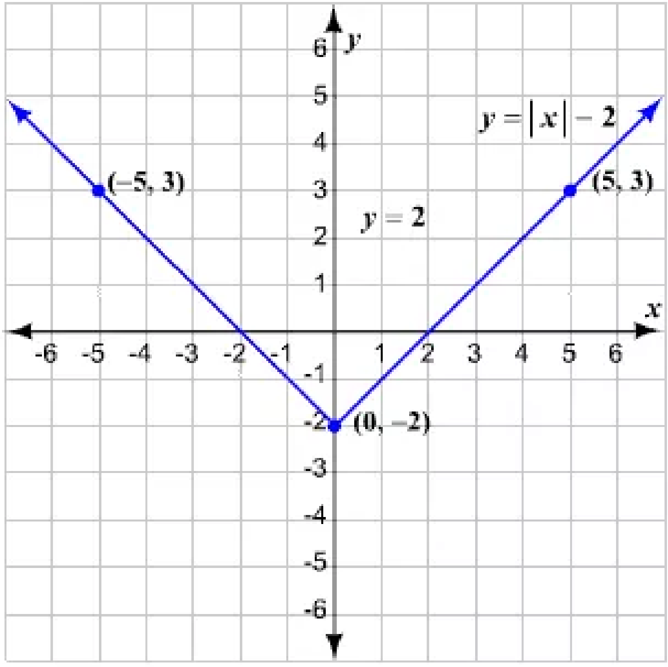
Use symmetry to find a third point on the graph and plot it. We know that the graph of an absolute value function is symmetric about the vertical line passing through the vertex.

Since the vertex of the graph of equation (1) is (0, –2), the graph is symmetric about the y-axis. The point (5, 3) is 5 units to the right of the x-axis. Thus, by symmetry, a third point on the graph is (–5, 3).

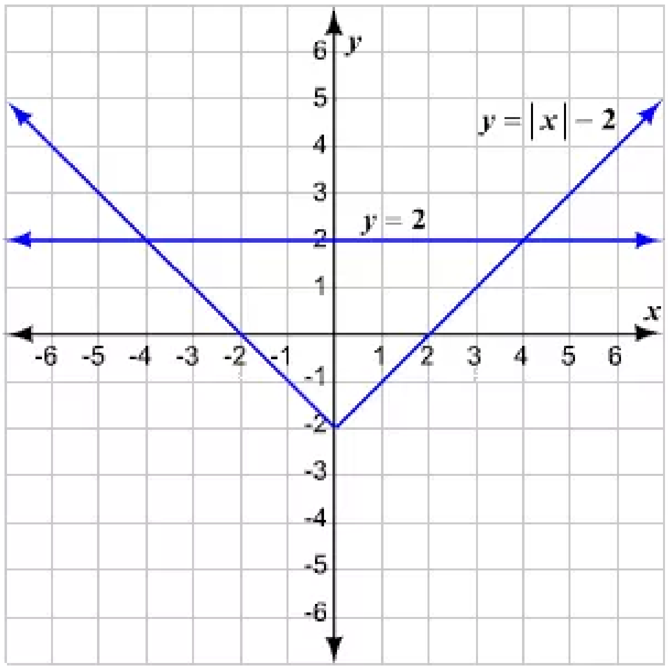
Plot the point (–5, 3) on the graph.



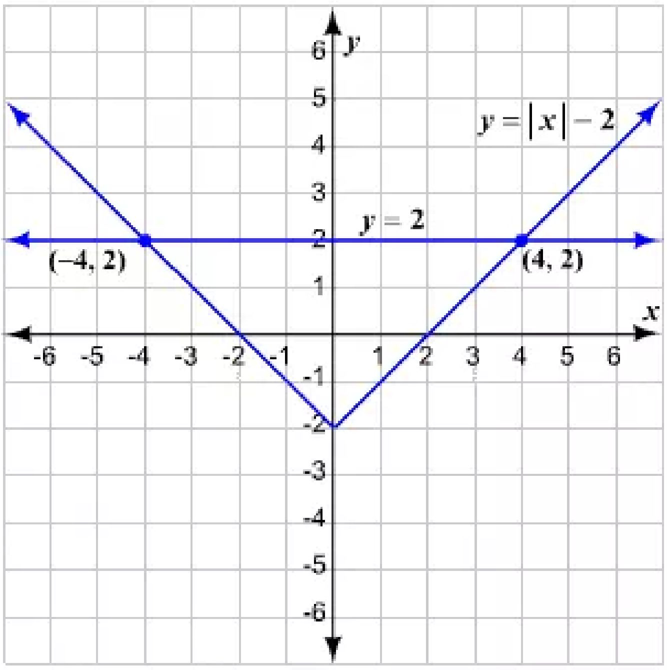
Connect the points with a V-shaped graph.



Graph equation (2) on the same axes. We know that the graph of $y = 2$ is a horizontal line passing through (0, 2).



Identify the point of intersection of the graphs.



The lines appear to intersect at (−4, 2) and (4, 2).

Check

For $(-4, 2)$

$y = \|x\| - 2$	$y = 2$
$2 = \|-4\| - 2$	$2 = 2$ ✓
$2 = 4 - 2$	
$2 = 2$ ✓	

For $(4, 2)$

$y = \|x\| - 2$	$y = 2$
$2 = \|4\| - 2$	$2 = 2$ ✓
$2 = 4 - 2$	
$2 = 2$ ✓	

Therefore, the solutions are (−4, 2) and (4, 2).

Answer 35e.

Let x be the number of hours worked as lifeguard and y be the number of hours worked as cashier.

Write a verbal model for the total time.

Number of hours worked as lifeguard (hours)		Number of hours worked as cashier (hours)		Total number of hours worked (hours)
⇓		⇓		⇓
x	+	y	=	14

The required equation is $x + y = 14$.

Now, write a verbal model for the total amount earned.

Amount earned per hour as lifeguard (dollars/hour)		Number of hours worked as lifeguard (hours)		Amount earned per hour as cashier (dollars/hour)		Number of hours worked as cashier (hours)		Total amount earned (dollars)
⇓		⇓		⇓		⇓		⇓
8	·	x	+	6	·	y	=	96

The required equation is $8x + 6y = 96$.

Number the equations.

$$x + y = 14 \quad (1)$$

$$8x + 6y = 96 \quad (2)$$

Write the first equation in the slope-intercept form. For this subtract x from both the sides.

$$x + y - x = 14 - x$$

$$y = -x + 14 \quad (3)$$

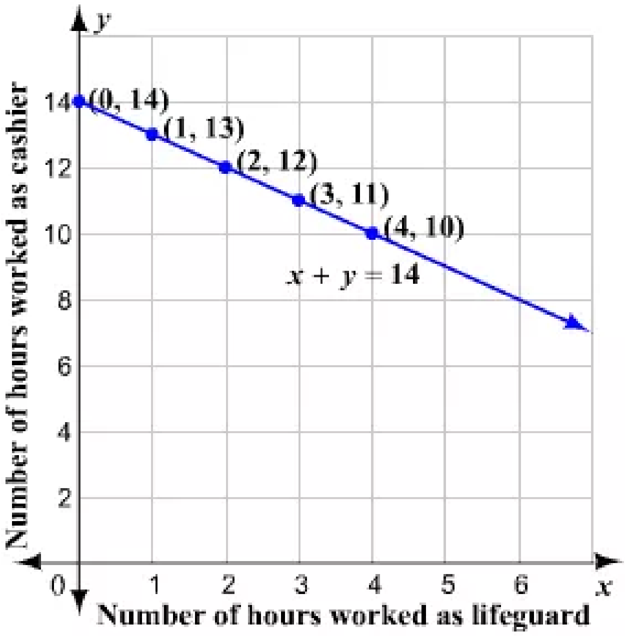
Find some points with coordinates that are solutions of equation (3).
Choose some values for x and find the corresponding values of y.
Organize the results in a table.

x	0	1	2	3	4
y	14	13	12	11	10

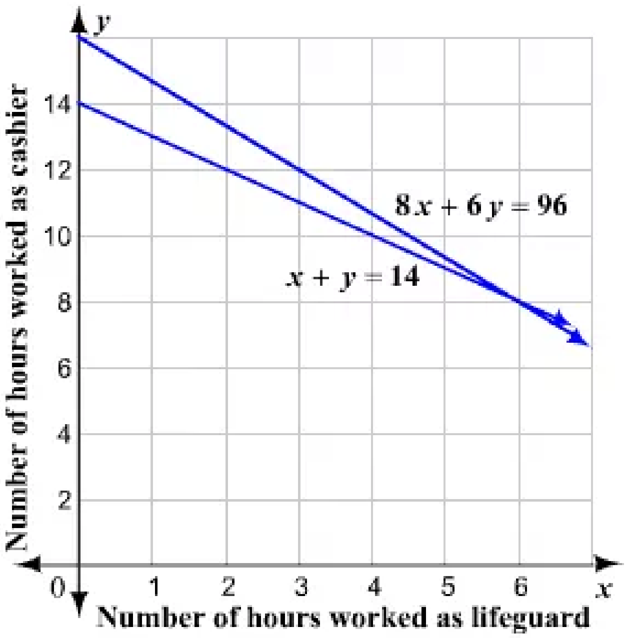
The points are (0, 14), (1, 13), (2, 12), (3, 11), and (4, 10).

Plot the points on the coordinate plane and connect the points with a straight line.

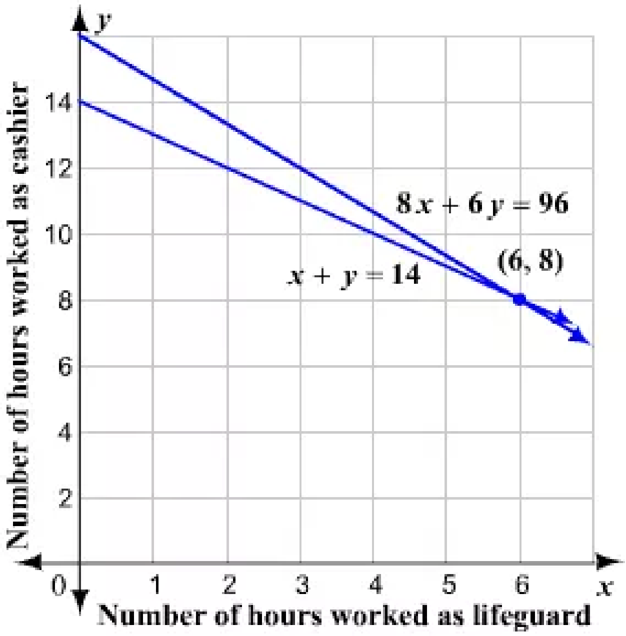
Label the x-axis with "Number of hours worked as lifeguard" and the y-axis with "Number of hours worked as cashier."



Similarly, graph equation (2) on the same set of axes.



Identify the point of intersection of the graphs.



The lines appear to intersect at (6, 8). The solution is (6, 8).

Therefore, you worked 6 hours as lifeguard and 8 hours as cashier.

Answer 36e.

During one calendar year, a state trooper issued a total of 375 citations for warnings and speeding tickets.

Let x be the citation for warnings and y be the citations for speeding tickets.

From the given data, we write the linear system as

$x + y = 375$ ...... (1)

$x - y = 37$ ...... (2)

To solve the system, add equations (1) and (2),

$$\begin{array}{ll} (1) : & x + y = 375 \\ (2) : & \underline{x - y = 37} \\ & 2x = 412 \quad \text{Add} \end{array}$$

$\boxed{x = 206}$

Substitute the value of x in one of the equations,

$x + y = 375$ Equation (1)

$206 + y = 375$ Substitute 206 for x

$\boxed{y = 169}$ Simplify

Therefore issued warnings are 206 and the speeding tickets are 169.

Answer 37e.

Let x be the number of days and y be the total cost.

Write a verbal model to form an equation for Option A.

Total cost (dollars)	=	Initiation fee (dollars)	+	Cost per day (dollars/day)	·	Number of days (days)
⇓		⇓		⇓		⇓
y	=	121	+	1	·	x

An equation for the total cost of Option A is $y = 121 + x$.

Now, write a verbal model form an equation for Option B.

Total cost (dollars)	=	Initiation fee (dollars)	+	Cost per day (dollars/day)	·	Number of days (days)
⇓		⇓		⇓		⇓
y	=	0	+	12	·	x

An equation for the total cost of Option B is $y = 12x$.

Number the equations.

$y = 121 + x$ (1)

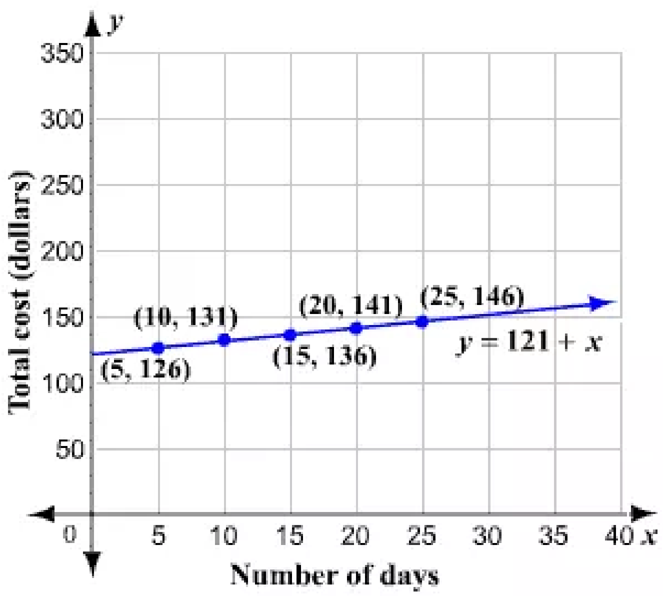
$y = 12x$ (2)

Find some points with coordinates that are solutions of equation (1).
Choose some values for x and find the corresponding values of y.
Organize the results in a table.

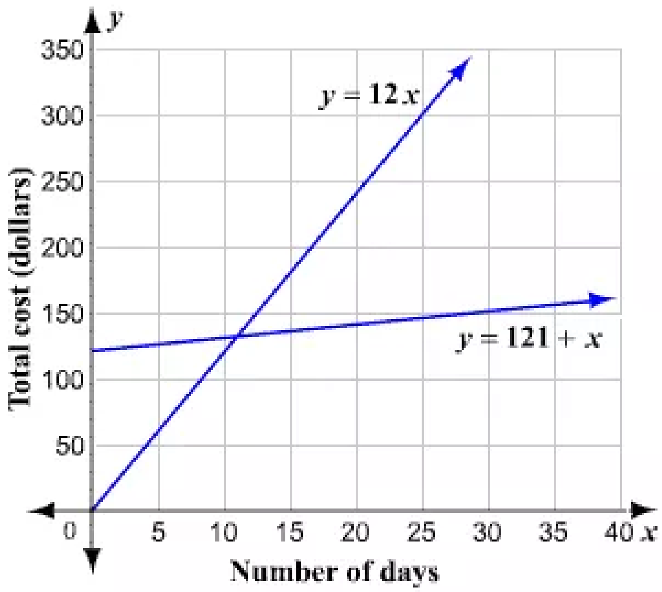
x	5	10	15	20	25
y	126	131	136	141	146

The points are (5, 126), (10, 131), (15, 136), (20, 141), and (25, 146).

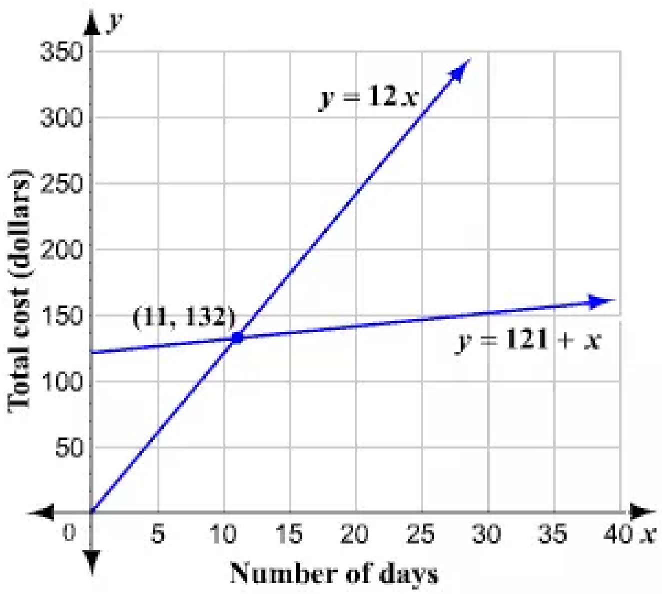
Plot the points on the coordinate plane and connect the points with a straight line.
Label the x-axis with "Number of days" and the y-axis with "Total cost (dollars)."



Similarly, graph equation (2) on the same set of axes.



Identify the point of intersection of the graphs.



The lines appear to intersect at (11, 132). The solution is (11, 132).

Thus, the total costs of the gym membership plans will be equal after 11 days.

In order to find the change if the daily cost of Option B increases, solve equation (2) for x.

$$x = \frac{y}{12}$$

It is noted that if the cost per day increases, the total cost y will be divided by a large number. This will decrease the quotient x, which is the number of days.

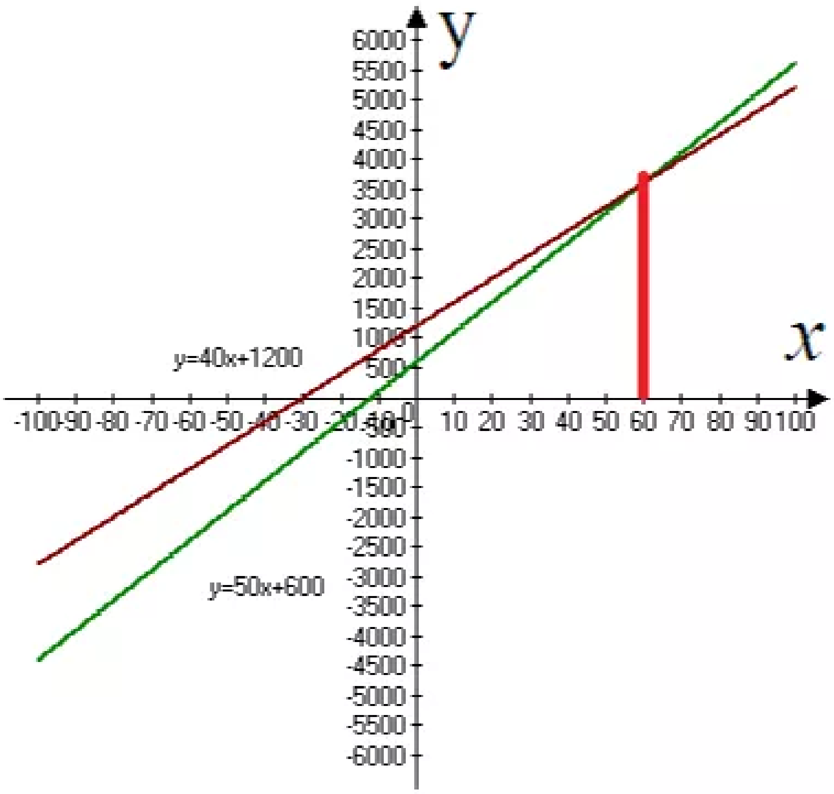
Therefore, if the daily cost of option B increases, the plans will be equal in fewer days.

Answer 38e.

The price of refrigerator A is \$600, and
The price of refrigerator B is \$1200.
Also the cost of electricity needed to operate A is \$50 per year
And the cost of electricity needed to operate B is \$40 per year

(a)
Thus write the equations for the cost of owing refrigerators as,
Refrigerator A: $y = 50x + 600$
Refrigerator B: $y = 40x + 1200$
Where x denotes the number of years.
And y denotes the cost of owing refrigerators

(b)



From the graph, observe that after $\boxed{60 \text{ years}}$ the total costs of owing the refrigerators are equal.

(c) $\boxed{\text{Yes}}$.
Because the cost of owing the refrigerators are equal

That is for refrigerator A: $y = 50x + 600$

$y = 50(60) + 600$ (Since $x = 60$)

Simplify

$y = 3600$

And for refrigerator B: $y = 40x + 1200$

$y = 40(60) + 1200$ (Since $x = 60$)

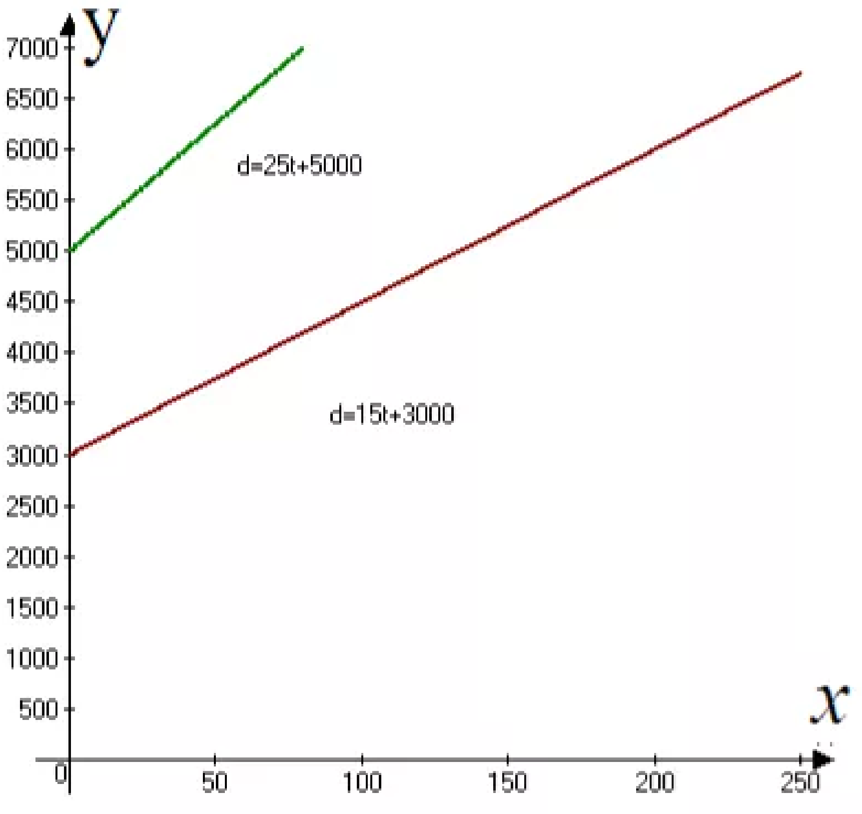
Simplify

$y = 3600$

Answer 40e.

Here d is the distance (in feet) from the park after t sec.

(a)
From the given data,
The equation giving your distance from the park after t sec is $d = 25t + 5000$



(b)
Know that,
The time taken to travel by you to park is,

$$\text{Time} = \frac{\text{distance}}{\text{speed}}$$

$$t = \frac{5000}{25}$$

$$= 200 \text{ sec}$$

You and your friend reach part at same time
Therefore the speed of your friend travel to park is

$$\text{speed} = \frac{\text{distance}}{\text{time}}$$

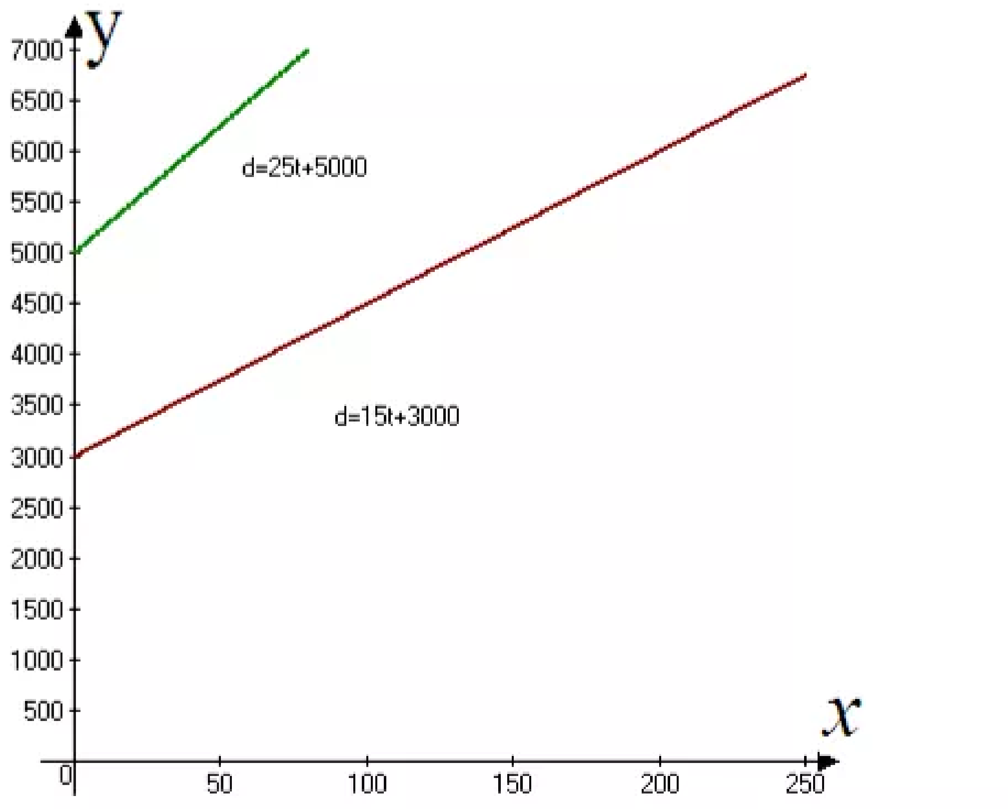
$$= \frac{3000}{200}$$

$$= 15 \text{ ft/sec}$$

Therefore speed of your friend is $\boxed{15 \text{ ft/sec}}$.

(c) The equation giving your friends distance d (in feet) from the park after t sec is

$$d = 15t + 3000$$



Answer 41e.

Subtract $3x$ from each side of the equation.

$$8x + 1 - 3x = 3x - 14 - 3x$$

$$5x + 1 = -14$$

Now, subtract 1 from each side.

$$5x + 1 - 1 = -14 - 1$$

$$5x = -15$$

Divide each side by 5.

$$\frac{5x}{5} = \frac{-15}{5}$$

$$x = -3$$

The solution is -3.

CHECK

Substitute -3 for x in the original equation.

$$8x + 1 = 3x - 14$$

$$8(-3) + 1 \stackrel{?}{=} 3(-3) - 14$$

$$-24 + 1 \stackrel{?}{=} -9 - 14$$

$$-23 = -23 \checkmark$$

The solution checks.

Answer 42e.

Consider the equation

$$-4(x+3)=5x+9$$

$$\begin{aligned} -4x-12&=5x+9 && \text{Distributive property} \\ -4x-5x-12&=5x+9-5x && \text{Subtract on both sides } 5x \\ -9x-12&=9 \\ -9x&=21 && \text{Add on both sides } 12 \\ x&=-\frac{21}{9} && \text{Divide on both sides by } -9 \\ x&=-\frac{7}{3} && \text{Simplify} \end{aligned}$$

Therefore, $x=\boxed{-\frac{7}{3}}$.

Answer 43e.

Subtract $\frac{3}{2}x$ from each side of the equation.

$$x+2-\frac{3}{2}x = \frac{3}{2}x-\frac{5}{4}-\frac{3}{2}x$$

$$2-\frac{1}{2}x = -\frac{5}{4}$$

Now, subtract 2 from each side.

$$2-\frac{1}{2}x-2 = -\frac{5}{4}-2$$

$$-\frac{1}{2}x = -\frac{13}{4}$$

Multiply each side by -2.

$$-2\left(-\frac{1}{2}x\right) = -2\left(-\frac{13}{4}\right)$$

$$x = \frac{13}{2}$$

The solution is $\frac{13}{2}$.

CHECK

Substitute $\frac{13}{2}$ for x in the original equation.

$$x+2 = \frac{3}{2}x-\frac{5}{4}$$

$$\frac{13}{2}+2 \stackrel{?}{=} \frac{3}{2}\left(\frac{13}{2}\right)-\frac{5}{4}$$

$$\frac{17}{2} \stackrel{?}{=} \frac{39}{4}-\frac{5}{4}$$

$$\frac{17}{2} = \frac{17}{2} \checkmark$$

The solution checks.

Answer 44e.

Consider the equation

$$|x-18|=9$$

Know that

If $|x|=a$, then $x=a$ or $x=-a$

Thus,

$x-18=9$ Or $x-18=-9$

Add on both sides with 18 | Add on both sides with 18

$x=27$ | $x=9$

Therefore, $x=\boxed{\{9,27\}}$.

Answer 45e.

In order to solve an absolute value equation $|ax+b|=c$ where $c>0$, rewrite as two equations $ax+b=c$ or $ax+b=-c$. Thus,

$2x+5=12$ or $2x+5=-12$.

Solve each equation.

Subtract 5 from both sides of the first equation and the second equation.

$$2x+5-5=12-5 \quad \text{or} \quad 2x+5-5=-12-5$$

$$2x=7 \qquad\qquad 2x=-17$$

Divide each side of the first and the second equation by 2.

$$\frac{2x}{2}=\frac{7}{2} \quad \text{or} \quad \frac{2x}{2}=\frac{-17}{2}$$

$$x=\frac{7}{2} \qquad\qquad x=\frac{-17}{2}$$

Thus, the solutions are $\frac{7}{2}$ and $-\frac{17}{2}$.

CHECK

Substitute $\frac{7}{2}$ and $-\frac{17}{2}$ for x in the original equation.

$x = \frac{7}{2}$	$x = -\frac{17}{2}$
$\lvert 2x+5 \rvert = 12$	$\lvert 2x+5 \rvert = 12$
$\left\lvert 2\left(\frac{7}{2}\right)+5 \right\rvert \stackrel{?}{=} 12$	$\left\lvert 2\left(-\frac{17}{2}\right)+5 \right\rvert \stackrel{?}{=} 12$
$\lvert 7+5 \rvert \stackrel{?}{=} 12$	$\lvert -17+5 \rvert \stackrel{?}{=} 12$
$\lvert 12 \rvert \stackrel{?}{=} 12$	$\lvert -12 \rvert \stackrel{?}{=} 12$
$12 = 12$ ✓	$12 = 12$ ✓

The solution checks.

Answer 46e.

Consider the equation

$$|5x-18|=17$$

Know that

If $|x|=a$, then $x=a$ or $x=-a$

Thus,

$$5x-18=17 \quad \text{Or} \quad 5x-18=-17$$

Add on both sides with 18 | Add on both sides with 18

$$5x=35 \quad \text{Or} \quad 5x=1$$

Divide on both sides by 5, get | Divide on both sides by 5, get

$$x=7 \qquad x=\frac{1}{5}$$

Therefore, $x=\boxed{\left\{\frac{1}{5},7\right\}}$.

Answer 47e.

STEP 1 Subtract $3x$ from both sides of the given equation to solve for y.

$$3x-2y-3x = 8-3x$$

$$-2y = 8-3x$$

Divide each side by -2.

$$\frac{-2y}{-2} = \frac{8-3x}{-2}$$

$$y = -4 + \frac{3}{2}x$$

STEP 2 Substitute -2 for x into the equation solved for y.

$$y = -4 + \frac{3}{2}(-2)$$

Simplify.

$$y = -4 - 3$$
$$= -7$$

We get the value of y as -7.

Answer 48e.

Consider the equation

$$-5x + y = -12$$

$$\boxed{y = 5x - 12} \quad \text{Add on both sides with } 5x$$

For $x = 9$,

$$y = 5x - 12$$

$$= 5(9) - 12 \quad \text{Substitute 9 for } x$$

$$= 45 - 12 \quad \text{Simplify}$$

$$= 33$$

Therefore, $y = \boxed{33}$.

Answer 49e.

STEP 1 Subtract $8x$ from both sides of the given equation to solve for y.

$$8x - 3y - 8x = 10 - 8x$$
$$-3y = 10 - 8x$$

Divide each side by -3.

$$\frac{-3y}{-3} = \frac{10-8x}{-3}$$

$$y = -\frac{10}{3} + \frac{8}{3}x$$

STEP 2 Substitute 8 for x into the equation solved for y.

$$y = -\frac{10}{3} + \frac{8}{3}(8)$$

Simplify.

$$y = -\frac{10}{3} + \frac{64}{3}$$
$$= \frac{54}{3}$$
$$= 18$$

We get the value of y as 18.

Answer 50e.

Consider the equation

$$8x - 2y = 7$$

$8x = 7 + 2y$ — Add $2y$ on both sides

$2y = 8x - 7$ — Subtract 7 on both sides

$\boxed{y = \frac{1}{2}(8x - 7)}$ — Divide 2 on both sides

For $x = -1$

$$y = \frac{1}{2}(8x - 7)$$
$$= \frac{1}{2}(8(-1) - 7) \quad \text{Substitute } -1 \text{ for } x$$
$$= \frac{1}{2}(-8 - 7)$$
$$= \frac{1}{2}(-15)$$
$$= \frac{-15}{2}$$

Therefore $y = \boxed{\frac{-15}{2}}$.

Answer 51e.

STEP 1 Subtract $16x$ from both sides of the given equation to solve for y.

$$16x + 9y - 16x = -24 - 16x$$
$$9y = -24 - 16x$$

Divide each side by 9.

$$\frac{9y}{9} = \frac{-24 - 16x}{9}$$

$$y = -\frac{24}{9} - \frac{16}{9}x$$

STEP 2 Substitute −6 for x into the equation solved for y.

$$y = -\frac{24}{9} - \frac{16}{9}(-6)$$

Simplify.

$$y = -\frac{24}{9} - \frac{16}{9}(-6)$$
$$= -\frac{24}{9} + \frac{96}{9}$$
$$= \frac{72}{9}$$
$$= 8$$

We get the value of y as 8.

Answer 52e.

Consider the equation

$$-12x + 9y = -60$$

$$9y = 12x - 60 \quad \text{Add on both sides with } 12x$$

$$y = \frac{12x - 60}{9} \quad \text{Divide on both sides by } 9$$

$$\boxed{y = \frac{1}{3}(4x - 20)} \quad \text{Simplify}$$

For $x = -7$

$$y = \frac{1}{3}(4x - 20)$$
$$= \frac{1}{3}(4(-7) - 20) \quad \text{Substitute } -7 \text{ for } x$$
$$= \frac{1}{3}(-28 - 20)$$
$$= \frac{1}{3}(-48) \quad \text{Simplify}$$
$$= -16$$

Therefore, $y = \boxed{-16}$.

Answer 53e.

We know that the formula for converting temperatures from degrees Fahrenheit to degrees Celsius is $C = \frac{5(F-32)}{9}$.

In order to convert $101°F$ to degrees Celsius temperature, substitute 101 for F and evaluate.

$$\begin{aligned} C &= \frac{5(101-32)}{9} \\ &\approx 38.33 \end{aligned}$$

The temperature of the dog in degrees Celsius is about $38.33°C$.

Compare the temperature of the dog and the normal body temperature.

It is given that the normal body temperature of a dog is $38°C$. Thus, the dog's temperature is higher than the normal body temperature of a dog.

Therefore, the dog has fever.