Panel 1

SM2   HANDOUT 3-1 Equations of Lines
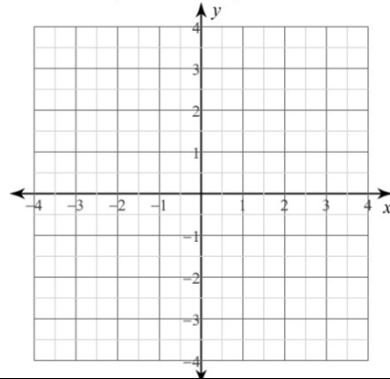
How can an equation "make" a line?

Fill in the rest of the table

$y = x + 1$

Graph the x-y pairs

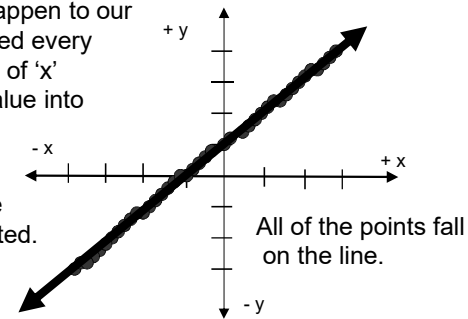| x	rule x + 1	y
-4	-4 + 1	-3
-3		
-2		
-1		
0		
1		
2		
3		

Panel 2

$y = x + 1$

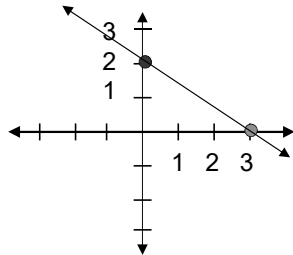So far, we've used integers and #'s halfway in between.

How many numbers are there between any 2 integers?.

What would happen to our graph if we used every possible value of 'x' as an input value into the function?
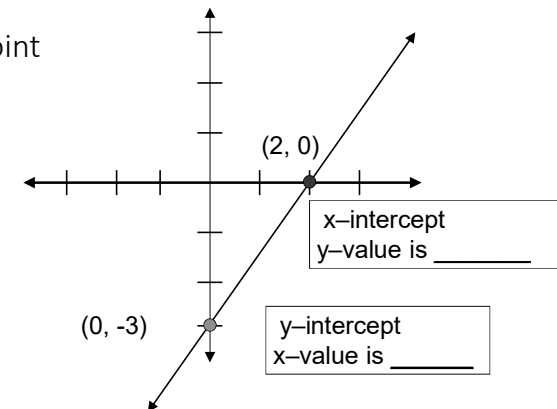
More and more points are plotted.

+ y

- x

+ x

- y

All of the points fall on the line.

Panel 3

1. What are the coordinates [(x, y) pair] of the x-intercept?

2. What are the coordinates [(x, y) pair] of the y-intercept?

3. What is the y-coordinate of the x-intercept?
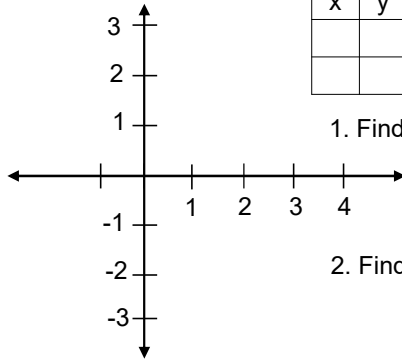
4. What is the x-coordinate of the y-intercept?

Panel 4

Key Point

(2, 0)

x–intercept
y–value is _____

(0, -3)

y–intercept
x–value is _____

Standard form of a linear equation: An equation
Of the form: Ax + By = C.   Example: 3x + 4y = 12
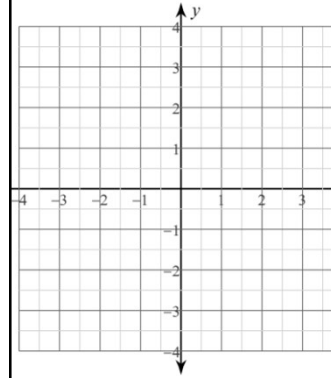
Graphing Standard form equations.

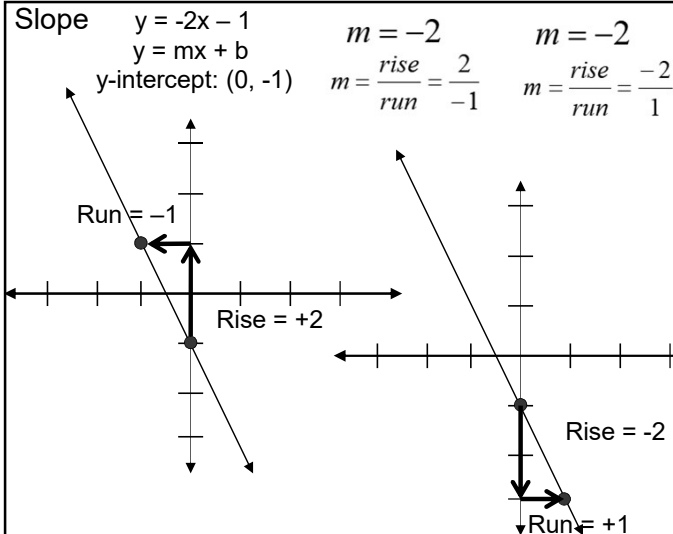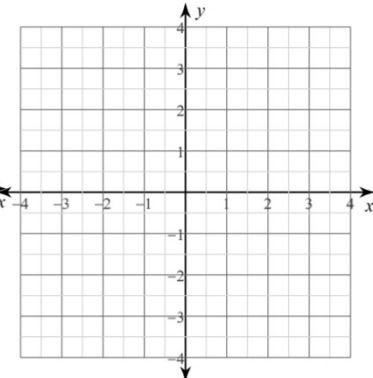| x	y	Ordered Pair

1. Find the y-intercept (let x = 0)

2. Find the x-intercept (let y = 0)

Graph the lines.

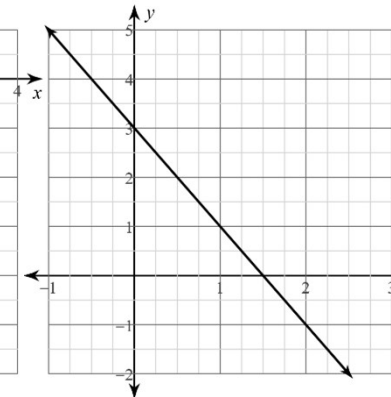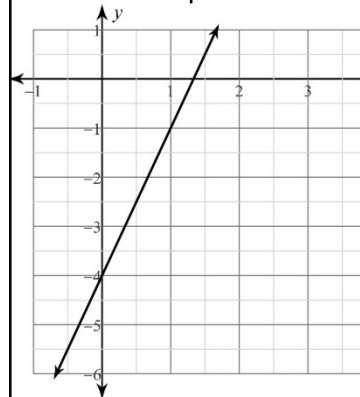2x + 3y = 6   -4x + 2y = 8
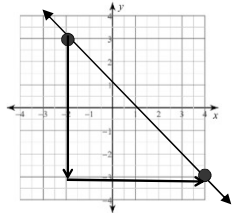

Slope   y = -2x – 1
         y = mx + b
    y-intercept: (0, -1)

$$m = -2$$
$$m = \frac{rise}{run} = \frac{2}{-1}$$

$$m = -2$$
$$m = \frac{rise}{run} = \frac{-2}{1}$$

Run = –1

Rise = +2

Rise = -2

Run = +1

What is the equation of the line?

Find the equation of a that passes through 2 points.

(-2, 3) and (4, -3)

Pick either point and substitute for x and y in the equation:

(3) = (-1)(-2) + b

Solve for 'b' (the y-intercept)

(3) = 2 + b

-2   -2

1= b

y = -x + 1

negative slope!

Rise = -6

Run = 6

$$m = \frac{rise}{run} = \frac{-6}{6} = -1$$

y = (-1)x + b

Find the equation of a that passes through 2 points.

(3, -1) and (-2, 2)

What is the slope and y-intercept of the following equation?

$$2x - 3y = 6$$

Convert the following equation to "slope intercept form"

Re-write slope intercept form as standard form

$$y = 2x + 2$$

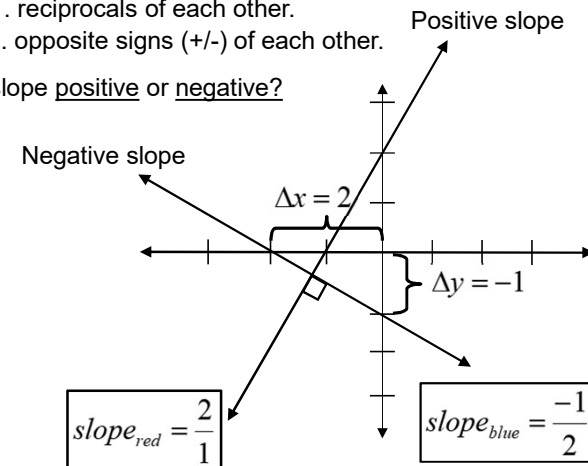Slope-intercept → standard form

Parallel → same slope   y = mx + b

Write the equation of a line that is parallel to the line
y = 2x + 1 and passes through the point (0, 4)

Write the equation of a line that is parallel to the line
y = 3x − 4 and passes through the point (3, 8)

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slopes of perpendicular lines are
    1. reciprocals of each other.
    2. opposite signs (+/−) of each other.

Positive slope

Is the slope underline positive or negative?

Negative slope

$\Delta x = 2$

$\Delta y = -1$

$slope_{red} = \dfrac{2}{1}$

$slope_{blue} = \dfrac{-1}{2}$

What two things do we know about the slopes of perpendicular lines?

The slopes of perpendicular lines are
    of each other.

What is the slope a line that is perpendicular to each of the following?

$y = 2x + 1$

$y = \dfrac{5}{9}x + 2$

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

$y = -\dfrac{1}{6}x - 7$

Find the slope intercept form of a line that is perpendicular to the line:
$$y = 2x - 6 \quad \text{and passes through the point (0, 1)}$$

Find the slope intercept form of a line that is perpendicular to the line:
$$y = \dfrac{1}{5}x - 8 \quad \text{and passes through the point (5, 2)}$$