Unit 7

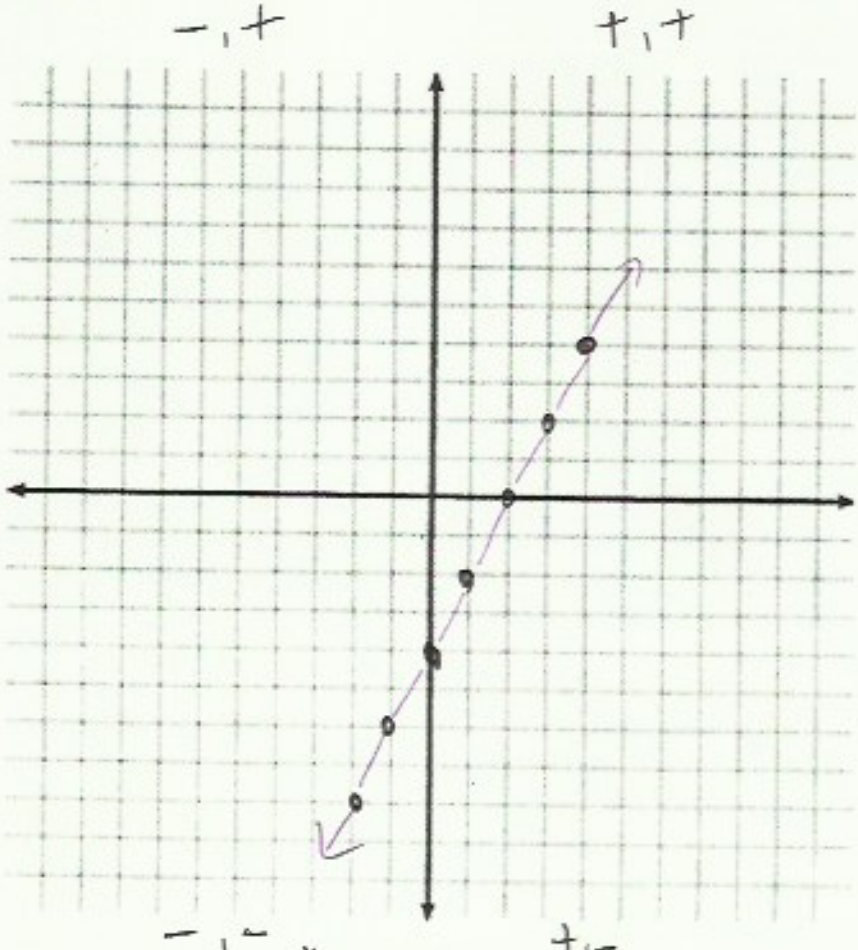
Lines parallel to the x-axis have equations as y=a numb
y-axis ... x=a number

Drawing graphs of equations 8 as 4

Example #1
Complete the table of values for y=2x-4

x	-2	-1	0	1	2	3	4
y	-8	2(-1)-4 -2-4 -6	2(0)-4 0-4 -4	2(1)-4 2-4 -2	0	2(3)-4 6-4 2	4

Term to term for Y
Term to term for X



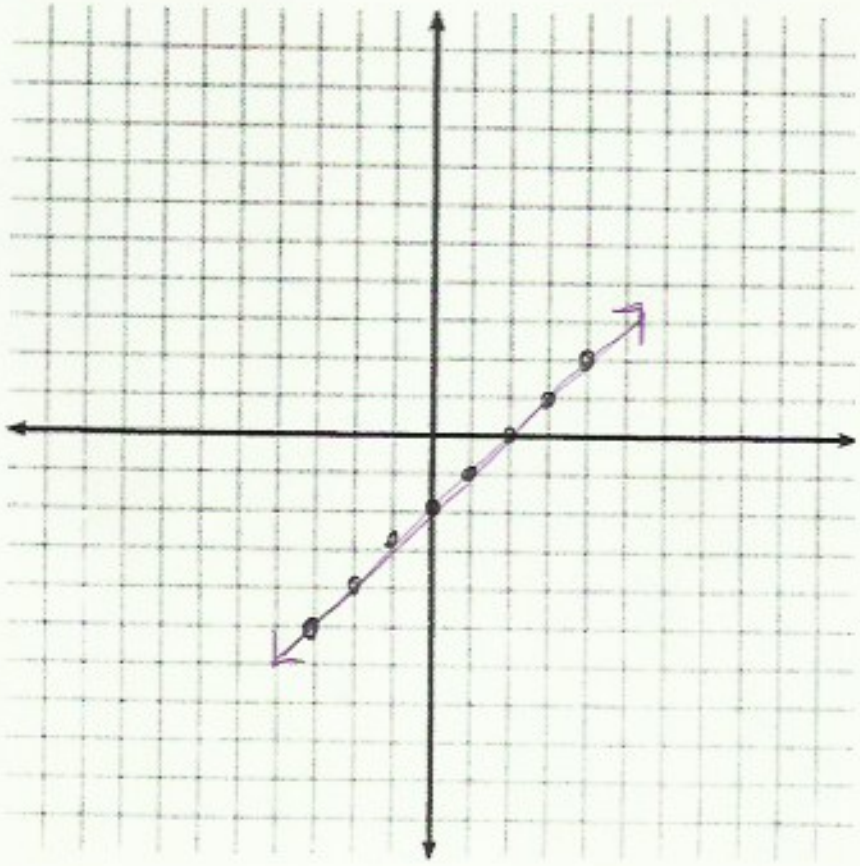
Arrows to show infinite solutions.

x	-4	-3	-2	-1	0	1	2	3	4
y	-6	-3-2 -5	-2-2 -4	-3	0-2 -2	-1	2-2 0	1	4-2 2

Plug in for X variable

Example #2
Complete the table of values for y=x-2

Term to term for Y
Term to term for X



Slope Formula

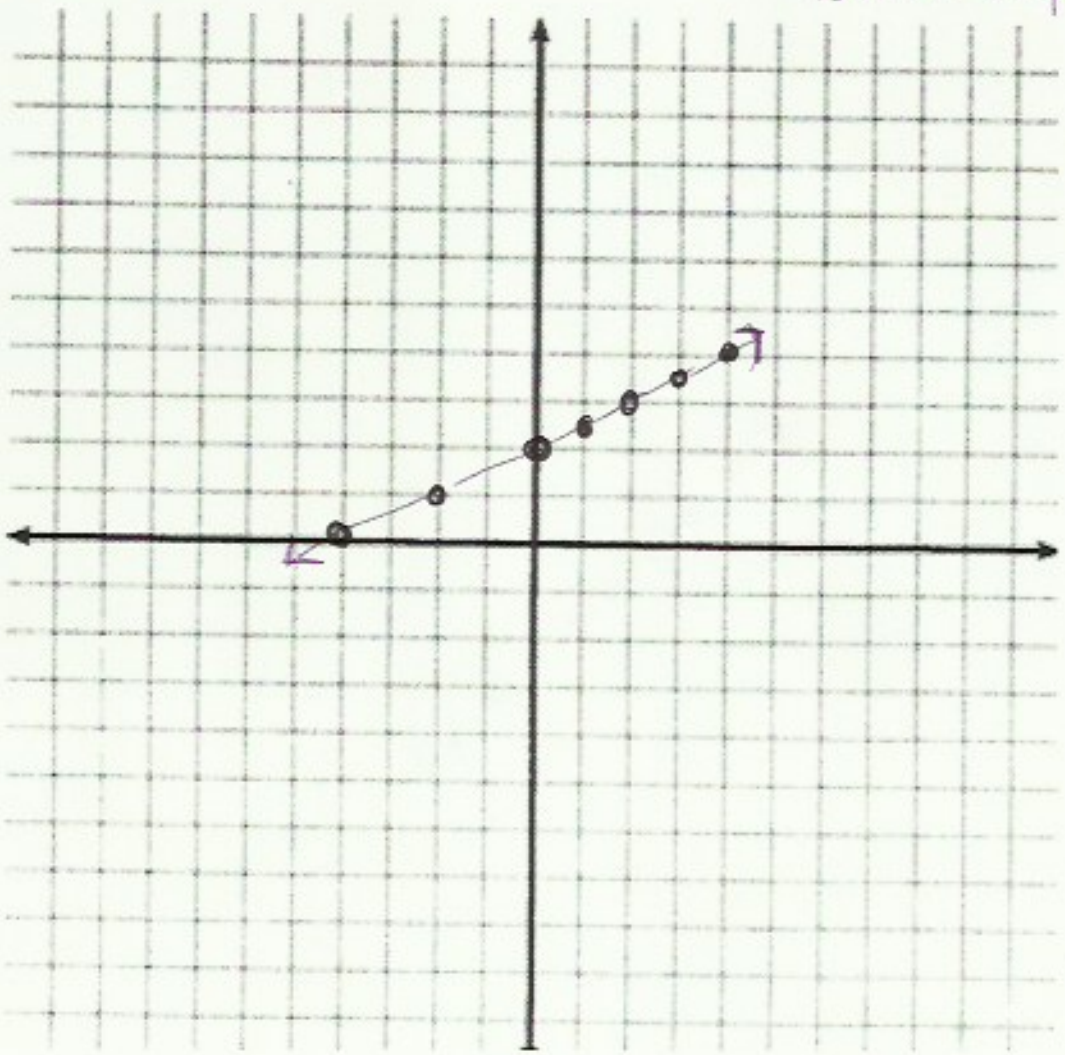
$$\text{Slope} = m = \frac{rise}{run} = \frac{y_2 - y_1}{x_2 - x_1}$$

Example #3
Complete the table for y=0.5x+2

X	-4	-2	0	1	2	3	4
Y	.5(-4)+2	1	.5(0)+2	.5(1)+2	3	3.5	.5(4)+2
	0		2	2.5			4

Term to term for Y
Term to term for X

Positive Slope



Equations of the form y=mx+b

$$y = mx + b$$

slope

rise (y) / run (x)

y-intercept

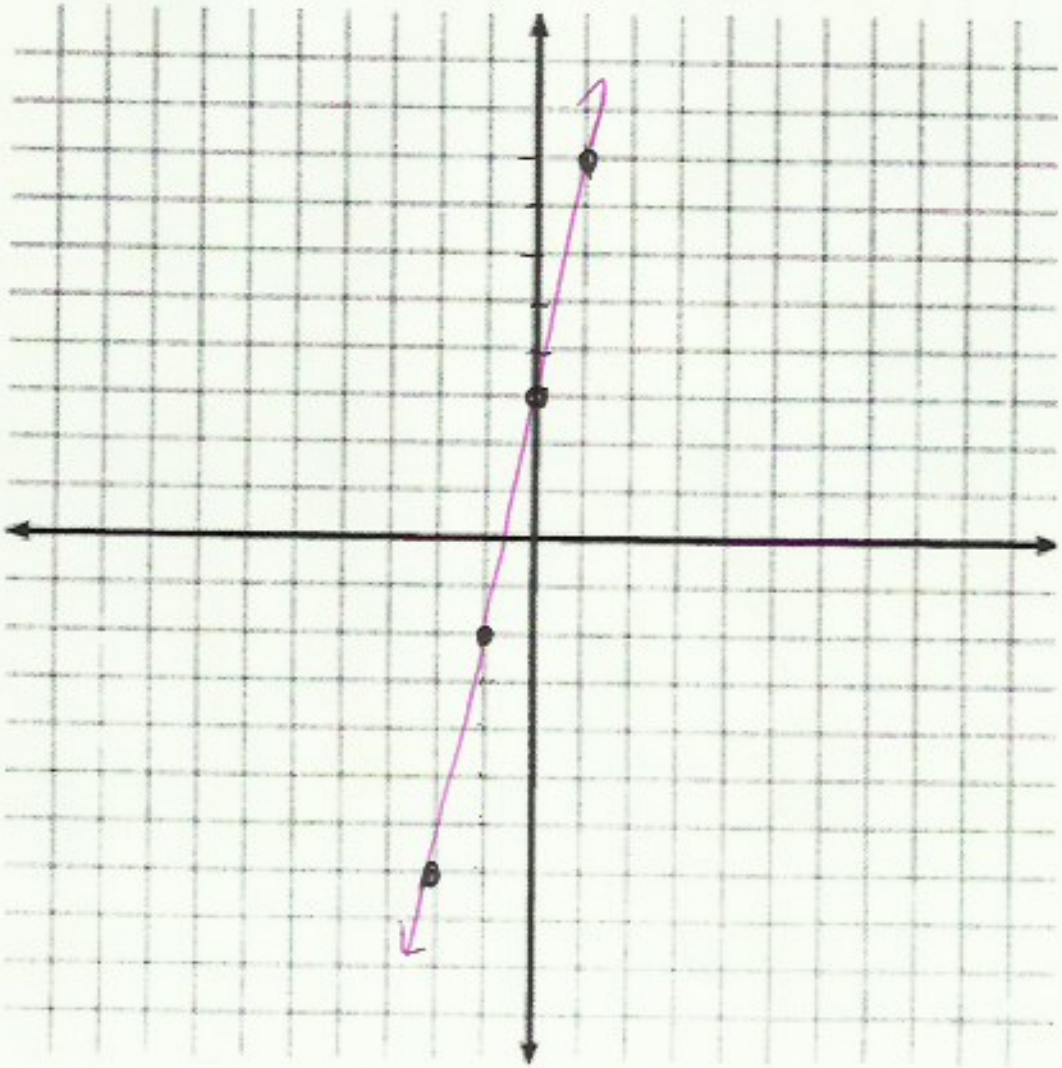
starting point on y-axis

Example #1

a) Graph $y = 5x + 3$ (3 = start) with slope and y-intercept

slope

Positive $\frac{5}{1}$

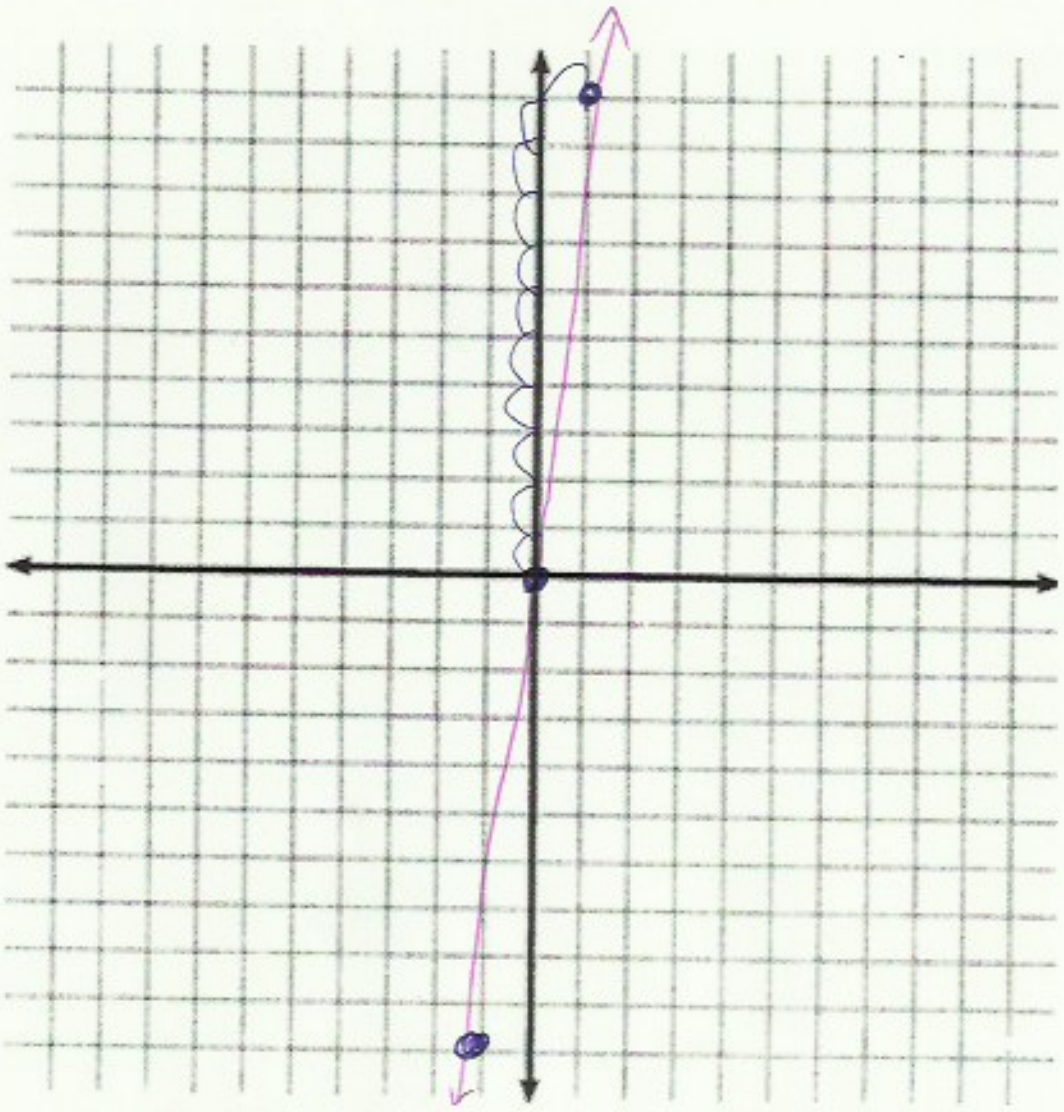


Example #2

$Y=\frac{10x}{1}$ +0

none, y-intercept

What would be the y-intercept? origin

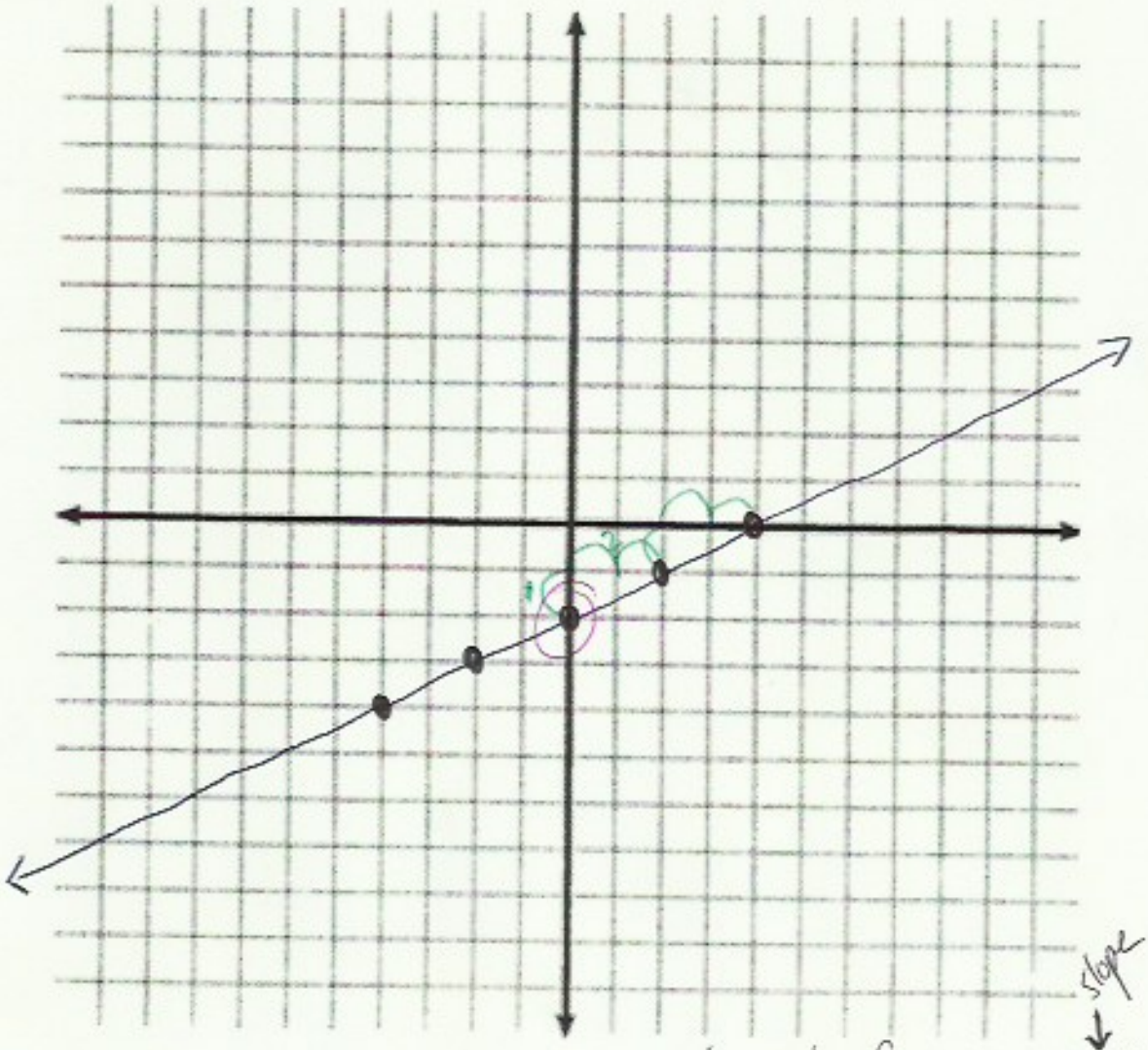


X	-3	-2	-1	0	1	2	3
Y	10(-3)	10(-2)	-10	10(0)	10	10(2)	10(3)
	-30	-20		0		20	30

Example #3

X	-4	-2	0	2	4
Y	-4	-3	-2	-1	0

A) Graph



B) Write the equation for the graph:

y-intercept form → $y = mx + b$ (slope = m, y intercept = b)

rise 1 -2

run 2

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

C) Show that (20,80) is not on the line.

x y

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

$80 = \frac{1}{2}(20) - 2$

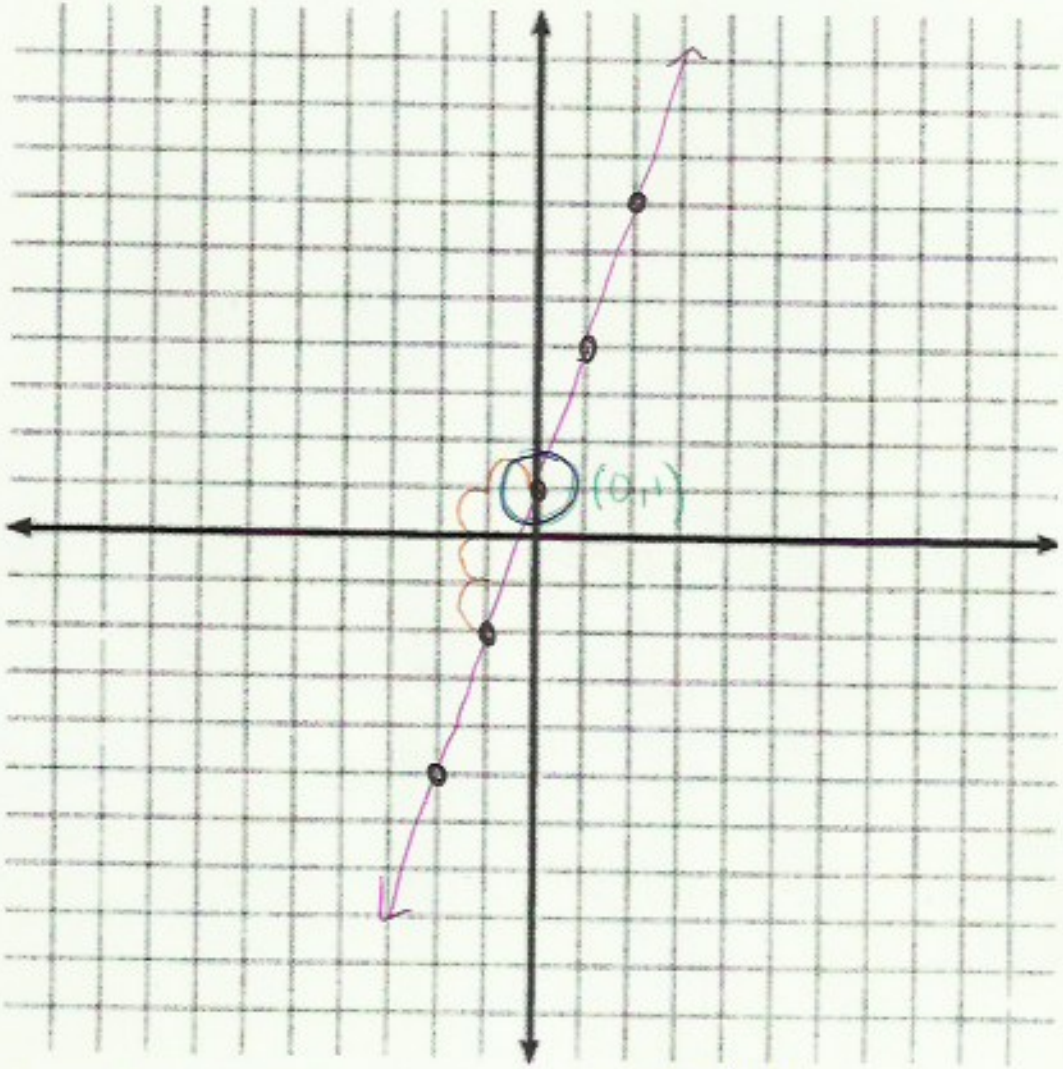
$80 = \frac{20}{2} - 2$

$80 = 10 - 2$

Example #4

X	-2	-1	0	1	2
Y	-5	-2	1	4	7

A) Graph



B) Write the equation for the graph:

$y = mx + b$

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

B) $y = 3x + 1$

C) Is (5, 80) on the line?

X Y NO

$y = 3x + 1$

C) $80 = 3(5) + 1$

$80 = 15 + 1$

$80 = 16$ no

D) What is y, when x=7?

D) $y = 3x + 1$

$y = 3(7) + 1$

$y = 21 + 1$

$y = 22$

The midpoint of a line segment 8gp1

Midpoint Formula

Mid-point Formula

$$\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$$

Example #1:

A (1,4) and B (5,2)

x_1 y_1 x_2 y_2

$$\left(\frac{1+5}{2}, \frac{4+2}{2}\right) \rightarrow \left(\frac{6}{2}, \frac{6}{2}\right) \rightarrow (3, 3)$$

Example #2:

C (-1,3) and D (3,-3)

x_1 y_1 x_2 y_2

$$\left(\frac{-1+3}{2}, \frac{3+(-3)}{2}\right) \rightarrow \left(\frac{2}{2}, \frac{0}{2}\right) \rightarrow (1, 0)$$

Example #3:

P (10,4) and Q (-4, -6)

x_1 y_1 x_2 y_2

$$\left(\frac{10+-4}{2}, \frac{4+(-6)}{2}\right) \rightarrow \left(\frac{6}{2}, \frac{-2}{2}\right) \rightarrow (3, -1)$$

Midpoint $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Segments in Shapes

Example #1:
A parallelogram has vertices at P (2, 5), Q (-2, 3), R (2, -1) and S (6,1). The diagonals are PR and QS. Are the diagonal midpoints the same length?

Example #2:
A quadrilateral has vertices at (-2,1), (0,4), (5, 2), and (1, -1). Do the diagonals have the same midpoint? Justify.

Practice:
Example #3: A square has vertices at A (2,3), B (3,-1), C (-1, -2), and D (-2,2)
The diagonals are AC and BD, Do they have the same midpoint?

example #1

$\left(\frac{2+2}{2}, \frac{5+-1}{2}\right)$

$(2, 2)$

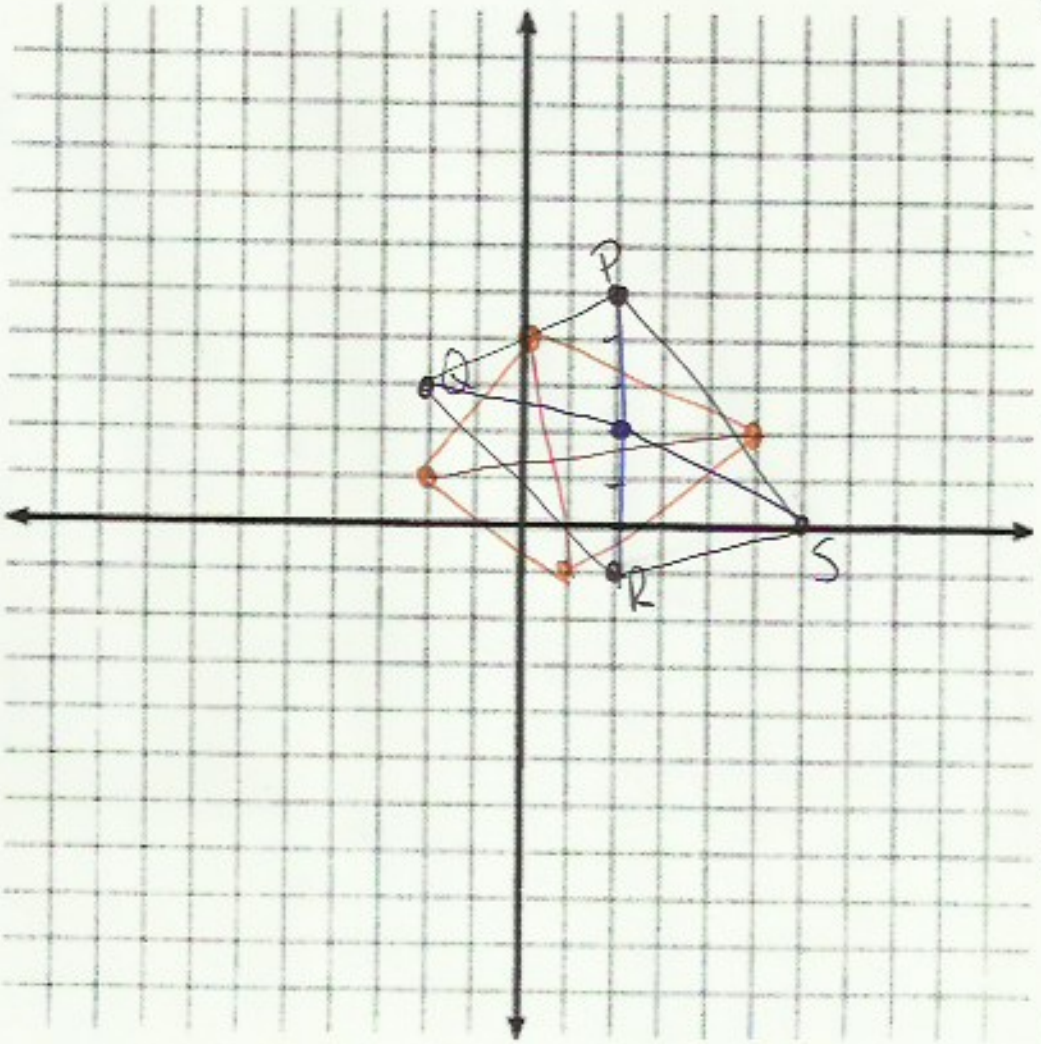
midpoint of PR

$\left(\frac{-2+6}{2}, \frac{3+1}{2}\right)$

$(2, 2)$

midpoint of QS

Yes, both are the same!



example #2

$\left(\frac{-2+5}{2}, \frac{1+2}{2}\right)$

$(1.5, 1.5)$

First diagonal

$\left(\frac{0+1}{2}, \frac{4+-1}{2}\right)$

$(.5, 1.5)$

Second diagonal

not, same midpoint!