BUREAU OF SECONDARY EDUCATION
DEPARTMENT OF EDUCATION

DISTANCE LEARNING MODULE
MATHEMATICS 1

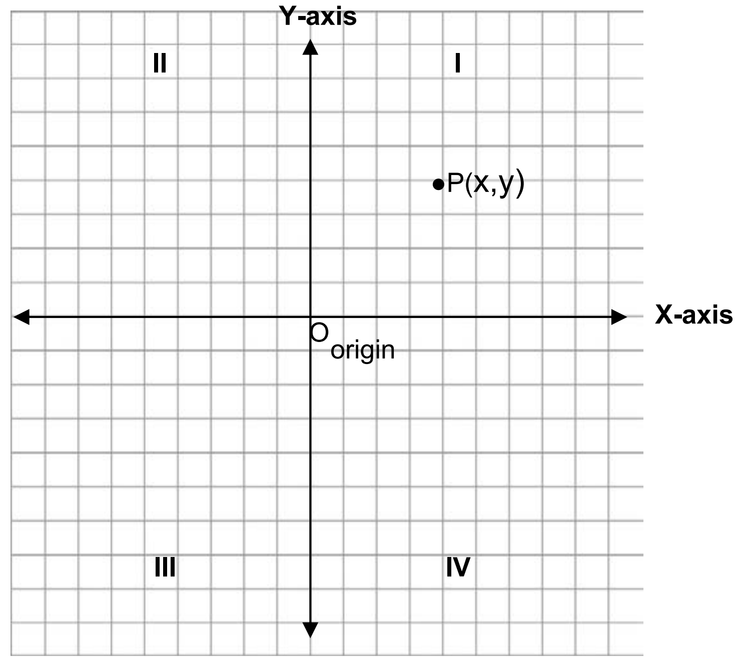
LINEAR EQUATIONS AND INEQUALITIES IN TWO VARIABLES

U N I T V

In a university intramurals, a coordinate model was used to plan the design of the location of each department. Each seat in the stadium can be located by an ordered pair (row letter, seat number). The departments occupying the seats can be directed to hold light colored cards or dark colored cards to create a design.

This unit will demonstrate to you the concepts of points and lines in a plane. The lessons contained in this unit will teach you how to plot points, graph and solve linear equations and inequalities in two variables and apply their solution in real life.

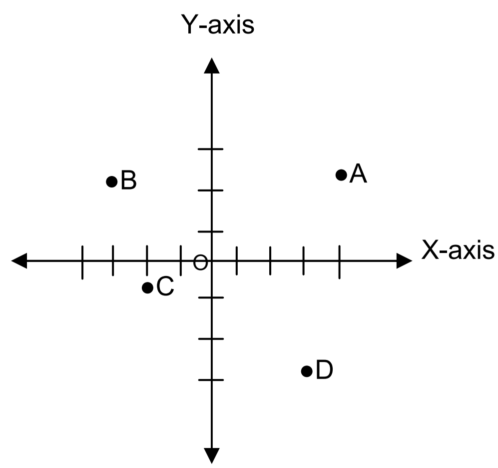
THE CARTESIAN COORDINATE SYSTEM



The French Philosopher Rene Descartes (1596 – 1650) developed a system on how you will determine the location of a place, a person or an object in a plane by representing them with an ordered pair of numbers (x, y). This system is called the *Cartesian coordinate system.*

The Cartesian coordinate system is formed by two perpendicular numberlines on the plane. The horizontal line is called the x-axis and the vertical line is called the y-axis. The intersection of the axes O is called the origin and is represented by ordered pair (0, 0).

The x - and y - axes divide the plane into regions called quadrants. The regions are named in counterclockwise direction as quadrants I, II, III, and IV.



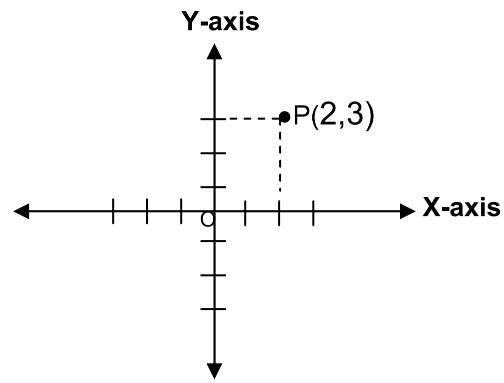
Point A is in Quadrant I,
Point B is in Quadrant II,
Point C is in Quadrant III and
Point D is in Quadrant IV.

The Coordinates of a Point

Every point on the Cartesian coordinate plane is associated with an ordered pair of numbers (x, y). This pair of numbers is called *coordinates* of a point. The coordinates of a point determine the location of a point in the Cartesian coordinate plane by indicating its distances from the axes.

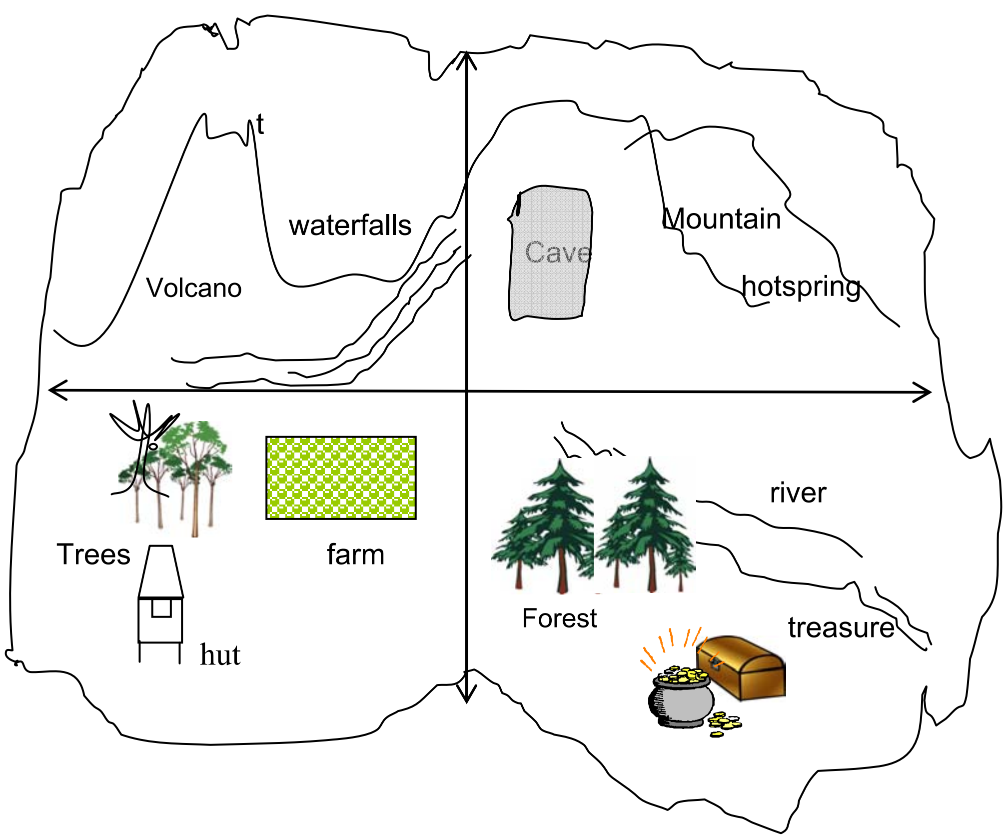
The distance from the y-axis is called the *abscissa* or the x-coordinate while the distance from the x-axis is called the *ordinate* or the y-coordinate.

The figure illustrates P(2,3) in the coordinate plane. The abscissa is 2 and the ordinate is 3. This tells you that point P is 2 units from the y-axis and 3 units from the x-axis.



Activity 1:

A. A treasure map is shown in the coordinate plane. Identify the things that are found in each quadrant. In what quadrant can the treasure be found?

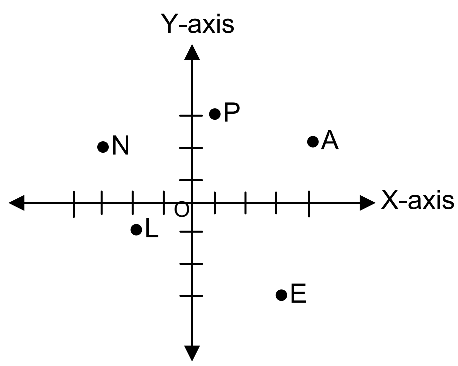


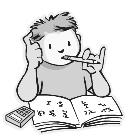
B. Determine the abscissa and the ordinate of the given coordinates

Coordinates	Abscissa	Ordinate
1. (2, -5)		
2. (6, -4)		
3. (0, 5)		
4. (-3, 0)		
5. (-6, -3)		

C. Give the coordinates, abscissa and ordinate of the following points.

1. P
2. L
3. A
4. N
5. E

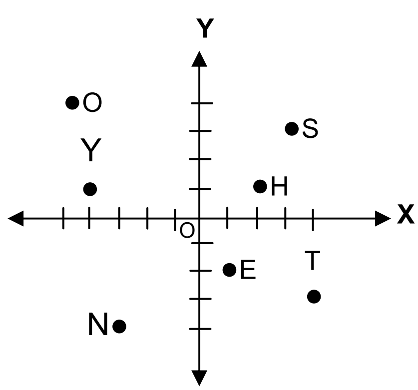




Test 1:

Can you give the points that correspond to the given coordinates? Write the letters at the space below to spell an important value a person must possess.

1. (2, 1)
2. (-5, 4)
3. (-3, -4)
4. (1, -2)
5. (3, 3)
6. (4, -3)
7. (-4, 1)



___ ___ ___ ___ ___ ___ ___
1 2 3 4 5 6 7

Plotting of Points

To plot a point is for you to locate the position of a coordinate in the Cartesian coordinate plane.

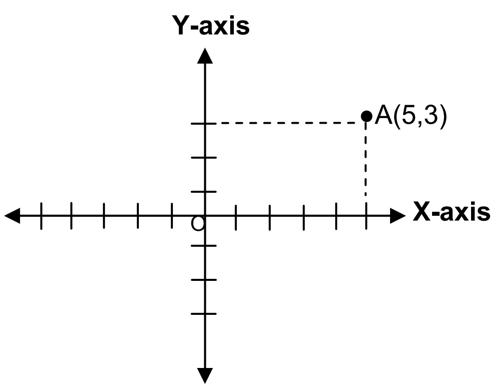
Follow these steps in plotting points:

a. Locate the x-coordinate along the x-axis. Draw an imaginary line parallel to the y-axis.
b. Locate the y-coordinate along the y-axis. Draw an imaginary line parallel to the x-axis.
c. Mark the intersection of the two imaginary lines with a dot.
d. Label the dot or point using a capital letter.

You may omit the imaginary lines when your skills in plotting of points have been developed.

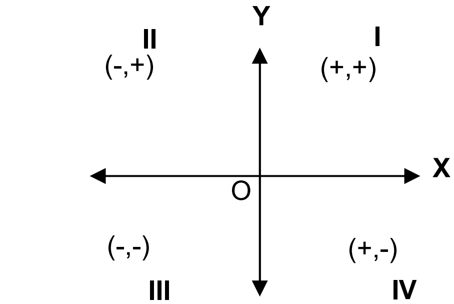
Example: Plot A(5, 3).

1. Locate 5 in the x-axis. Draw an imaginary line parallel to the y-axis.
2. Locate 3 in the y-axis. Draw an imaginary line parallel to the y-axis.
3. Mark the intersection of the two imaginary lines with a dot.
4. Label the point A.



The Location of a Point

The quadrant of a point is determined by the signs of its coordinates.



A point is in

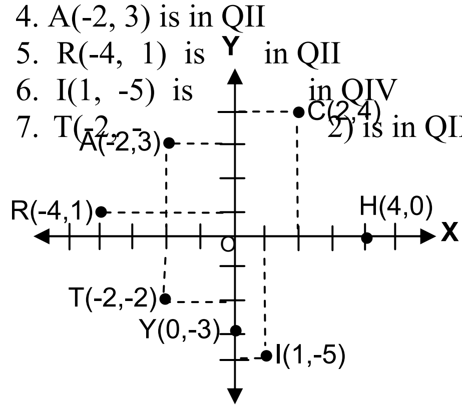
a. quadrant I if $x > 0$ and $y > 0$.
b. quadrant II if $x < 0$ and $y > 0$
c. quadrant III if $x < 0$ and $y < 0$.
d. quadrant IV if $x > 0$ and $y < 0$.

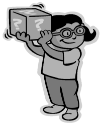
The points on the axes are not in any quadrant.

Examples:

The following points are located in their respective quadrants in the Cartesian coordinate plane.

1. C(2, 4) is in QI
2. H(4, 0) is in the x-axis
3. Y(0, -3) is in the y-axis
4. A(-2, 3) is in QII
5. R(-4, 1) is in QII
6. I(1, -5) is in QIV
7. T(-2, -2) is in QIII





Activity 2:

A. On one coordinate plane, plot the points and give the quadrants/axes.

1. P(5, 2)
2. R(-3, 4)
3. A(-4, -6)
4. I(3, -5)
5. S(0, 4)
6. E(6, 0)

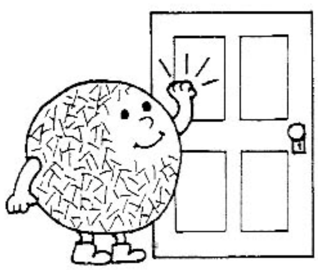
B. Write the letter from the graph that corresponds to each ordered pair to decode the punch line to this knock-knock joke.

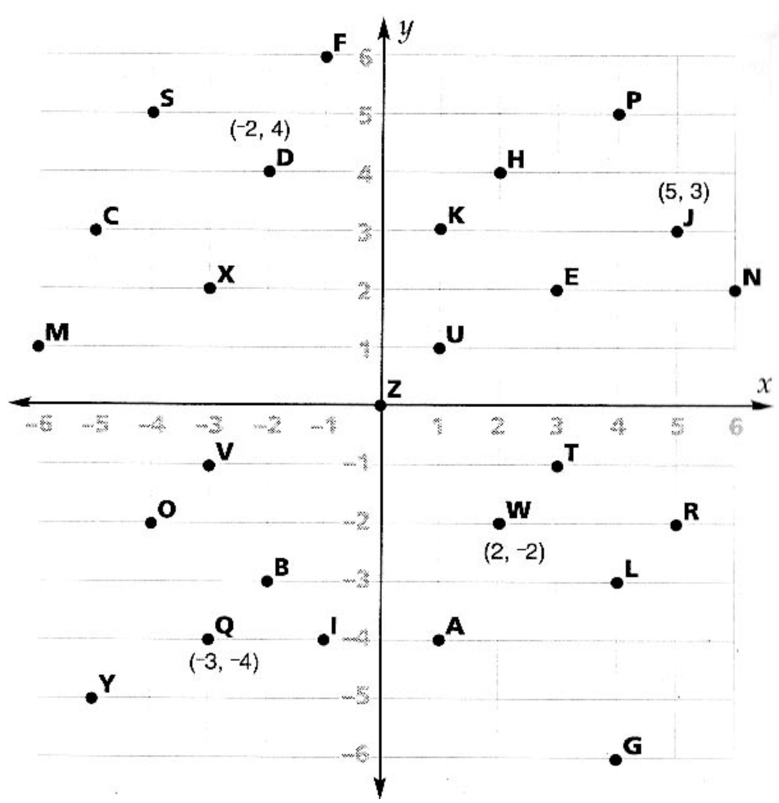
Knock-knock.

Who's there?

Cantaloupe.

Cantaloupe who?





___ ___ ___ ___ , ___ ___ ___ ___ ___
(-5,3) (1,-4) (6,2) (3,-1) (3,2) (4,-3) (-4,-2) (4,5) (3,2)

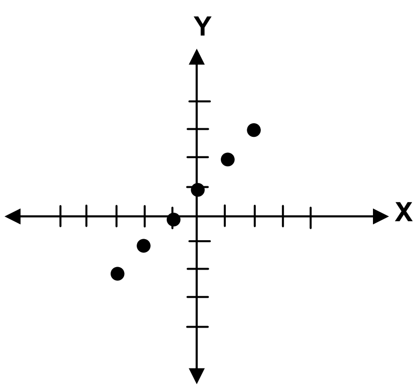
___ ___ ___ ___ ___ ___ ___, ___ , ___ ___ ___ ___ ___!
(3,-1)(-4,-2)(6,2)(-1,-4)(4,-6)(2,4)(3,-1) (-1,-4)(-6,1) (-2,-3)(1,1)(-4,5)(-5,-5)

Test 2: In one coordinate plane, plot the points and give the quadrants where each point belongs.

1. E(6, 4)
2. M(3, -7)
3. P(-5, -8)
4. A(-2, 5)
5. T(0, 3)
6. H(-2, 0)
7. Y(0, -7)

LINEAR EQUATIONS IN TWO VARIABLES

Linear equations play an important role in our lives. A lot of things around us form a straight-line pattern. Imagine the dotted figure below as the stairway steps in going up the lighthouse in the picture. What would happen to you if these steps were not equally distanced?



These steps represent points on the Cartesian coordinate plane whose coordinates are (-3,-2), (-2,-1), (-1,0), (0,1), (1,2) and (2,3). We can say that the second coordinate (y) is one unit more than the first coordinate (x) and can be represented by the equation $y = x + 1$.

When these points are connected, you will form a straight line. We can now say that the graph of a linear equation in two variables is a straight line.

REWRITING A LINEAR EQUATION $AX + BY = C$ IN THE FORM $Y = MX + B$

An equation of the form $ax + by = c$ and can be written in the form $y = mx + b$ is a *linear equation in two variables*.

The linear equation $x - y = -1$ is in the form $ax + by = c$. You can write this in the form $y = mx + b$ as $y = x + 1$.

The equations can be transformed in the form $y = mx + b$ by solving for y.

Examples:

1. x – y = 4

   -y = -x + 4 APE

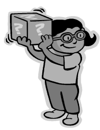
   y = x – 4 MPE

2. 2x + 3y = 6

   3y = -2x + 6 Add -2x to both sides of the equation

   $y = \frac{-2x+6}{3}$

   $y = \frac{-2x}{3} + 2$ Divide both sides by 3



Activity 3:

Transform the linear equations in the form y = mx + b.

1. x + y = 4
2. x – y = 6
3. x + 2y = -8
4. 3x + 2y = 10
5. 4x - 3y = -9

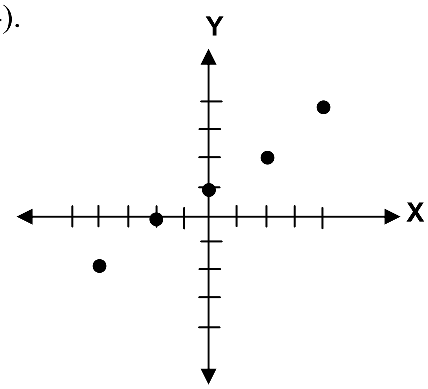
Test 3:

Transform the linear equations in the form ax + by = c.

1. y = x + 5
2. y = -x + 3
3. y = 4x – 7
4. y = -2x + 5
5. $y = \frac{3}{2}x - 4$

Table of Values of a Linear Equation

The graph illustrates the ordered pairs (-4, -1), (-2, 0), (0, 1), (2, 2) and (4, 4).



These ordered pairs are described by the equation $y = \frac{1}{2}x + 1$ and can be presented through a table of values.

x	-4	-2	0	2	4
y	-1	0	1	2	4

Hence, (-4,-1), (-2,0), (0,1), (2,2), (4,4) are the solutions.

These values are also called the solution of $y = \frac{1}{2}x + 1$ or x - 2y = -1.

Example:
To make a table of values for $3x - y = 2$, you have to follow these procedures.

1. Solve for y.

$$y = 3x - 2$$

2. Make a table.

You may assign values for x. Use at least 3 values as your replacement set, say {-1, 0, 1}.

3. Solve for y by substituting the values of x in the equation.

Replace x with -1

$y = 3x - 2$
$y = 3(-1) - 2$
$y = -3 - 2$
$y = -5$

Replace x with 0.

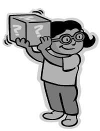
$y = 3x - 2$
$y = 3(0) - 2$
$y = 0 - 2$
$y = - 2$

Replace x with 1

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

4. Complete the table.

x	-1	0	1
y	-5	-2	1



Activity 4: Complete the table of values

1. $y = 3x$

x	0	1	2	3
y	0		6	

2. $y = 2x$

x	-2	-1	0	1	2
y		-2			4

3. $y = x + 3$

x	-3	0	3	6
y	0			

4. $y = 4x - 1$

x	0	1	2	3
y		3		

5. $y = -2x + 5$

x	-2	-1	0	1	2
y		6		3	

6. $y = x - 5$

x	1	3	5	7
y		-2		2

Test 4:

A. Construct a table of values for each equation. Use x = 0, 1, 2, 3.

1. $y = 5x$
2. $y = x + 6$
3. $2x + y = 3$
4. $x - 2y = -2$
5. $2x + 3y = 6$

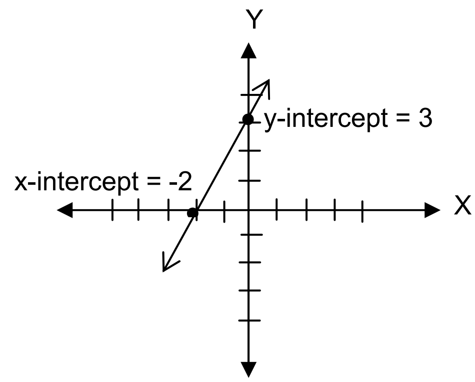
B. Tell whether the given ordered pair is a solution of the given equation.

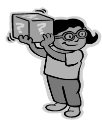
1. $x + y = 8$ (5, 3)
2. $2x - y = 4$ (3, 2)
3. $3x + 2y = 7$ (-1, 5)
4. $x + 6y = 4$ (10, 1)
5. $5x - 3y = 5$ (4, 5)

INTERCEPTS, SLOPE AND TREND OF THE LINE

The Intercepts

The graph of a linear equation illustrates that the line contains points (-2, 0) and (0, 3) or intersects the x and y axes at (-2, 0) and (0, 3), respectively. The x value where the graph crosses the x – axis is called the x - intercept and the y value where the graph crosses the y-axis is called the y – intercept. Hence, the x–intercept is -2 and the y – intercept is 3.





Activity 5:

Find the x and y intercepts of the equations.

1. x + y = 1
2. y = x – 7
3. 2x + 3y = 9
4. x = 2y + 7
5. 3x + y = 3

Test 5:

Find the x - and y - intercepts of the equations.

1. x = 2y + 7
2. 2x – 3y = 6
3. y = 3x – 4
4. x + 2y = 3
5. x + 8y = 16

The Slope of the Line

We usually see ramps in buildings and business establishments. The steepness or inclination of a line is what we call the *slope*.

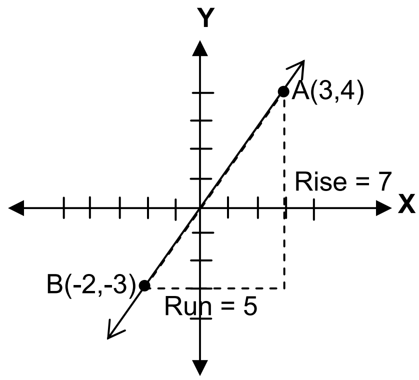
The slope is the ratio of the vertical change to the horizontal change.

The slope can be determined through the coordinates of two points. First find the difference between the coordinates or the vertical change. Second, find the difference between the x-coordinates or the horizontal change. Then, write the ratio of the differences.

$$\text{Slope} = \frac{\textit{vertical change}}{\textit{horizontal change}} = \frac{\textit{rise}}{\textit{run}}$$

Examples:

1. Let A(3,4) and B(-2,-3) be points on the line. Find the slope of the line.



Procedure:

a. Get the difference of the y-coordinates: 4-(-3) = 7

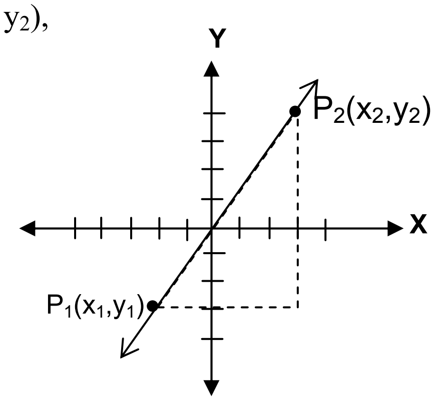
b. Get the difference of the x-coordinates: 3-(-2) = 5

c. Express the slope:

$$\text{Slope} = \frac{\textit{difference in } y-\textit{coordinates}}{\textit{difference in } x-\textit{coordinates}}$$

$$= \frac{4-(-3)}{3-(-2)} = \frac{7}{5}$$

If the two points were represented as $P_1(x_1, y_1)$ and $P_2(x_2, y_2)$,

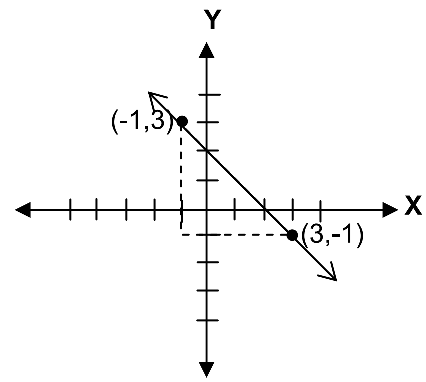


then the slope = $\dfrac{\textit{vertical change}}{\textit{horizontal change}}$

$$= \frac{y_2 - y_1}{x_2 - x_1}.$$

The slope is usually denoted by the letter *m*.

2. Find the slope of a line passing through points (-1, 3) and (3, -1).



$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m = \frac{-1-3}{3-(-1)} = \frac{-4}{4} = -1$$

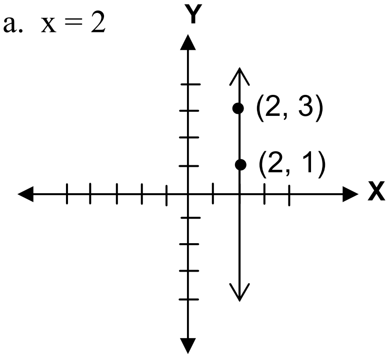
Notice that the slope in Example 1 is positive, while the slope in Example 2 is negative.

The graph in Example 1 whose slope is positive has a line which rises to the right. The graph in Example 2 whose slope is negative has a line which falls to the right.

What could be the slope of a line parallel to the y – axis? To the x – axis?

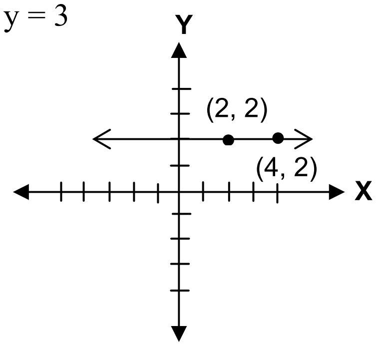
The slopes of vertical and horizontal lines.

a. x = 2



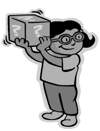
$$m = \frac{3-1}{2-2} = \frac{2}{0} \text{ undefined}$$

b. y = 3



$$m = \frac{2-2}{2-4} = \frac{0}{-2} = 0$$

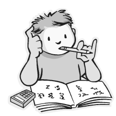
The vertical line, x = 2 has no slope. The horizontal line y = 3 has a slope of 0.



Activity 6**:**

Find the slope of the line passing through the given pairs of points.

1. (5, 2) and (7, 3)
2. (0, -3) and (2, -1)
3. (-5, 1) and (-3, 2)
4. (1, 3) and (2, 6)
5. (3, 4) and (3, 7)



Test 6:

Find the slope of the line passing through the given pairs of points.

1. (2, 1) and (0, 3)
2. (-7, -3) and (-4, 1)
3. (1, 3) and (2, 5)
4. (3, 1) and (6, 2)
5. (3, 1) and (6, 1)

The Trend of the Line

The graphs of the two previous examples whose slopes are $\frac{1}{2}$ and -1 are illustrated in figures A and B, respectively. Observe the *trend* of the line of the two graphs.

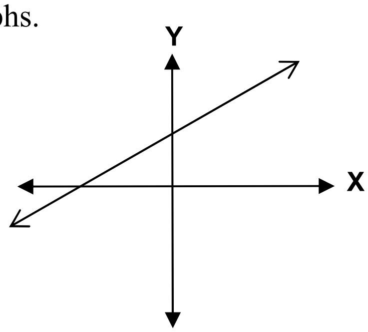


Figure A

The graph in Figure A is *increasing* or *increases from left to right*.

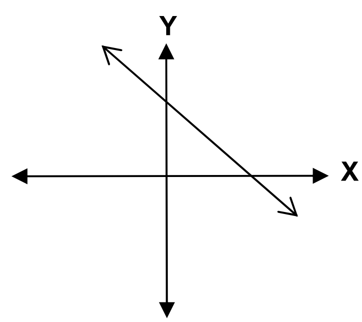
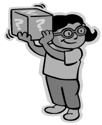


Figure B

In Figure B, the *graph is decreasing or decreases from left to right*.

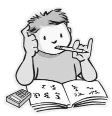
This tells us that the trend of the line is determined by the sign of the slope.



Activity 7:

Find the slope and describe the trend of the line containing the points.

1. (5, -3) and (6, -1)
2. (2, 1) and (-1, 3)
3. (3, 0) and (8, 2)
4. (-6, 4) and (-2, 0)
5. (5, 7) and (4, -6)



Test 7:

Find the slope and describe the trend of the line containing the points.

1. (0, 2) and (-3, 5)
2. (4, 5) and (7, 6)
3. (1, -3) and (0, -5)
4. (-6, -3) and (4, 1)
5. (-1, 8) and (1, -1)

THE GRAPH OF LINEAR EQUATIONS IN TWO VARIABLES

You can graph a linear equation in two variables in several ways. This is through the use of:

a. the *slope and the y-intercept*
b. the *x and y intercepts*
c. *any two points* and
d. the *slope and a given point.*

Examples:

1. Using the slope and the y - intercept.

The equation 3x – 2y = 4 when transformed in the form y = *m*x + *b* will give us $y = \frac{3}{2}x - 2$. The slope (*m*) of the equation is $\frac{3}{2}$ and the y–intercept (*b*) is -2.

The equation 3x – 2y = 4 of the form $y = \frac{3}{2}x - 2$ can now be graphed using $m = \frac{rise}{run} = \frac{3}{2}$ and the y – intercept = -2.

Procedure:

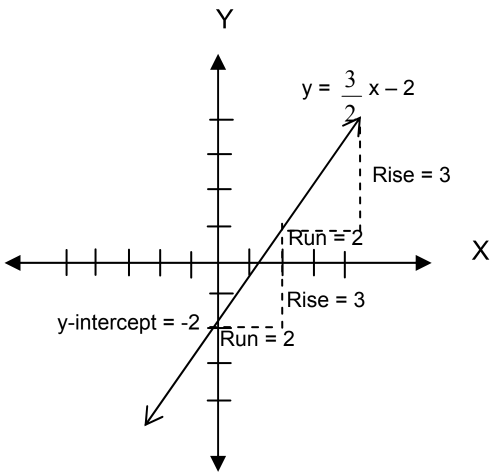
Find at least 3 points contained in the graph of 3x – 2y = 4.

1. Locate the y-intercept, -2 at the y-axis. Mark the point associated with this.

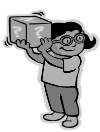
2. Starting from the y-intercept move 3 units upward (rise) and from this position move 2 units to the right (run). Mark this point.

3. Move again from this point using the value of the slope. Mark this point.

4. Connect the points with a straight line. Use 3 points.



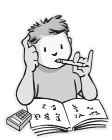
This is now the graph of $y = \frac{3}{2}x - 2$.



Activity 8:

Graph the following linear equations using the slope – intercept method.

1. $x + y = 3$
2. $5x - y = 3$
3. $x + y = 4$
4. $2x + y = 3$
5. $-4x + y = -6$



Test 8:

Graph the following linear equations using the slope – intercept method.

1. $x - y = 8$
2. $3x + 4y = 12$
3. $2x - 3y = 6$
4. $3x + 2y = 4$
5. $x - 2y = -8$

1. Using the x - and y - Intercepts

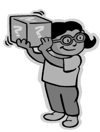
The equation 3x – 2y = 6 can be graphed using the x and y intercepts.

From our previous discussion, the x-intercept is the *abscissa* of the point (x, 0) and the y-intercept is the *ordinate* of the point (0, y).

This means that in the equation 3x – 2y = 6, when y = 0, x = 2 and when x = 0, y = -3.

Therefore, the x – intercept 2 is the abscissa of the point (2, 0) and the y – intercept -3 is the ordinate of the point (0, -3).

Using the values of the x - and y - intercepts, the equation 3x – 2y = 6 can now be graphed.



Activity 9:

Graph the line using the intercepts.

1. (0, -4) and (5, 0)
2. (-6, 0) and (0, -7)
3. (0, 8) and (4, 0)
4. (3, 0) and (0, 3)
5. (0, -4) and (-3, 0)

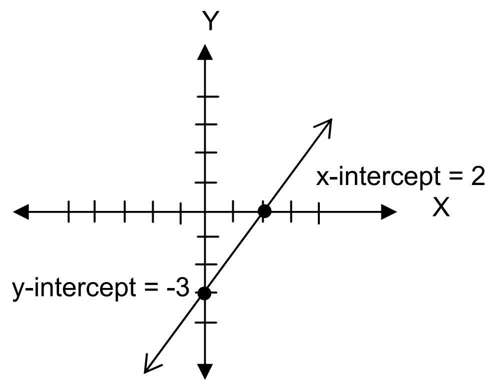
Test 9:

Graph the line using the intercepts.

1. (-1, 0) and (0, 3)
2. (5, 0) and (0, 6)
3. (-7, 0) and (0, 5)
4. (6, 0) and (0, -3)
5. (1, 0) and (0, 4)

Follow the procedure in graphing.

1. Locate the x – intercept = 2 in the x – axis. Mark the point (2, 0).
2. Locate the y – intercept = -3 in the y – axis. Mark the point (0, -3).
3. Connect the points with a line.



This is now the graph of 3x – 2y = 6.

3. Using Any Two Points

Two points determine a line.

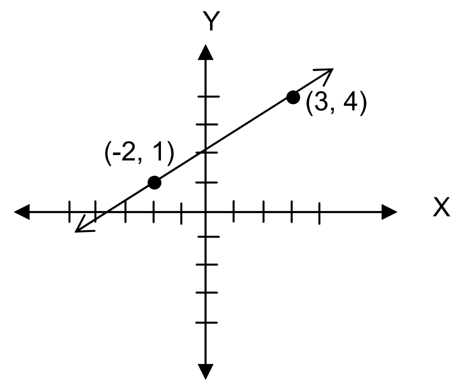
Aside from the points associated with the intercepts, two points on the Cartesian coordinate plane can be used to show the graph of a linear equation in two variables.

Example:

Graph the line passing through points (-2, 1) and (3, 4)

Procedure:

Locate the points on the Cartesian coordinate plane and draw a line connecting the points.



Activity 10:

Graph the line passing through the given points.

1. (3, 5) and (7, 1)
2. (4, 2) and (1, 0)
3. (-2, -3) and (2, 5)
4. (6, 4) and (5, 3)
5. (-1, 3) and (4, -6)

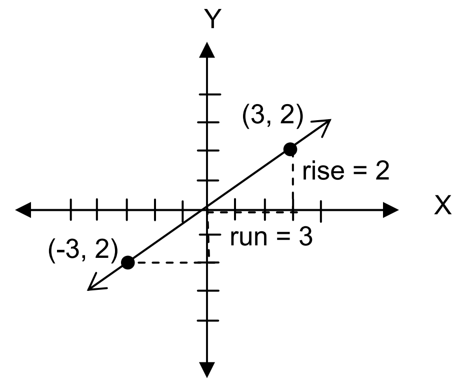
Test 10:

Graph the line passing through the given points.

1. (0, -5) and (3, 5)
2. (-4, 5) and (6, -4)
3. (6, 0) and (2, 5)
4. (-3, 0) and (1, 7)
5. (-4, 5) and (6, -3)

4. Using the slope and a Point

The graph of a linear equation can be drawn using the slope and a point on the line.



Example: Graph the line whose slope is $\frac{2}{3}$ and passing through (-3, 2).

Procedure:

1. Locate point (-3, 2).

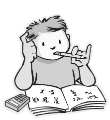
2. From (-3, 2), move 2 units vertically and 3 units horizontally.

This is the graph of the line whose slope is $\frac{2}{3}$ and passing through (-3, 2).

Activity 11:

Graph the line with the given slope and passing through the indicated point.

1. $m = 3$, (0, 2)
2. $m = 4$, (-5, -6)
3. $m = -1$, (0, -1)
4. $m = \frac{2}{3}$, (5, 0)
5. $m = \frac{3}{4}$, (1, 3)



Test 11:

Graph the line with the given slope and passing through the indicated point.

1. $m = -\frac{1}{2}$, (4, 3)
2. $m = -2$, (3, -2)
3. $m = \frac{1}{3}$, (-3, -4)
4. $m = -2$, (-5, 6)
5. $m = 3$, (0, - 4)

FINDING THE EQUATION OF A LINE

The graph of a linear equation was drawn using points, slopes and intercepts.

You can use these properties to solve linear equations in two variables.

The Slope-Intercept Form

If the slope and the y-intercept of a line is given, the slope-intercept form can be used to determine the equation of a line.

The Slope – Intercept Form:
$y = mx + b,\ m \neq 0.$

Example:

If m = 3 and the y-intercept = -4, the equation of a line can be solved by substituting the value of the slope (m) and the y-intercept (b) in

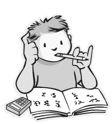
$y = mx + b$

Then, $y = 3x - 4$.

Activity 12:

Determine the equation of the line described by the given slope and y-intercept.

1. $m = 6$, y – intercept = -2
2. $m = \frac{1}{2}$, y – intercept = 3
3. $m = -2$, y – intercept = 7
4. $m = \frac{2}{3}$, y – intercept = 3
5. $m = -1$, y – intercept = 8



Test 12:

Determine the equation of the line described by the given slope and y-intercept.

1. $m = -\frac{1}{2}$, y – intercept = 4
2. $m = 3$, y – intercept = -5
3. $m = \frac{2}{3}$, y – intercept = $-\frac{1}{2}$
4. $m = \frac{1}{3}$, y – intercept = 5

5. $m = \frac{3}{4}$, y – intercept = 2

The Point - Slope Form

You can determine the equation of a line if the slope and a point are given. The slope formula $m = \frac{y - y_1}{x - x_1}$ can be transformed into the point – slope form.

> The Point – Slope Form:
>
> $(y - y_1) = m(x - x_1)$

Example:

The equation of a line whose slope is $\frac{2}{3}$ and passing through point (2, -5).

Using the point-slope form:

$$(y - y_1) = m(x - x_1)$$

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

$$3(y + 5) = 2x - 4$$

$$3y + 15 = 2x - 4$$

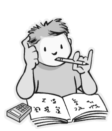
$$2x - 3y = 19$$

Therefore, the equation of a line whose slope is $\frac{2}{3}$ and passing through point (2, -5) is 2x – 3y = 19.

Activity 13:

Find the equation of a line described by each given slope and point.

1. m = 4, (-5, -6)
2. m = -1, (0, -1)
3. $m = \frac{2}{3}$, (5, 0)
4. $m = \frac{3}{4}$, (1, 3)
5. m = -2, (3, -2)



Test 13:

Find the equation of a line described by each given slope and point.

1. m = 3, (0, 2)
2. $m = -\frac{1}{2}$, (4, 3)
3. $m = \frac{1}{3}$, (-3, -4)
4. m = -2, (-5, 6)

5. m = 3, (0, - 4)

The Two - Point Form

Similarly, you can solve the equation of a line by using any two points on the line.

Using the formula $m = \frac{y - y_1}{x - x_1}$ and assigning an arbitrary point (x_2, y_2), will give us the two-point form.

> The Two-Point Form:
> $$\frac{y - y_1}{x - x_1} = \frac{y_2 - y_1}{x_2 - x_1}$$

Example:

Find the equation of a line passing through points (-2, -3) and (4, 5).

Using the form:

$$\frac{y - y_1}{x - x_1} = \frac{y_2 - y_1}{x_2 - x_1}$$

$$\frac{y - (-3)}{x - (-2)} = \frac{5 - (-3)}{4 - (-2)}$$

$$\frac{y + 3}{x + 2} = \frac{8}{6}$$

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

$$3(y + 3) = 4(x + 2)$$

$$3y + 9 = 4x + 8$$

$$4x - 3y = 1$$

Therefore the equation of a line passing through points (-2,-3) and (4, 5) is 4x – 3y = 1.

Activity 14:

Find the equation of a line passing through the given points.

1. (4, 1) and (-6, -3)
2. (0, -5) and (1, -3)
3. (4, 5) and (7, 6)
4. (-6, 4) and (-2, 0)
5. (2, 1) and (-1, 3)

Test 14:

Find the equation of a line passing through the given points.

1. (5, -3) and (6, -1)
2. (0, 2) and (3, 5)
3. (-3, 0) and (8, 2)

4. (1, -3) and (0, -5)
5. (5, 7) and (4, -6)

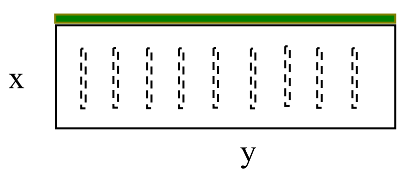
Solving Problems Involving Linear Equations in Two Variables

Many solutions to real life problems require the use of linear equations. In this lesson, your skills in interpreting a problem and how to solve it are essential.

Examples:

1. Jessie wishes to construct a poultry house using a 60 meter chicken wire. If one side of the poultry house is bounded by a concrete wall, find the possibilities by which he can fence his poultry.

   Diagram:



Solution: Let x = width
y = length
P= 60m (the perimeter)

The entire enclosure of the poultry is P = 2x + y or 2x + y = 60.

The table will show you some of the possibilities.

x	1	3	5	7	9	11	13	15
y	58	54	50	46	42	38	34	30

Can we use the value x > 15? If not, why?

2. Jamie plans to spend P1000 for T-shirts and shorts. If a short costs P200 and a T-shirt costs P100, find all possible number combinations of T-shirts and shorts which she can spend her money. Find the equation of the relation.

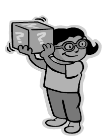
   Solution:
   Let x = number of shorts
   y = number of T-shirts

   a. Illustrate the possibilities through a table.

x	1	2	3	4
y	8	6	4	2

   b. The equation: 200x + 100y = 1000

   How many T-shirts will she be able to buy if she bought 5 shorts?



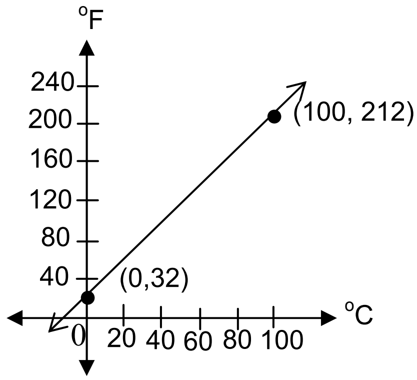
Activity 15:

Solve the following problems:

1. A TV repairman charges a minimum service fee of P350 and P50 per hour, thereafter. Find the repair charge for 5 hours. What is the equation for the relation between the number of hours and the service fee?

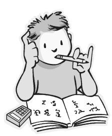
2. SEJ Company gives a 10% increase in salary to its employees, that is $y = 0.1x$, where y is the increase in peso and x is the salary. Write three ordered pairs satisfying this relation. Let x = P10,000, P12,000 and P14,000. What is the increase for a salary of P20,000?

3. The freezing point of water is 0°C and 32 °F and the boiling point is 100 °C and 212 °F. Use the graph to answer the following:



If x = temperature in °C and y = temperature in °F, use the equation $y = mx + b$.

a. What is the temperature in °F of a 30°C reading?
b. What is the temperature in °C of an 86°F reading?



Test 15:

1. Joseph found that the total bill to repair his car is P2,500 for new parts and P150 per hour for repair service. How much would he spend for a 6 hour repair job?

2. A fast food outlet has the following chart for its service crew to use in computing customers' bills for a value meal of burgers, fries and drinks.

x	1	2	3	4	5	6
y	53	106	159	212	265	318

a. Write an equation describing the relation between the number of value meals (x) and the corresponding cost (y).

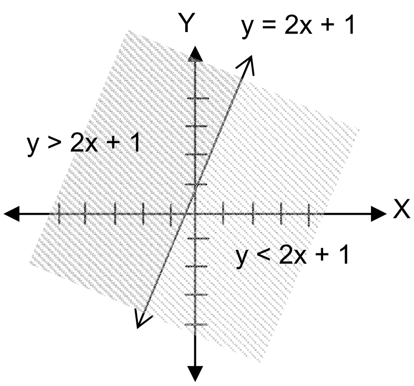
b. What would be the customer's bill for 10 value meals?

3. Write an equation describing the relation between the number of hours (x) playing the computer game and the cost (y). Use the equation to complete the table below.

x	1	2	3	4	5	6
y	15	30	45			

GRAPHS OF LINEAR INEQUALITIES

Let us consider the linear equation $y = 2x + 1$. The line divides the coordinate plane into 3 sets of points, the points on the two half-planes and the points on the line.



Thus, the set of points can either be in the line $y = 2x + 1$ or the half-plane $y > 2x + 1$ (above the line) or the half-plane $y < 2x + 1$ (below the line).

To illustrate the points not on the line, a dashed line takes the place of the bold line representing the equation.

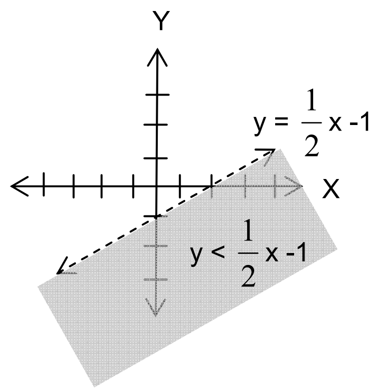
Examples:

1. Graph $y < \frac{1}{2}x - 1$.

Procedure:

a. Graph the equation $y = \frac{1}{2}x - 1$ with a dashed line.

b. Shade the half-plane below the line $y = \frac{1}{2}x - 1$.

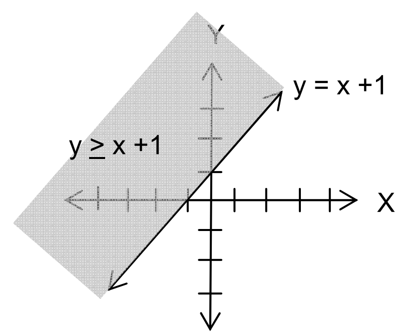


This is now the graph of $y < \frac{1}{2}x - 1$.

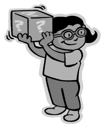
2. Graph $y \geq x + 1$.

   a. Graph $y = x + 1$ with a solid line.

   b. Shade the half-plane above line $y = x + 1$.



This is the graph of $y > x + 1$.

 Activity 16:

Graph the following inequalities:

1. $y > -\frac{2}{3}x + 4$
2. $y < \frac{1}{2}x - 1$
3. $y \geq 3x - 4$
4. $y \leq -2x + 3$
5. $y \geq -3x + 4$

 Test 16:

Graph the following inequalities:

1. $y > \frac{3}{2}x - 5$
2. $y < \frac{1}{2}x + 2$
3. $y \geq 2x - 3$
4. $y \leq -3x + 4$
5. $y \geq x - 2$

Chapter Summary:

- A location of a plane, person or object can be represented in a plane by an ordered pair (x,y) called coordinates.
- The distance from the y-axis is called the abscissa or the x-coordinate.
- The distance from the x-axis is called the ordinate or the y-coordinate
- To plot a point is to locate the position of a coordinate in the Cartesian coordinate plane.
- The quadrant of a point is determined by the signs of its coordinates. A point is in

- quadrant 1 if $x > 0$ and $y > 0$.
- quadrant II if $x < 0$ and $y > 0$.
- quadrant III if $x < 0$ and $y < 0$.
- quadrant IV if $x > 0$ and $y < 0$.

- The points on the axes are not in any quadrant.

- A linear equation in two variables is a first-degree equation of the form $ax + by = c$, where a and b are not equal to zero.

- The x-value where the graph crosses the x-axis is called the x-intercept.

- The y-value where the graph crosses the y-axis is called the y-intercept.

- The steepness or inclination of a line is called the slope.

- The trend of the line is increasing if the slope is positive.

- The trend of the line is decreasing if the slope is negative.

- A linear equation $ax + by = c$ can be transformed in the form $y = mx + b$, where m is the slope and b is the y-intercept.

- A linear equation in two variables can be graphed using:

  - the slope and y-intercept.
  - the x- and y-intercept.
  - two points on the line
  - a point and the slope.

- The equation of a line can be solved using:

  - the slope-intercept form, $y = mx + b$.
  - the point-slope form, $m(x - x_1) = (y - y_1)$.
  - the two point form, $\frac{y - y_1}{x - x_1} = \frac{y_2 - y_1}{x_2 - x_1}$.

Chapter Test:

DIRECTIONS: Choose the letter that corresponds to the correct answer.

1. In what quadrant does the point (4, -5) belong?

   a. I
   b. II
   c. III
   d. IV

2. Loida is scheduled for an interview with the principal of the school. To reach the principal's office, the guard instructed her to walk 2 units North and 3 units West. Which ordered pair would represent the location?

a. (3, 2) c. (2, 3)
b. (-3, 2) d. (2, -3)

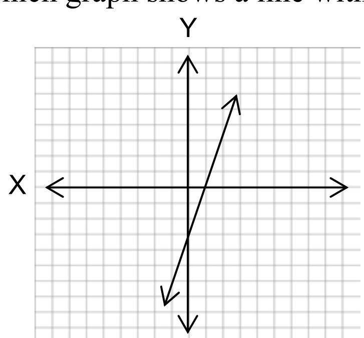
3. Which of the following is a linear equation in two variables?

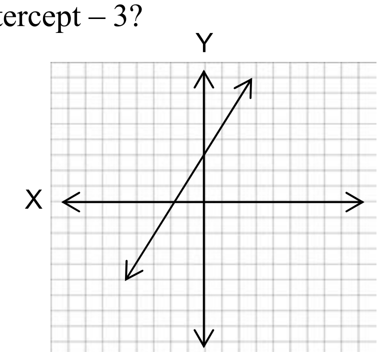
a. $x^2 + y^2 = 4$ c. $x + y = 12$
b. $y = 5$ d. $xy = 9$

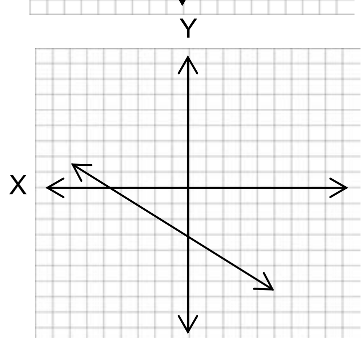
4. What is the slope of the line that passes through the points (1, -1) and (4, 5)?

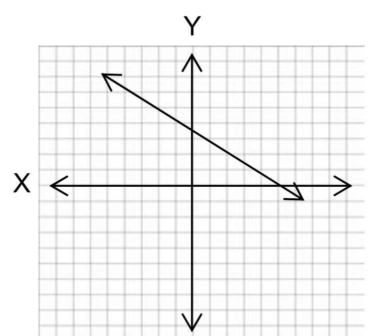
a. -2 c. $\frac{1}{2}$
b. $-\frac{1}{2}$ d. 2

5. Which graph shows a line with slope 2 and y-intercept – 3?

a.


c.


b.


d.


6. What is the equation of the line described in no. 5?

a. 2x – y = 3 c. 2x - y = -3
b. 2x + y = 3 d. 2x + y = -3

7. What is the y-coordinate at which a line crosses the y-axis called?

a. x – intercept c. slope
b. y – intercept d. trend

8. What is the equation of a line that passes through points (-3, -5) and (2, 5)?

a. $2x - y = 1$
b. $2x - y = -1$
c. $2x + y = 1$
d. $2x + y = -1$

9. The graph of $y = 5x + 3$ will pass through which point?

a. (-2, -7)
b. (3, 12)
c. (0, 2)
d. (2, 1)

10. The slope of the line described by the equation $4x + 3y = 7$ is

a. $-\frac{4}{7}$
b. $\frac{4}{7}$
c. $-\frac{4}{3}$
d. $\frac{4}{3}$

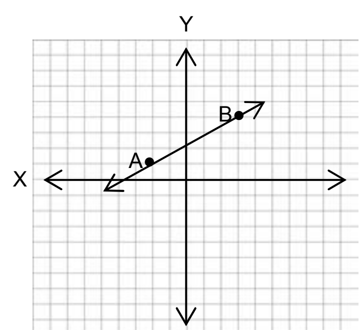
11. What is the y-intercept of the line described in no. 10?

a. $\frac{4}{7}$
b. $\frac{7}{3}$
c. $-\frac{4}{7}$
d. $-\frac{7}{3}$

12. Which is the representation of the equation $3y + 12 = 2x$ in slope-intercept form?

a. $3y = 2x - 12$
b. $3y - 2x = -12$
c. $-2x + 3y + 12 = 0$
d. $y = \frac{2}{3}x - 4$

13. Which is the equation of the line whose graph passes through points A and B?



a. $y = \frac{5}{3}x - \frac{11}{5}$
b. $y = \frac{3}{5}x + \frac{11}{5}$
c. $y = -\frac{3}{5}x + \frac{11}{5}$
d. $y = -\frac{5}{3}x + \frac{11}{5}$

14. Which is the equation of the line with slope –2 and passing through point (-3, 5)?

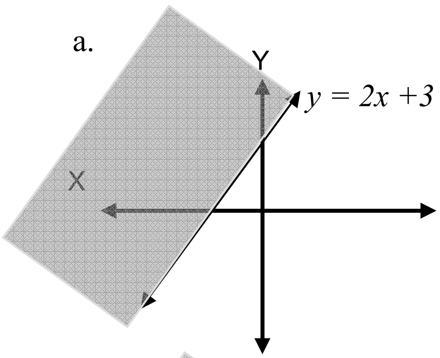
a. $y = 2x - 1$
b. $y = 2x + 1$
c. $y = -2x - 1$
d. $y = \frac{2}{3}x - 4$

15. If the mailing fee (f) is P20.00 flat fee plus P5.00 for each gram (g) or a fraction of a pound, write the equation that relates f to g.

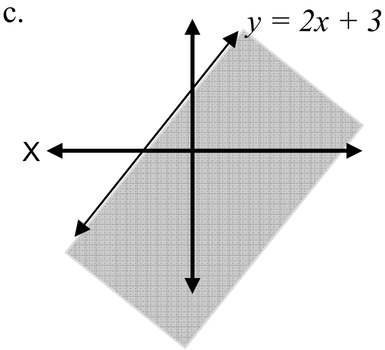
a. $f = 5g - 20$
b. $f = 20g - 5$
c. $f = 5g + 20$
d. $f = 20g + 5$

16. Which graph represents the solution set of $y \leq 2x + 3$?

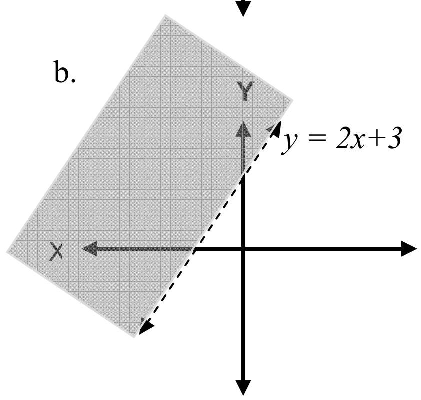
a.



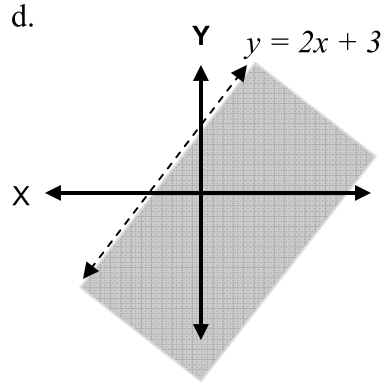
c.



b.



d.

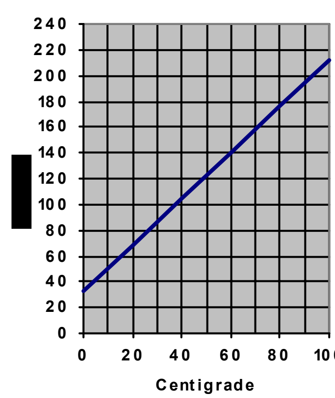


17. Marylis wants to spend less than P10.00 for 5 sheets of paper at x pesos and 10 paper clips at y pesos. Which inequality illustrates the statement?

a. $5x + 10y < 10$
b. $5x + 10y > 10$
c. $5x - 10y < 10$
d. $5x - 10y > 10$

For nos. 18 - 20.

The graph shows the freezing point of water is 0^oC and 32^o F and the boiling point of water is 100^oC and 212^oF.



18. Determine the equation of the line that describes the relationship between ^oC and ^oF. Hint: $F = mC + b$

a. $F = \frac{9}{5}C - 32$
b. $F = \frac{9}{5}C + 32$
c. $F = \frac{5}{9}C - 32$
d. $F = \frac{5}{9}C + 32$

19. What is the slope of the line in no. 18?

a. 32

b. $\frac{9}{5}$

c. $\frac{5}{9}$

d. -32

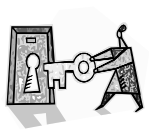
20. The highest surface temperature on the Pacific Ocean is 30^{o}C. How many degrees Fahrenheit is this?

a. 80

b. 82

c. 84

d. 86



Key to Correction:

Activity 1:

A.

Quadrant I
Mountain, cave, hotspring

Quadrant II
waterfalls, volcano

Quadrant III
trees, farm, hut

Quadrant IV
forest, river, treasure

B. Determine the abscissa and the ordinate of the given coordinates

Coordinates	Abscissa	Ordinate
1. (2, -5)	2	-5
2. (6, -4)	6	-4
3. (0, 5)	0	5
4. (-3,0)	-3	0
5. (-6 -3)	-6	-3

C. Give the coordinates, abscissa and ordinate of the following points.

Point	Coordinates	Abscissa	Ordinate
1. P	(1, 3)	1	3
2. L	(-2, -1)	-2	-1
3. A	(4, 2)	4	2
4. N	(-3, 2)	-3	2
5. E	(3, -3)	3	-3

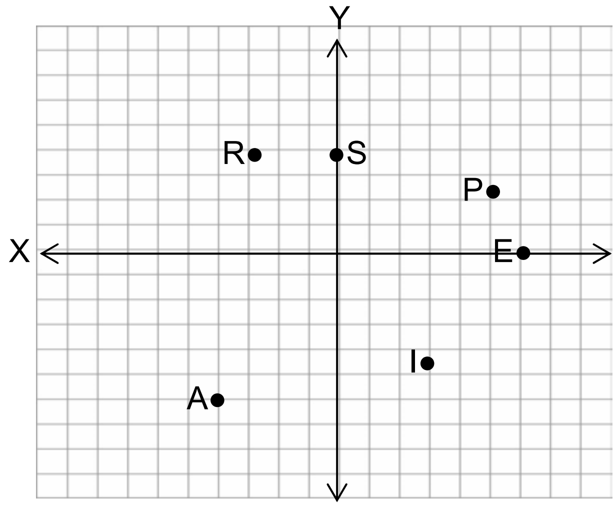
Test 1:

H O N E S T Y

____ ____ ____ ____ ____ ____ ____

Activity 2:

A. On one coordinate plane, plot the points and give the quadrants/axes.



B. Write the letter from the graph that corresponds to each ordered pair to decode the punch line to this knock-knock joke.

Knock-knock. Who's there? **Cantaloupe.** Cantaloupe who?

C A N' T E L O P E

____ ____ ____ ____ ____ ____ ____ ____ ____

(-5,3) (1,-4) (6,2) (3,-1) (3,2) (4,-3) (-4,-2) (4,5) (3,2)

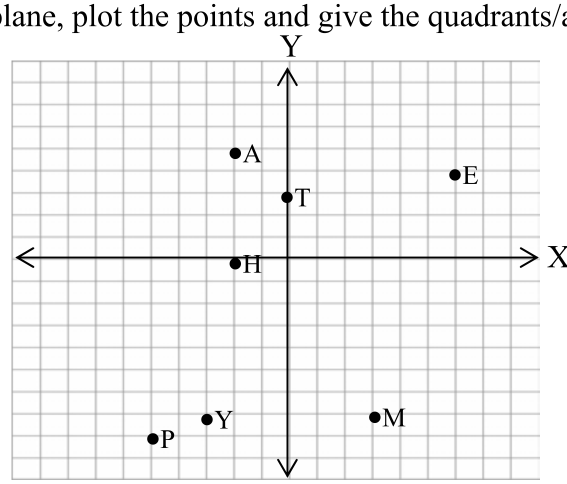
T O N I G H T I ' M B U S Y

___ ___ ___ ___ ___ ___ ___, ___ ___ ___ ___ ___ ___!

(3,-1)(-4,-2)(6,2)(-1,-4)(4,-6)(2,4)(3,-1) (-1,-4)(-6,1) (-2,-3)(1,1)(-4,5)(-5,-5)

Test 2: On one coordinate plane, plot the points and give the quadrants/axes.

1. E(6, 4), Q1
2. M(3, -7), QIV
3. P(-5, -8), QIII
4. A(-2, 5), QII
5. T(0, 3), y-axis
6. H(-2, 0), x-axis
7. Y(0, -7), y-axis



Activity 3:

Transform the linear equations in the form y = mx + b.

1. x + y = 4 　　　 y = -x + 4
2. x – y = 6 　　　 y = x - 6
3. x + 2y = -8 　　　 $y = -\frac{1}{2}x - 4$
4. 3x + 2y = 10 　　　 $y = -\frac{3}{2}x + 5$
5. 4x - 3y = -9 　　　 $y = \frac{4}{3}x + 3$

Test 3:

Transform the linear equations in the form ax + by = c.

1. y = x + 5 　　　 x – y = -5
2. y = -x + 3 　　　 x + y = 3
3. y = 4x – 7 　　　 4x – y = 7
4. y = -2x + 5 　　　 2x + y = 5
5. $y = \frac{3}{2}x - 4$ 　　　 3x – 2y = 8

Activity 4:

Complete the table of values

1. y = 3x

x	0	1	2	3
y	0	3	6	9

4. y = 4x – 1

x	0	1	2	3
y	-1	3	7	11

2. y = 2x

x	-2	-1	0	1	2
y	-4	-2	0	2	4

5. y = -2x + 5

x	-2	-1	0	1	2
y	9	7	5	3	1

3. y = x + 3

x	-3	0	3	6
y	0	3	6	9

6. y = x – 5

x	1	3	5	7
y	-4	-2	0	2

Test 4:

A. Construct a table of values for each equation. Use x = 0, 1, 2, 3.

1. y = 5x

x	0	1	2	3
y	0	5	10	15

2. y = x + 6

x	0	1	2	3
y	6	7	8	9

3. 2x + y = 3

x	0	1	2	3
y	3	1	-1	-3

4. x – 2y = -2

x	0	1	2	3
y	1	$\frac{3}{2}$	2	$\frac{5}{2}$

5. 2x + 3y = 6

x	0	1	2	3
y	2	$\frac{4}{3}$	$\frac{2}{3}$	0

B. Tell whether the given ordered pair is a solution of the given equation.

1. x + y = 8, (5, 3) solution
2. 2x – y = 4, (3, 2) solution
3. 3x + 2y = 7, (-1, 5) solution
4. x + 6y = 4, (10,1) not a solution
5. 5x – 3y = 5, (4, 5) solution

Activity 5:

Find the x and y intercepts of the given equations.

1. x + y = 1 x-intercept = 1 y-intercept = 1
2. y = x – 7 x-intercept = 7 y-intercept = -7
3. 2x + 3y = 9 x-intercept = $\frac{9}{2}$ y-intercept = 3
4. x = 2y + 7 x-intercept = 7 y-intercept = $-\frac{7}{2}$
5. 3x + y = 3 x-intercept = 1 y-intercept = 3

Test 5:

Find the x and y intercepts of the given equations.

1. x = 2y + 7 — x-intercept = 7 — y-intercept = $-\frac{7}{2}$
2. 2x – 3y = 6 — x-intercept = 3 — y-intercept = -2
3. y = 3x – 4 — x-intercept = $\frac{4}{3}$ — y-intercept = -4
4. x + 2y = 3 — x-intercept = 3 — y-intercept = $\frac{3}{2}$
5. x + 8y = 16 — x-intercept = 16 — y-intercept = 2

Activity 6:

Find the slope of the line passing through the given pairs of points.

1. (5, 2) and (7, 3) — $m = \frac{1}{2}$
2. (0, -3) and (2, -1) — m = 1
3. (-5, 1) and (-3, 2) — $m = \frac{1}{2}$
4. (1, 3) and (2, 6) — m = 3
5. (3, 4) and (3, 7) — undefined

Test 6:

Find the slope of the line passing through the given pairs of points.

1. (2, 1) and (0, 3) — m = -1
2. (-7, -3) and (-4, 1) — $m = \frac{4}{3}$
3. (1, 3) and (2, 5) — m = 2
4. (3, 1) and (6, 2) — $m = \frac{1}{3}$
5. (3, 1) and (6, 1) — m = 0

Activity 7:

Find the slope and describe the trend of the line containing the points.

1. (5, -3) and (6, -1) — m = 2 — increasing
2. (2, 1) and (-1, 3) — $m = -\frac{2}{3}$ — decreasing
3. (3, 0) and (8, 2) — $m = \frac{2}{5}$ — increasing
4. (-6, 4) and (-2, 0) — m = -1 — decreasing
5. (5, 7) and (4, -6) — m = 13 — increasing

Test 7:

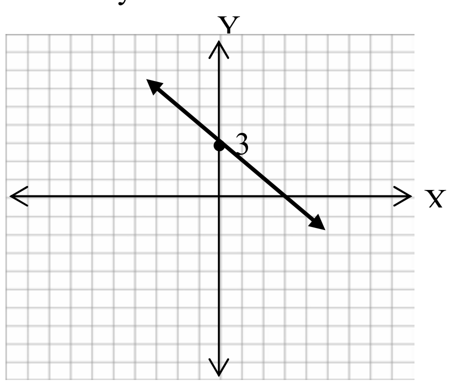
Find the slope and describe the trend of the line containing the points.

1. (0, 2) and (-3, 5) $m = -1$ decreasing
2. (4, 5) and (7, 6) $m = \frac{1}{3}$ increasing
3. (1, -3) and (0, -5) $m = 2$ increasing
4. (-6, -3) and (4, 1) $m = \frac{2}{5}$ increasing
5. (-1, 8) and (1, -1) $m = -\frac{9}{2}$ decreasing

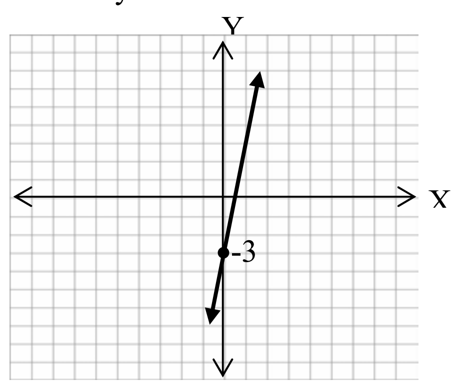
Activity 8:

Graph the following linear equations using the slope and y- intercept.

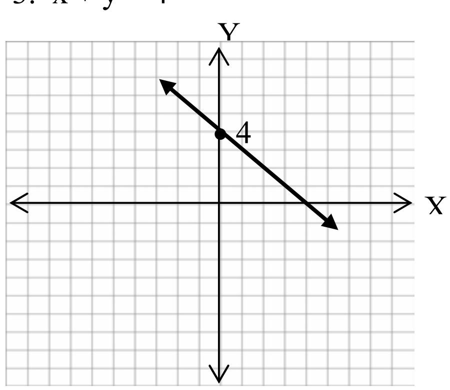
1. x + y = 3



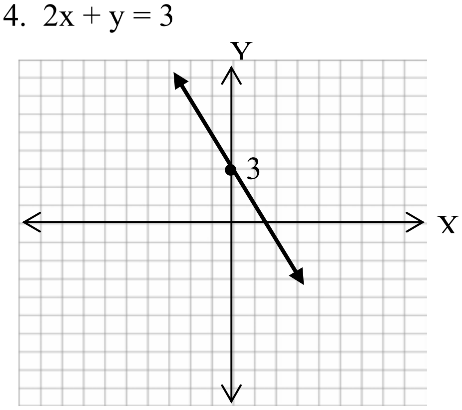
2. 5x – y = 3



3. x + y = 4



4. 2x + y = 3

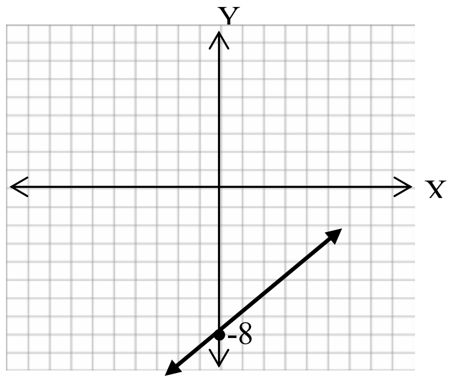


5. -4x + y = - 6 (the checking is left for you)

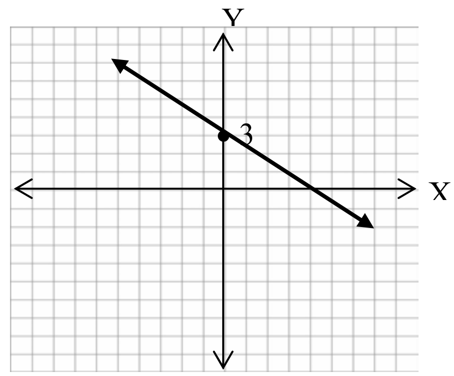
Test 8:

Graph the following linear equations using the slope and y- intercept.

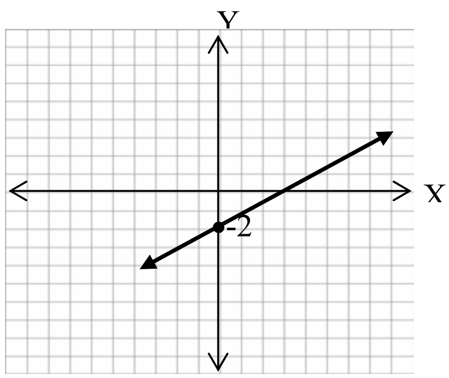
1. x – y = 8



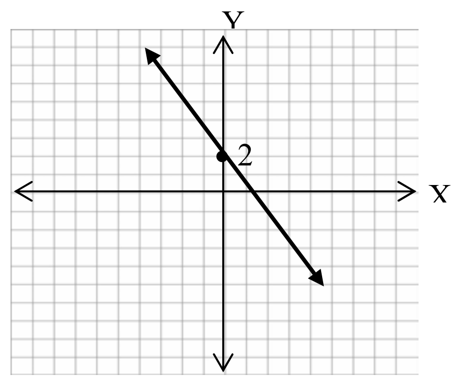
2. 3x + 4y = 12



3. 2x – 3y = 6



4. 3x + 2y = 4

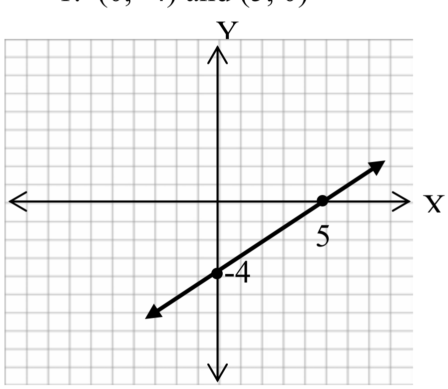


5. x – 2y = -8 (the checking is left for you)

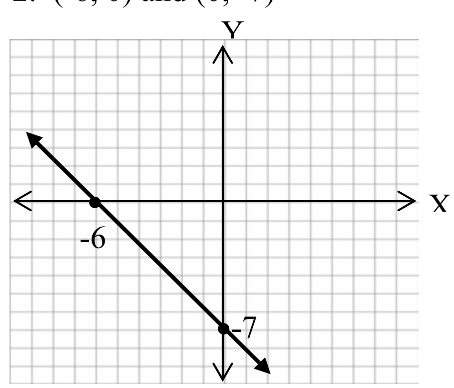
Activity 9:

Graph using the intercepts.

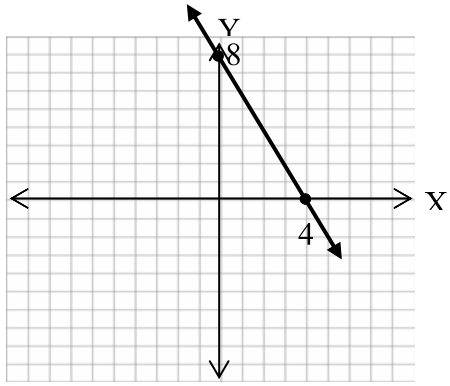
1. (0, -4) and (5, 0)



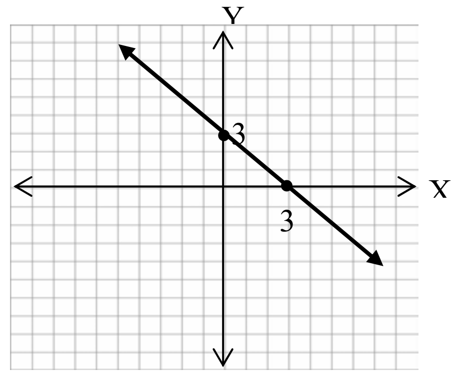
2. (-6, 0) and (0, -7)



3. (0, 8) and (4, 0)



4. (3, 0) and (0, 3)

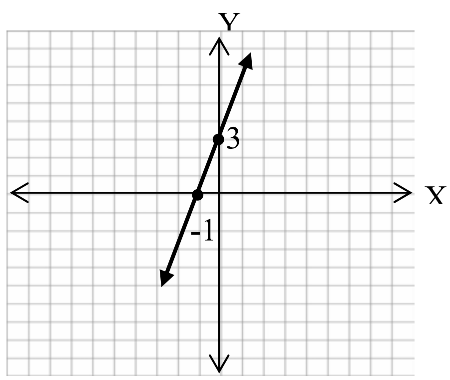


5. (0, -4) and (-3, 0) (the checking is left for you)

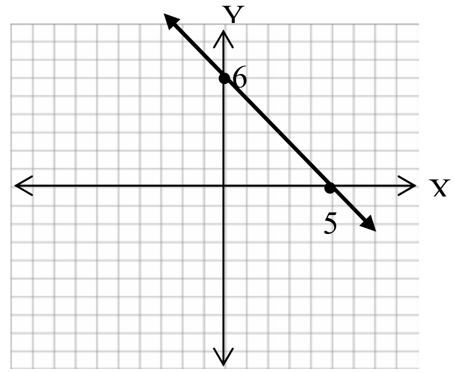
Test 9:

Graph using the intercepts.

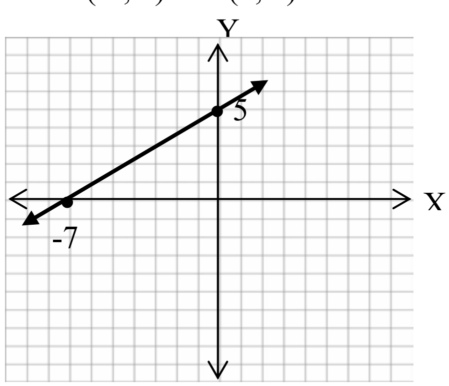
1. (-1, 0) and (0, 3)



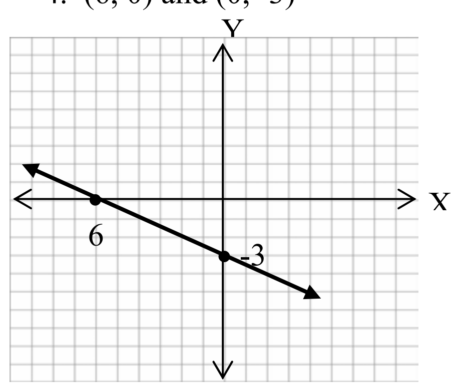
2. (5, 0) and (0, 6)



3. (-7, 0) and (0, 5)



4. (6, 0) and (0, -3)

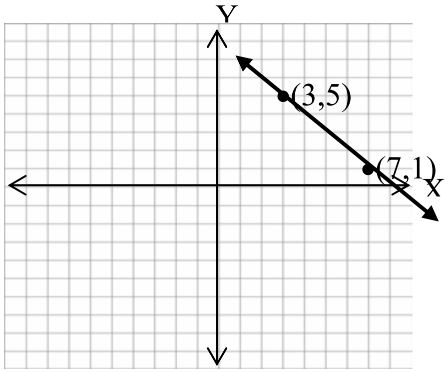


5. (1, 0) and (0, 4) (the checking is left for you)

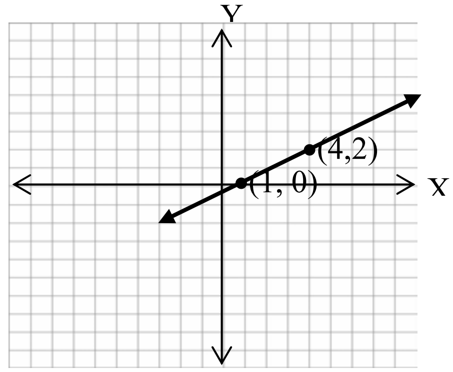
Activity 10:

Graph the line passing through the given points.

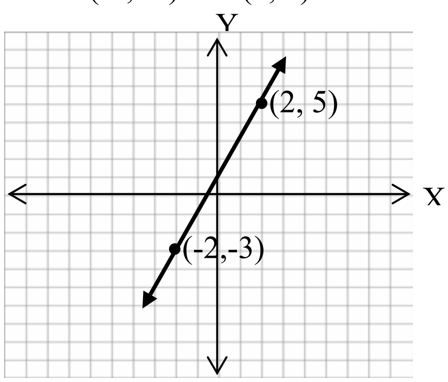
1. (3, 5) and (7, 1)



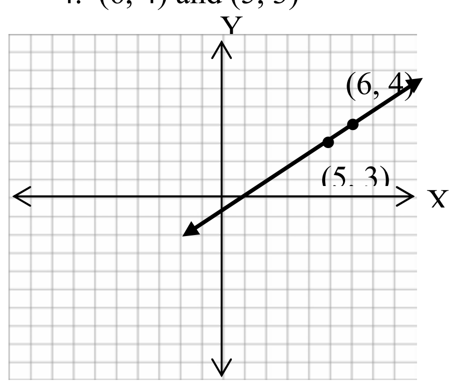
2. (4, 2) and (1, 0)



3. (-2, -3) and (2, 5)



4. (6, 4) and (5, 3)

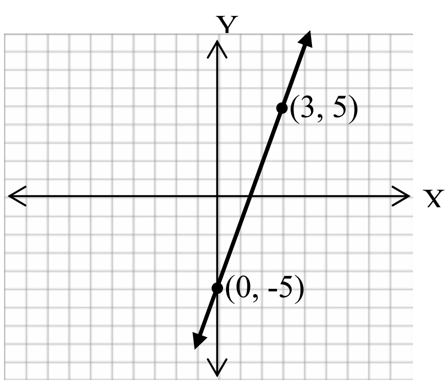


5. (-1, 3) and (4, -6) (the checking is left for you)

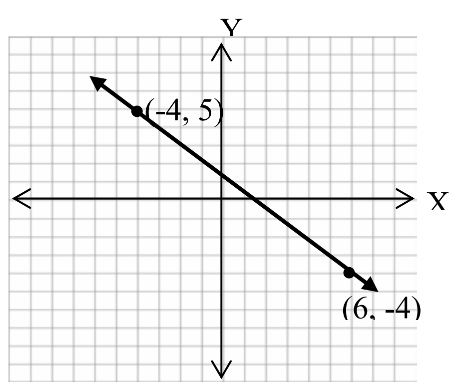
Test 10:

Graph the line passing through the given points.

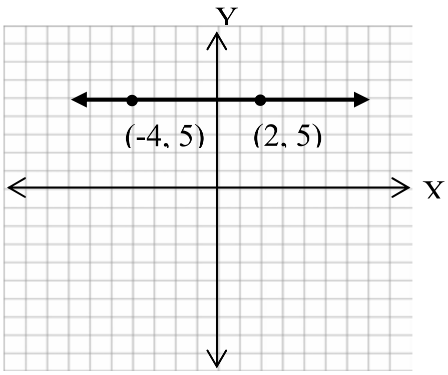
1. (0, -5) and (3, 5)



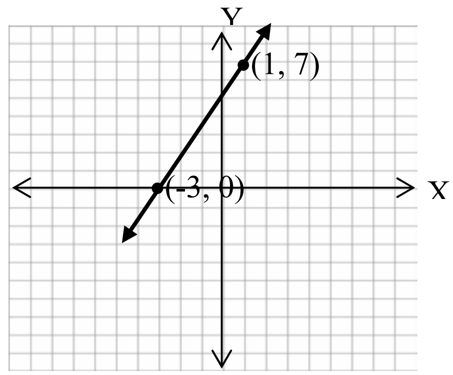
2. (-4, 5) and (6, -4)



3. (6, 0) and (2, 5)



4. (-3, 0) and (1, 7)

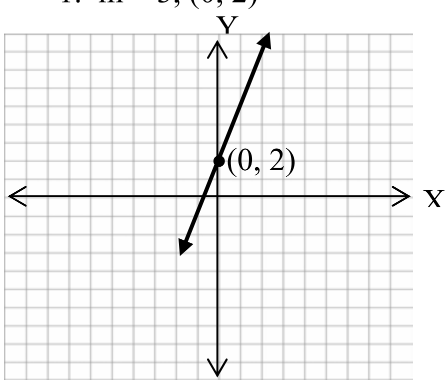


5. (-4, 5), (6, -3) (the checking is left for you)

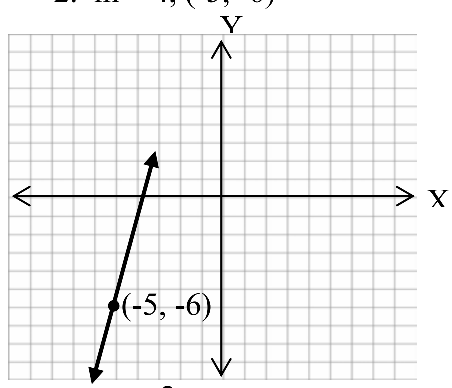
Activity 11:

Graph the line with the given slope and passing through the indicated points.

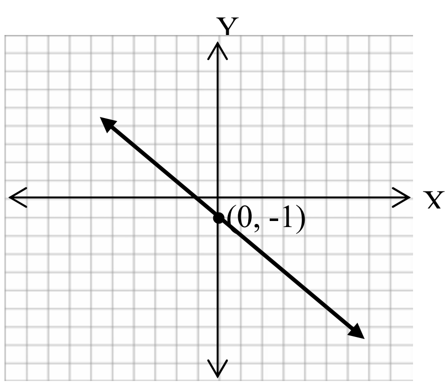
1. m = 3, (0, 2)



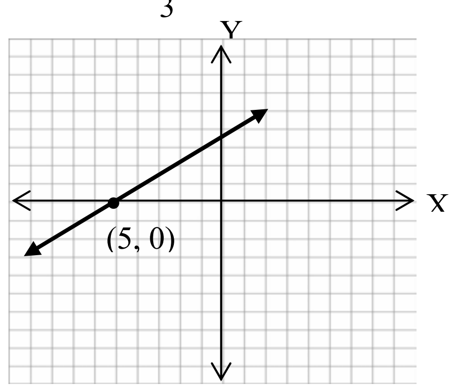
2. m = 4, (-5, -6)



2. m = -1, (0, -1)



3. m = $\frac{2}{3}$, (5, 0)

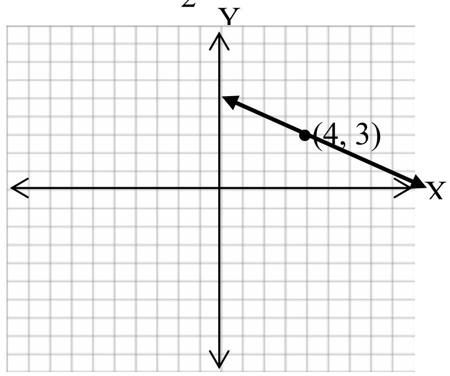


5. m = $\frac{3}{4}$, (1, 3) (the checking is left for you)

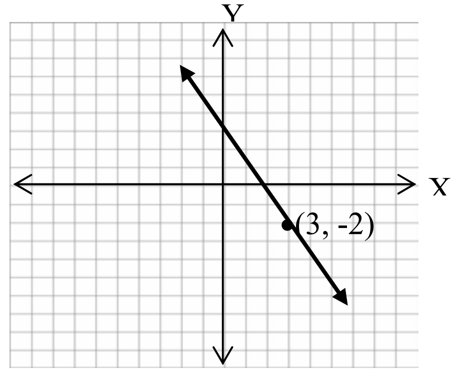
Test 11:

Graph the line with the given slope and passing through the indicated points.

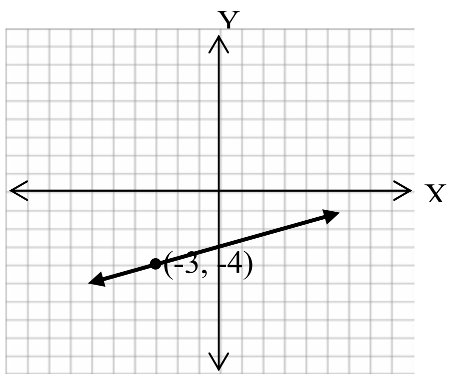
1. $m = -\frac{1}{2}$, (4, 3)



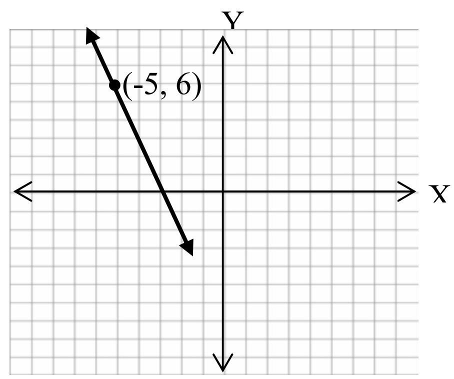
2. m = -2, (3, -2)



3. $m = \frac{1}{3}$, (-3, -4)



4. m = -2, (-5, 6)



5. m = 3, (0, - 4) (checking is left for you)

Activity 12:

Determine the equation of the line described by the given slope and y-intercept.

1. m = 6, y – intercept = -2 — y = 6x - 2
2. $m = \frac{1}{2}$, y – intercept = 3 — $y = \frac{1}{2}x + 3$
3. m = -2, y – intercept = 7 — y = -2x + 7
4. $m = \frac{2}{3}$, y – intercept = 3 — $y = \frac{2}{3}x + 3$
5. m = -1, y – intercept = 8 — y = -x + 8

Test 12:

Determine the equation of the line described by the given slope and y-intercept.

1. $m = -\frac{1}{2}$, y – intercept = 4 $\qquad y = -\frac{1}{2}x + 4$
2. m = 3, y – intercept = -5 $\qquad y = 3x - 5$
3. $m = \frac{2}{3}$, y – intercept = $-\frac{1}{2}$ $\qquad y = \frac{2}{3}x - \frac{1}{2}$
4. $m = \frac{1}{3}$, y – intercept = 5 $\qquad y = \frac{1}{3}x + 5$
5. $m = \frac{3}{4}$, y – intercept = 2 $\qquad y = \frac{3}{4}x + 2$

Activity 13:

Find the equation of a line described by each given slope and point.

1. m = 4, (-5, -6) $\qquad 4x – y = -14$
2. m = -1, (0, -1) $\qquad x + y = -1$
3. $m = \frac{2}{3}$, (5, 0) $\qquad 2x – 3y = 10$
4. $m = \frac{3}{4}$, (1, 3) $\qquad 3x – 4y = -9$
5. m = -2, (3, -2) $\qquad 2x + y = 4$

Test 13:

Find the equation of a line described by each given slope and point.

1. m = 3, (0, 2) $\qquad 3x – y = -2$
2. $m = -\frac{1}{2}$, (4, 3) $\qquad x + 2y = 10$
3. $m = \frac{1}{3}$, (-3, -4) $\qquad x – 3y = 9$
4. m = -2, (-5, 6) $\qquad 2x + y = 16$
5. m = 3, (0, - 4) $\qquad 3x – y = 4$

Activity 14:

Find the equation of a line passing through the given points.

1. (4, 1) (-6, -3) $\qquad 2x – 5y = 3$
2. (0,-5) (1, -3) $\qquad 2x – y = 5$
3. (4, 5) (7, 6) $\qquad x – 3y = -11$

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

Test 14:

Find the equation of a line passing through the given points.

1. (5, -3) (6, -1) $2x – y = 13$
2. (0, 2) (3, 5) $x – y = -2$
3. (-3, 0) (8, 2) $2x – 11y = -6$
4. (1, -3) (0, -5) $2x – y = 5$
5. (5, 7) (4, -6) $13X – y = 58$

Activity 15:

Solve the following problems:

1.
   - The charge for 5 hours is P600.
   - The equation is $y = 50x + 350$.

2. SEJ Company gives a 10% increase in salary to its employees. That is $y = 0.1x$, where y is the increase in peso and x is the salary. Write three ordered pairs for the relation. Let x = P10,000, P12,000 and P14,000. What is the increase for a salary of P20,000?

   - (10000, 1000), (12000, 1200), (14000, 1400)
   - (20,000, 2000)

3.
   a. What is the temperature in ^{o}F of a 30^{o}C reading.
   - 86 ^{o}F

   b. The temperature in ^{o}C of an 86^{o}F reading
   - 30 ^{o}C

Test 15:

1. Joseph will spend for a 6 hour repair job P3,400.

2.
   a. The equation describing the relation between the number of value meals (x) and the corresponding cost (y).
   - $y = 53X$

   b. The customer's bill for 10 value meals.
   - Y = P530

3. The equation describing the relation between the number of hours (x) playing the computer game and the cost (y).

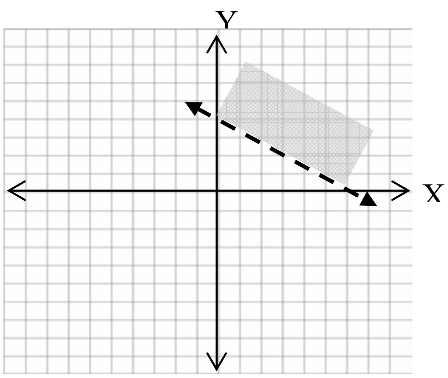
- Y = 15x
- The table of values

x	1	2	3	4	5	6
y	15	30	45	60	75	90

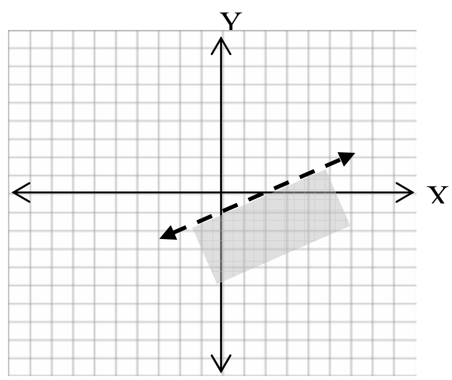
Activity 16:

Graph the following inequalities:

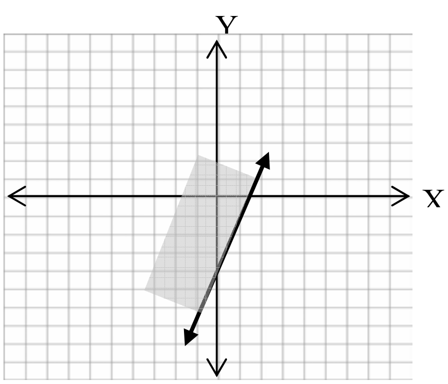
1. $y > -\frac{2}{3}x + 4$



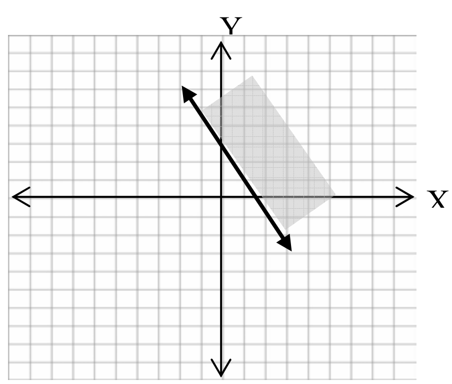
2. $y < \frac{1}{2}x - 1$



3. $y \geq 3x - 4$



4. $y \leq -2x + 3$

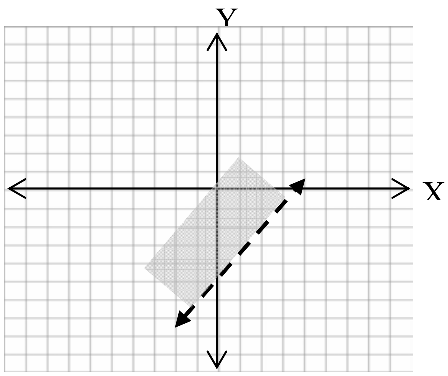


5. $y \geq -3x + 4$ (checking is left for you)

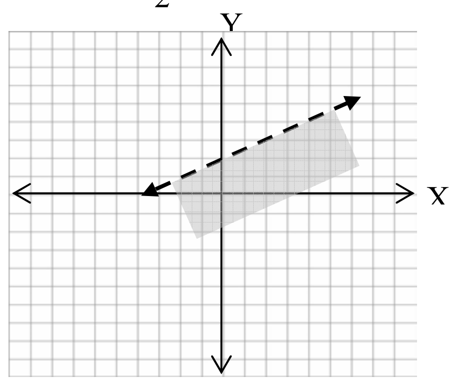
Test 16:

Graph the following inequalities:

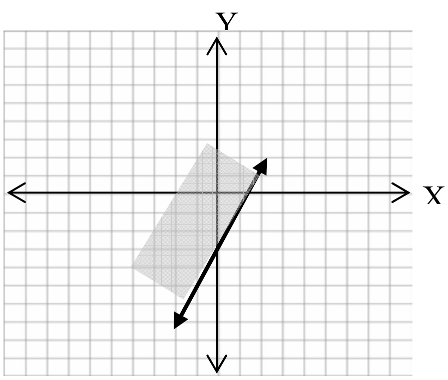
1. $y > \frac{3}{2}x - 5$



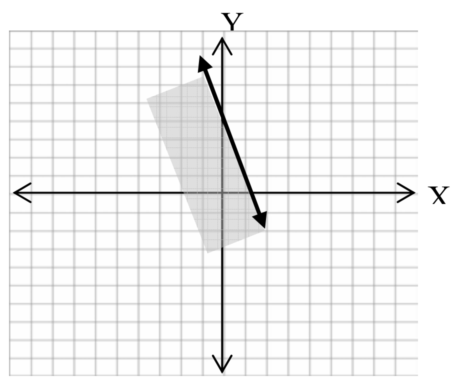
2. $y < \frac{1}{2}x + 2$



3. $y \geq 2x - 3$



4. $y \leq -3x + 4$



5. $y \geq x - 2$ (checking is left for you)

Chapter Test:

1. d
2. b
3. c
4. d
5. a
6. a
7. b
8. b
9. a
10. c
11. b
12. d
13. b
14. c
15. c
16. c
17. a
18. b
19. b
20. d

Common Errors / Misconceptions in Unit VI

1. In plotting of points:

    a. students usually interchanges points belonging to quadrants 2 and 4.
    b. students usually interchanges points lying in the x or y axis.

2. The x and y intercepts are often mistaken as points.

3. Students miss the proper operation to be performed.
    e.g. In finding the slope of the line passing through points (3, 4) and (-2, -3). The x- and y- values are substituted in the formula m = $\frac{y - y_1}{x - x_1}$.

    What students' usually do: $\frac{4-3}{3-2}$ instead of $\frac{4-(-3)}{3-(-2)}$.