Algebra 1 Part 1

Siuslaw High School

Note to Students: In this packet, you will find two weeks worth of activities to complete during this time.

Key

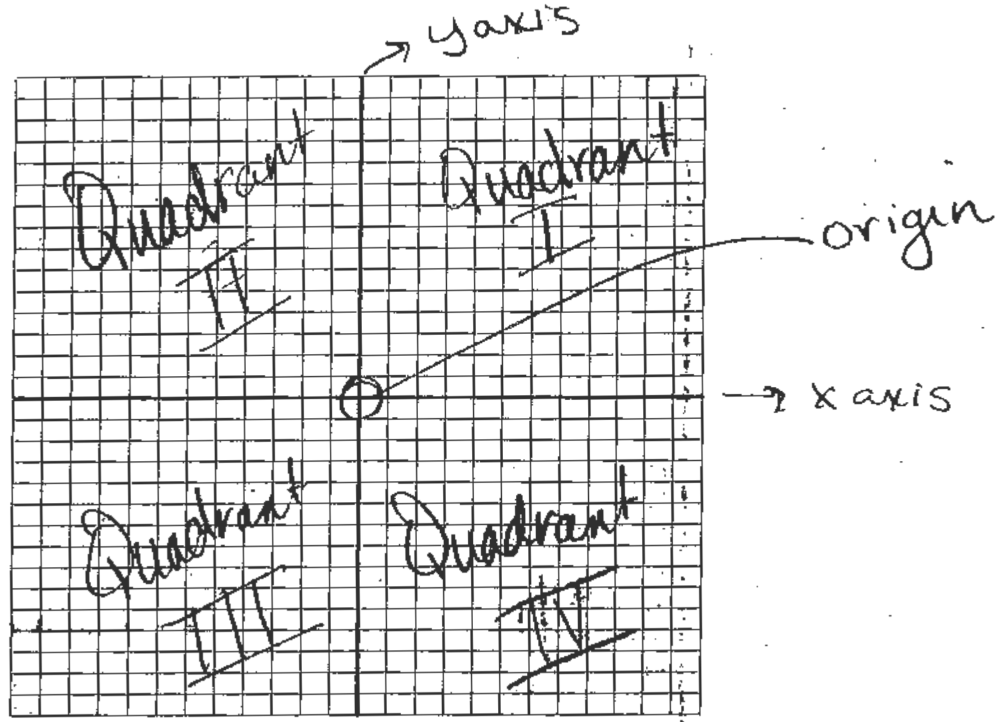
Algebra 1P **4^{th} Quarter, Semester 2**

Lesson D 11 – D14

Lesson D 11 - Coordinate Plane, Quadrants, Coordinates, Graphing Points

Definition: A ***coordinate plane*** is formed by two real number lines that intersect at a right angle.

EXAMPLE:



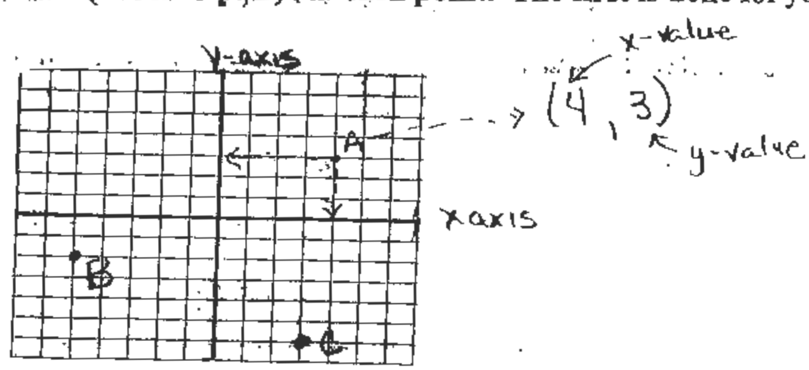
Parts of the Coordinate Plane (look at diagram above). Label above as we go through…

1) **x-axis:** This is the horizontal number line (horizontal axis.)
2) **y-axis:** This is the vertical number line (vertical axis.)
3) **origin:** This point where the x- and y-axes intersect.
4) **Quadrants:** The x and y-axes divide the plane into 4 regions called quadrants.
   We use ROMAN NUMERALS to name Quadrants

Coordinates: Each point (dot) on the coordinate plane corresponds to an ***ordered pair*** of numbers. The order they are written in is important. An *ordered pair* consists of an x value and a y value and are written in this form: (x,y) Note they are in alphabetical order. Hence an *ordered pair.* Also note that the parentheses are a necessary part of the notation.

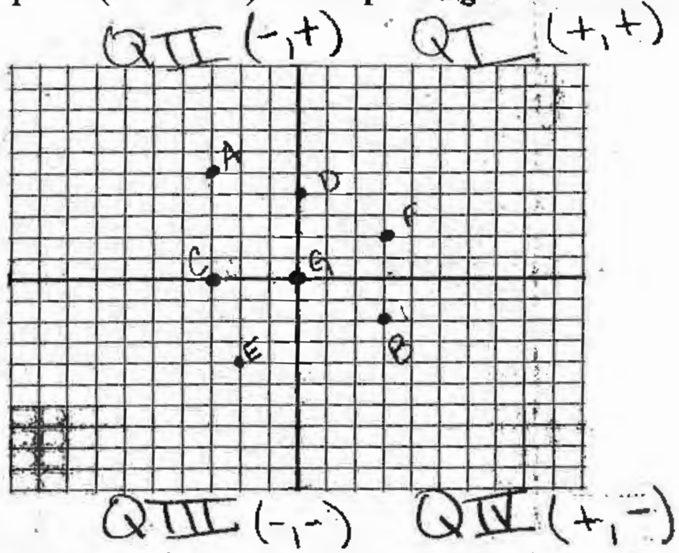
Examples: **State the coordinate (ordered pair) for each point. The first is done for you.**

1) A (4, 3)
2) B (-5, -2)
3) C (3, -6)



Summary: Each point is assigned a UNIQUE x-value and y-value. These values, written in the form (x,y) is the ***coordinate or ordered pair*** assigned to that point.

Examples/Practice: Identify the point (it's Letter) corresponding to each coordinate.



1) (3, -2) B

2) (-3, 5) A

3) (0,4) D

4) (-3,0) C

5) (-2,-4) E

6) (3,2) F

7) (0,0) G

Also, the point (0,0) is known as the origin.

Examples/Practice: State whether the given point (coordinate) lies in a quadrant (use Roman Numerals) or on an axis (x-axis, y-axis or both axes).

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

4) (2,3) I
5) (5,1) I
6) (3,7) I

7) (-2,-3) III
8) (-4,-5) III
9) (-1,-4) III

10) (3,-2) IV
11) (5,-1) IV
12) (8,-4) IV

13) (0, -5) y axis
14) (0,3) y axis
15) (0,8) y axis

16) (3,0) x axis
17) (-4,0) x axis
18) (-2,0) x axis

19) (0,0) origin

Plot (put a dot where the point goes) the coordinates listed below on the coordinate plane. Label each point with its corresponding letter.

1) A (-3,4)

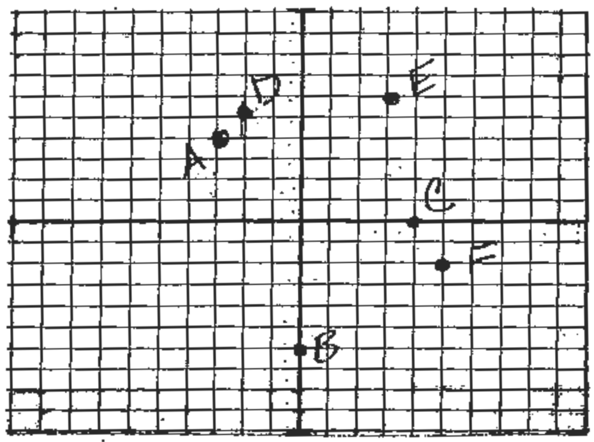
2) B (0,-6)

3) C (4,0)

4) D (-2,5)

5) E (3,6)

6) F (5,-2)



Lesson D12

A line consists of an infinite amount of points in the form (x, y) – also know as coordinates or an ordered pair. A point on the graph of a line is a ***solution*** (answer) to the equation of that line. Because a line consists of an infinite amount of points, a linear equation has an infinite amount of solutions (points on the line).

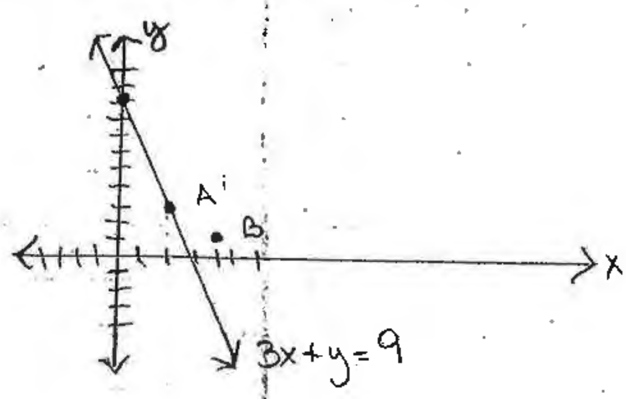
Definition: Linear equation means line equation

We will be looking at the linear equation $3x + y = 9$. It creates a line, non-ending, on a coordinate plane.

A ***solution*** to a linear equation (equation with x and y variables) is an ***ordered pair*** (x, y) that makes the equation a true statement. For example, (2, 3) is a solution to $3x + y = 9$ because $3(2) + 3 = 9$ is a true statement. However, (4, 1) is not a solution because $3(4) + 1 = 9$ is a false statement. So to determine if an ordered pair is a solution (that is, a point is on the graph of the line), substitute the x and y values from the ordered pair into the linear equation and check to see if it produces a true statement.

Example: **Since (2, 3) [point A] is a solution to $3x + y = 9$, it lies on the graph of the line $3x + y = 9$.**

Since (4, 1) [point B] is not a solution to $3x + y = 9$, it does not lie on the graph of the line $3x + y = 9$.



Examples/Practice: Is the ordered pair a solution to the equation? Answer Yes or No.

1. (5, 2); $3x + 2y = 19$

$3(5) + 2(2) = 19$
$15 + 4 = 19$ yes

2. (4, -2); $4x - 3y = 22$

$4(4) - 3(-2) = 22$
$16 + 6 = 22$
yes

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

$3(-2) + 5(1) = 1$
$-6 + 5 = 1$
$-1 = 1$
No

4. (-3, -4) $y = x - 1$

$-4 = -3 - 1$
$-4 = -4$
yes

* Always use a straight edge to draw the line.

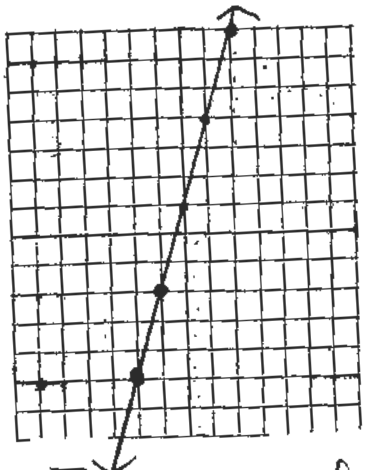
GRAPHING USING AN XY-TABLE: One method of graphing a linear equation (line) is to use an XY - Table of values. Using this method, one chooses x-values and substitutes these values into the equation to determine the corresponding y-values. You are actually finding points (x, y) on the line. Plot these points and then draw the line through the points.

Examples/Practice: Make a table of values (5 values). Draw a graph for each.

1. $y = 3x + 1$

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

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

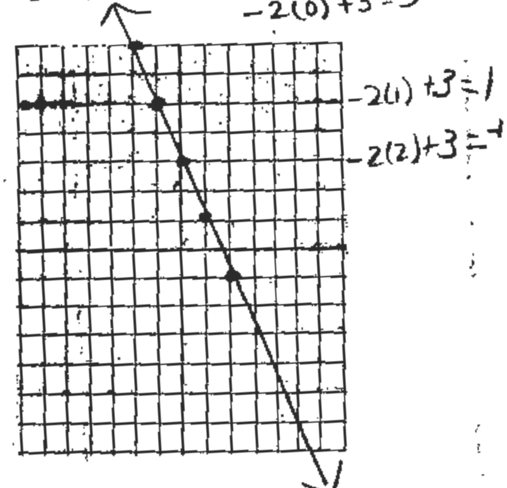


* lines beyond edge of graph with arrows

2. $y = -2x + 3$

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

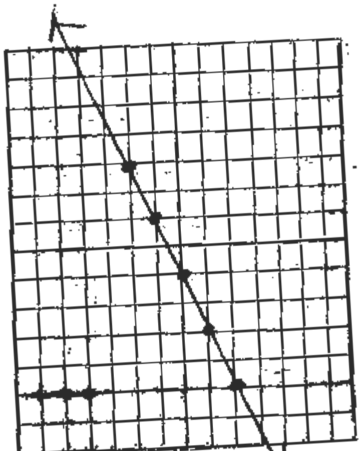
$-2(-2)+3=7$
$-2(-1)+3=5$
$-2(0)+3=3$
$-2(1)+3=1$
$-2(2)+3=-1$



3. $y = -2x - 1$

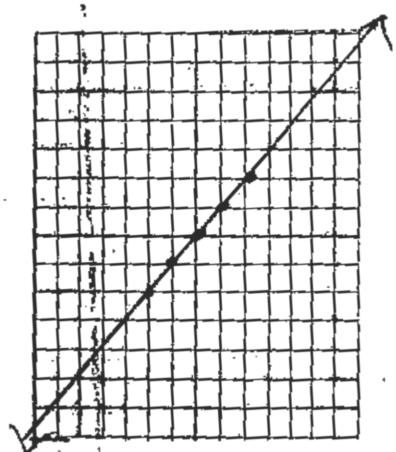
x	y
-2	3
-1	1
0	-1
1	-3
2	-5

$-2(-2)-1=$
$4-1=3$
$-2(0)-1=$
$0-1=$
$-2(-1)-1$
$2-1=1$
$-2(1)-1=$
$-2-1=-3$
$-2(2)-1$
$-4-1=-5$



4. $y = x$

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



HINT: In problems like #3 and 4 below, choose x-values that are ± multiples of the denominator. This will help "eliminate" any fractional y-values.

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

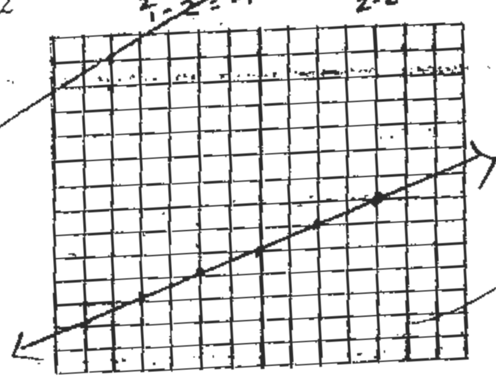
$y=\frac{1}{2}(2)-2$
$\frac{2}{2}-2$
$1-2=-1$

$y=\frac{1}{2}(4)-2$
$\frac{4}{2}-2$
$2-2=0$

$\frac{1}{2}(-4)-2$
$\frac{4}{2}-2$
$2-2$

$-\frac{2}{2}-2$
$-1-2$
$=-3$

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

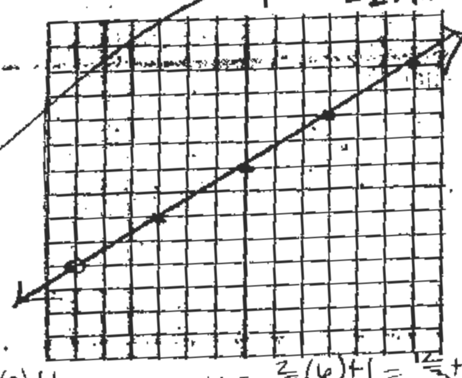


4. $y = \frac{2}{3}x + 1$

$y=\frac{2}{3}(-6)+1$
$-\frac{12}{3}+1$
$-4+1=-3$

$y=\frac{2}{3}(-3)+1$
$-\frac{6}{3}+1$
$-2+1=-1$

x	y
-6	-3
-3	-1
0	1
3	3
6	5



$y=\frac{2}{3}(3)+1$ $y=\frac{2}{3}(6)+1=\frac{12}{3}+1$

Lesson D13

It is often easier to create an XY - Table when the equation is in the form of y = mx + b. So in the following examples/practice problems, first solve each equation for y. Now create your XY - Table of values, plot these points and draw your line.

Examples/Practice: **a) Solve for y**
b) Make an XY - Table of values (3)
c) Plot the points and draw the graph (line)

1. $2x + y = 5$ $-2x$ $-2x$

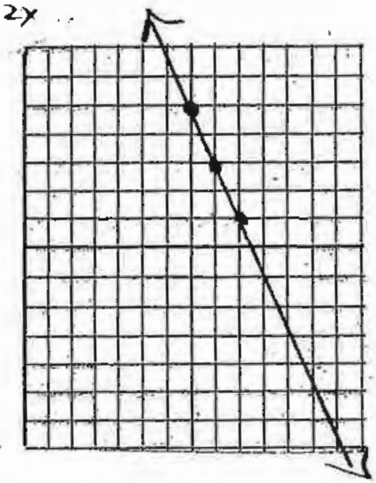
$y = -2x + 5$

x	y
0	5
1	3
2	1

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

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

$y = -2(2) + 5$
$= -4 + 5$
$= 1$



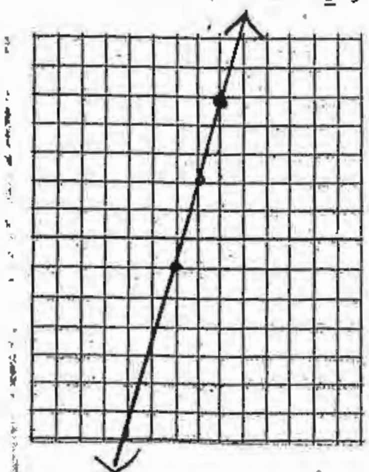
2. $-3x + y = 2$ $+3x$ $+3x$

$y = 3x + 2$

x	y
-1	-1
0	2
1	5

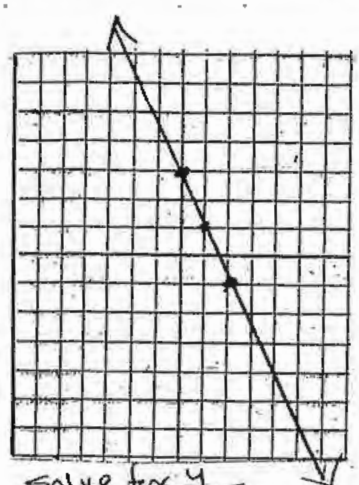
$y = 3(-1) + 2$
$-3 + 2$
-1

$y = 3(1) + 2$
$3 + 2$
$= 5$



3. $4x + 2y = 6$

x	y
0	3
1	1
2	-1



Solve for y
$4x + 2y = 6$
$-4x$ $-4x$

$\frac{2y}{2} = \frac{-4x}{2} + \frac{6}{2}$

$y = -2x + 3$

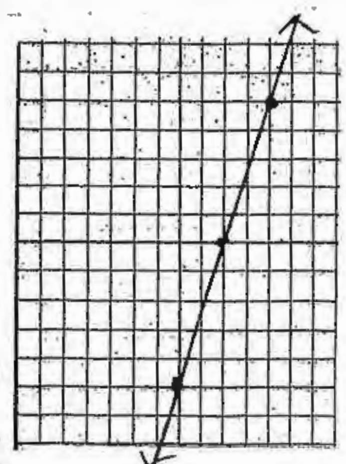
$y = -2(0) + 3$
$y = 0 + 3$
$= 3$

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

$y = -2(2) + 3$
$= -4 + 3$
$= -1$

4. $5x - 2y = 10$

x	y
0	-5
2	0
4	5



Solve for y
$5x - 2y = 10$
$-5x$ $-5x$

$\frac{-2y}{-2} = \frac{-5x}{-2} + \frac{10}{-2}$

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

$y = \frac{5}{2}(0) - 5$
$= 0 - 5$
$= -5$

$y = \frac{5}{2}(2) - 5$
$= \frac{10}{2} - 5$
$= 5 - 5$
$= 0$

$y = \frac{5}{2}(4) - 5$
$= \frac{20}{2} - 5$
$= 10 - 5$

Lesson D14

It is often easier to create an XY-Table when the equation is in the form of $y=mx+b$. Notice that in the linear equations below, the x and y are on the same side. So in the following examples/practice problems, <u>first solve each equation for y.</u> Next, create your XY-Table of values, plot these points and draw your line.

I. Is the ordered pair a solution to the equation?

1. (4, 3); $y = \frac{1}{2}x + 1$

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

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

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

II. Make a table of values. Make a graph of each.

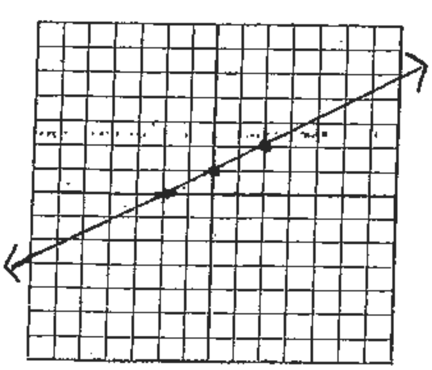
1) $y = \frac{1}{2}x + 1$

x	y
-2	0
0	1
2	2

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

$y = \frac{1}{2}(0) + 1$
$= 0 + 1$
$= 1$

$y = \frac{1}{2}(2) + 1$
$= 1 + 1$
$= 2$

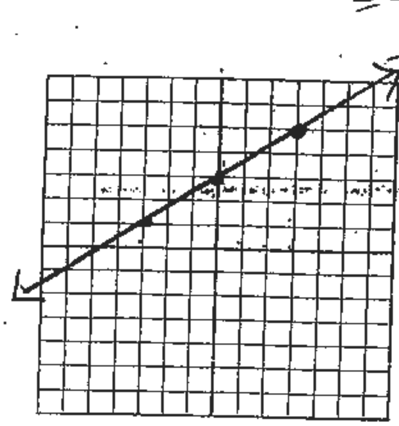


2) $y = \frac{2}{3}x + 3$

x	y
-3	1
0	3
3	5

$y = \frac{2}{3}(3) + 3$
$= \frac{6}{3} + 3$
$= 2 + 3$
$= 5$

$y = \frac{2}{3}(-3) + 3$
$= -\frac{6}{3} + 3$
$= -2 + 3$
$= 1$



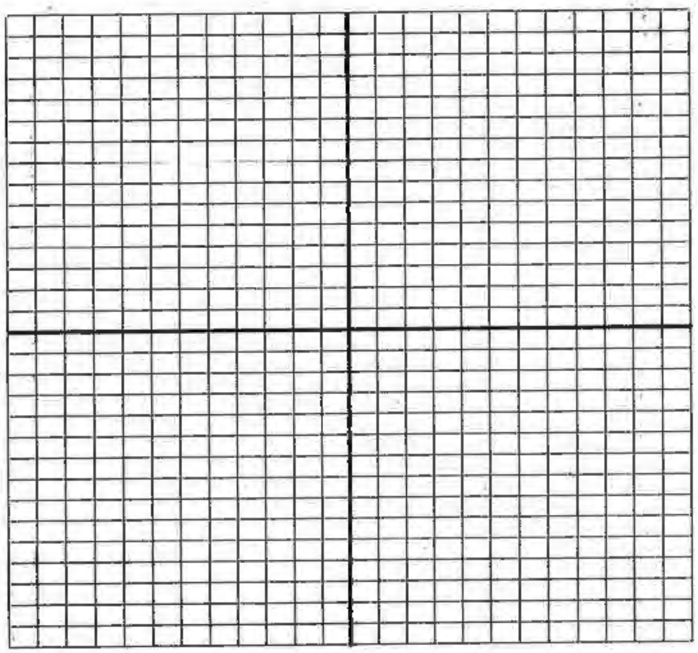
Algebra 1P **4^{th} Quarter, Semester 2**

Lesson D D11 - D14

Lesson D D11- Coordinate Plane, Quadrants, Coordinates, Graphing Points

Definition: A ***coordinate plane*** is formed by two real number lines that intersect at a right angle.

EXAMPLE:



Parts of the Coordinate Plane (look at diagram above). Label above as we go through...

1) **x-axis:** This is the horizontal number line (horizontal axis.)
2) **y-axis:** This is the vertical number line (vertical axis.)
3) **origin:** This point where the x- and y-axes intersect.
4) **Quadrants:** The x and y-axes divide the plane into 4 regions called quadrants.
   We use ROMAN NUMERALS to name Quadrants

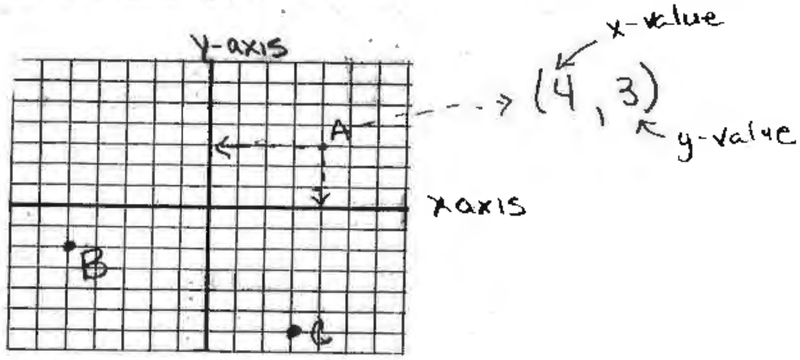
Coordinates: Each point (dot) on the coordinate plane corresponds to an ***ordered pair*** of numbers. The order they are written in is important. An *ordered pair* consists of an x value and a y value and are written in this form: (x,y) Note they are in alphabetical order. Hence an *ordered pair.* Also note that the parentheses are a necessary part of the notation.

Examples: State the coordinate (ordered pair) for each point. The first is done for you.

1) A (4,3)

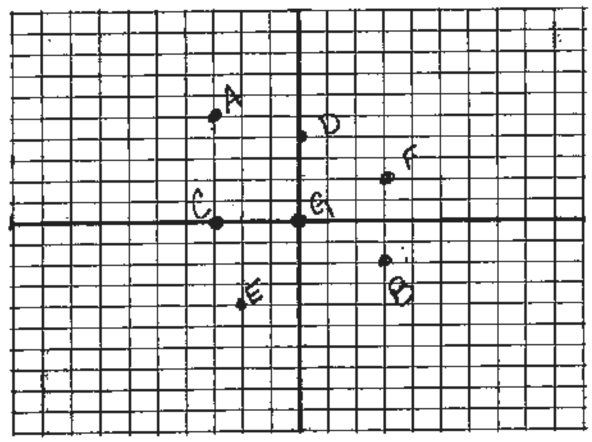
2) B ________

3) C ________



Summary: Each point is assigned a UNIQUE x-value and y-value. These values, written in the form (x,y) is the *coordinate or ordered pair* assigned to that point.

Examples/Practice: Identify the point (it's Letter) corresponding to each coordinate.



1) (3, -2) _________

2) (-3, 5) __________

3) (0,4) __________

4) (-3,0) __________

5) (-2,-4) __________

6) (3,2) __________

7) (0,0) __________

Also, the point (0,0) is known as the ________________________.

Examples/Practice: State whether the given point (coordinate) lies in a quadrant (use Roman Numerals) or on an axis (x-axis, y-axis or both axes).

1) (-3,2) __________ **2) (-5,4) ____________** **3) (-1,3) ____________**

4) (2,3) __________ **5) (5,1) ____________** **6) (3,7) ____________**

7) (-2,-3) _________ **8) (-4,-5)___________** **9) (-1,-4) ___________**

10) (3,-2) _________ **11) (5,-1) ___________** **12) (8,-4) ___________**

13) (0, -5) _________ **14) (0,3) ____________** **15) (0,8) ____________**

16) (3,0) __________ **17) (-4,0) ___________** **18) (-2,0)____________**

19) (0,0) ___________

Plot (put a dot where the point goes) the coordinates listed below on the coordinate plane. Label each point with its corresponding letter.

1) A (-3,4)

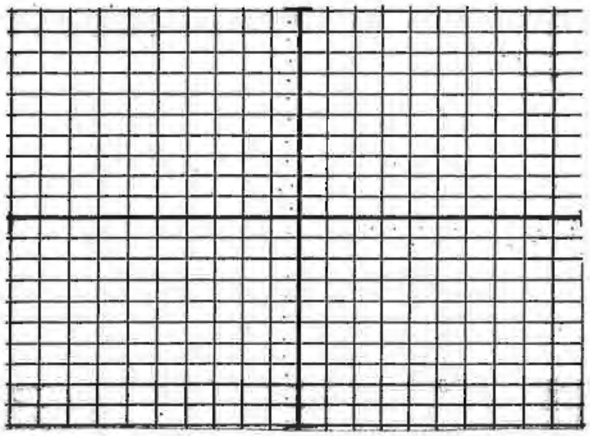
2) B (0,-6)

3) C (4,0)

4) D (-2,5)

5) E (3,6)

6) F (5,-2)



Algebra IP D11

COORDINATE PLANE

For 1-10, state the coordinate for each point. Use the coordinate plane below.

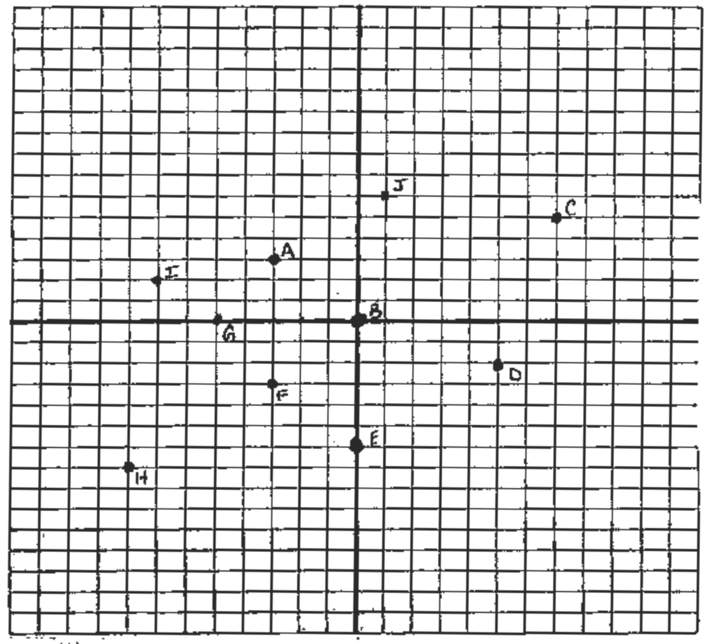
1. A______ 2. B______

3. C______ 4. D______

5. E______ 6. F______

7. G______ 8. H______

9. I______ 10. J______



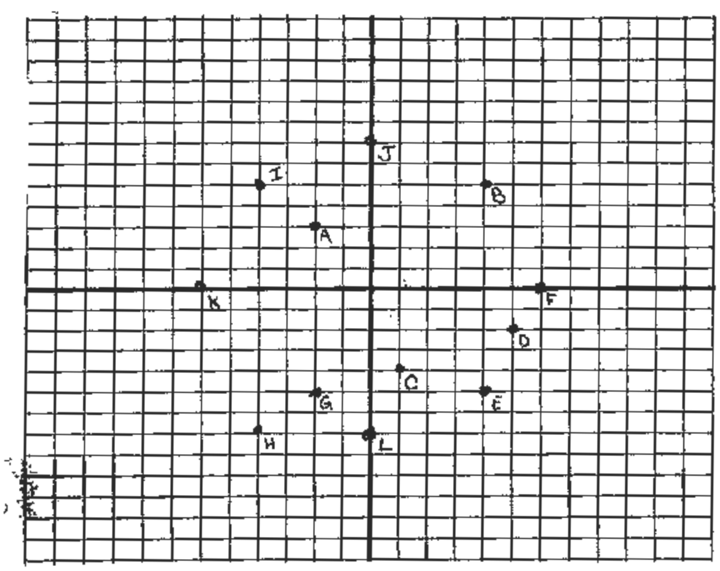
For 11-20, identify the point corresponding to each coordinate. Use the coordinate plane below.

(-2, 3)____ 12. (4, 5)____

13. (-2, -5)____ 14. (0, 7)____

15. (-6, 0)____ 16. (1, -4)____

17. (-4, -7)____ 18. (5, -2)____



B. Refer to the first coordinate plane above to answer the following questions.

19. List all of the points that lie in Quadrant I. ____________________
20. List all of the points that lie in Quadrant II. ____________________
21. List all of the points that lie in Quadrant III. ____________________
22. List all of the points that lie in Quadrant IV. ____________________

List all of the points that lie on the x-axis. ____________________

24. List all of the points that lie on the y-axis ____________________

C. For problems 25-32, state whether the given point (coordinate) lies in a Quadrant (I, II, III, or IV), on
either the x-axis or y-axis, or botb axes.

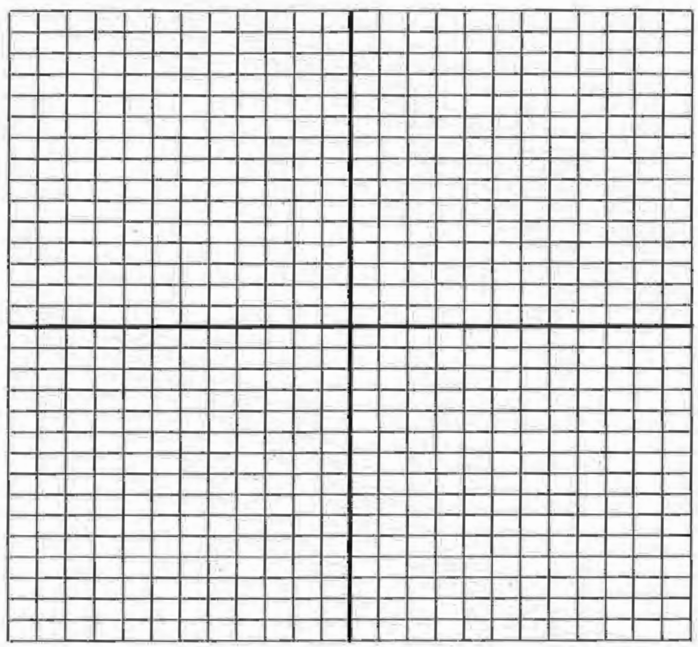
25. (-4, 5) ________ 26. (0, 5) ________ 27. (0, 0) ________ 28. (-4, 0) ________

29. (6, 3) ________ 30. (-1, -9) ________ 31. (0, -3) ________ 32. (3, -7) ________

D. For problems 33-42, plot the points on the coordinate plane. Label each point with its corresponding letter.

33. A (-4, 9) 34. B (-5, -12) 35. C (10, 5) 36. D (0, 7) 37. E (-8, 0)

38. F (0, 0) 39. G (5, -3) 40. H (6, 0) 41. I (4, 9) 42. J (-4, -6)



Lesson D12

A line consists of an infinite amount of points in the form (x, y) – also know as coordinates or an ordered pair. A point on the graph of a line is a ***solution*** ( ) to the equation of that line. Because a line consists of an infinite amount of points, a linear equation has an infinite amount of solutions (points on the line).

Definition: Linear equation means

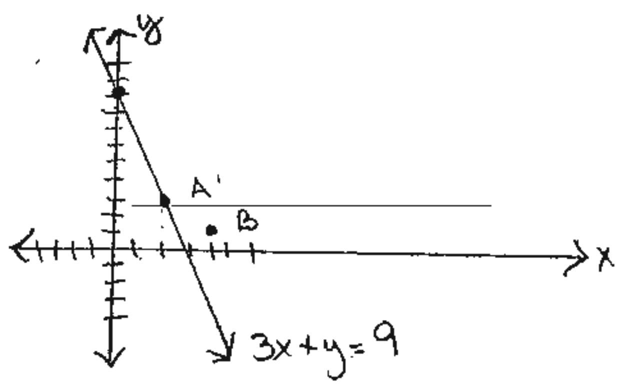
____

We will be looking at the linear equation $3x + y = 9$. It creates a line, non-ending, on a coordinate plane.

A ***solution*** to a linear equation (equation with x and y variables) is an ***ordered pair*** (x, y) that makes the equation a true statement. For example, (2, 3) is a solution to $3x + y = 9$ because $3(2) + 3 = 9$ is a true statement. However, (4, 1) is not a solution because $3(4) + 1 = 9$ is a false statement. So to determine if an ordered pair is a solution (that is, a point is on the graph of the line), substitute the x and y values from the ordered pair into the linear equation and check to see if it produces a true statement.

Example: **Since (2, 3) [point A] is a solution to $3x + y = 9$, it lies on the graph of the line $3x + y = 9$.**

Since (4, 1) [point B] is <u>not</u> a solution to $3x + y = 9$, it does not lie on the graph of the line $3x + y = 9$.



Examples/Practice: Is the ordered pair a solution to the equation? Answer Yes or No.

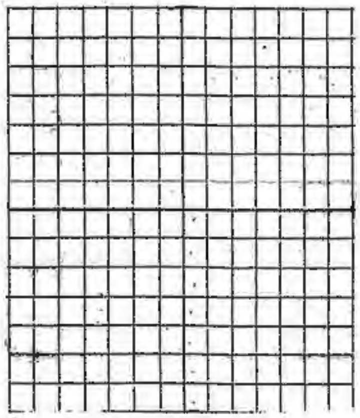
1. (5, 2); $3x + 2y = 19$
2. (4, -2); $4x - 3y = 22$
3. (-2, 1); $3x + 5y = 1$
4. (-3, -4) $y = x - 1$

GRAPHING USING AN XY-TABLE: One method of graphing a linear equation (line) is to use an XY - Table of values. Using this method, one chooses x-values and substitutes these values into the equation to determine the corresponding y-values. You are actually finding points (x, y) on the line. Plot these points and then draw the line through the points.

Examples/Practice: Make a table of values (5 values). Draw a graph for each.

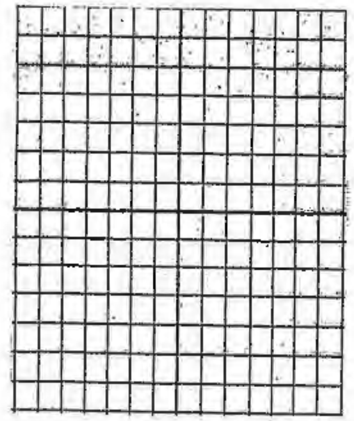
1. $y = 3x + 1$

x	y



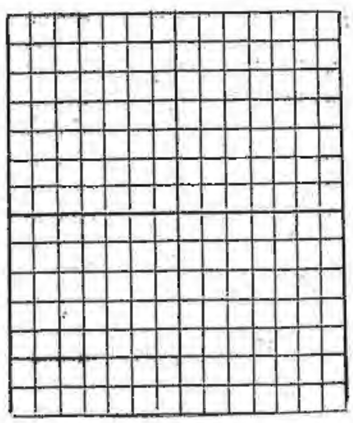
2. $y = -2x + 3$

x	y



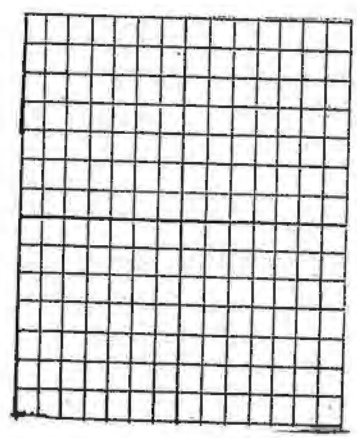
3. $y = -2x - 1$

x	y



4. $y = x$

x	y



Algebra IP

D12

XY-TABLES & GRAPHS I

A. Is the ordered pair a solution to the equation?

1. $(2, 3)$; $2x + 3y = 13$
2. $(4, 1)$; $x + 2y = 5$
3. $(2, -1)$; $2x - y = 3$
4. $(-1, -4)$; $y = x - 3$
5. $(0, -6)$; $2x + 3y = -18$
6. $(4, -1)$; $3x - y = 11$
7. $(-2, -3)$; $y = x - 1$
8. $(1, 7)$; $y = 2x + 5$

B. Make a table of values. Draw a graph for each.

9. $y = 2x + 1$
10. $y = 3x - 1$
11. $y = 4x + 2$
12. $y = x + 2$
13. $y = x$
14. $y = -2x + 1$
15. $y = -3x - 1$
16. $y = -x + 2$
17. $y = -3x + 4$
18. $y = -x$
19. $y = 2x + 5$
20. $y = -4x + 3$
21. $y = 5x - 3$
22. $y = x - 2$
23. $y = -2x - 1$

Lesson D13

It is often easier to create an XY - Table when the equation is in the form of $y = mx + b$. So in the following examples/practice problems, first solve each equation for y. Now create your XY - Table of values, plot these points and draw your line.

Examples/Practice: **a) Solve for y**
b) Make an XY - Table of values (3)
c) Plot the points and draw the graph (line)

1. $2x + y = 5$

x	y

2. $-3x + y = 2$

x	y

3. $4x + 2y = 6$

x	y

4. $5x - 2y = 10$

x	y

Algebra IP D13

XY TABLE & GRAPH III

a) Solve for y.
b) Make a table of values.
c) Draw a graph for each.

A.

1. $x + y = 6$
2. $3x + y = 2$
3. $-2x + y = 5$
4. $-3x + y = 1$
5. $-7x + y = 2$
6. $-4x + y = 1$
7. $-5x + y = -2$
8. $-6x + y = -3$
9. $6x + 3y = 9$
10. $4x + 2y = 8$
11. $10x + 5y = 10$
12. $-8x + 2y = 16$
13. $-6x - 2y = 12$
14. $-12x - 2y = 2$
15. $-9x + 3y = -6$
16. $-20x - 4y = 8$

Lesson D14

It is often easier to create an XY-Table when the equation is in the form of y=mx+b. Notice that in the linear equations below, the x and y are on the same side. So in the following examples/practice problems, first solve each equation for y. Next, create your XY-Table of values, plot these points and draw your line.

I. Is the ordered pair a solution to the equation?

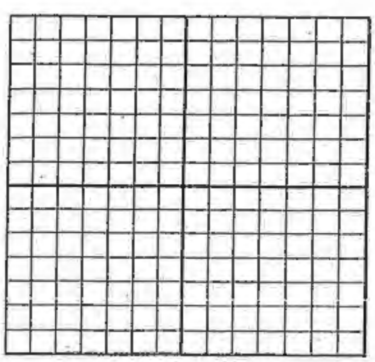
1. (4, 3); $y = \frac{1}{2}x + 1$

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

II. Make a table of values. Make a graph of each.

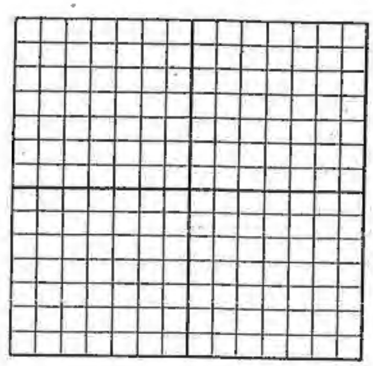
1) $y = \frac{1}{2}x + 1$

x	y



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

x	y



GEOMETRY ESSENTIALS D14

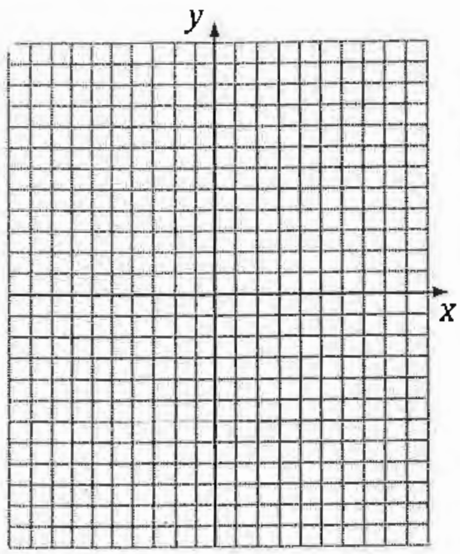
XY-TABLE & GRAPHS II

I. Is the ordered pair a solution to the equation?

1. (4, 3); $y = \frac{1}{2}x + 1$
2. (2, 5); $y = \frac{3}{2}x + 2$
3. (-2, 3); $y = \frac{1}{2}x - 2$
4. (6, -2); $y = \frac{2}{3}x - 6$
5. (-4, 1); $y = \frac{1}{2}x + 1$
6. (-6, 3); $y = \frac{-2}{3}x - 1$

II. Make a table of values. Make a graph of each.

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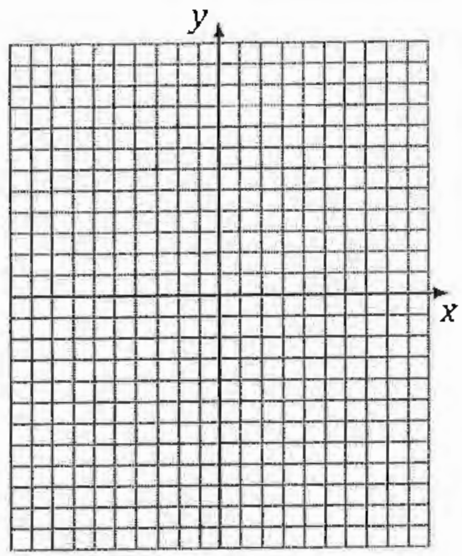
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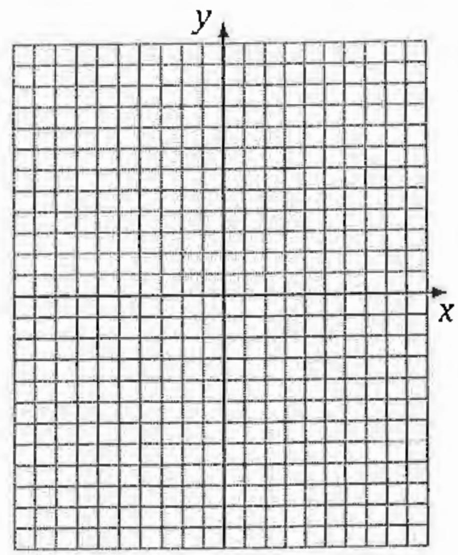
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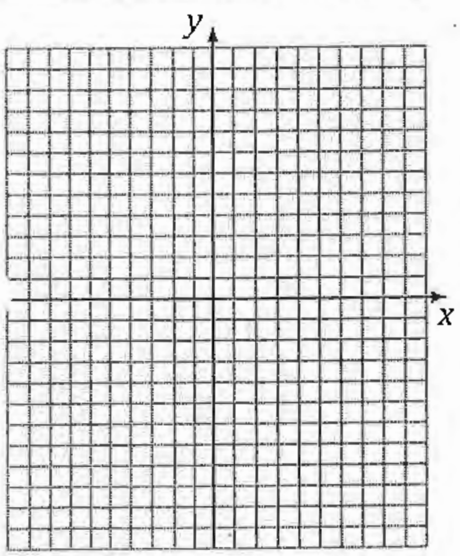
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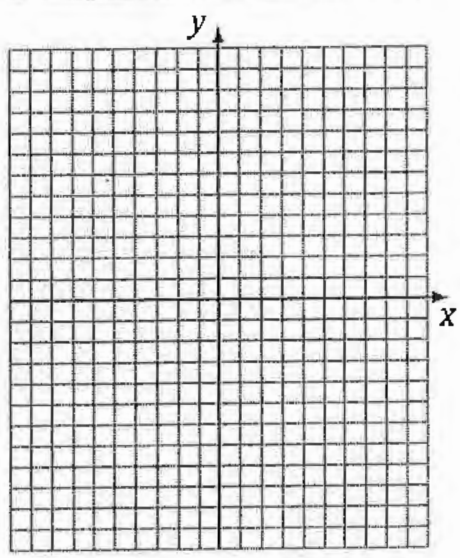
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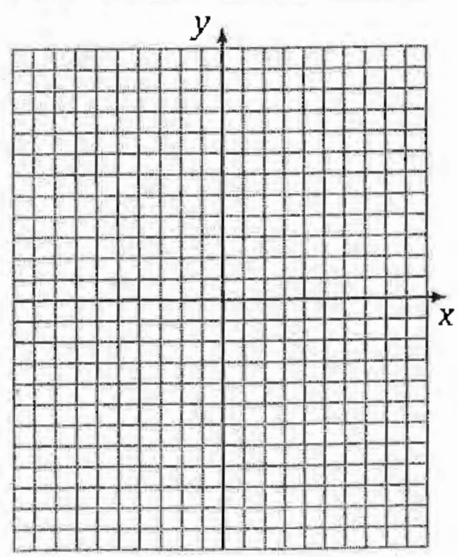
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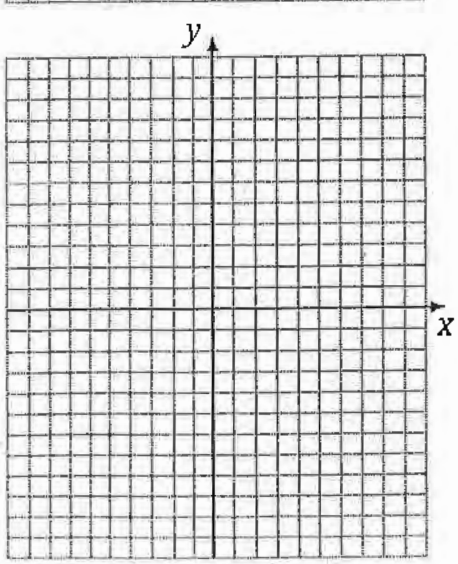
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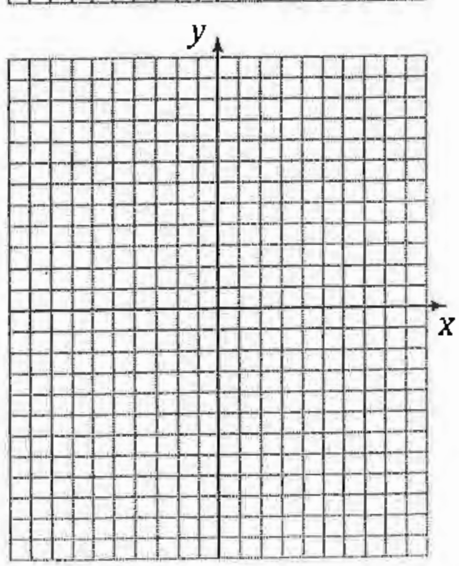
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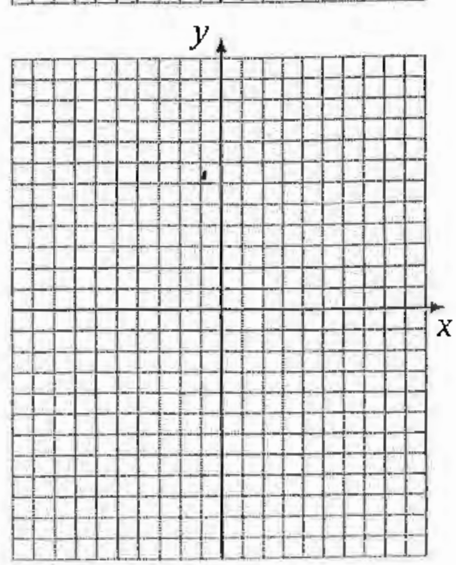
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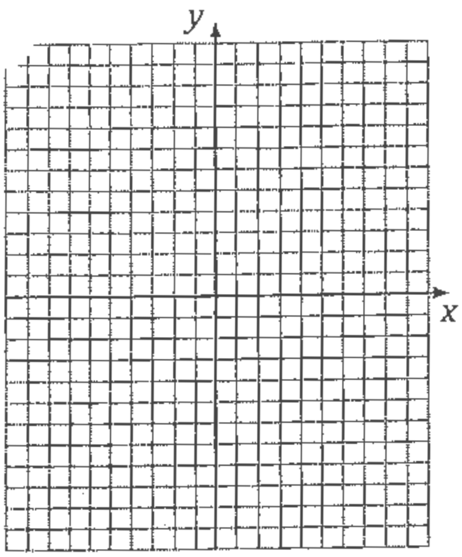
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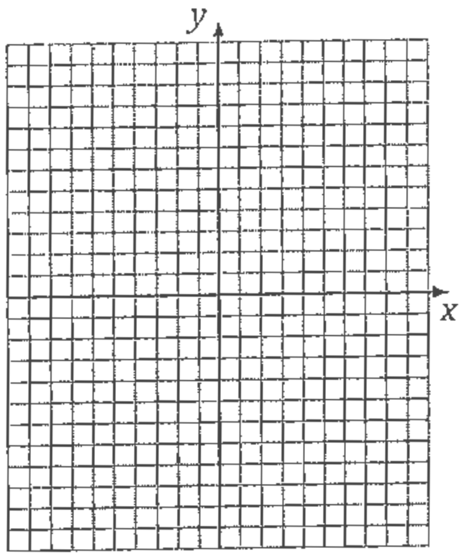
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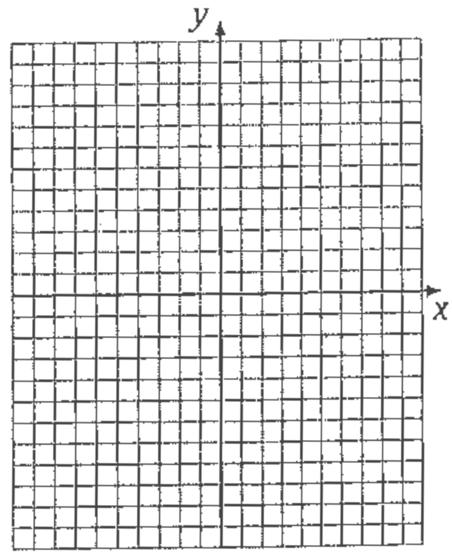
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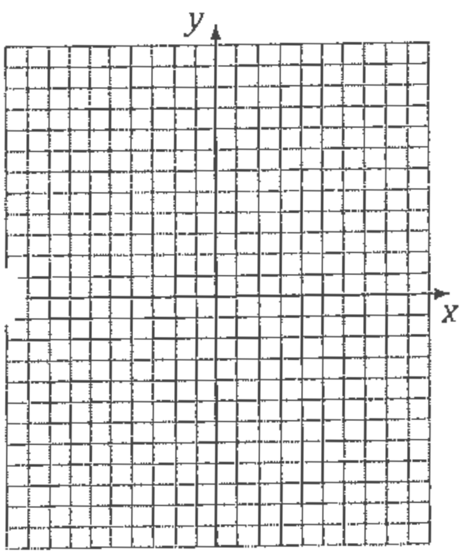
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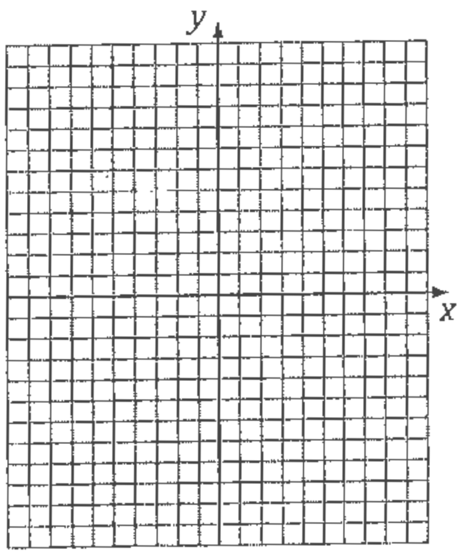
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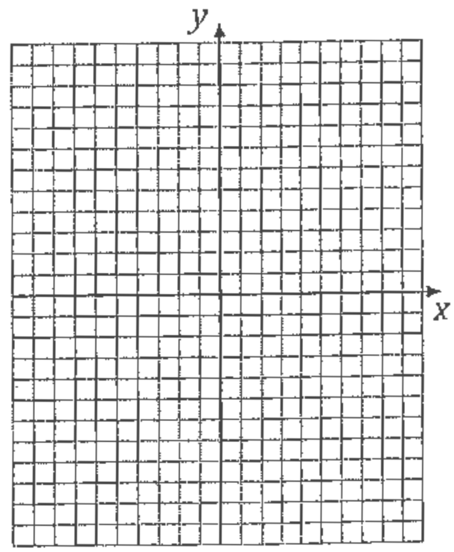
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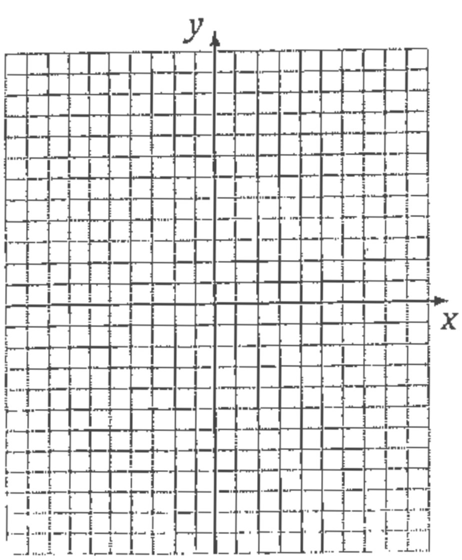
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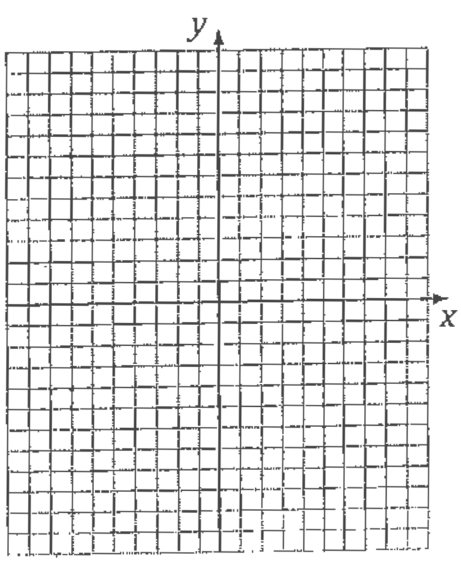
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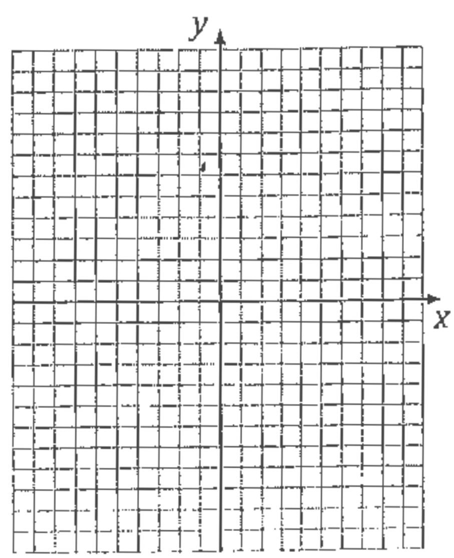
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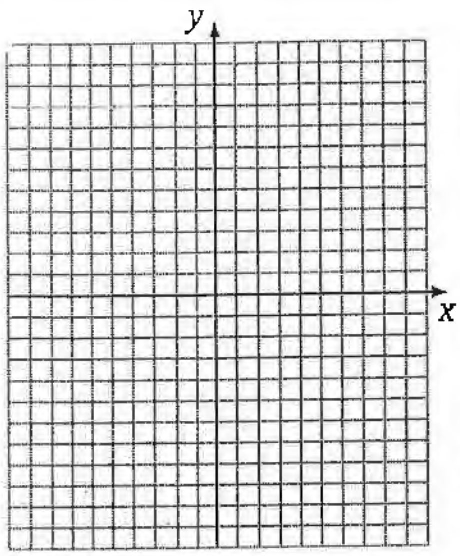
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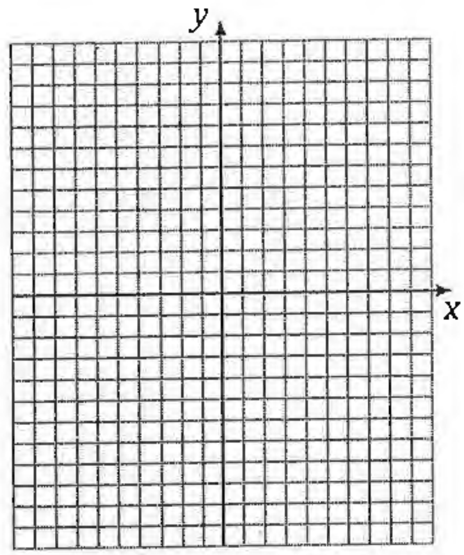
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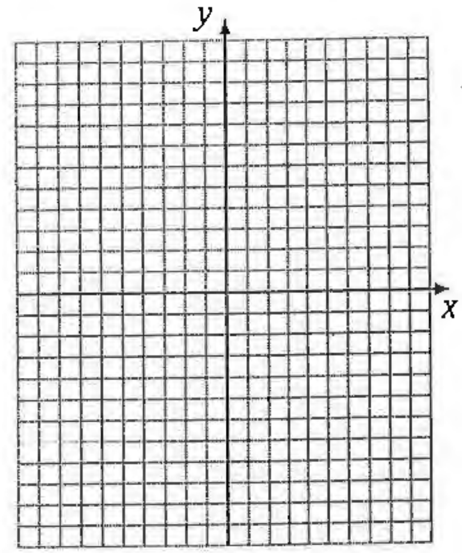
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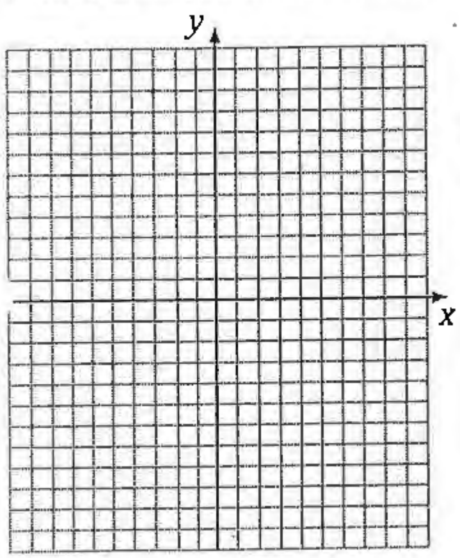
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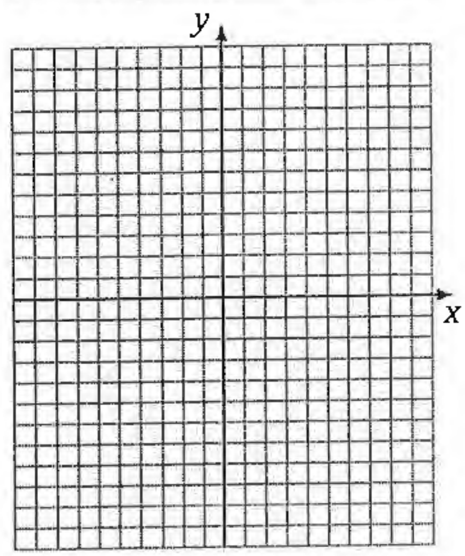
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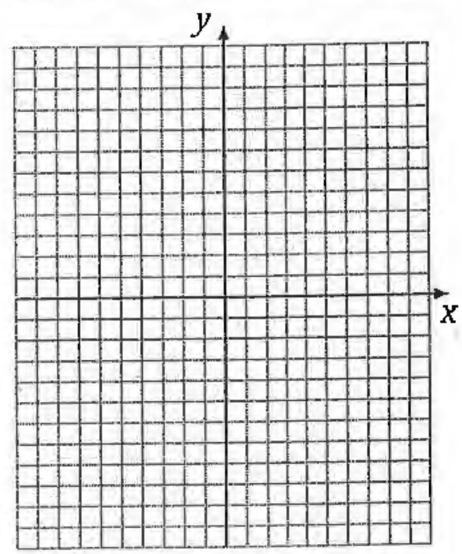
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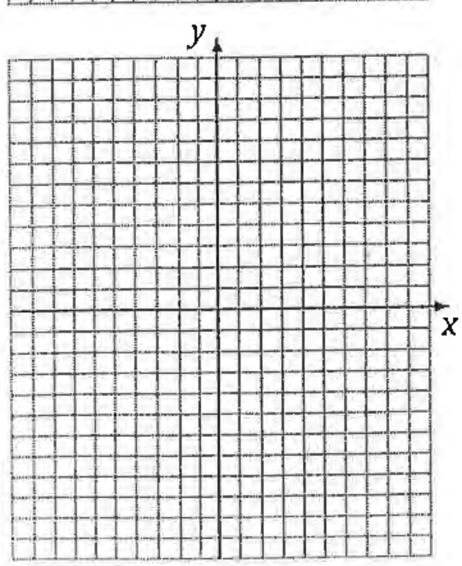
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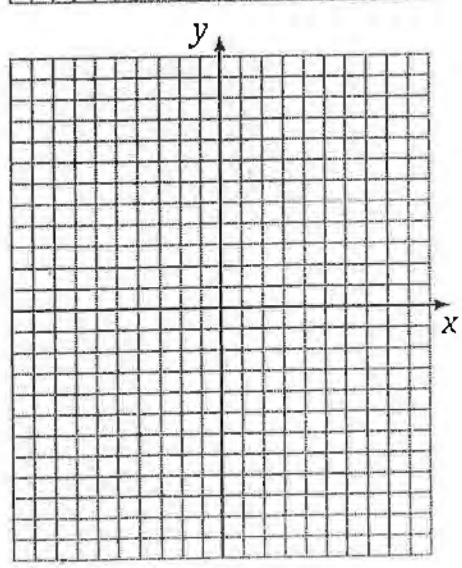
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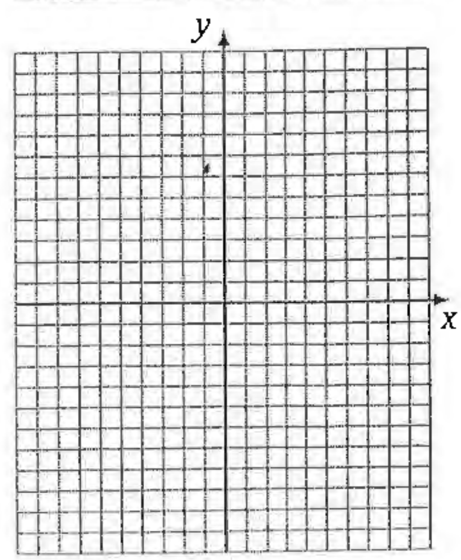
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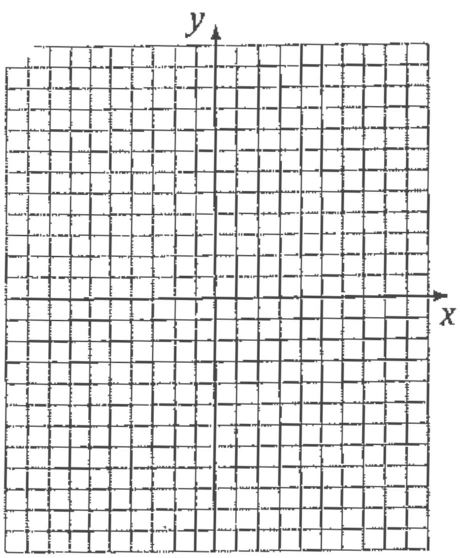
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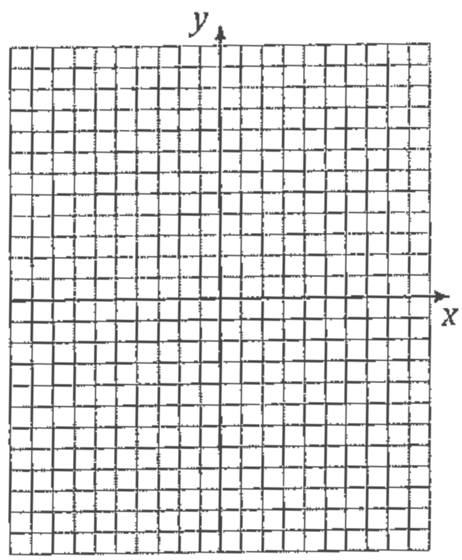
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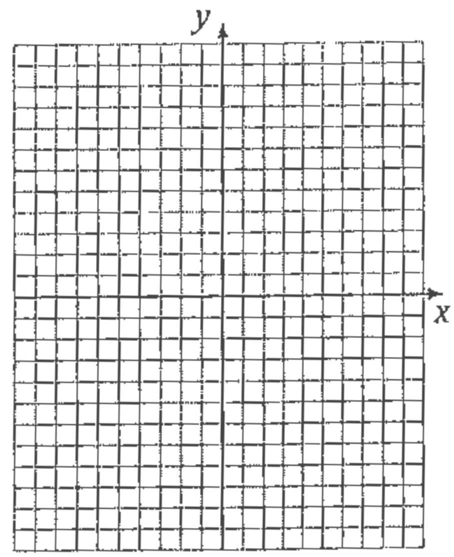
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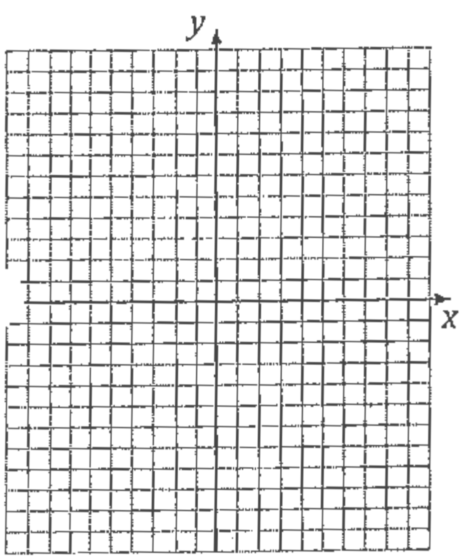
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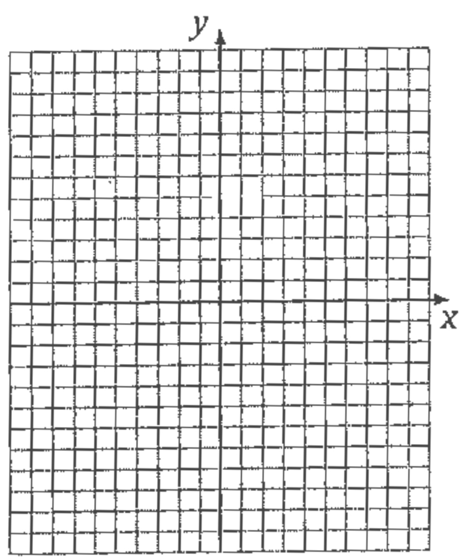
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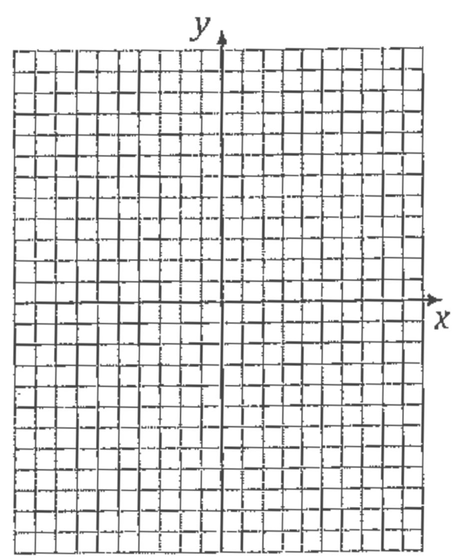
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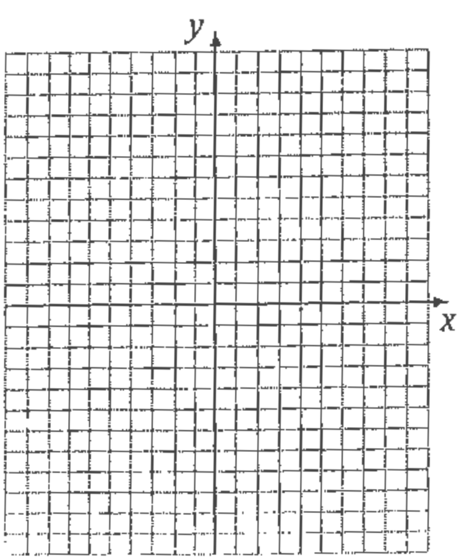
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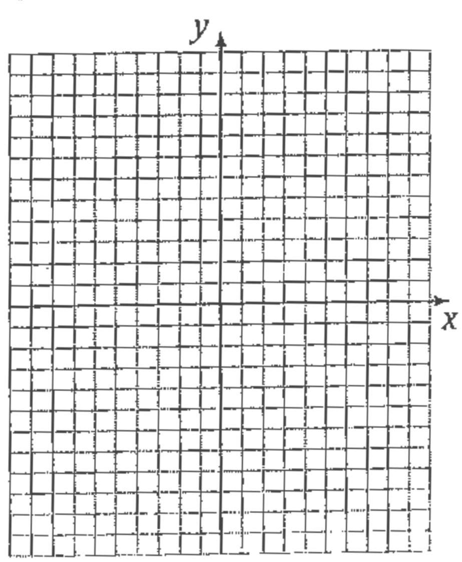
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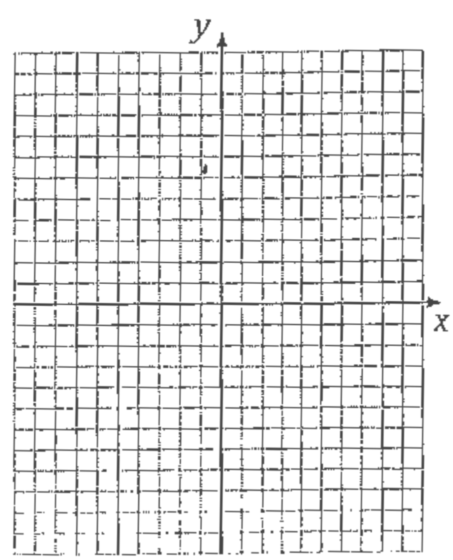
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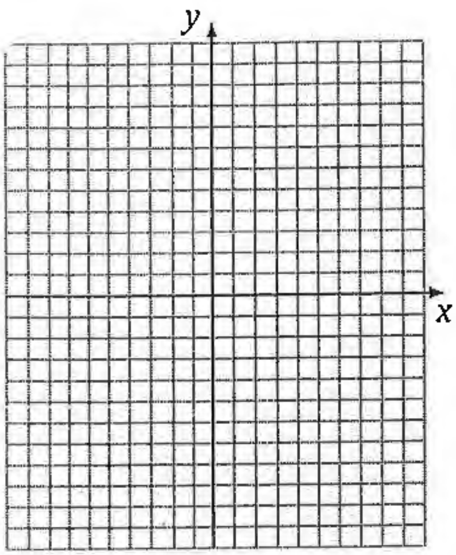
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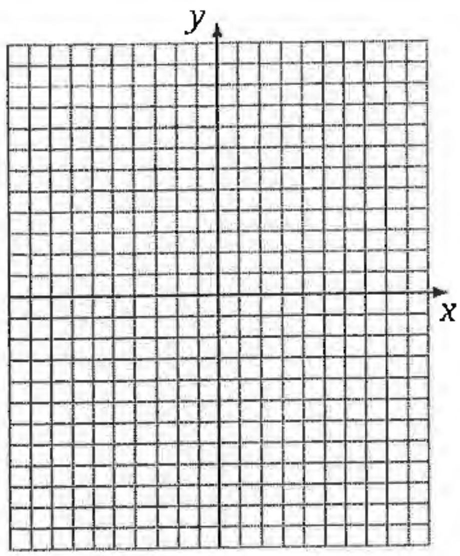
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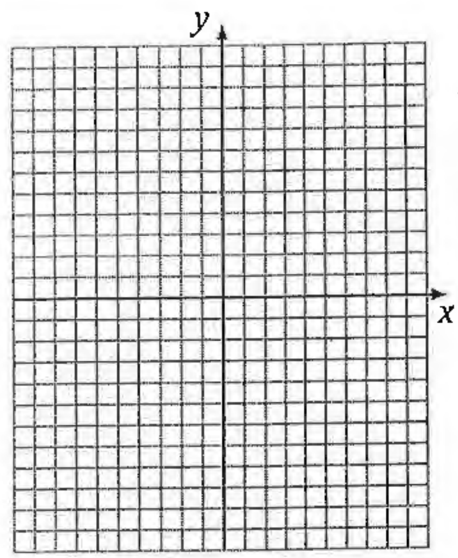
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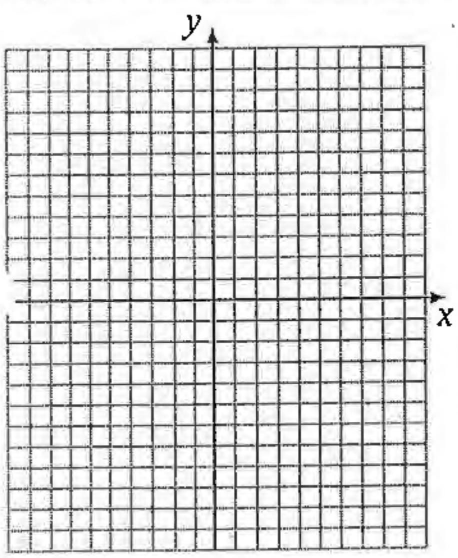
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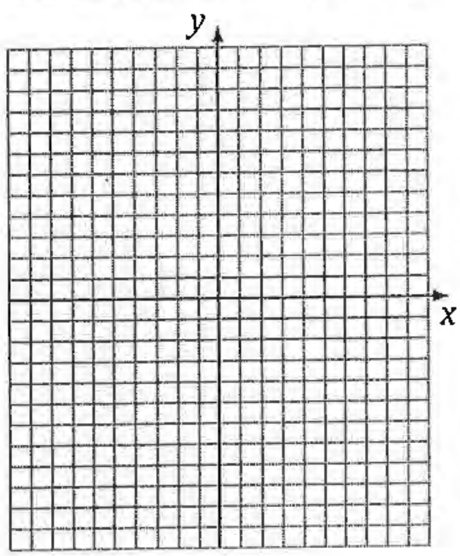
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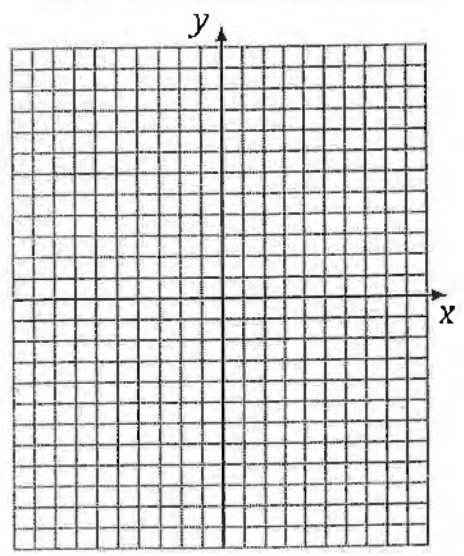
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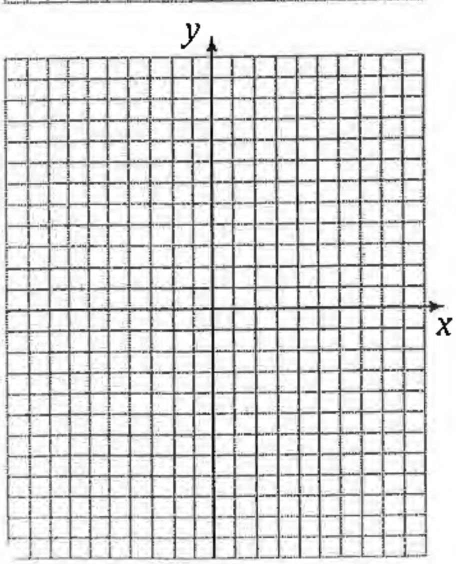
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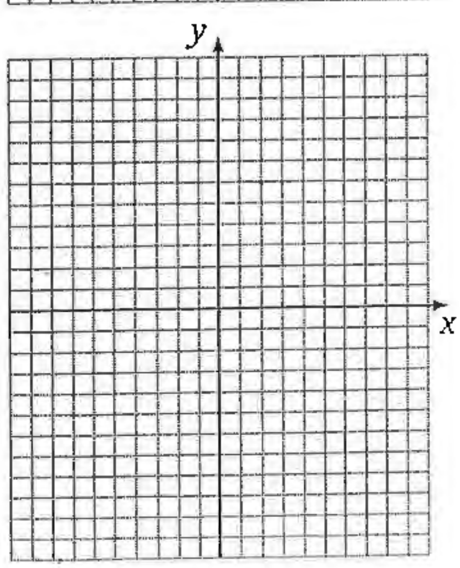
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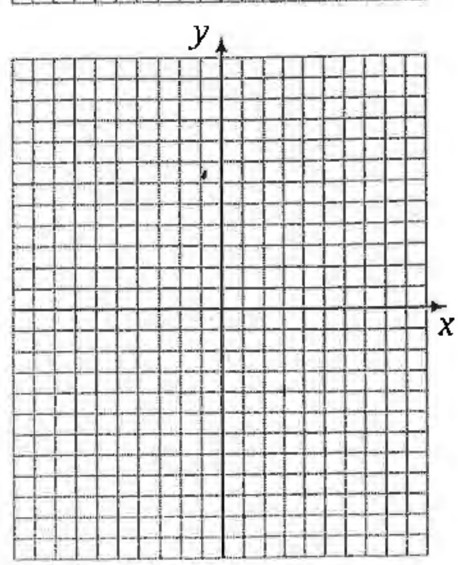
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