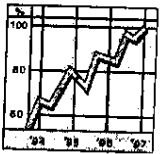
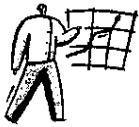


Chapter 3: Graphing



3.1: Graphing Using the Rectangular Coordinate System



3.2: Graphing Linear Equations Using Intercepts



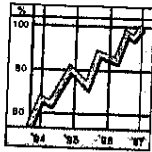
3.3: Graphing Linear Equations



3.4: Slope of a Line

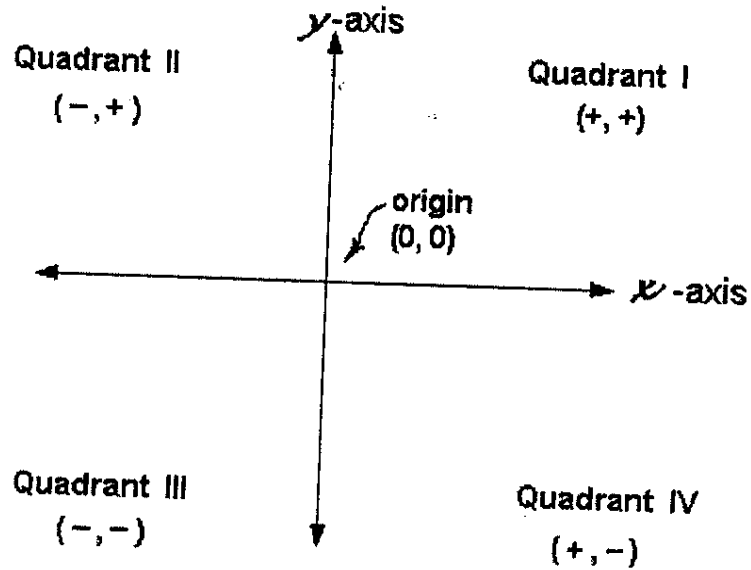


3.5: Slope Intercept Form



3.1: Graphing Using the Rectangular Coordinate System

Why do we need to know how to graph using the rectangular coordinate system?



Key points:

Axes- to locate points on a plane, two perpendicular number lines

Origin- coordinate (0, 0)

Quadrants- axes divide the plane into 4 regions

x-axis- horizontal axis

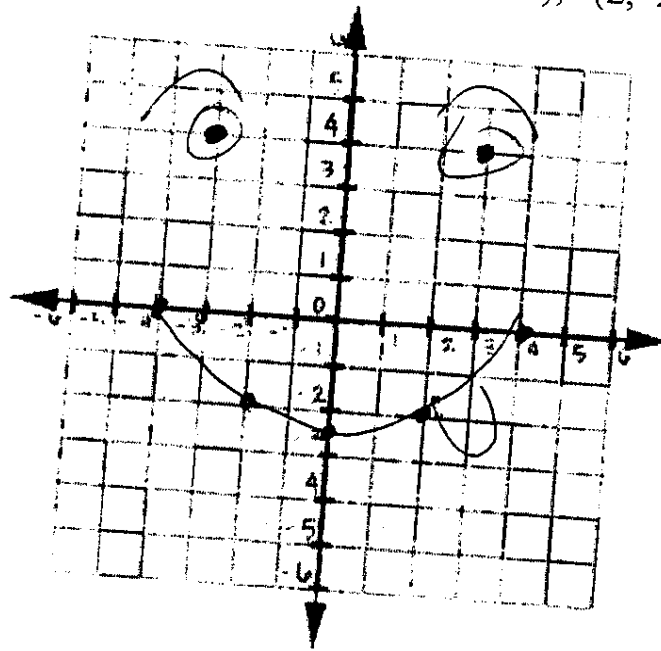
y-axis- vertical axis

Ordered pair- (x-coordinate (abscissa), y-coordinate (ordinate))

$$(x, y)$$

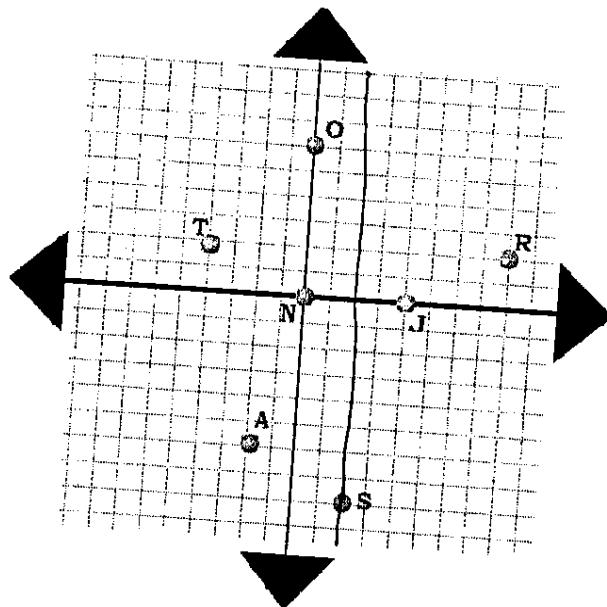
Exercise: Graph and label the points

$(-3, 4)$, $(3, 4)$, $(-4, 0)$, $(-2, -2)$, $(0, -2.5)$, $(2, -2)$, $(4, 0)$



Exercise: Label the coordinate for each letter

A: $(-2, -6)$ J: $(4, 0)$ N: $(0, 0)$ O: $(0, 6)$
 R: $(8, 2)$ S: $(2, -8)$ T: $(-4, 2)$

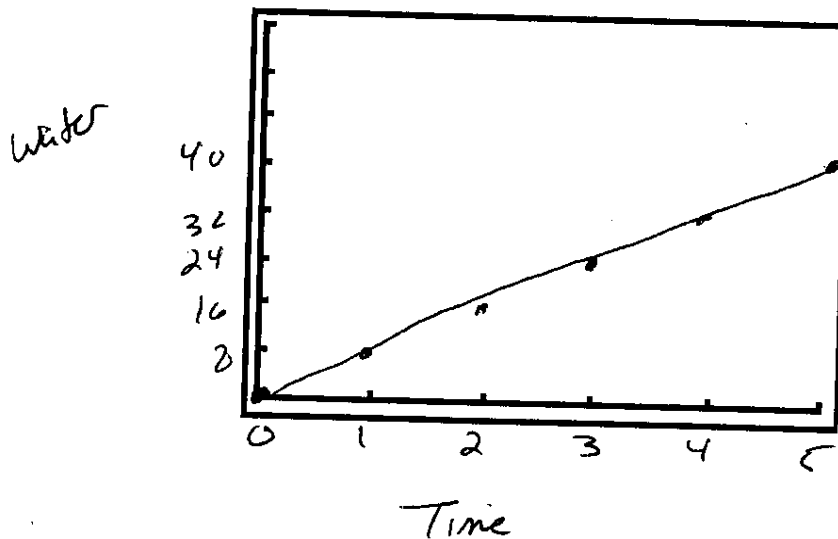


Graph Mathematical Relationships

The time to fill a tub of water follows the table below.

Exam the relationship between the time in minutes and the water in the tub in gallons and determine what the missing values are. Then use the graph below to label the axes, label the scales, and plot the points.

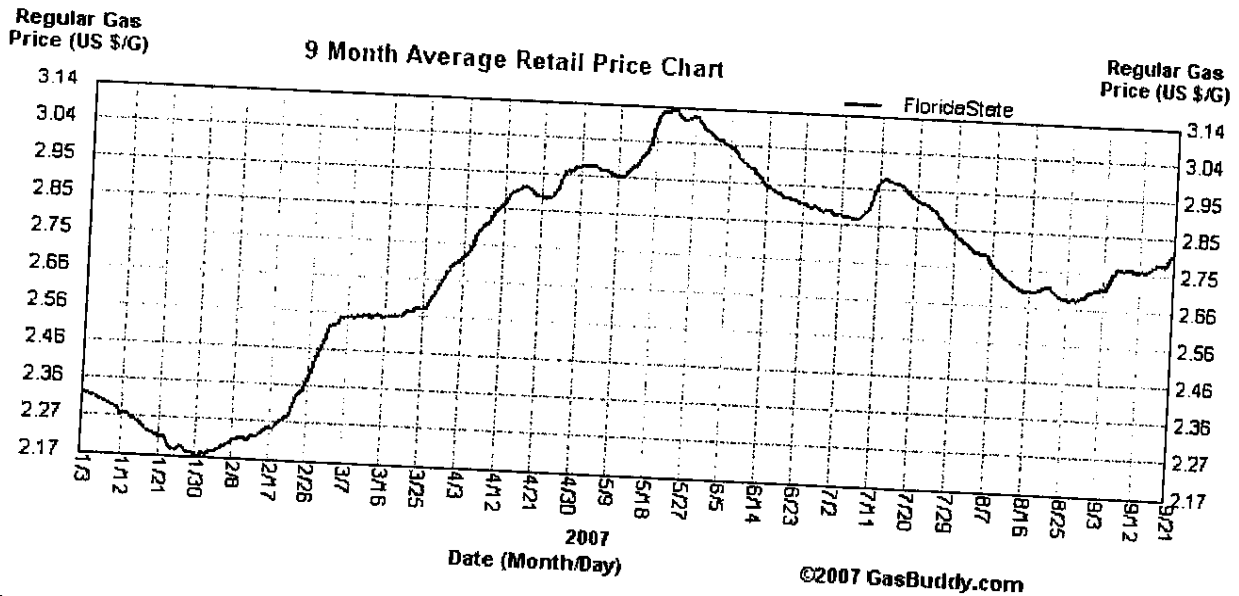
X Time (minutes)	Y Water in tub (gallons)
0	0
1	8
2	16
3	24
4	32
5	40



Looking at the plotted points, what do you notice about the relationship between the time and the amount of water in the tub?

As time increases by 1 minute, the water level increases 8 gallons.

Reading Graphs



The x-axis represents time from January 3, 2007 to September 21, 2007.

The y-axis represents the average price of gas in Florida per gallon.

How much was gas in Florida on January 12, 2007?

2.27

How much was gas in Florida on March 16, 2007?

2.56

How much was gas in Florida on September 12, 2007?

2.75

When was the gas price in Florida the least amount per gallon and how much was it?

When: Jan. 30

How much: 2.17

When was the gas price in Florida the most amount per gallon and how much was it?

When: May 18

How much: 3.14

When was the gas price \$2.75 per gallon?

4/4 | 8/7 | ~~9/10~~ | ~~9/12~~
9/15 | 9/12

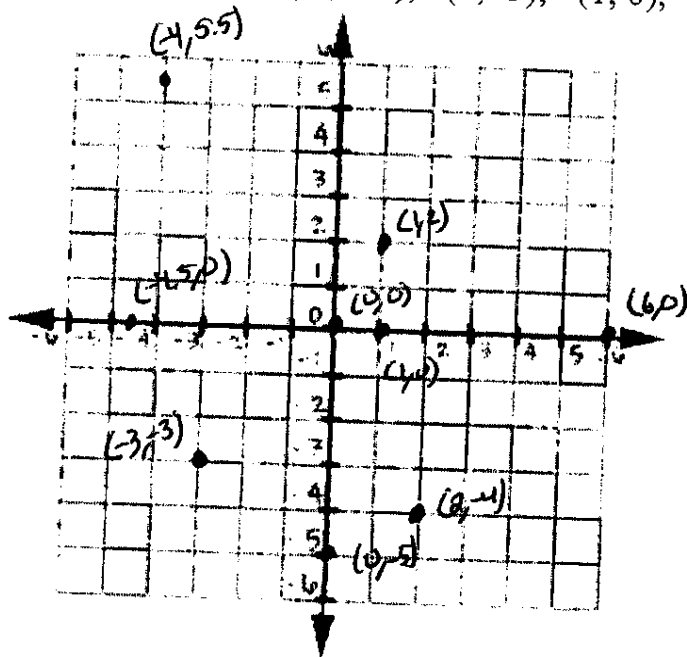
Why do we need to know how to graph using the rectangular coordinate system?

Varies

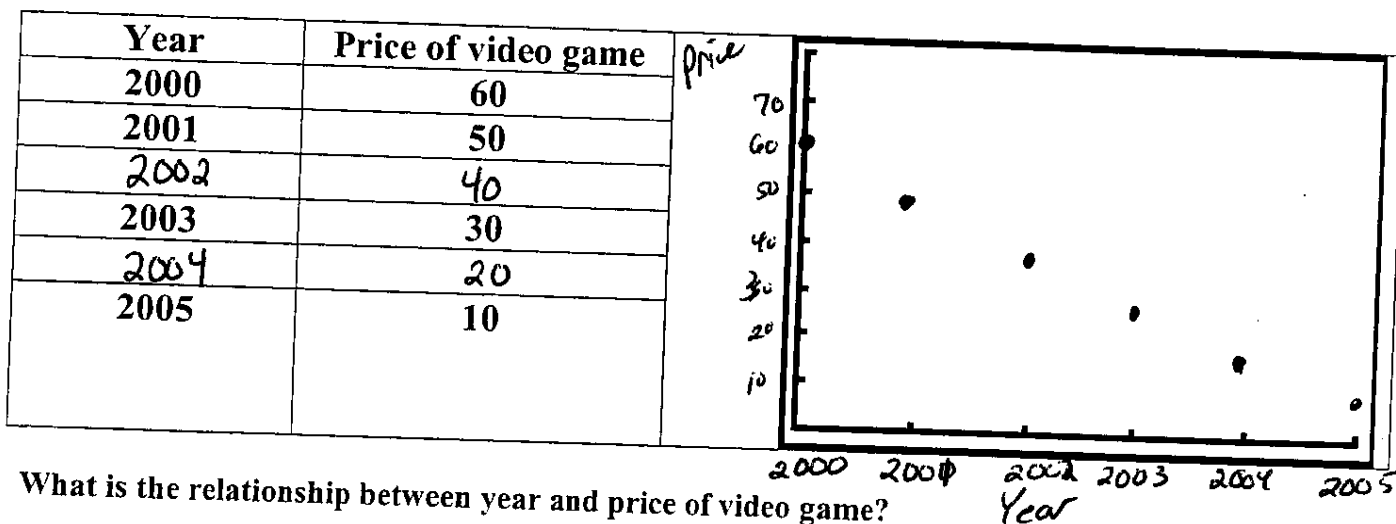
3.1 Graphing Using the Rectangular Coordinate System Practice Problems

1. Plot and label the following points:

$(0, 0)$, $(1, 2)$, $(2, -4)$, $(-3, -3)$, $(-4, 5.5)$, $(0, -5)$, $(1, 0)$, $(6, 0)$, $(-4.5, 0)$



2. Review the table and exam the relationship. Fill in the missing values and plot the points. Label the axes and label the scales.

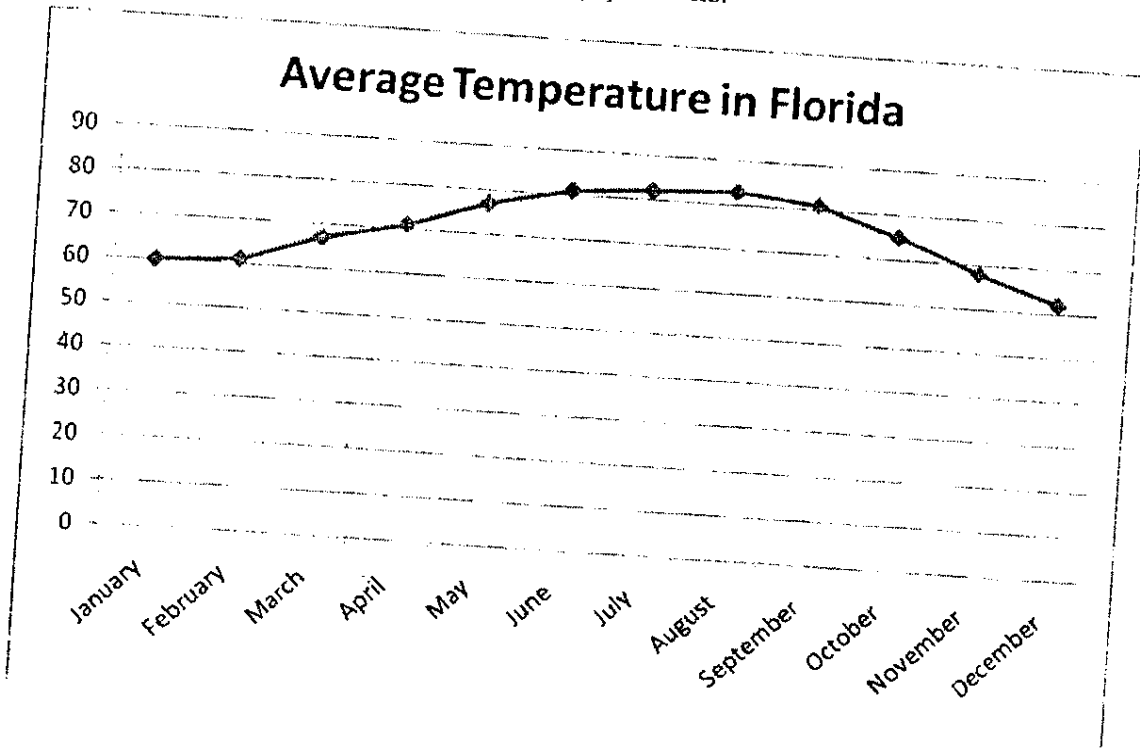


What is the relationship between year and price of video game?

As year increases by 1 the price of video game decreases by 10.

3.1 Graphing Using the Rectangular Coordinate System Practice Problems Continue

3. Examine the graph and answer the following questions.



What is the average temperature in Florida in January?

60

What is the average temperature in Florida in June?

80

What is the average temperature in Florida in October?

75

What month has the lowest average temperature in Florida and what is that temperature?

Month: January

Temperature: 60

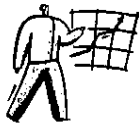
What month has the highest average temperature in Florida and what is that temperature?

Month: August

Temperature: ≈ 82

When is the average temperature 80 degrees?

June / September



3.2: Graphing Linear Equations Using Intercepts

What is one way to graph linear equations?

Solutions of Equations in Two Variables

Example: Determine whether each ordered pair is a solution of: $2x - y = 10$

a) (2, -6)

x y

$$2(2) - (-6) = 10$$

$$4 + 6 = 10$$

$$10 = 10$$

YES

b) (10, -10)

x y

$$2(10) - (-10) = 10$$

$$20 + 10 = 10$$

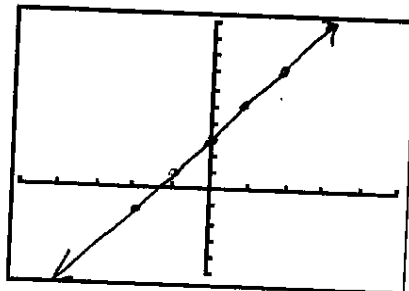
$$30 = 10$$

NO

Example: Complete the table of solutions for: $y = 2x + 3$

x	y	(x, y)
-2	-1	(-2, -1)
-1	1	(-1, 1)
0	3	(0, 3)
1	5	(1, 5)
2	7	(2, 7)
3	9	(3, 9)

Graph the points from the example: $y = 2x + 3$



Example: Complete the table of solutions for : $2x - 3y = 12$

$$\begin{aligned} x=0 \\ 2(0) - 3y = 12 \\ -3y = 12 \\ \frac{-3y}{-3} = \frac{12}{-3} \\ y = -4 \end{aligned}$$

$$\begin{aligned} y=0 \\ 2x - 3(0) = 12 \\ 2x = 12 \\ \frac{2x}{2} = \frac{12}{2} \\ x = 6 \end{aligned}$$

$$\begin{aligned} x=3 \\ 2(3) - 3y = 12 \\ 6 - 3y = 12 \\ \frac{-6}{-3} - \frac{-6}{-3} \\ -3y = 6 \\ \frac{-3y}{-3} = \frac{6}{-3} \\ y = -2 \end{aligned}$$

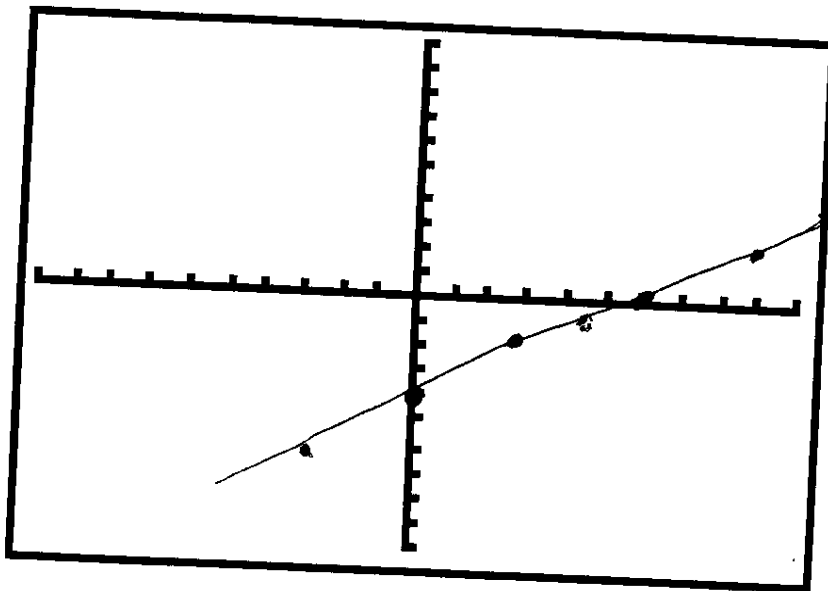
x	y	(x, y)
0	-4	(0, -4)
6	0	(6, 0)
3	-2	(3, -2)
9	2	(9, 2)
-3	-6	(-3, -6)
4.5	-1	(4.5, -1)

$$\begin{aligned} y=2 \\ 2x - 3(2) = 12 \\ 2x - 6 = 12 \\ \frac{+6}{+6} \quad \frac{+6}{+6} \\ 2x = 18 \\ \frac{2x}{2} = \frac{18}{2} \\ x = 9 \end{aligned}$$

$$\begin{aligned} x=-3 \\ 2(-3) - 3y = 12 \\ -6 - 3y = 12 \\ \frac{+6}{+6} \quad \frac{+6}{+6} \\ -3y = 18 \\ \frac{-3y}{-3} = \frac{18}{-3} \\ y = -6 \end{aligned}$$

$$\begin{aligned} y=-1 \\ 2x - 3(-1) = 12 \\ 2x + 3 = 12 \\ \frac{-3}{-3} \quad \frac{-3}{-3} \\ 2x = 9 \\ \frac{2x}{2} = \frac{9}{2} \\ x = 4.5 \end{aligned}$$

Graph the points from the example: $2x - 3y = 12$



Graphing Linear Equations

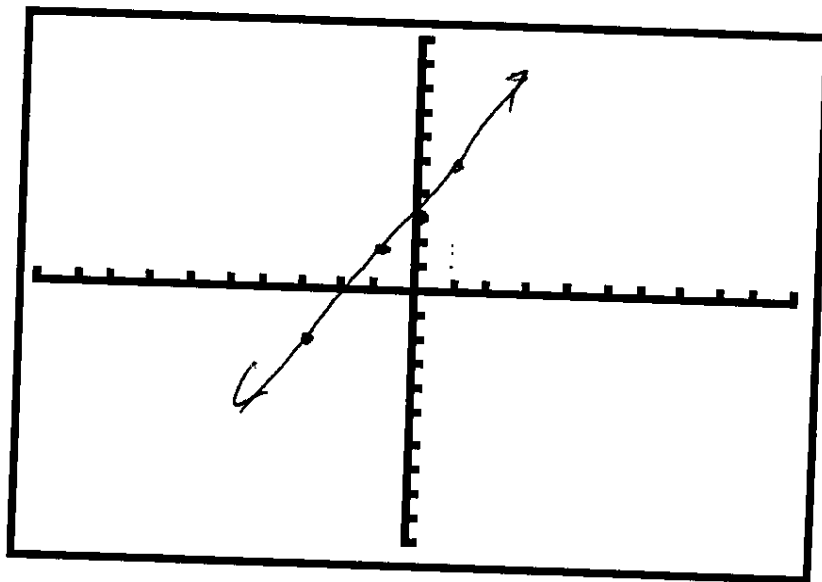
Linear Equation- equations that can be written as $ax + by = c$ (standard form)

Graph: $y = 2x + 4$

Step 1: Find at least 3 solutions using a table of values

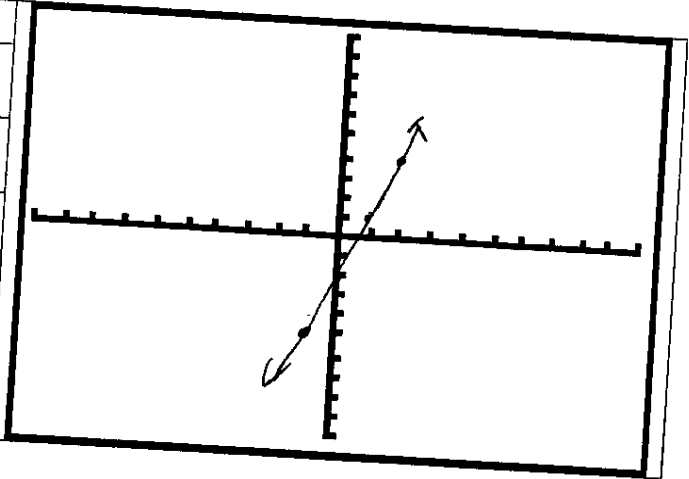
x	y	(x, y)
1	6	(1, 6)
-3	-2	(-3, -2)
0	4	(0, 4)
-1	2	(-1, 2)

Step 2: Plot the solutions and connect the coordinates



Graph using a table of values: $y = 3x - 2$

x	y	(x, y)
-1	-5	(-1, -5)
0	-2	(0, -2)
1	1	(1, 1)
2	4	(2, 4)



Graph using a table of values: $2x - 4y = 6$

$$2(0) - 4y = 6$$

$$\frac{-4y}{-4} = \frac{6}{-4}$$

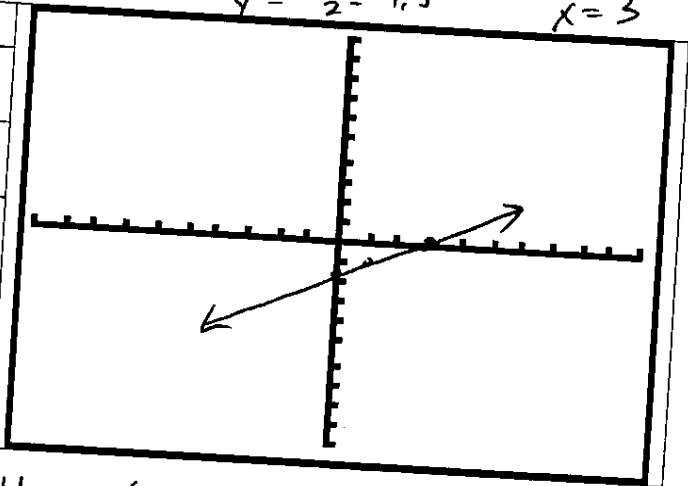
$$y = -\frac{3}{2} = -1.5$$

$$2x - 4(0) = 6$$

$$\frac{2x}{2} = \frac{6}{2}$$

$$x = 3$$

x	y	(x, y)
0	-1.5	(0, -1.5)
3	0	(3, 0)
1	-1	(1, -1)



$$2(1) - 4y = 6$$

$$2 - 4y = 6$$

$$\frac{-2}{-4} = \frac{4}{-4}$$

$$-4y = \frac{4}{-4} = -1$$

What is one way to graph linear equations?

Varies

Table of values

Section 3.2 Graphing Linear Equations Practice Problems

1. Determine whether each ordered pair is a solution of: $x - 4y = 12$

a) $(0, -3)$
 $x \quad y$

$$0 - 4(-3) = 12$$

$$0 + 12 = 12$$

$$12 = 12$$

Yes

b) $(-4, 4)$
 $x \quad y$

$$(-4) - 4(4) = 12$$

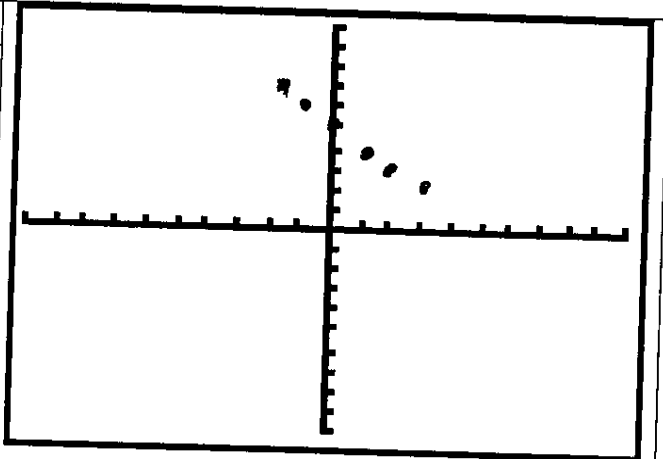
$$-4 - 16 = 12$$

$$-20 = 12$$

No

2. Complete the table of solutions for: $y = -x + 5$
 Then plot the coordinates.

x	y	(x, y)
-2	7	$(-2, 7)$
-1	6	$(-1, 6)$
0	5	$(0, 5)$
1	4	$(1, 4)$
2	3	$(2, 3)$
3	2	$(3, 2)$

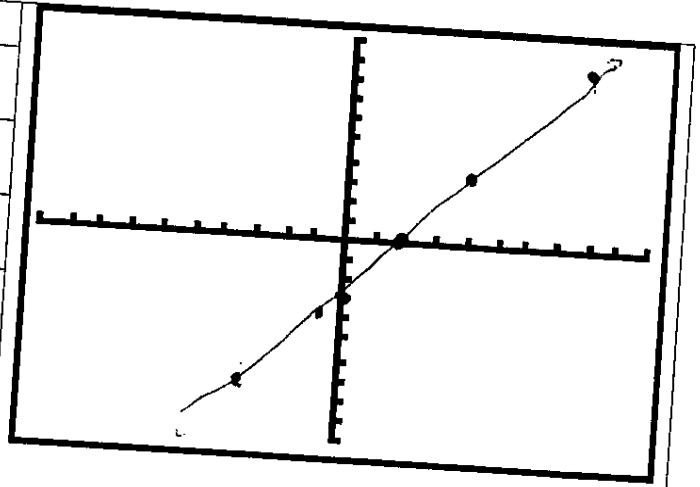


$x = -2$ $y = -(-2) + 5$ $y = 2 + 5$ $y = 7$	$x = -1$ $y = -(-1) + 5$ $y = 1 + 5$ $y = 6$	$x = 0$ $y = -0 + 5$ $y = 5$
$x = 1$ $y = -1 + 5$ $y = 4$	$x = 2$ $y = -2 + 5$ $y = 3$	$x = 3$ $y = -3 + 5$ $y = 2$

Section 3.2 Graphing Linear Equations Practice Problems Continue

3. Complete the table of solutions for: $3x - 2y = 6$
Then plot the coordinates.

x	y	(x, y)
0	-3	(0, -3)
2	0	(2, 0)
4	3	(4, 3)
8	9	(8, 9)
-3	-7.5	(-3, -7.5)
$-\frac{2}{3}$	-4	



$x=0$
 $3(0) - 2y = 6$
 $-2y = 6$
 $\frac{-2y}{-2} = \frac{6}{-2}$
 $y = -3$

$y=0$
 $3x - 2(0) = 6$
 $3x = 6$
 $\frac{3x}{3} = \frac{6}{3}$
 $x = 2$

$x=4$
 $3(4) - 2y = 6$
 $12 - 2y = 6$
 $\frac{12 - 2y}{-2} = \frac{6}{-2}$
 $\frac{-2y}{-2} = \frac{-6}{-2}$
 $y = 3$

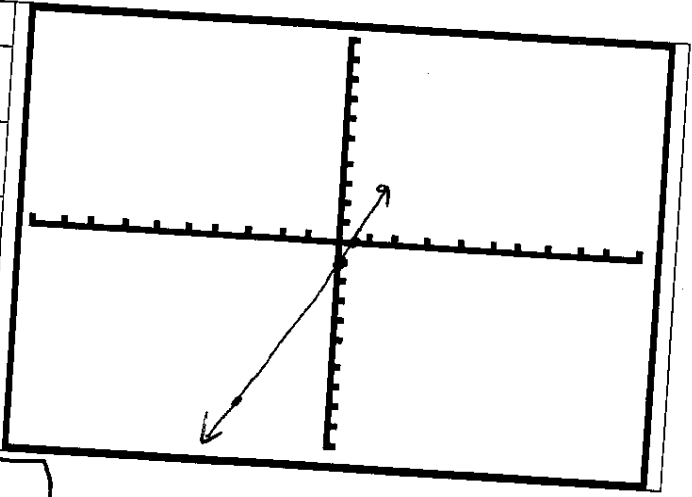
$y=9$
 $3x - 2(9) = 6$
 $3x - 18 = 6$
 $\frac{3x - 18}{+18} = \frac{6}{+18}$
 $\frac{3x}{3} = \frac{24}{3}$
 $x = 8$

$x=-3$
 $3(-3) - 2y = 6$
 $-9 - 2y = 6$
 $\frac{-9 - 2y}{+9} = \frac{6}{+9}$
 $\frac{-2y}{-2} = \frac{15}{-2}$
 $y = -7.5$

$y=-4$
 $3x - 2(-4) = 6$
 $3x + 8 = 6$
 $\frac{3x + 8}{-8} = \frac{6}{-8}$
 $\frac{3x}{3} = \frac{-2}{3}$
 $x = -\frac{2}{3}$

4. Graph using a table of values: $y = 2x - 1$

x	y	(x, y)
0	-1	(0, -1)
-3	-7	(-3, -7)
$\frac{1}{2}$	0	($\frac{1}{2}$, 0)



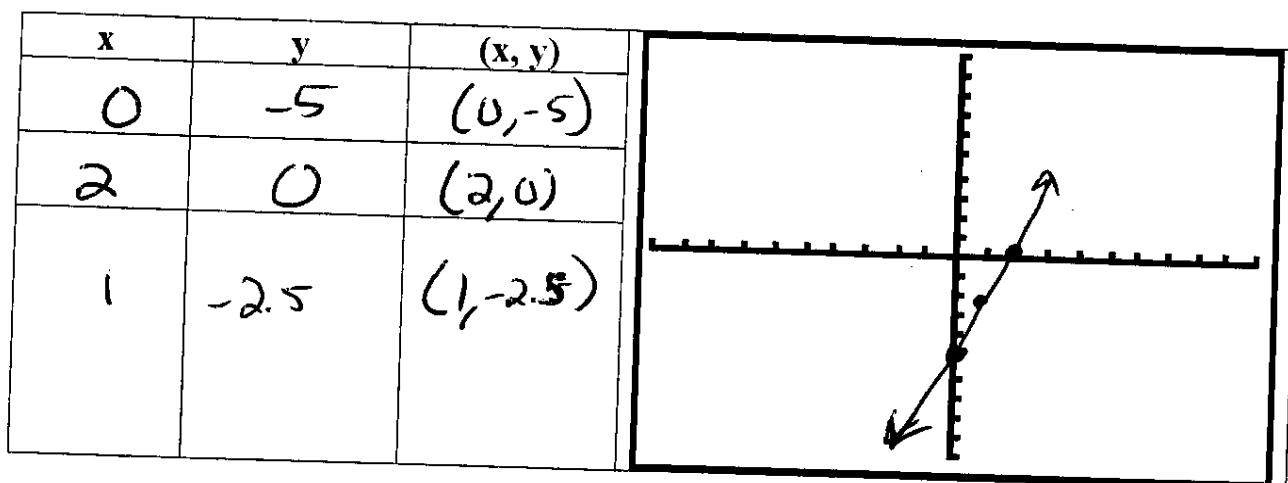
$x=0$
 $y = 2(0) - 1$
 $y = -1$

$x=-3$
 $y = 2(-3) - 1$
 $y = -6 - 1$
 $y = -7$

$y=0$
 $0 = 2x - 1$
 $\frac{0 + 1}{+1} = \frac{2x - 1}{+1}$
 $\frac{1}{2} = \frac{2x}{2}$
 $x = \frac{1}{2}$

Section 3.2 Graphing Linear Equations Practice Problems Continue

5. Graph using a table of values: $5x - 2y = 10$



$$5(0) - 2y = 10$$

$$-2y = 10$$

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

$$y = -5$$

$$5x - 2(0) = 10$$

$$5x = 10$$

$$\frac{5x}{5} = \frac{10}{5}$$

$$x = 2$$

$$x = 1$$

$$5(1) - 2y = 10$$

$$5 - 2y = 10$$

$$\frac{-5}{-2} = \frac{5}{-2}$$

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

$$y = -2.5$$

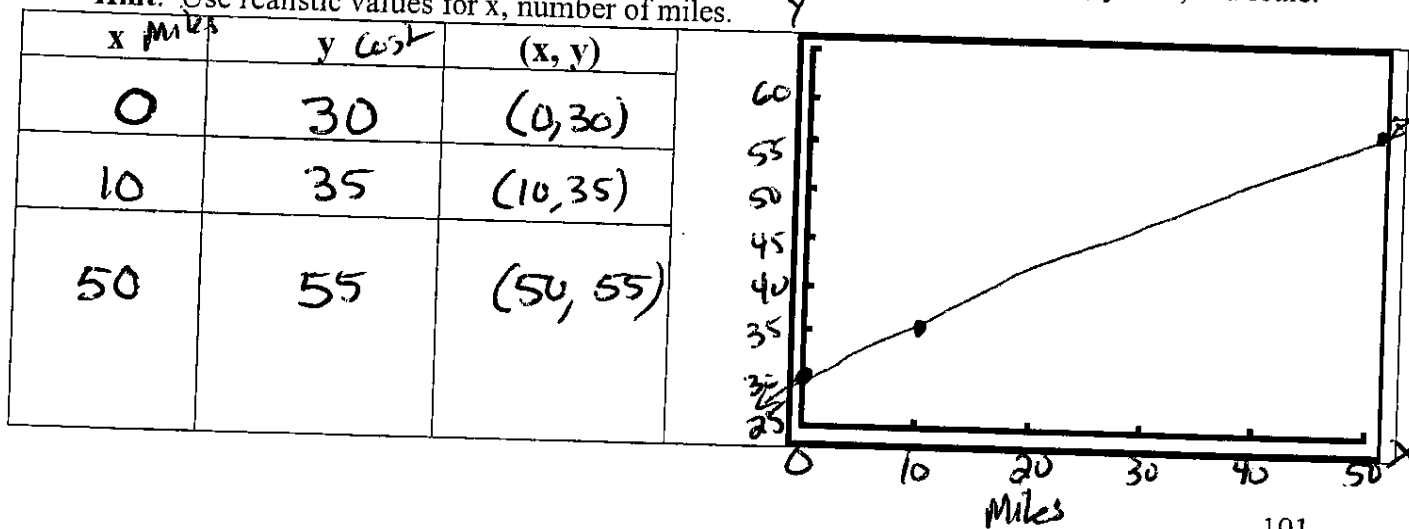
6. Write a linear equation for this situation and graph.

The cost to rent a car you must pay \$30.00 and \$0.50 per mile, where the total cost is "y" and the amount of miles used is "x"

$$y = 30 + .50x$$

Graph the linear equation using a table of values. Make sure you label x axis, y axis, and scale.

Hint: Use realistic values for x, number of miles.





3.3: Graphing Linear Equations

What is another way to graph linear equations?

Linear Equation- equations that can be written as $ax + by = c$ (standard form)

Linear Function- written as $f(x) = mx + b$

Intercepts

x-intercept -the point where the graph crosses the x-axis (horizontal intercept)
Find the x-intercept by making $y = 0$

y-intercept -the point where the graph crosses the y-axis (vertical intercept)
Find the y-intercept by making $x = 0$

Graph the given the equation: $2x - 3y = 6$

Find the x-intercept: $(3, 0)$

x	y
3	0

$$2x - 3y = 6$$

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

$$\frac{2x}{2} = \frac{6}{2} \quad x = 3$$

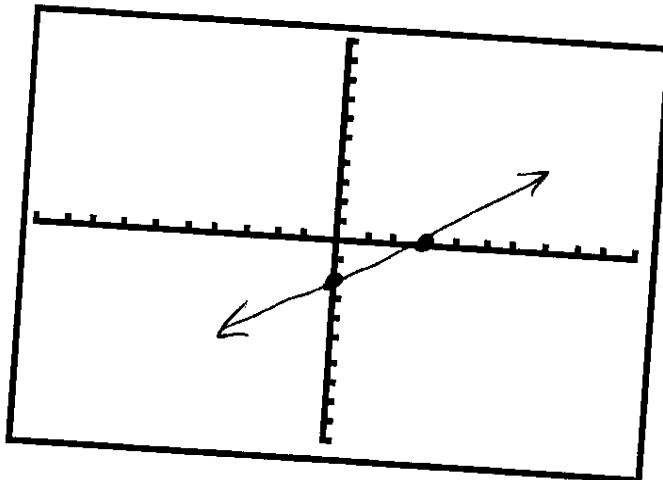
Find the y-intercept: $(0, -2)$

x	y
0	-2

$$2(0) - 3y = 6$$

$$\frac{-3y}{-3} = \frac{6}{-3} \quad y = -2$$

Graph the equation



Practice Examples

Graph the given the equation: $3x = -5y + 8$

Find the x-intercept: $(2\frac{2}{3}, 0)$

Find the y-intercept: $(0, 1\frac{3}{5})$

x	y
$2\frac{2}{3}$	0

x	y
0	$1\frac{3}{5}$

$$3x = -5(0) + 8$$

$$\frac{3x}{3} = \frac{8}{3}$$

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

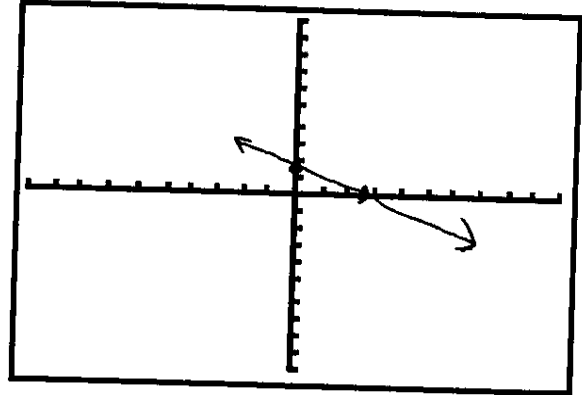
$$3 \overline{) 2.666}$$

$$3(0) = -5y + 8$$

$$0 = -5y + 8$$

$$-8 = -5y$$

$$y = \frac{8}{5} = 1\frac{3}{5}$$



Graph the given the equation: $y = -3x + 6$

Find the x-intercept: $(2, 0)$

Find the y-intercept: $(0, 6)$

x	y
2	0

x	y
0	6

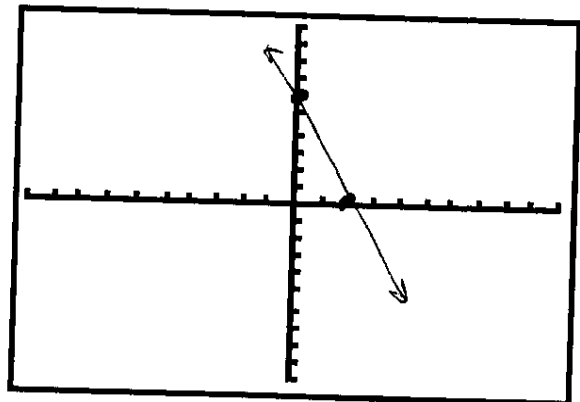
$$0 = -3x + 6$$

$$-6 = -3x$$

$$x = 2$$

$$y = -3(0) + 6$$

$$y = 6$$



What is another way to graph linear equations?

Varies Finding intercepts

Section 3.3 Graphing Linear Equations Using Intercepts Practice Problems

1. Graph the given the equation: $3x - 4y = 12$

Find the x-intercept: $(4, 0)$

x	y
4	0

$$3x - 4(0) = 12$$

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

$$x = 4$$

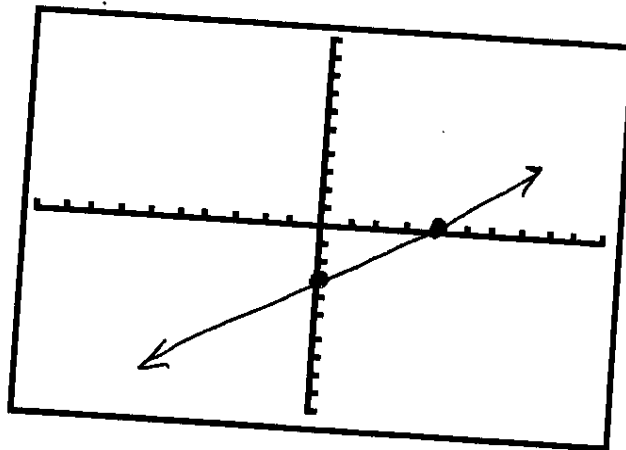
$$3(0) - 4y = 12$$

$$\frac{-4y}{-4} = \frac{12}{-4}$$

$$y = -3$$

Find the y-intercept: $(0, -3)$

x	y
0	-3



2. Graph the given the equation: $y = 4x - 5$

Find the x-intercept: $(1\frac{1}{4}, 0)$

x	y
$1\frac{1}{4}$	0

$$\underline{y = 0}$$

$$0 = 4x - 5$$

$$\begin{array}{r} +5 \\ 5 = 4x \end{array}$$

$$\frac{5}{4} = \frac{4x}{4}$$

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

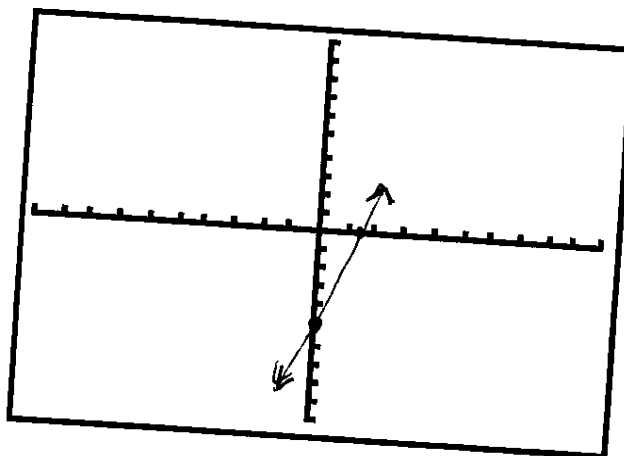
$$\underline{x = 0}$$

$$y = 4(0) - 5$$

$$y = -5$$

Find the y-intercept: $(0, -5)$

x	y
0	-5



Section 3.3 Graphing Linear Equations Using Intercepts

Practice Problems Continue

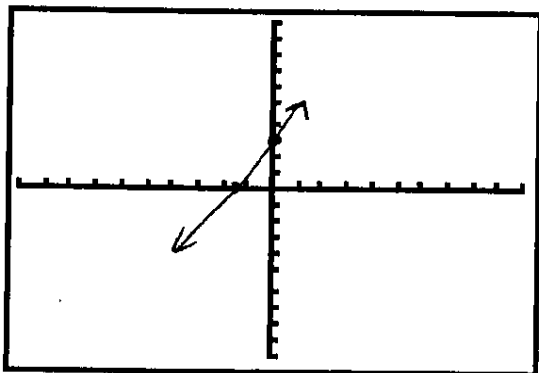
4. Graph the given the equation:
 $y = 2x + 3$

Find the x-intercept: $\underline{\left(-\frac{3}{2}, 0\right)}$

$$\begin{array}{l} y=0 \\ 0=2x+3 \\ -3 \end{array} \rightarrow \frac{-3}{2} = \frac{2x}{2} \rightarrow x = -\frac{3}{2} = -1\frac{1}{2}$$

Find the y-intercept: $\underline{(0, 3)}$

$$\begin{array}{l} x=0 \\ y=2(0)+3 \\ y=3 \end{array}$$



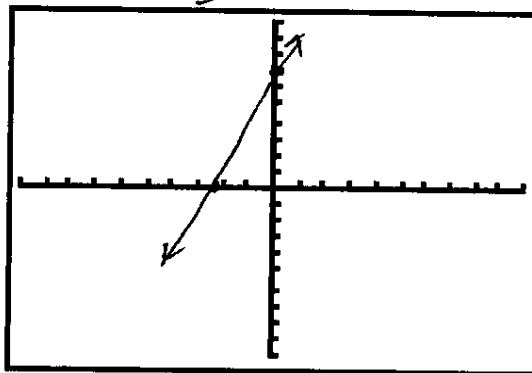
5. Graph the given the equation:
 $3x = y - 7$

Find the x-intercept: $\underline{\left(-\frac{7}{3}, 0\right)}$

$$\begin{array}{l} y=0 \\ 3x=0-7 \\ 3x=-7 \end{array} \rightarrow \frac{3x}{3} = \frac{-7}{3} \rightarrow x = -\frac{7}{3} = -2\frac{1}{3}$$

Find the y-intercept: $\underline{(0, 7)}$

$$\begin{array}{l} x=0 \\ 3(0) = y - 7 \\ 0 = y - 7 \\ +7 \end{array} \rightarrow y = 7$$



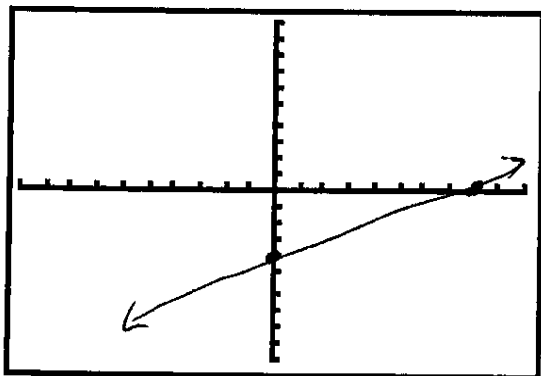
5. Graph the given the equation:

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

Find the x-intercept: $\underline{(8, 0)}$

Find the y-intercept: $\underline{(0, -4)}$

$$\begin{array}{l} y = \frac{1}{2}(0) - 4 \\ y = -4 \end{array}$$



$$\begin{array}{l} 0 = \frac{1}{2}x - 4 \\ +4 \quad \quad +4 \\ \frac{1}{2} \cdot 4 = \frac{1}{2}x \cdot \frac{2}{2} \\ 8 = x \end{array}$$

6. Graph the given the equation:

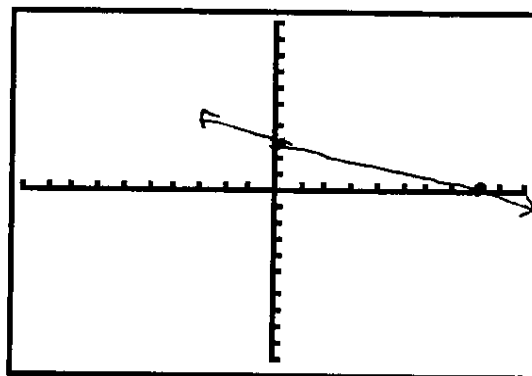
$$\frac{1}{4}x + \frac{2}{3}y = 2$$

Find the x-intercept: $\underline{(8, 0)}$ $\frac{1}{4} \cdot \frac{1}{4}x = 2 \cdot \frac{4}{1}$

$$\frac{1}{4}x + \frac{2}{3}(0) = 2$$

Find the y-intercept: $\underline{(0, 3)}$ $\frac{x}{2} = \frac{2}{3}y = \frac{2}{1} \cdot \frac{3}{2}$

$$y = 3$$





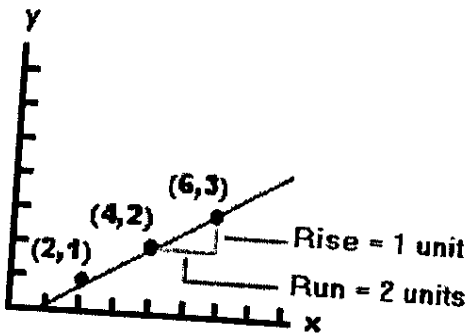
3.4: Slope of a Line

What is the slope of a line?

Slope of a line is the ratio $\frac{\text{change in } y\text{-coordinate}}{\text{change in } x\text{-coordinate}}$ as we move from one point to another.

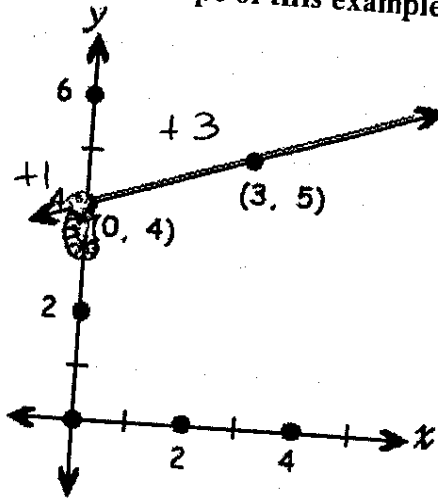
$$\frac{\text{Rise}}{\text{Run}} : \begin{array}{l} + = \text{Up} \quad - = \text{Down} \\ - = \text{Left} \quad + = \text{Right} \end{array}$$

Example:



$$\text{Slope} = \frac{\text{Rise}}{\text{Run}} = \frac{1}{2} = .5$$

Find the slope of this example:

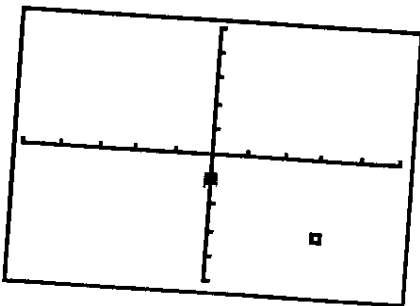


$$\text{Slope} = \frac{\text{Rise}}{\text{Run}} = \frac{+1}{+3} = \frac{1}{3}$$

Practice Examples:

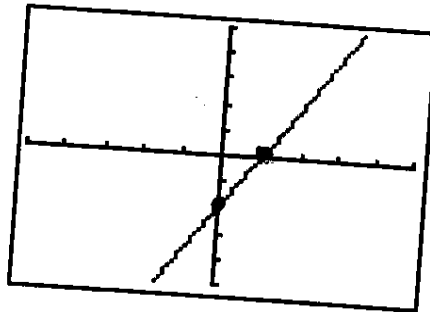
Find the slope of the following graphs

$$m = \underline{-\frac{2}{3}}$$



$$\frac{\text{Rise}}{\text{Run}} = \frac{-2}{+3} = \left(-\frac{2}{3}\right)$$

$$m = \underline{2}$$



$$\frac{+2}{+1} = 2$$

What does slope mean?

Slope- is the rate of change.

Example:

Al would like to improve his health by joining a gym. To join a gym there is a one time membership fee of \$100 and a monthly fee of \$30.

Write an equation to describe this situation using "y" as the total cost and "x" as the number of months going to the gym.

The equation for this situation is:

$$y = 100 + 30x$$

What part of the situation is changing when x, the amount of months, changes?
Is it the one time membership fee or the total charge of the monthly fees?

$$\underline{30x \quad \text{Monthly Fees}}$$

↑ slope

To find the slope of this situation:

Label the variables: $\frac{\text{Change in y - coordinate}}{\text{Change in x - coordinate}} = \frac{\text{Change in Total Cost}}{\text{Change in Total Months}}$

$$\text{Slope: } \frac{\text{Rise}}{\text{Run}}: \frac{30}{1} = \frac{\text{change in cost}}{\text{change in months}}$$

What does the slope mean in this case?

$$\underline{\$30 \text{ cost per 1 month}}$$

Find the slope given two points

To find slope given two points we use the slope formula.

$$\text{Slope formula: } m = \frac{y_2 - y_1}{x_2 - x_1}$$

Example: Find the slope using the points (6, -3) and (4, 3)

Step 1: Label the points

$$\begin{array}{ll} (6, -3) & (4, 3) \\ (x_1, y_1) & (x_2, y_2) \end{array}$$

Step 2: Substitute values into the slope formula and solve.

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{3 - (-3)}{4 - 6} = \frac{6}{-2} = -3$$

Answer: The slope is -3

Example:

Find the slope given the points (3, 6) and (5, 2)

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{2 - 6}{5 - 3} = \frac{-4}{2} = -2$$

Example:

Find the slope given the points (-2, -2) and (-12, -8)

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-8 - (-2)}{-12 - (-2)} = \frac{-8 + 2}{-12 + 2} = \frac{-6}{-10} = \frac{3}{5}$$

Example:

Find the slope given the points (8, -4) and (8, -3)

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-3 - (-4)}{8 - 8} = \frac{-3 + 4}{0} = \frac{1}{0} = \underline{\underline{\text{Undefined}}}$$

Horizontal and Vertical Lines

Slope



Time
Positive



Time
Negative

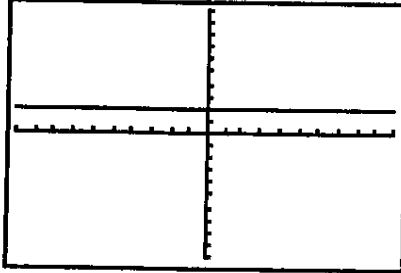
Horizontal Lines

The graph of a horizontal line is: $y = k$ (k is a constant)

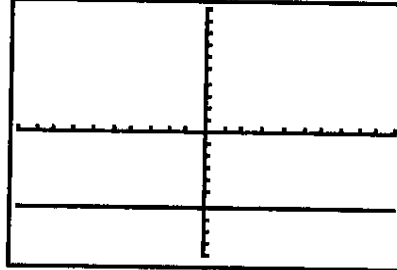
The slope of a horizontal line is zero.

Slope is 0

Example: Graph $y = 2$



Example: Graph $y = -6$



Find it.
Go thru it.

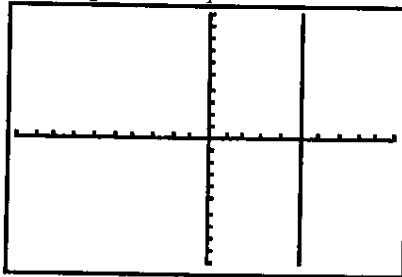
Vertical Lines

The graph of a vertical line is: $x = k$ (k is a constant)

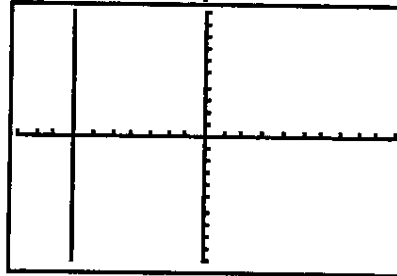
The slope of a vertical line is **undefined**.

Slope is undefined

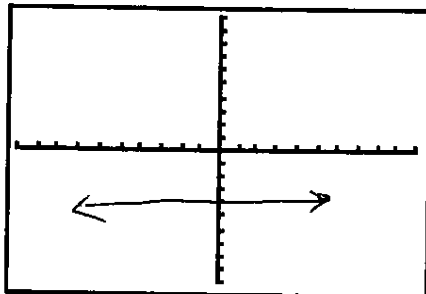
Example: Graph $x = 5$



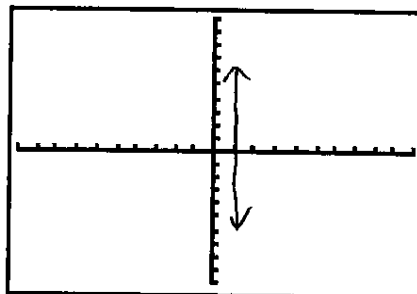
Example: Graph $x = -7$



Practice: Graph $y = -4$



Practice: Graph $x = 1$



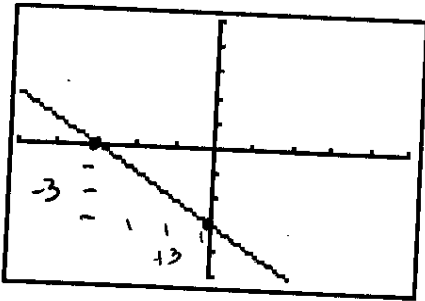
What is the slope of a line?

Varies

Section 3.4 The Slope of a Line Practice Problems

1. Given the picture find the slope:

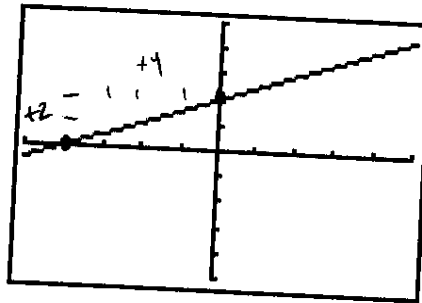
$m = \underline{-1}$



$\frac{\text{rise}}{\text{run}} = \frac{-3}{+3} = -1$

2. Given the picture find the slope:

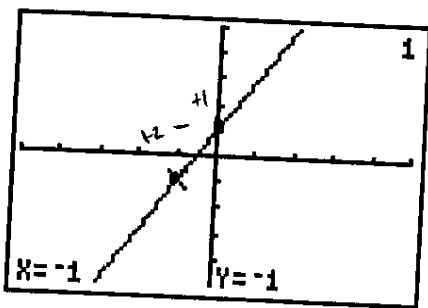
$m = \underline{\frac{1}{2}}$



$\frac{\text{rise}}{\text{run}} = \frac{+2}{+4} = \frac{1}{2}$

3. Given the picture find the slope:

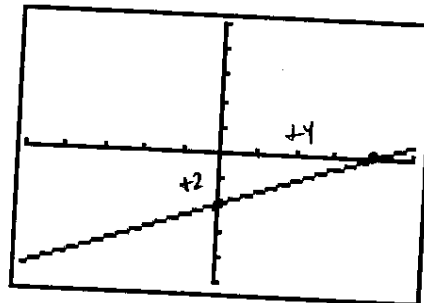
$m = \underline{2}$



$\frac{\text{rise}}{\text{run}} = \frac{2}{1} = 2$

4. Given the picture find the slope:

$m = \underline{\frac{1}{2}}$



$\frac{\text{rise}}{\text{run}} = \frac{+2}{+4} = \frac{1}{2}$

5. To join an online video game website you need to pay a one time registration fee of \$20 and \$1.50 per hour to use the website.

What is the equation for the cost of joining the website where "y" is the total cost and "x" is the number of hours on the website?

$y = 20 + 1.50x$

What is the slope in this situation?

$+ \frac{1.50}{1}$

$\frac{\text{change in } y \text{ total cost}}{\text{change in } x \text{ hours}}$

Explain the slope in the context of the situation?

paying \$1.50 per 1 hour

Section 3.4 The Slope of a Line Practice Problems Continue

6. Find the slope given the points (3, 7) and (2, 10)

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{10 - 7}{2 - 3} = \frac{-3}{-1} = \boxed{3}$$

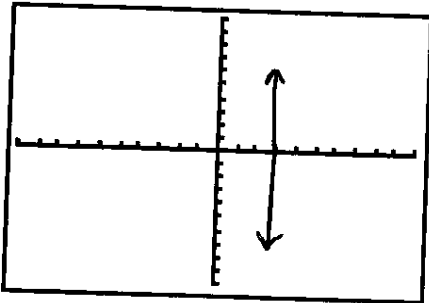
7. Find the slope given the points (3, -5) and (-6, -7)

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-7 - (-5)}{-6 - 3} = \frac{-2}{-9} = \boxed{\frac{2}{9}}$$

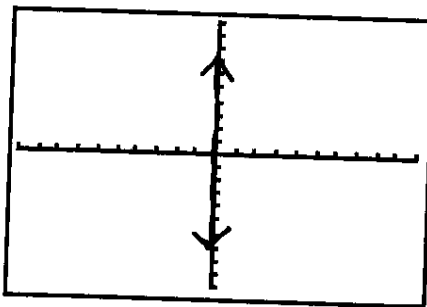
8. Find the slope given the points $(\frac{1}{2}, -4)$ and $(\frac{2}{3}, 6)$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{6 - (-4)}{\frac{2}{3} - \frac{1}{2}} = \frac{10}{\frac{4}{6} - \frac{3}{6}} = \frac{10}{\frac{1}{6}} = 10 \div \frac{1}{6} = 10 \cdot 6 = \boxed{60}$$

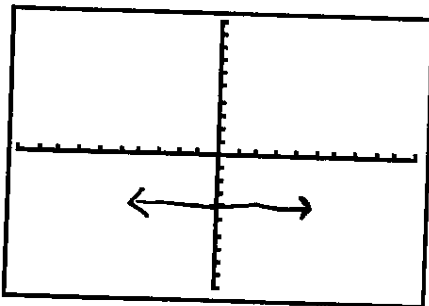
9. Graph $x = 3$



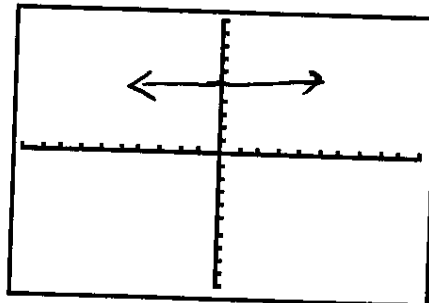
10. Graph $x = 0$

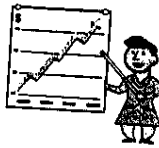


11. Graph $y = -4$



12. Graph $y = 5$





3.5: Slope Intercept Form

Slope-Intercept Form: $y = mx + b$

$m = \text{slope}$ $b = \text{y-intercept}$

An example of graphing using slope-intercept form: Graph: $y = -\frac{2}{3}x - 1$

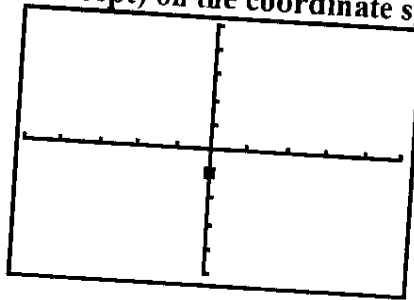
Step 1: Determine the "m" (slope) and "b" (y-intercept)

The equation can be written as: $y = -\frac{2}{3}x + (-1)$ to clearly see "m" and "b".

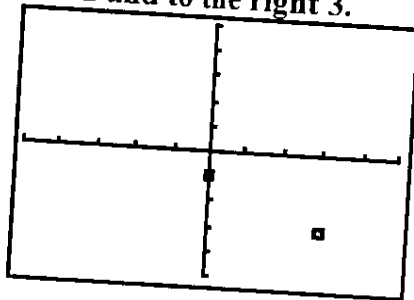
The m (slope) is: $\frac{-2}{3}$

The b (y-intercept) is: -1

Step 2: First plot your "b" (y-intercept) on the coordinate system. $b = -1$

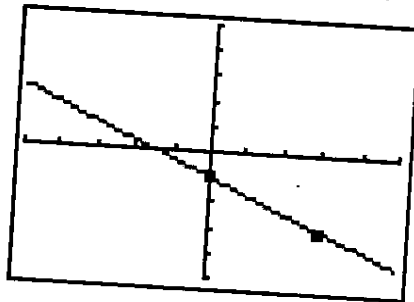


Step 3: Use the "m" (slope) to find another coordinate. The slope is $\frac{-2}{3}$ which means from the y intercept you should go down 2 and to the right 3.



$$\frac{-2}{3} = \begin{matrix} \downarrow 2 \\ \rightarrow 3 \end{matrix}$$

Step 4: Connect the coordinates and you have graphed: $y = -\frac{2}{3}x - 1$



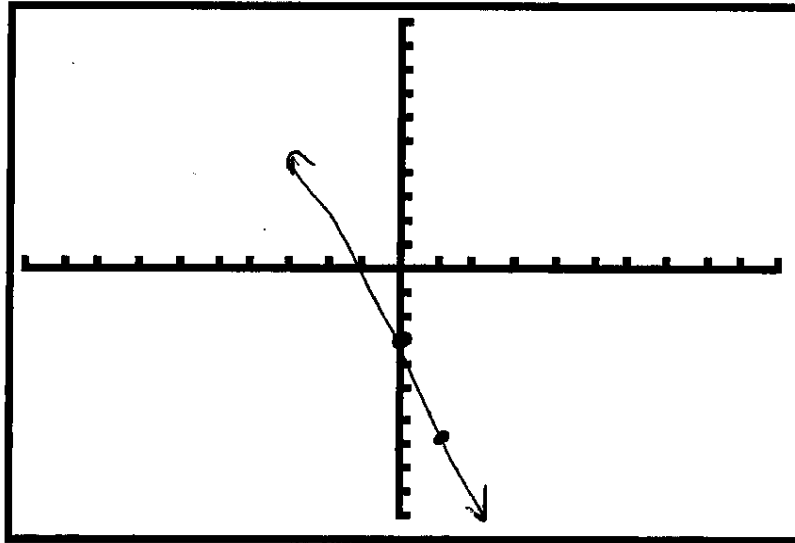
Practice Graphing Linear Equations using the Slope-Intercept Form

Graph the equation $y = -4x - 3$

$$m = \frac{-4}{1}$$

$-4 \downarrow 4$
 $1 \rightarrow 1$

$$b = -3$$



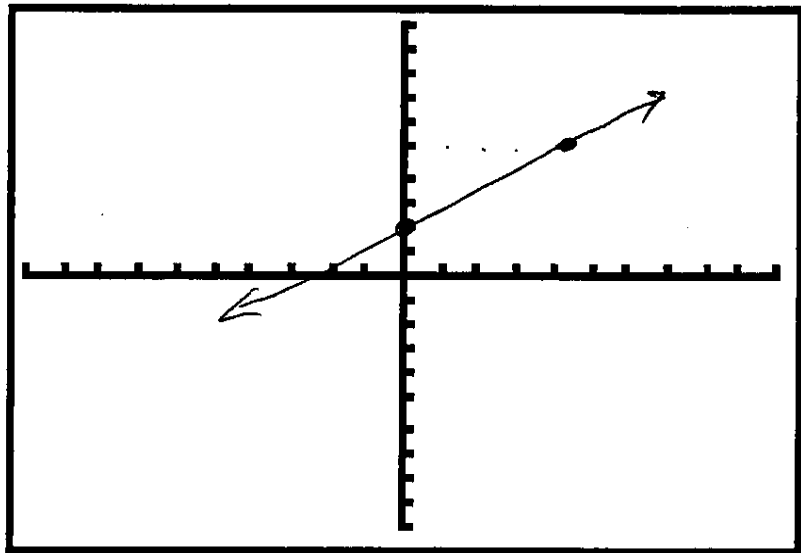
Graph the equation $-3x + 4y = 8$
First step solve the equation for "y"

$$\begin{aligned} -3x + 4y &= 8 \\ +3x & \quad +3x \\ \hline 4y &= 3x + 8 \\ \frac{4y}{4} &= \frac{3x + 8}{4} \\ y &= \frac{3}{4}x + 2 \end{aligned}$$

$$m = \frac{3}{4}$$

$3 \uparrow 3$
 $4 \rightarrow 4$

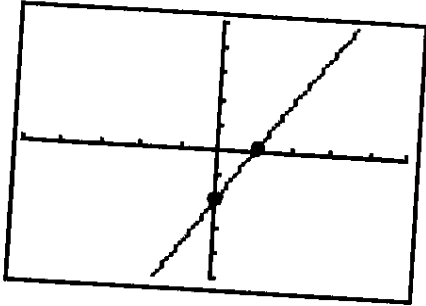
$$b = 2$$



What's My Line?

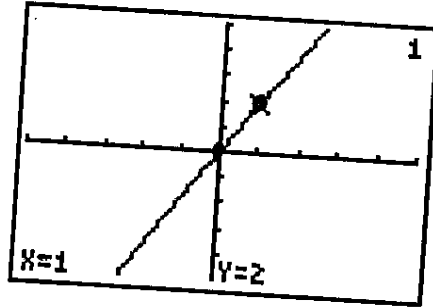
For each of the lines shown below, use your knowledge of slope and intercept to find the equation of the line given. Give your answer in the form: $y = mx + b$. Each tick mark represents 1 unit.

1. $y = \underline{2}x + \underline{-2}$



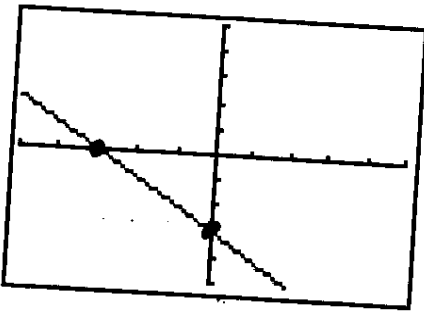
$$\frac{\uparrow 2 +}{\rightarrow 1 +} = 2$$

2. $y = \underline{2}x + \underline{0}$



$$\frac{+2}{+1}$$

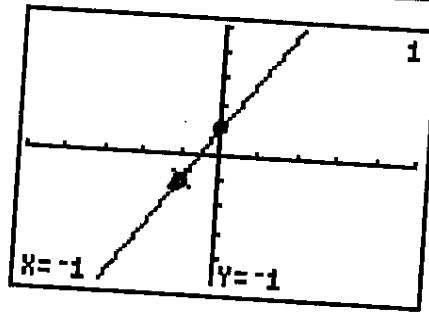
3. $y = \underline{-1}x + \underline{-3}$



$$\frac{-3}{3} = -1$$

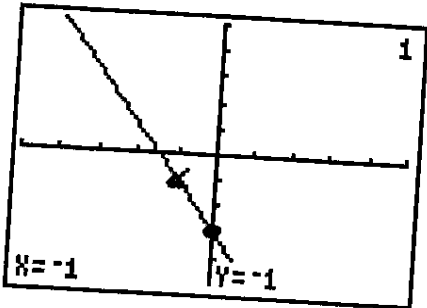
$$\frac{+3}{3} = 1$$

4. $y = \underline{2}x + \underline{1}$

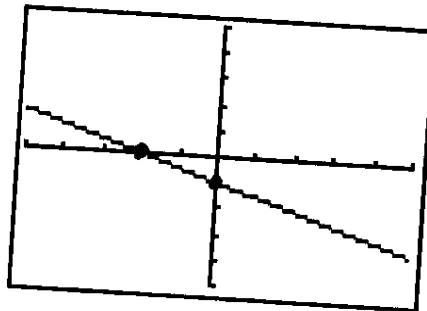


$$\frac{+2}{+1} = 2$$

5. $y = \underline{-2}x + \underline{-3}$

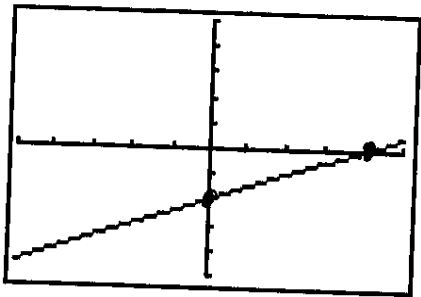


6. $y = \underline{-\frac{1}{2}}x + \underline{-1}$



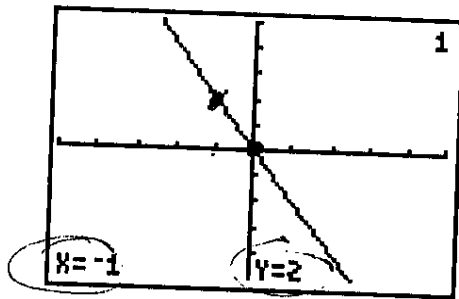
$$\frac{+1}{-2} = -\frac{1}{2}$$

$$7. y = \frac{1}{2}x + -2$$



$$\frac{+2}{+4} = \frac{1}{2}$$

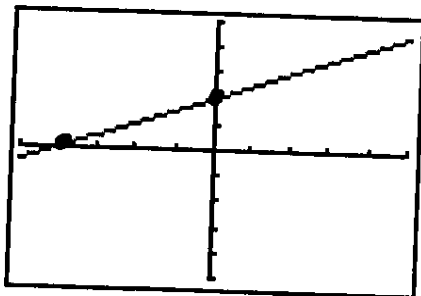
$$8. y = -2x + 0$$



$$\frac{-2}{+1} = -2$$

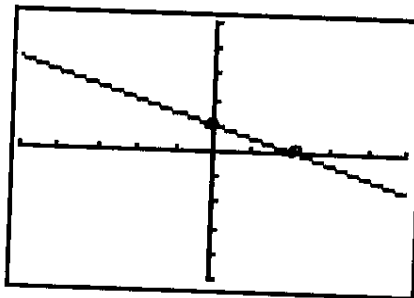
$$\frac{+2}{-1} = -2$$

$$9. y = \frac{1}{2}x + 2$$



$$\frac{+2}{+4} = \frac{1}{2}$$

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



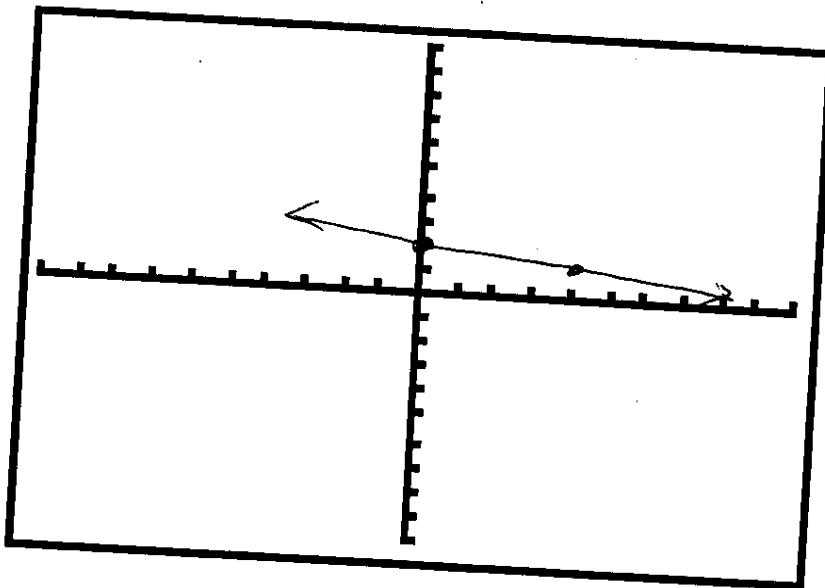
$$\frac{-1}{+2} = -\frac{1}{2}$$

Practice Graphing Linear Equations using the Slope-Intercept Form

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

$$m = \frac{-1}{4} \begin{array}{l} \downarrow 1 \\ \rightarrow 4 \end{array}$$

$$b = 2$$



Graph the equation $-2x + 3y = 6$

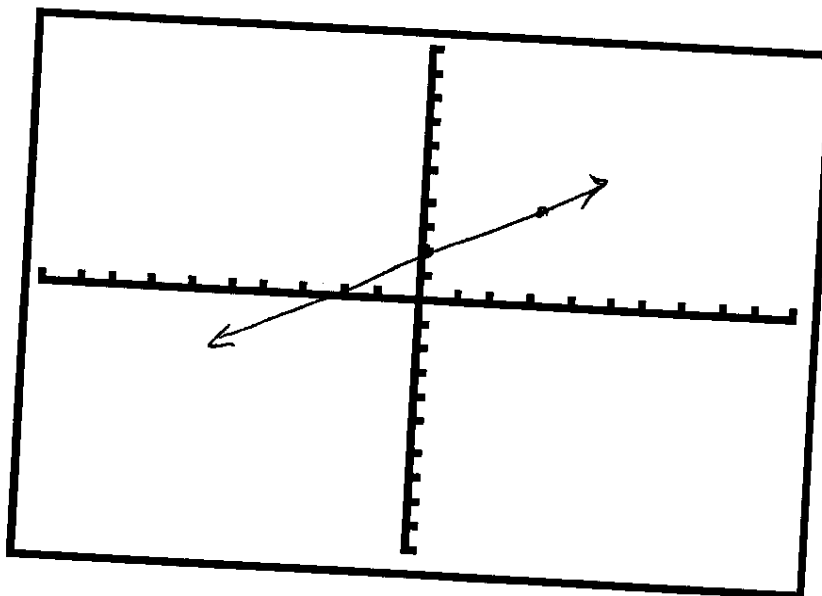
First step solve the equation for "y"

$$m = \frac{2}{3}$$

$$b = 2$$

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

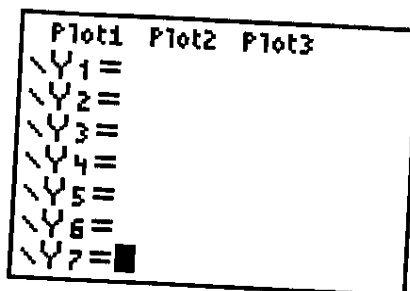
$$y = \frac{2}{3}x + 2$$



Graphing Using the Calculator

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

Step 1: Press the $y =$ button on the top left of the calculator.
The screen should look like this:



Step 2: After the $y_1 =$ type in the equation.

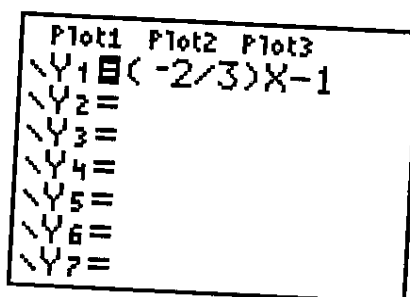
*Be careful when you type in the fractions and negatives.

It is recommended to put in the fractions in parenthesis.

There are different buttons for subtraction sign $-$ and negative sign $(-)$.

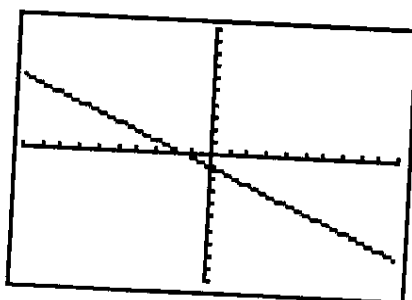
Here is how you should type the equation in to the calculator: $(-2/3)x-1$

This is how the screen should look:



Step 3: Then press *graph* button to graph this equation.

Your graph should look like this in a standard window.



Equation of a Line using a Real Life Application "Going to the Movies"



Al is inviting his friends to go to the movies on Friday night, but he does not know how many of them are coming and what the total cost will be. He knows that he has to pay \$5.00 for parking at Pointe Orlando. Also, the cost of the movies is \$10.00 per person. (Movie Prices)

Write a linear equation in for the following example using "x" to represent the number of friends going to the movies and "y" representing the total cost.

$$y = 5 + 10x$$

Answer the following questions for this real life word problem

How much will it cost if Al invites 1 friend to the movies?

(Do not count Al, this is just the price for the friend)

After you find the solution, plot the solution (x, y) on the graph below.

\$15

$$y = 5 + 10(1) = 15$$

How much will cost if Al invites three friends to the movies?

(Do not count Al, this is just the price for the friends)

After you find the solution, plot the solution (x, y) on the graph below.

\$35

$$y = 5 + 10(3) = 35$$

If Al decided to pay for the trip out to the movies

for his friends, how many people can Al pay for with \$55.00?

After you find the solution, plot the solution (x, y) on the graph below.

5

$$\begin{array}{r} 55 = 5 + 10x \\ -5 \quad -5 \\ \hline \end{array}$$

$$\begin{array}{r} 50 = 10x \\ \hline 10 \end{array}$$

$$x = 5$$

If Al decided to pay for the trip out to the movies

for his friends, how many people can Al pay for with \$75.00?

After you find the solution, plot the solution (x, y) on the graph below.

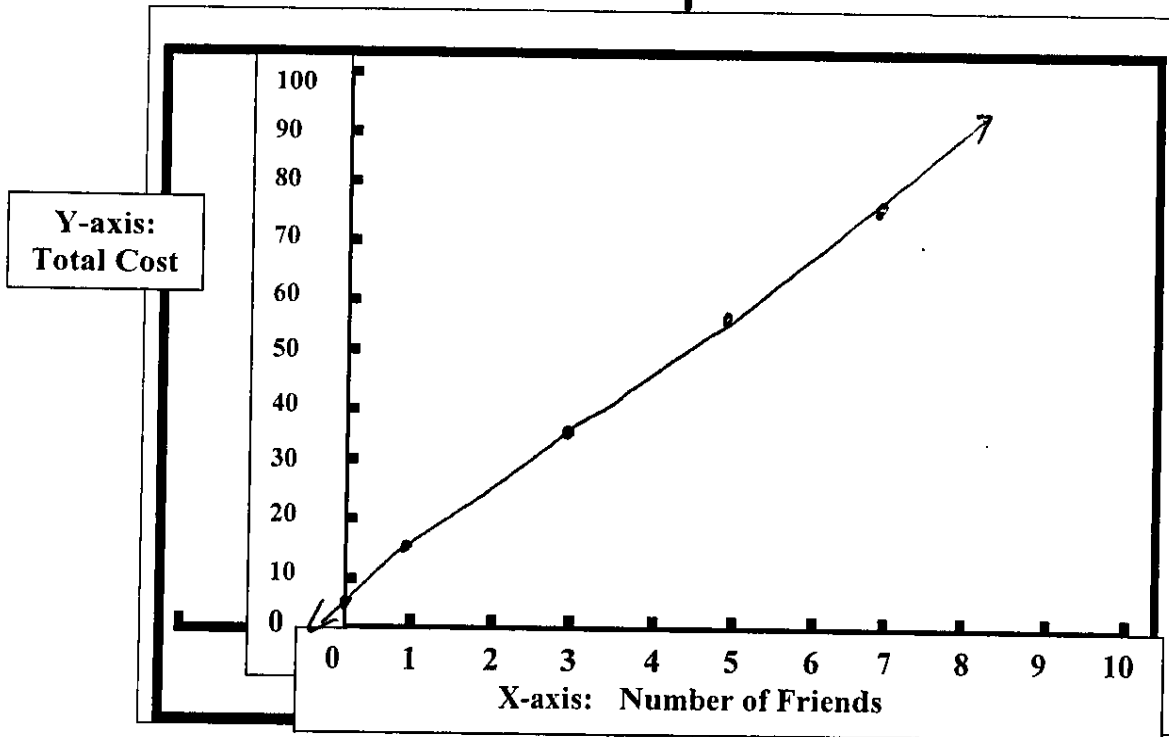
7

$$\begin{array}{r} 75 = 5 + 10x \\ -5 \quad -5 \\ \hline \end{array}$$

$$\begin{array}{r} 70 = 10x \\ \hline 10 \end{array}$$

$$x = 7$$

Graph



What do you notice about the points that were plotted?

Goes up, as friends increase 1 cost goes up 10

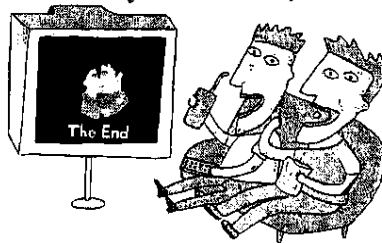
Is there a relationship between the (x) number of friends and the (y) total cost to go to the movies? If so, what is the relationship?

Hint: Look at the cost as you add one more friend.

$\frac{10}{1}$ \$10 per 1 friend

What is the cost if no one goes to the movies and why?

\$5 y-intercept parking



3.5: Slope Intercept Form Practice Problems

1. Given the equation $y = 4x - 3$

What is the slope (m)? 4

What is the y-intercept (b)? -3

2. Given the equation $y = -\frac{2}{5}x + 6$

What is the slope (m)? $-\frac{2}{5}$

What is the y-intercept (b)? 6

3. Given the equation $2x - 3y = 12$

$$\begin{array}{r} 2x - 3y = 12 \\ -2x \quad -2x \\ \hline -3y = -2x + 12 \\ \quad -3 \quad -3 \\ \hline y = \frac{2}{3}x - 4 \end{array}$$

What is the slope (m)? $\frac{2}{3}$

What is the y-intercept (b)? -4

4. Given the equation $4x + 7y = 14$

$$\begin{array}{r} 4x + 7y = 14 \\ -4x \quad -4x \\ \hline 7y = -4x + 14 \\ \quad 7 \quad 7 \\ \hline y = -\frac{4}{7}x + 2 \end{array}$$

What is the slope (m)? $-\frac{4}{7}$

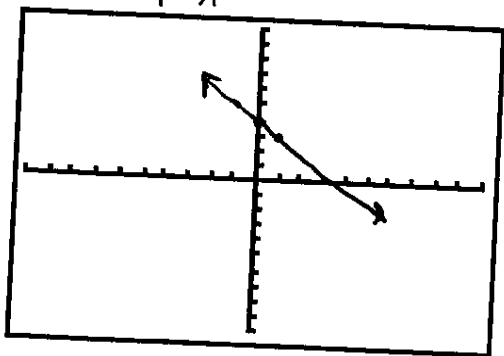
What is the y-intercept (b)? 2

5. Graph using slope-intercept form

$$y = -x + 4$$

$$m = \frac{-1}{1} \quad b = 4$$

$\begin{array}{l} \swarrow 1 \\ \searrow 1 \end{array}$

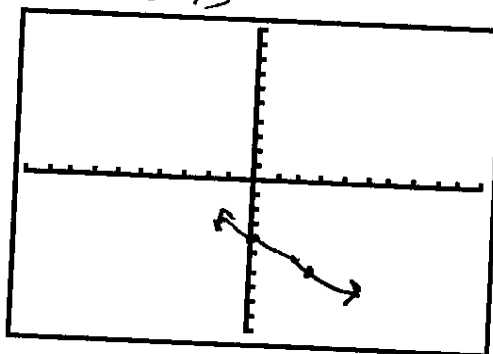


6. Graph using slope-intercept form

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

$$m = \frac{-2}{3} \quad b = -4$$

$\begin{array}{l} \swarrow 2 \\ \searrow 3 \end{array}$



3.5: Slope Intercept Form Practice Problems Continue

7. Graph using slope-intercept form

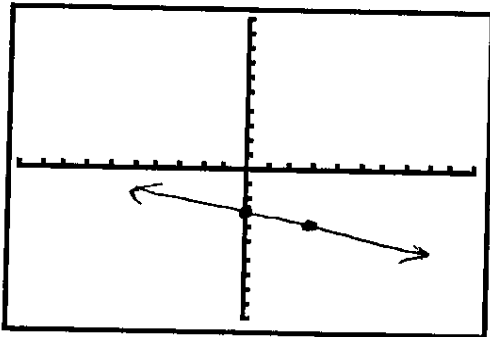
$$x + 3y = -9$$

$$\frac{-x}{3} = \frac{-x}{3}$$

$$3y = \frac{-x - 9}{3}$$

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

$$m = \frac{-1}{3} \rightarrow 3 \quad b = -3$$



8. Graph using slope-intercept form

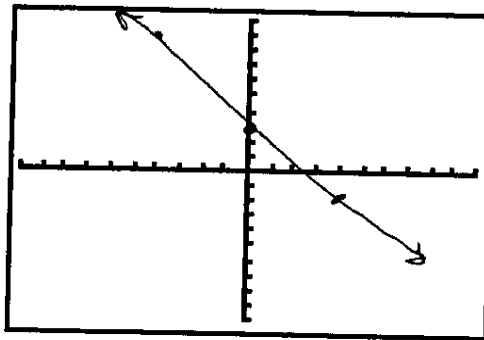
$$-5x - 4y = -12$$

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

$$-4y = \frac{5x - 12}{-4}$$

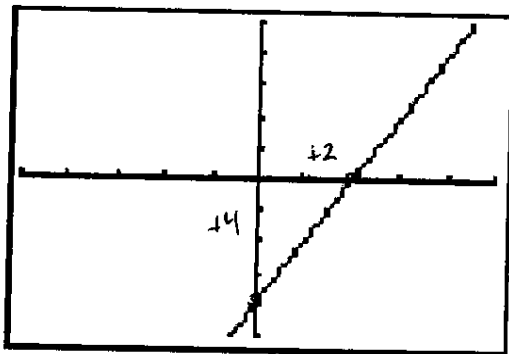
$$y = -\frac{5}{4}x + 3$$

$$m = \frac{-5}{4} \rightarrow 4 \quad b = 3$$



9. Find the equation of the line in slope-intercept form of the graph below:

$$y = 2x - 4$$

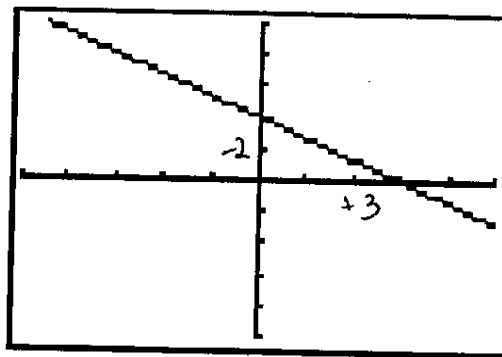


$$\frac{+4}{+2} = 2$$

$$y = 2x - 4$$

10. Find the equation of the line in slope-intercept form of the graph below:

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



$$-\frac{2}{3}$$

3.5: Slope Intercept Form Practice Problems Continue

11. You are trying to raise money to buy a new cell phone. You already have \$50.00 saved up and you are working at a job where you make \$10 per hour.

a. Write an equation in slope-intercept form that explains this relationship where "x" is the number of hours you work and "y" is the total amount you have earned?

$$y = 10x + 50$$

b. What is the slope? 10 or $\frac{10}{1}$

What does the slope mean in the context of the problem?

For every 1 hour you earn 10 more dollars

c. What is the y-intercept? 50

What does the y-intercept mean in the context of the problem?

Started with \$50

d. How much money would you have saved up after 8 hours of work?

130

$$y = 10(8) + 50$$

$$y = 80 + 50$$

$$y = 130$$

e. How much money would you have saved up after 16 hours of work?

210

$$y = 10(16) + 50$$

$$y = 160 + 50$$

$$y = 210$$

f. How many hours do you have to work if the cost of the cell phone is \$300?

25

$$300 = 10x + 50$$

$$\underline{-50} \qquad \underline{-50}$$

$$250 = 10x$$

$$x = 25$$