

Name:

Class Period:

First Semester Day 4 Review: Graphing and Solving

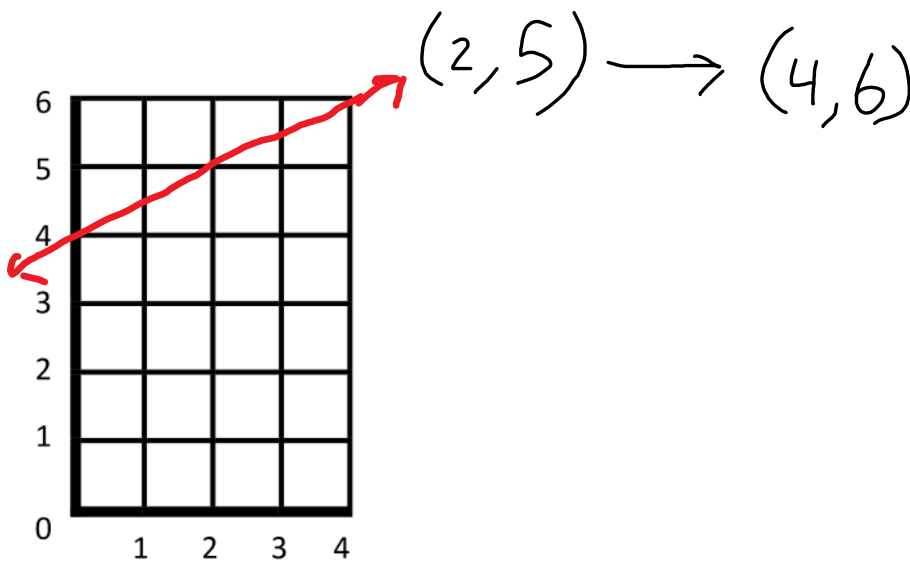
Guided Notes

Graphing is another way to have another representation of a problem, a method of solving a system, and a way of testing whether an ordered pair is a solution.

Graphing Linear Equations

Example 1

Graph the equation $y - 5 = \frac{1}{2}(x - 2)$.



Example 2

Graph $2x + 3y = 12$.



x-intercept

$$2x + 3(0) = 12$$

$$\frac{2x}{2} = \frac{12}{2}$$

$$x = 6 \rightarrow (6, 0)$$

y-intercept

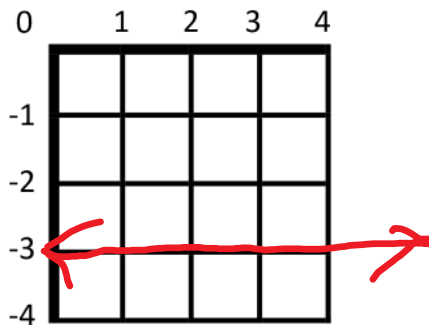
$$2(0) + 3y = 12$$

$$\frac{3y}{3} = \frac{12}{3}$$

$$y = 4 \rightarrow (0, 4)$$

Example 3

Graph $y = -3$.



horizontal

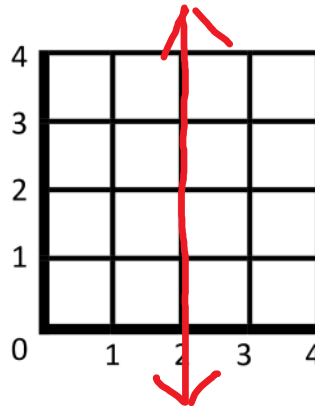
domain $\{ \text{all real \#}'s \}$

range $\{ -3 \}$

Mr. Turner

Example 4

Graph $x = 2$.



vertical

domain $\{ 2 \}$

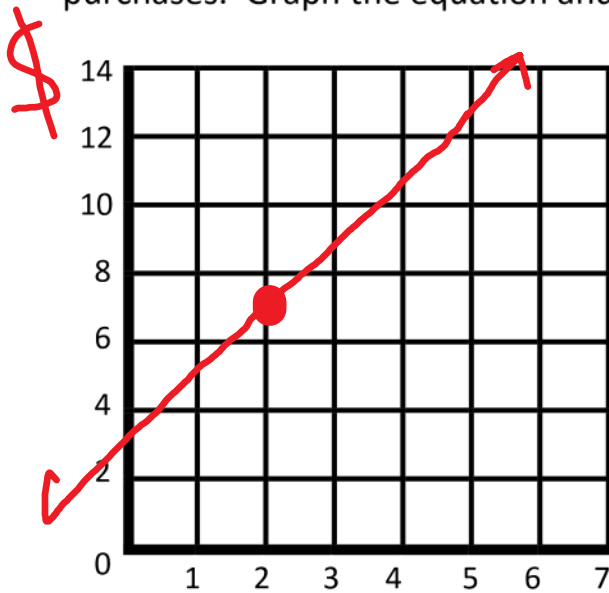
range $\{ \text{all real \#}'s \}$

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Algebra I

Example 5

Mr. Turner buys vegetables at a farmer's market for \$2 per pound. The equation $y = 2x$ represents the situation where x is the number of pounds and y is the total cost of your purchase. Because Mr. Turner forgets to bring a bag, he buys a \$3 bag each week to hold his purchases. Graph the equation and label the axes.



$$(0, 3)$$
$$y = 2x + 3$$

lbs of vegetables

Graphing Systems of Linear Equations

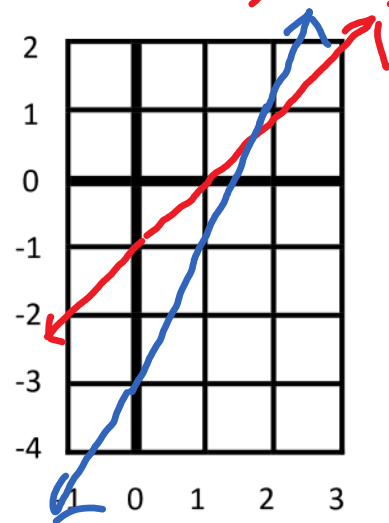
Example 6

Solve by graphing. Check your solution.

$$y = 2x - 3$$

$$y = x - 1$$

$$\begin{array}{l} ? \\ 1 = 2(2) - 3 \\ 1 = 1 \checkmark \end{array} \quad \begin{array}{l} (2, 1) \\ ? \\ 1 = 2 - 1 \\ 1 = 1 \checkmark \end{array}$$



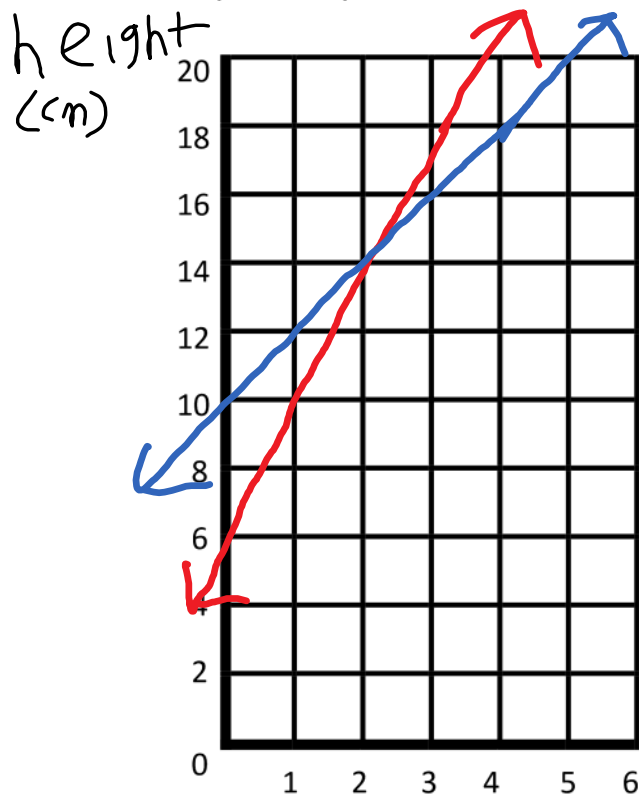
Example 7

Suppose Mr. Turner is testing two fertilizers on bamboo plants A and B, which are growing under identical conditions. Plant A is 6 cm tall and growing at a rate of 4 cm/day. Plant B is 10 cm tall and growing at a rate of 2 cm/day. The following system of equations models the height of each plant $H(d)$ as a function of days d :

$$H(d) = 4d + 6$$

$$H(d) = 2d + 10$$

Graph the system, label the axes, and interpret the solution.



$(2, 14)$

On the second day,
both plant A and
B will be 14 cm tall

days

Remember Other Methods

There are two other commonly used methods for solving a system of linear equations.

Solving by Elimination

Example 8

Solve by the elimination method.

$$\begin{aligned} 2x + 5y &= -22 \\ 10x + 3y &= 22 \end{aligned}$$

Start with the given system

$$\begin{aligned} 2x + 5y &= -22 \\ 10x + 3y &= 22 \end{aligned}$$

Multiply to eliminate x

$$\begin{array}{r} (2x + 5y = -22) \quad 5 \\ - \quad 10x + 3y = 22 \\ \hline \end{array}$$

Subtract to eliminate

$$\begin{array}{r} \cancel{22}y = -132 \\ \hline \cancel{22} \quad \quad \quad \cancel{22} \\ y = -6 \end{array}$$

Solve for y

Solve for the eliminated variable

$$\begin{aligned} 2x + 5(-6) &= -22 \\ 2x - 30 &= -22 \\ \quad \quad \quad \cancel{+30} & \quad \quad \quad \cancel{+30} \\ \hline \cancel{2x} &= \frac{8}{2} \\ x &= 4 \end{aligned}$$

Solution $(4, -6)$

Check solution

$$\begin{aligned} 2(4) + 5(-6) &\stackrel{?}{=} -22 \\ 8 - 30 &= -22 \quad \checkmark \end{aligned}$$

$$\begin{aligned} 10(4) + 3(-6) &\stackrel{?}{=} 22 \\ 40 - 18 &= 22 \quad \checkmark \end{aligned}$$

Mr. Turner

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Solving by Substitution

Example 9

Solve using the substitution method.

$$\begin{aligned} 3y + 2x &= 4 \\ -6x + y &= -7 \end{aligned}$$

Solve one equation for one variable (y)

$$\begin{array}{r} \cancel{+6x} \quad \quad \quad \cancel{+6x} \\ \hline \end{array}$$

$$y = 6x - 7$$

Write the other equation

$$3y + 2x = 4$$

Substitute the first equation in for y

$$3(6x - 7) + 2x = 4$$

Use the Distributive Property

$$18x - 21 + 2x = 4$$

Combine like terms

$$\begin{array}{r} 20x - 21 = 4 \\ \quad \quad \quad \cancel{+21} \quad \quad \quad \cancel{+21} \\ \hline \end{array}$$

Isolate x

$$\begin{array}{r} \cancel{20x} = 25 \\ \quad \quad \quad \cancel{20} \quad \quad \quad \cancel{20} \\ \hline \end{array}$$

Solve for the other variable (~~x~~^y) in either equation

$$x = 5/4$$

Simplify

$$-6(5/4) + y = -7$$

$$-15/2 + y = -7$$

Isolate y

$$\begin{array}{r} \quad \quad \quad \cancel{+15/2} \quad \quad \quad \cancel{+15/2} \\ \hline \end{array}$$

$$y = -\frac{14}{2} + \frac{15}{2} = \frac{1}{2}$$

Solution $(5/4, 1/2)$

Check solution $3(1/2) + 2(5/4) \stackrel{?}{=} 4$
 $3/2 + 5/2 = 4 \checkmark$

$-6(5/4) + (1/2) \stackrel{?}{=} -7$
 $-15/2 + 1/2 = -7 \checkmark$

Graphing Systems of Linear Inequalities

Example 10

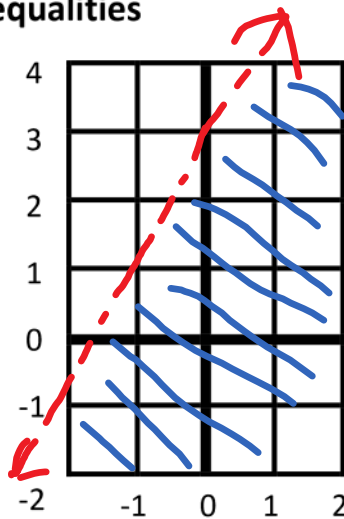
Graph $y < 2x + 3$.

Plot two points

$(0, 3)$ and $(-1, 1)$

Draw the appropriate line

Shade the region



Example 11

Graph $3x - 5y \leq 10$.

Solve for y

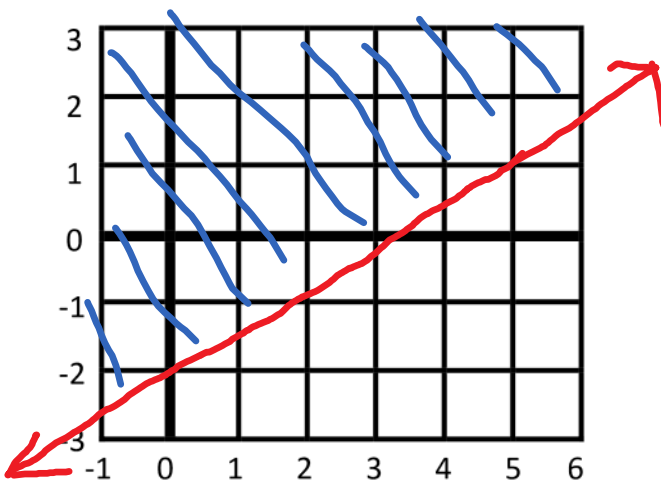
$$\begin{array}{r}
 3x - 5y \leq 10 \\
 \underline{-3x} \quad \underline{-3x} \\
 -5y \leq -3x + 10 \\
 \underline{-5} \quad \underline{-5} \\
 y \geq \frac{3}{5}x - 2
 \end{array}$$

Plot two points

$(0, -2)$ and $(5, 1)$

Draw the appropriate line

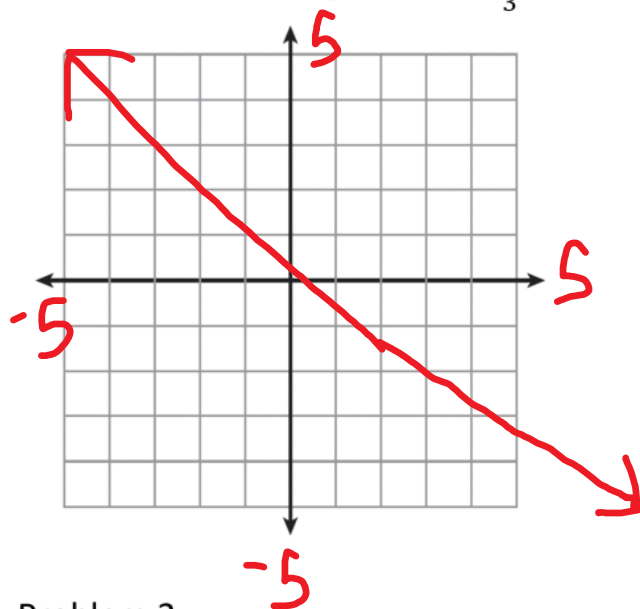
Shade the region



Classwork

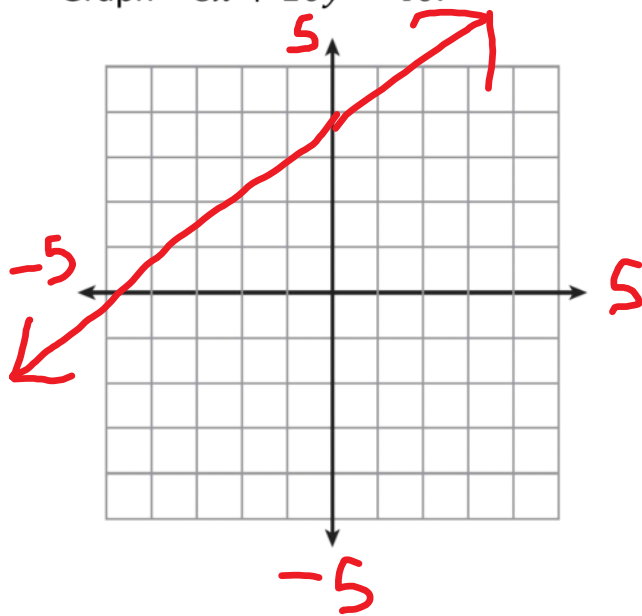
Problem 1

Graph the equation $y + 1 = -\frac{2}{3}(x - 2)$.



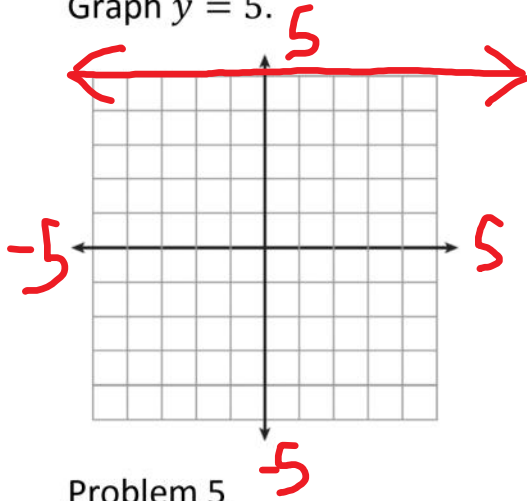
Problem 2

Graph $-8x + 10y = 40$.



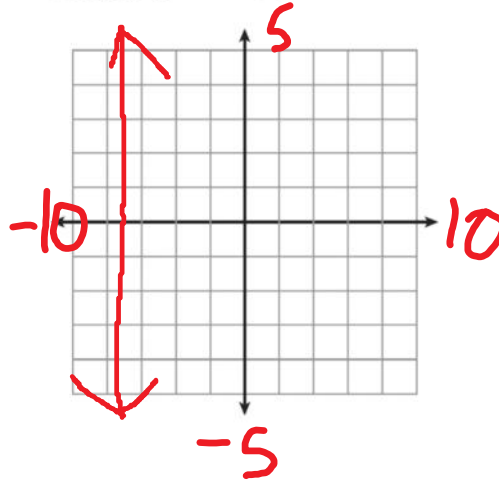
Problem 3

Graph $y = 5$.



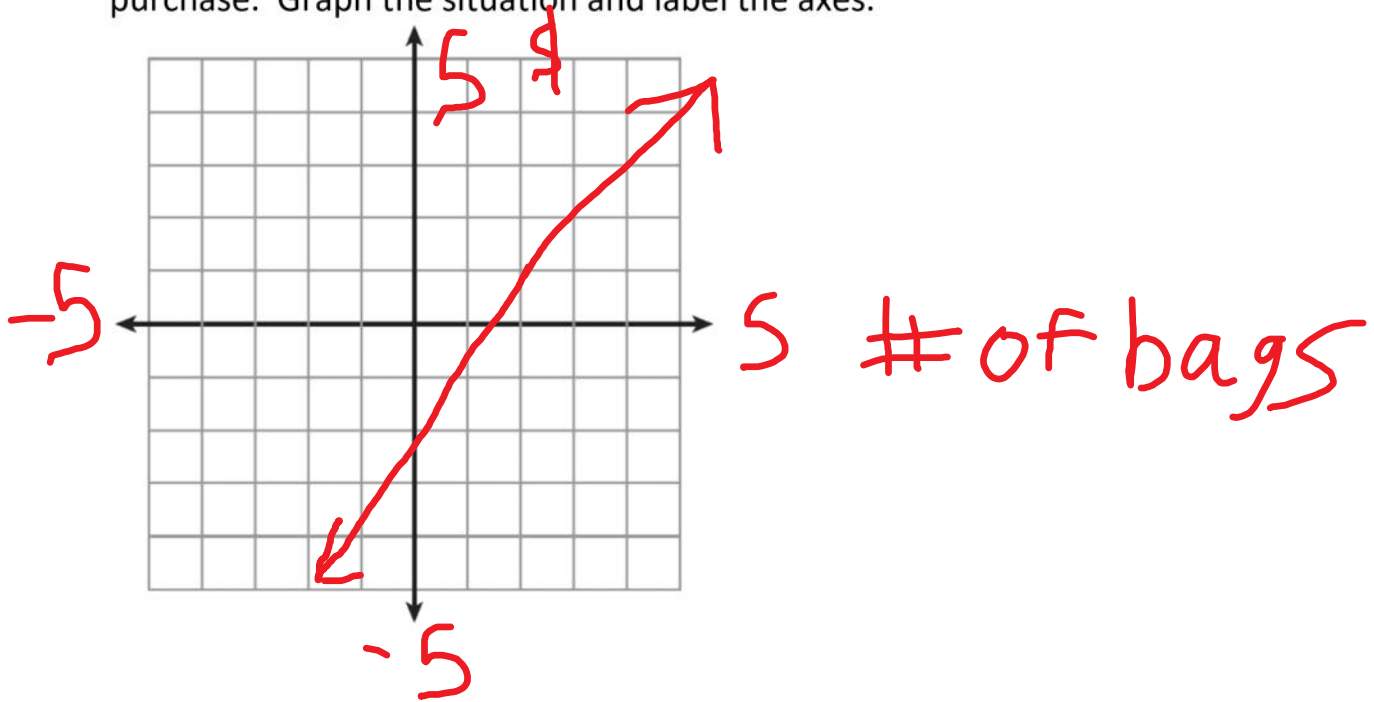
Problem 4

Graph $x = -7$.



Problem 5

A student buys various snacks for \$1.50 per bag. The student saves \$2 using a store rewards card. The equation $y = \frac{3}{2}x - 2$ represents the situation where x is the number of bags and y is the total cost of the purchase. Graph the situation and label the axes.

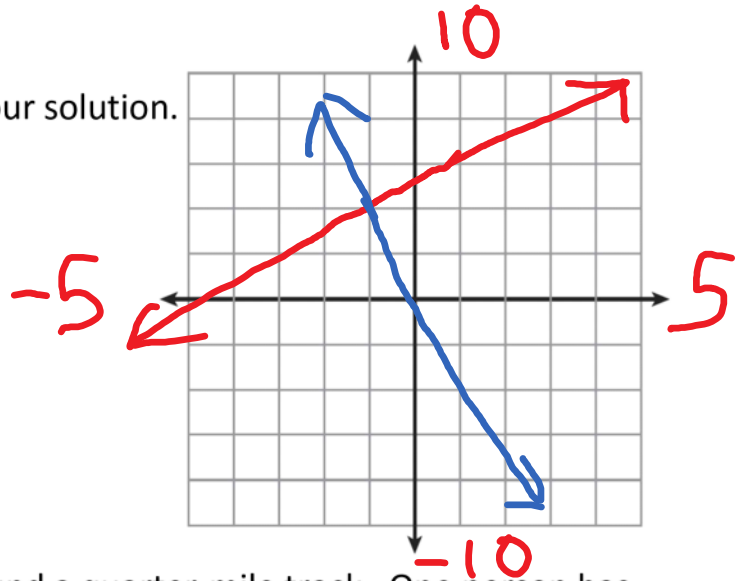


Problem 6

Solve by graphing. Check your solution.

$$\begin{aligned} y &= x + 5 \\ y &= -4x \end{aligned} \quad (-1, 4)$$
$$4 \stackrel{?}{=} -1 + 5$$
$$4 = 4 \checkmark$$

$$4 \stackrel{?}{=} -4(-1)$$
$$4 = 4 \checkmark$$



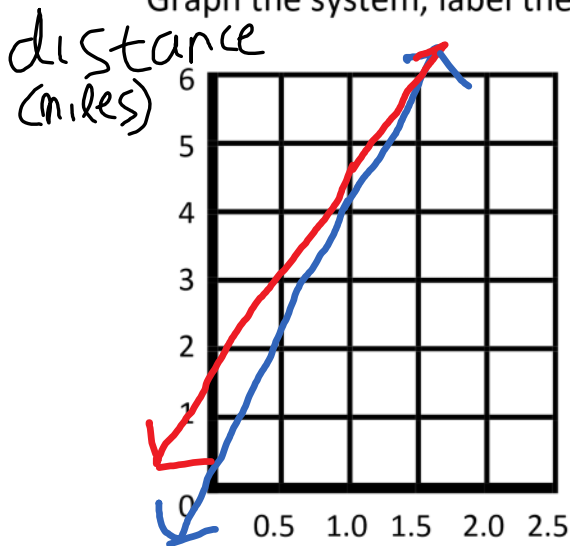
Problem 7

Two friends are walking around a quarter-mile track. One person has completed six laps before the second one starts. The system below models the distance $d(t)$ in miles each walker covers as a function of time t in hours.

$$d(t) = 3t + 1.5$$

$$d(t) = 4t$$

Graph the system, label the axes, and interpret the solution.

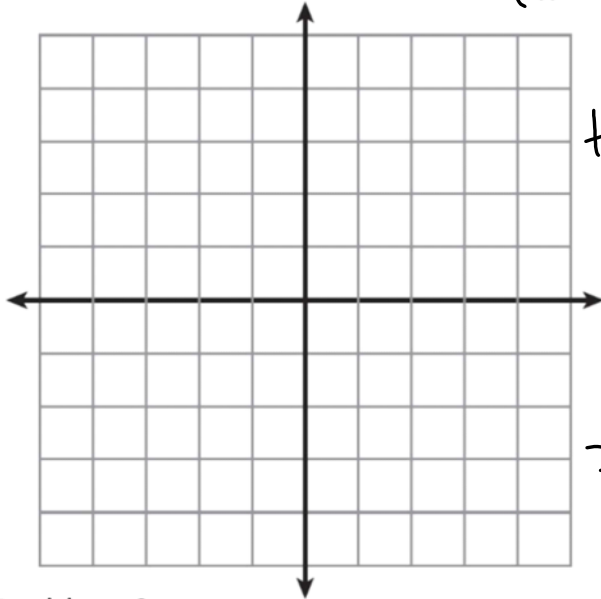


$$(1.5, 6)$$

After 1.5 hours, both friends have walked 6 miles.

Problem 8

Solve by the elimination method. $7x + 15y = 32$
 $(x - 3y = 20) \cdot 5$



$$\begin{array}{r} 7x + 15y = 32 \\ + 5x - 15y = 100 \\ \hline 12x = 132 \\ \hline \frac{12x}{12} = \frac{132}{12} \end{array}$$

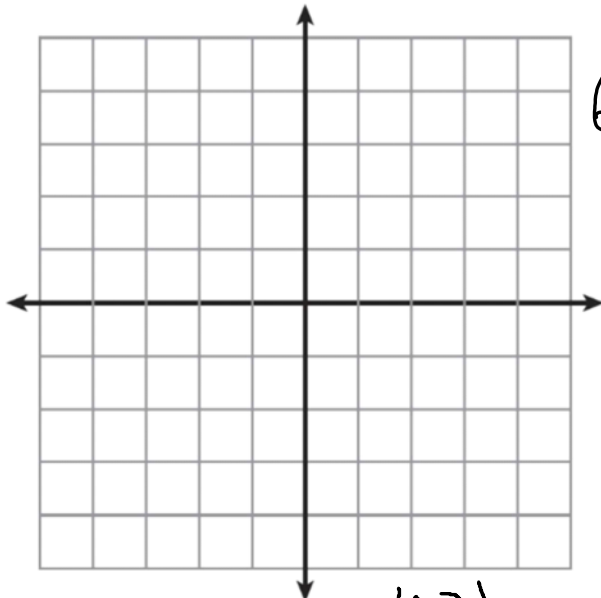
$$x = 11$$

$$\begin{array}{r} 11 - 3y = 20 \\ -11 \quad -11 \\ \hline -3y = 9 \\ \hline \frac{-3y}{-3} = \frac{9}{-3} \\ y = -3 \end{array}$$

$$(11, -3)$$

Problem 9

Solve using the substitution method. $6y + 8x = 28$
 $3 = 2x - y \rightarrow y = 2x - 3$



$$\begin{array}{l} 6(2x - 3) + 8x = 28 \\ 12x - 18 + 8x = 28 \end{array}$$

$$\begin{array}{r} 20x - 18 = 28 \\ + 18 \quad + 18 \\ \hline 20x = 46 \end{array}$$

$$\begin{array}{r} 20x = 46 \\ \hline \frac{20x}{20} = \frac{46}{20} \end{array}$$

$$x = 23/10$$

$$(23/10, 8/5)$$

$$3 = 2\left(\frac{23}{10}\right) - y$$

$$y = \frac{46}{10} - \frac{30}{10} = \frac{16}{10} = \frac{8}{5}$$

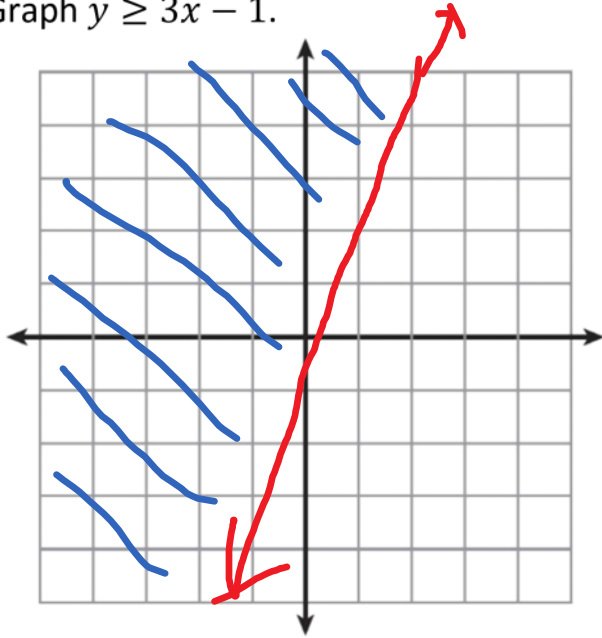
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Problem 10

Graph $y \geq 3x - 1$.



Problem 11

Graph $6x + 8y > 12$.

