VideoText *Interactive*

HomeSchool and Independent Study Sampler

Print Materials
for
"Algebra: A Complete Course"

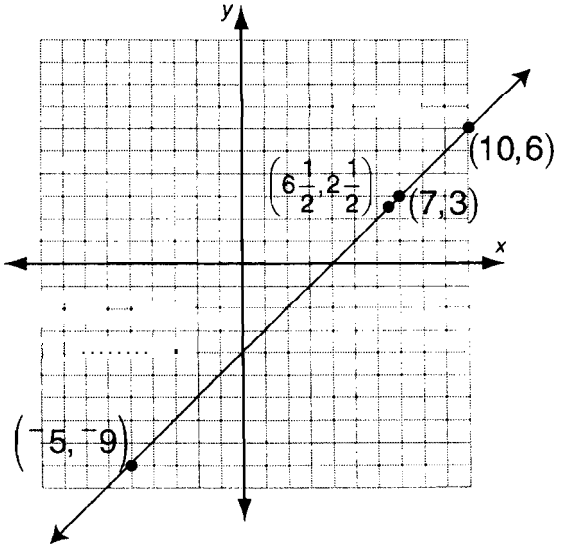
Unit III, Part A, Lesson 1 –
"Solution Sets for Equations"

Course Notes (1 page)
Student WorkText (6 pages)
Solutions Manual (2 pages)
Quizzes – Forms A and B (4 pages)
Quiz Solutions (4 pages)

x	$-$	y	$=$	4	
(7)	$-$	(3)	$=$	4	$(7,3)$
(10)	$-$	(6)	$=$	4	$(10,6)$
$(^{-}5)$	$-$	$(^{-}9)$	$=$	4	$(^{-}5,^{-}9)$
$\left(6\frac{1}{2}\right)$	$-$	$\left(2\frac{1}{2}\right)$	$=$	4	$\left(6\frac{1}{2},2\frac{1}{2}\right)$

WAYS TO SHOW SETS

1. Roster – actual list of elements
2. Rule – word description of elements
3. Graph – picture of elements



Unit III – First Degree Relations with Two Placeholders

Part A – Solution Set for One Open Sentence

LESSON 1 Solution Sets for Equations

Objective: To be able to find the solution set for a first degree equation with two placeholders and show that solution set on a graph.

Important Terms:

Ordered Pair – a term used to describe a solution of any relation with two placeholders. It consists of two values, listed in a particular order, and generally grouped by using parentheses.

Linear Equation – a first degree equation whose graphed solutions all lie on a single line in the plane.

Example 1: For the following equation, determine whether the given ordered pairs are solutions.

$$3x + 2y = 6$$

a. (0, 0) **b.** (0, 3) **c.** (2, 3) **d.** (3, 0) **e.** (2, 0)

Solution: In each case, we will substitute the values from the ordered pair in the equation, remembering that the value for x will be the first number in the pair, and the value for y will be the second number in the pair.

a. For (0, 0) we have
$$\begin{aligned} 3(0) + 2(0) &= 6 \\ 0 + 0 &= 6 \\ 0 &= 6 \end{aligned}$$
This is a false statement, so this ordered pair is **not** a solution.

b. For (0, 3) we have
$$\begin{aligned} 3(0) + 2(3) &= 6 \\ 0 + 6 &= 6 \\ 6 &= 6 \end{aligned}$$
This is a true statement, so this ordered pair is a solution.

Example 1 cont'd:

c. For (2, 3) we have
$$3(2)+2(3)=6$$
$$6+6=6$$
$$12=6$$
This is a false statement, so this ordered pair is **not** a solution.

d. For (3, 0) we have
$$3(3)+2(0)=6$$
$$9+0=6$$
$$9=6$$
This is a false statement, so this ordered pair is **not** a solution.

e. For (2, 0) we have
$$3(2)+2(0)=6$$
$$6+0=6$$
$$6=6$$
This is a true statement, so this ordered pair is a solution.

Example 2: For the following equation, complete each of the ordered pairs so they will be solutions.

$$2x + 5y = 0$$

a. (0, ___) **b.** (5, ___) **c.** (___, −4) **d.** (___, 2)

Solution: In each case, we will substitute the given value into the equation and solve for the value of the remaining placeholder.

a. For (0, ___) we know x is 0.
Substituting, we get
$$2(0)+5y=0$$
$$0+5y=0$$
Now we solve for y.
$$5y=0$$
Mult. $\frac{1}{5}$
$$\frac{1}{5}(5y)=\frac{1}{5}(0)$$
$$\frac{5}{5}y=\frac{0}{5}$$
$$1y=0$$
The complete solution is (0, 0).

Example 2 cont'd:

b. For (5, ___) we know x is 5.
Substituting, we get

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

Now we solve for *y*.

$$10 + 5y = 0$$

Add –10

$$10 + 5y + (^{-}10) = 0 + (^{-}10)$$
$$5y + 0 = {}^{-}10$$
$$5y = {}^{-}10$$

Mult. $\frac{1}{5}$

$$\frac{1}{5}(5y) = \frac{1}{5}(^{-}10)$$
$$\frac{5}{5}y = \frac{^{-}10}{5}$$
$$1y = -2$$

The complete solution is (5, –2).

c. For (___, –4) we know y is –4.
Substituting, we get

$$2x + 5(^{-}4) = 0$$
$$2x - 20 = 0$$

Now we solve for x. **Add 20**

$$2x - 20 + 20 = 0 + 20$$
$$2x + 0 = 20$$
$$2x = 20$$

Mult. $\frac{1}{2}$

$$\frac{1}{2}(2x) = \frac{1}{2}(20)$$
$$\frac{2}{2}x = \frac{20}{2}$$
$$1x = 10$$

The complete solution is (10, –4).

d. For (___, 2) we know y is 2.
Substituting, we get

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

Nowwesolveforx. **Add –10**

$$2x + 20 + (^{-}10) = 0 + (^{-}10)$$
$$2x + 0 = -10$$
$$2x = -10$$

Mult. $\frac{1}{2}$

$$\frac{1}{2}(2x) = \frac{1}{2}(^{-}10)$$
$$\frac{2}{2}x = \frac{-10}{2}$$
$$1x = -5$$

The complete solution is (–5, 2).

Example 3: For the following equation, complete each of the ordered pairs so they will be solutions. Then graph those solutions using the two given number lines showing the linear quality of those solutions.

$$6x = 24 + 4y$$

a. (0, ___) **b.** (___, $^-3$) **c.** (6, ___) **d.** (___, 0)

Solution: We will first complete all of the ordered pairs by substituting the known value into the equation and solving for the remaining placeholder.

a. For (0, ___), we know x is 0.
Substituting, we get

$$6(0) = 24 + 4y$$
$$0 = 24 + 4y$$

Now we solve for y. **Add –24**

$$0 + \left(^-24\right) = 24 + 4y + \left(^-24\right)$$
$$^-24 = 0 + 4y$$
$$^-24 = 4y$$

Mult. $\frac{1}{4}$

$$\frac{1}{4}(^-24) = \frac{1}{4}(4y)$$
$$\frac{^-24}{4} = \frac{4}{4}y$$
$$-6 = 1y$$

The complete solution is (0, –6)

b. For (___, $^-3$), we know y is –3.
Substituting, we get

$$6x = 24 + 4(^-3)$$
$$6x = 24 + ^-12$$

Now we solve for x.

C.L.T.

$$6x = 12$$

Mult. $\frac{1}{6}$

$$\frac{1}{6}(6x) = \frac{1}{6}(12)$$
$$\frac{6}{6}x = \frac{12}{6}$$
$$1x = 2$$

The complete solution is (2, –3)

Example 3 cont'd:

c. For (6, ___) we know x is 6. Substituting, we get

$$6(6) = 24 + 4y$$

Now we solve for y. **Add –24**

$$36 = 24 + 4y$$
$$36 + (^-24) = 24 + 4y + (^-24)$$
$$12 = 0 + 4y$$
$$12 = 4y$$

Mult. $\frac{1}{4}$

$$\frac{1}{4}(12) = \frac{1}{4}(4y)$$
$$\frac{12}{4} = \frac{4}{4}y$$
$$3 = 1y$$

The complete solution is (6, 3)

d. For (___, 0), we know y is 0. Substituting, we get

$$6x = 24 + 4(0)$$
$$6x = 24$$

Now we solve for *x*. **Mult. $\frac{1}{6}$**

$$\frac{1}{6}(6x) = \frac{1}{6}(24)$$
$$\frac{6}{6}x = \frac{24}{6}$$
$$1x = 4$$

The complete solution is (4, 0)

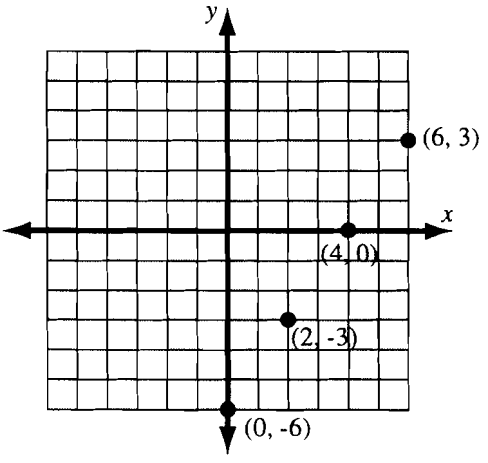
Now we show each solution on a graph using two number lines.

a. (0, –6) will be 0 units to the right and 6 units down.

b. (2, –3) will be 2 units to the right and 3 units down.

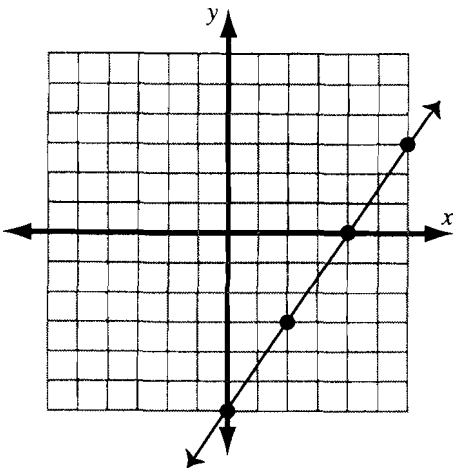
c. (6, 3) will be 6 units to the right and 3 units up.

d. (4, 0) will be 4 units to the right and 0 units down.



Example 3 cont'd:

The single line through these points is immediate.



Lesson 1 – Exercises:

For the following equation determine whether the given ordered pairs are solutions.

$$4x - 3y = 12$$

1. (0, 0) **2.** (3, 0) **3.** (0, 4)

4. (6, 4) 5. (0, –4) ***6.*** (–3, –8)

For the following, complete each of the ordered pairs so they will be solutions.

$$3x + y = 3$$

7. (0, ___) **8.** (___, 6) **9.** (3, ___)

10. (4, ___) **11.** (___, 0) **12.** (___, -3)

For the following equation, complete each of the ordered pairs so they will be solutions. Then graph those solutions using a number line, showing their linear quality.

$$2x - 3y = 6$$

13. (9, ___) **14.** (___, 2) **15.** (0, ___)

16. (-6, ___) **17.** (-3, ___) **18.** (___, 0)

Unit III – First Degree Relations With Two Placeholders

Part A – Solution Set For One Open Sentence

p. *146* **Lesson 1 – Solution Sets For Equations**

1. $4(0)-3(0)=12$
$0-0=12$
$0=12$
False.
Not a solution.

2. $4(3)-3(0)=12$
$12-0=12$
$12=12$
True.
Is a solurion.

3. $4(0)-3(4)=12$
$0-12=12$
$^{-}12=12$
False.
Nor a solution.

4. $4(6)-3(4)=12$
$24-12=12$
$12=12$
True.
Is a solution.

5. $4(0)-3(^{-}4)=12$
$0+12=12$
$12=12$
True.
Is a solution.

6. $4(^{-}3)-3(^{-}8)=12$
$^{-}12+24=12$
$12=12$
True.
Is a solution.

7. $3(0)+y=3$
$0+y=3$
$y=3$
$(0,3)$

8. $3x+6=3$
$3x+6+^{-}6=3+^{-}6$
$3x+0=^{-}3$
$3x=^{-}3$
$(\frac{1}{3})(3x)=(\frac{1}{3})(^{-}3)$
$(\frac{3}{3})x=\frac{-3}{3}$
$1x=^{-}1$
$x=-1$
$(^{-}1,6)$

9. $3(3)+y=3$
$9+y=3$
$9+y+^{-}9=3+^{-}9$
$0+y=^{-}6$
$y=^{-}6$
$(3,^{-}6)$

10. $3(4)+y=3$
$12+y=3$
$12+y+^{-}12=3+^{-}12$
$0+y=^{-}9$
$y=^{-}9$
$(4,^{-}9)$

11. $3x+0=3$
$3x=3$
$(\frac{1}{3})(3x)=(\frac{1}{3})(3)$
$(\frac{3}{3})x=\frac{3}{3}$
$1\cdot x=1$
$x=1$
$(1,0)$

12. $3x+^{-}3=3$
$3x+^{-}3+3=3+3$
$3x+0=6$
$3x=6$
$(\frac{1}{3})(3x)=(\frac{1}{3})(6)$
$(\frac{3}{3})x=\frac{6}{3}$
$1\cdot x=2$
$x=2$
$(2,^{-}3)$

13. $2(9)-3y=6$
$18-3y=6$
$18-3y+^{-}18=6+^{-}18$
$0-3y=^{-}12$
$^{-}3y=^{-}12$
$(\frac{-1}{-3})(^{-}3y)=(\frac{-1}{-3})(^{-}12)$
$(\frac{-3}{-3})y=\frac{-12}{-3}$
$1\cdot y=4$
$y=4$

14. $2x-3(2)=6$
$2x-6=6$
$2x-6+6=6+6$
$2x+0=12$
$2x=12$
$(\frac{1}{2})(2x)=(\frac{1}{2})(12)$
$(\frac{2}{2})x=\frac{12}{2}$
$1\cdot x=6$
$x=6$
$(6,2)$

15. $2(0)-3y=6$
$0-3y=6$
$^{-}3y=6$
$(\frac{-1}{-3})(^{-}3y)=(\frac{-1}{-3})(6)$
$(\frac{-3}{-3})y=\frac{-6}{-3}$
$1\cdot y=^{-}2$
$y=^{-}2$
$(0,^{-}2)$

$$2(-6)-3(y)=6$$
$$-12-3y=6$$
$$-12-3y+12=6+12$$
$$0-3y=18$$
$$-3y=18$$
$$\left(\frac{1}{-3}\right)(-3y)=\left(\frac{1}{-3}\right)(18)$$
$$\left(\frac{-3}{-3}\right)y=\frac{18}{-3}$$
$$1\cdot y=-6$$
$$y=-6$$

$$(-6,-6)$$

17. $2(-3)-3y=6$

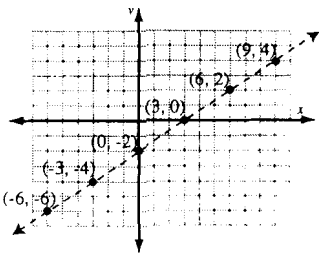
$$-6-3y=6$$
$$-6-3y+6=6+6$$
$$0-3y=12$$
$$-3y=12$$
$$\left(\frac{1}{-3}\right)(-3y)=\left(\frac{1}{-3}\right)(12)$$
$$\left(\frac{-3}{-3}\right)y=\frac{-12}{-3}$$
$$1\cdot y=-4$$
$$y=-4$$

$$(-3,-4)$$

18. $2x-3(0)=6$

$$2x-0=6$$
$$2x=6$$
$$\left(\frac{1}{2}\right)(2x)=\left(\frac{1}{2}\right)(6)$$
$$\left(\frac{2}{2}\right)x=\frac{6}{2}$$
$$1\cdot x=3$$
$$x=3$$

$$(3,0)$$



Quiz Form A

Name _____

Class _____ **Date** _____ **Score** _____

Unit III – First Degree Relations with Two Placeholders
Part A – Solution Set For One Open Sentence

Lesson 1 – Solution Sets For Equations
Lesson 2 – Solution Sets For Inequalities
Lesson 3 – Graphing Terminology

Give the coordinates of each point.

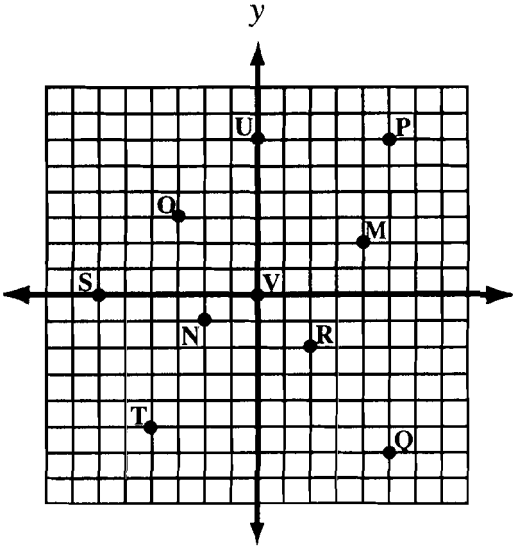
1. M _____ **2.** R _____

3. N _____ **4.** S _____

5. O _____ **6.** T _____

7. P _____ **8.** U _____

9. Q _____ **10.** V _____



List the points on the graph above which are in each of the following quadrants.

11. Quadrant I

12. Quadrant II

13. Quadrant III

14. Quadrant IV

15. Complete the following statements:

In the graph above, point N has an abscissa of _____ and an ordinate of _____

Point _____ is the origin.

Name _____

Unit III, Part A, Lessons 1, 2 and 3, Quiz Form A
– Continued –

Determine whether the given ordered pair is a solution of the given equation or inequality.

16. $(11,2)$ $2x - 7y = 8$

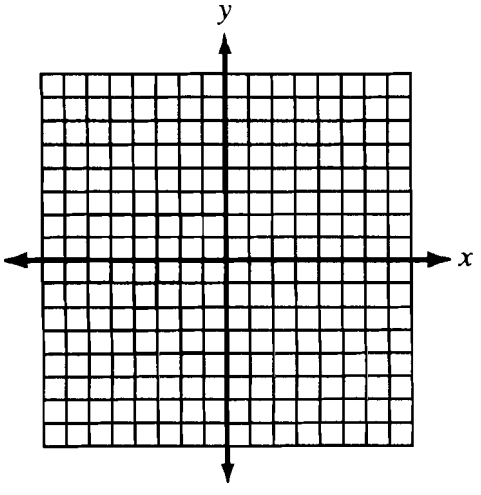
17. $(3,^{-}2)$ $2y - 8x \leq 8$

18. $(1,4)$ $3m - n = 1$

19. $(5,^{-}9)$ $6x + 2y \geq 3 - y$

20. X, Y, and Z are three vertices of a rectangle as given below. Find the coordinates of V, the fourth vertex.

$X = (^{-}1,2)$ $Y = (4,2)$ $Z = (4,4)$ V = _____



Quiz Form B

Name _____

Class _____ **Date** _____ **Score** _____

Unit III – First Degree Relations with Two Placeholders
Part A – Solution Set For One Open Sentence

Lesson 1 – Solution Sets For Equations
Lesson 2 – Solution Sets For Inequalities
Lesson 3 – Graphing Terminology

Give the coordinates of each point.

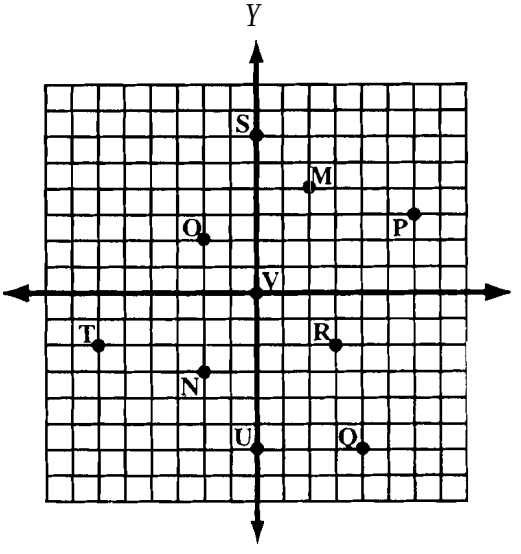
1. M _____ **2.** R _____

3. N _____ **4.** S _____

5. O _____ **6.** T _____

7. P _____ **8.** U _____

9. Q _____ **10.** V _____



List the points on the graph above which are in each of the following quadrants.

11. Quadrant I

12. Quadrant II

13. Quadrant III

14. Quadrant IV

15. Complete the following statements:

In the graph above, point N has an abscissa of _____ and an ordinate of _____

Point _____ is the origin.

Name _____

Unit III, Part A, Lessons 1, 2 and 3, Quiz Form B
– Continued –

Determine whether the given ordered pair is a solution of the given equation or inequality.

16. $(\bar{}3,6)$ $y-2x=12$

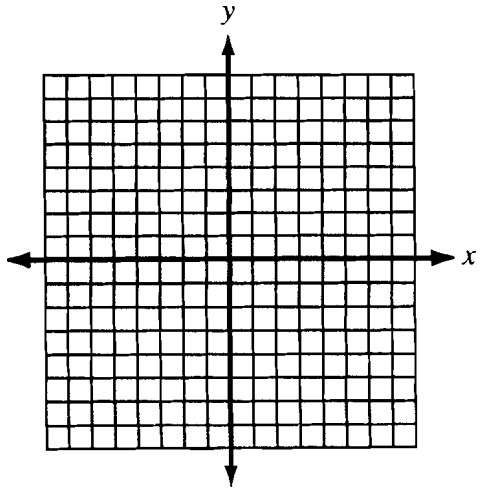
17. $(\bar{}1,1)$ $3y+9x\geq 6$

is. $(\bar{}1,\bar{}4)$ $y=3x+1$

19. $(7,5)$ $y\leq 3x-1$

20. X, Y, and Z are three vertices of a rectangle as given below. Find the coordinates of V. the fourth vertex.

$X=(3,\bar{}1)$ $Y=(7,\bar{}1)$ $Z=(7,3)$ V = _____



Quiz Form A

Name _____

Class _____ **Date** _____ **Score** _____

Unit III – First Degree Relations with Two Placeholders
Part A – Solution Set For One Open Sentence
Lesson 1 – Solution Sets For Equations
Lesson 2 – Solution Sets For Inequalities
Lesson 3 – Graphing Terminology

Give the coordinates of each point.

1. M (4,2)

2. R (2,-2)

3. N (-2,-1)

4. S (-6,0)

5. O (-3,3)

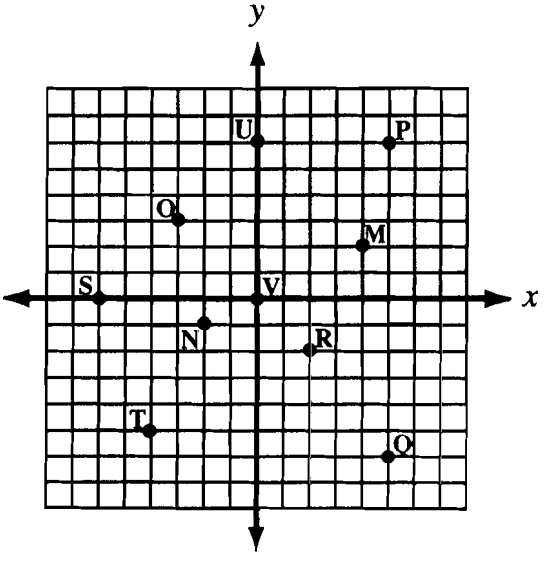
6. T (-4,-5)

7. P (5,6)

8. U (0,6)

9. Q (5,-6)

10. V (0,0)



List the points on the graph above which are in each of the following quadrants.

11. Quadrant I

M, P

12. Quadrant II

O

13. Quadrant III

N, +-

14. Quadrant IV

R, Q

15. Complete the following statements:

In the graph above, point N has an abscissa of -2 and an ordinate of -1.

Point V is the origin.

Name _____

Unit III, Part A, Lessons 1, 2 and 3, Quiz Form A
- Continued -

Determine whether the given ordered pair is a solution of the given equation or inequality.

16. $(11,2)$ $\quad 2x-7y=8$

$2(11)-7(2)=8$
$22-14=8$
$8=8$
True!
So (11,2) is a solution.

17. $(3,^-2)$ $\quad 2y-8x\le 8$

$2(^-2)-8(3)\le 8$
$-4-24\le 8$
$-28\le 8$
True!
So (3,-2) is a solution.

18. $(1,4)$ $\quad 3m-n=1$

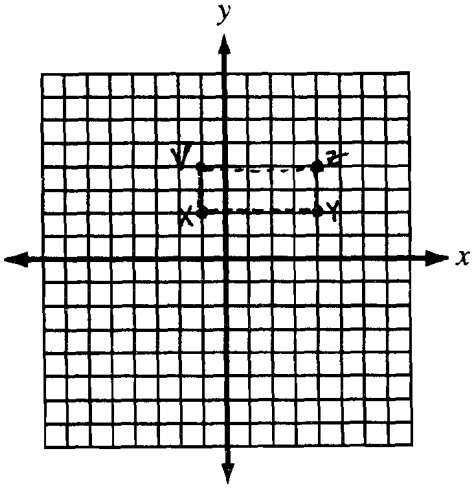
$3(1)-4=1$
$3-4=1$
$-1=1$
False!
So (1,4) is not a solution.

19. $(5,^-9)$ $\quad 6x+2y\ge 3-y$

$6(5)+2(^-9)\ge 3-(^-9)$
$30+^-18\ge 12$
$12\ge 12$
True!
So (5,-9) is a solution.

20. X, Y, and Z are three vertices of a rectangle as given below. Find the coordinates of V, the fourth vertex.

X = $(^-1,2)$ Y = $(4,2)$ Z = $(4,4)$ V = $(-1,4)$



Plot each point, X, Y, and Z.
Draw rectangle.
Notice where V must be.
The coordinates of V must be (-1,4) to complete the rectangle.

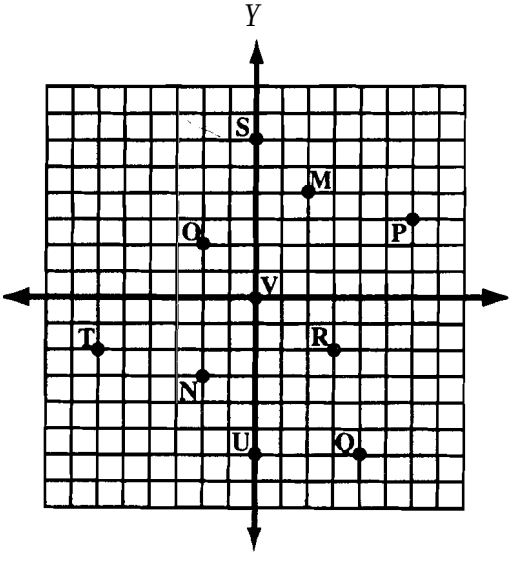
Quiz Form B

Name _____

Class _____ **Date** _____ **Score** _____

Unit III – First Degree Relations with Two Placeholders
Part A – Solution Set For One Open Sentence
Lesson 1 – Solution Sets For Equations
Lesson 2 – Solution Sets For Inequalities
Lesson 3 – Graphing Terminology

Give the coordinates of each point.



1. M (2,4)

2. R (3,-2)

3. N (-2,-3)

4. S (0,6)

5. O (-2,2)

6. T (-6,-2)

7. P (6,3)

8. U (0,-6)

9. Q (4,-6)

10. V (0,0)

List the points on the graph above which are in each of the following quadrants.

11. Quadrant I

M, P

12. Quadrant II

O

13. Quadrant III

N, T

14. Quadrant IV

R, Q

15. Complete the following statements:

In the graph above, point N has an abscissa of -2 and an ordinate of -3

Point V is the origin.

Name _____

Unit III, Bart A, Lessons 1, 2 and 3, Quiz Form B
– Continued –

Determine whether the given ordered pair is a solution of the given equation or inequality.

16. $(-3,6)$ $\quad y-2x=12$

$6-2(-3)=12$
$6+6=12$
$12=12$
True!
So $(-3,6)$ is a solution.

17. $(-1,1)$ $\quad 3y+9x\geq 6$

$3(1)+9(-1)\geq 6$
$3+-9\geq 6$
$-6\geq 6$
False!
So $(-1,1)$ is not a solution

18. $(-1,-4)$ $\quad y=3x+1$

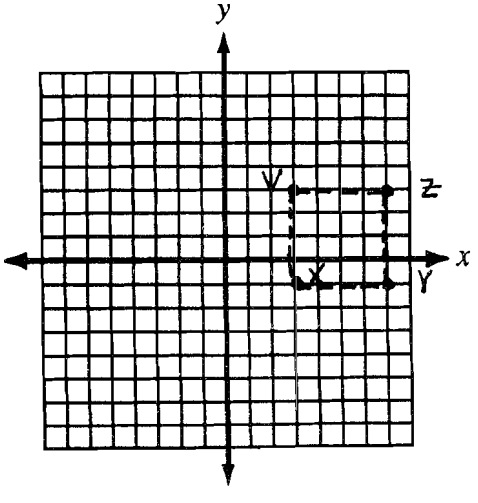
$-3=3(-1)+1$
$-3=-3+1$
$-4=-2$
False!
So $(-1,-4)$ is not a solution

19. $(7,5)$ $\quad y\leq 3x-1$

$5\leq 3(7)-1$
$5\leq 21-1$
$5\leq 20$
True!
So $(7,5)$ is a solution.

20. X, Y, and Z are three vertices of a rectangle as given below. Find the coordinates of V, the fourth vertex.

$X=(3,-1)$ $\quad Y=(7,-1)$ $\quad Z=(7,3)$ $\quad V=$ $(3,3)$



Plot each point, X, Y, and Z.
Draw rectangle.
Notice where V must be.
The coordinates of V must be (3,3) to complete the rectangle.