

?

Learning Goals

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Getting our Minds on Math-Part 1

What do you notice about these representations? Explain.

Words

The starting point is 5 and the rate of change is $-\frac{1}{2}$.

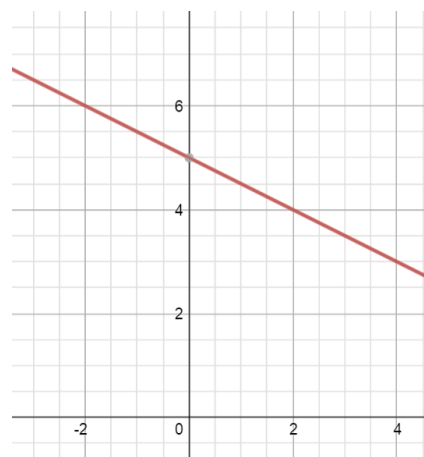
Equation

$$y = -\frac{1}{2}x + 5$$

Table


| x | y |
|----|-----|
| -2 | 6 |
| -1 | 5.5 |
| 0 | 5 |
| 1 | 4.5 |
| 2 | 4 |


Graph

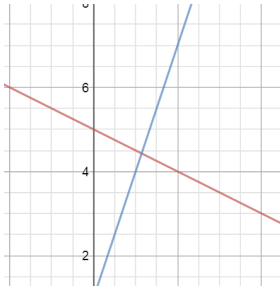




Getting our Minds on Math-Part 2

These are **systems**


1  $y = -\frac{1}{2}x + 5$


2  $y = 3x + 1$

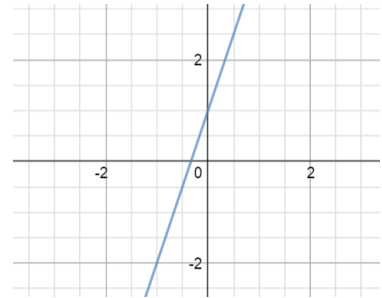


| x_1 |  y_1 |
|-------|---|
| -2 | 6 |
| -1 | 5.5 |
| 0 | 5 |
| 1 | 4.5 |
| 2 | 4 |
| x_2 |  y_2 |
| -2 | -5 |
| -1 | -2 |
| 0 | 1 |
| 1 | 4 |
| 2 | 7 |

These are NOT **systems**

2  $y = 3x + 1$

| x_1 |  y_1 |
|-------|---|
| -2 | 6 |
| -1 | 5.5 |
| 0 | 5 |
| 1 | 4.5 |
| 2 | 4 |



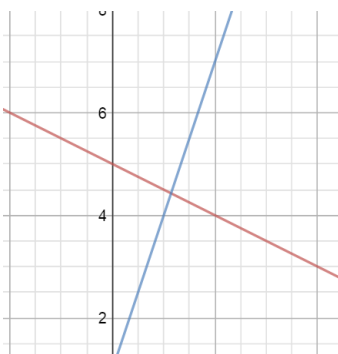
What's a system?

Getting our Minds on Math-Part 3



Desmos 

What is the **solution** to the system in a)? in b)?


a)




b)

| x |  $-2x - 3$ |
|-----|---|
| -2 | 1 |
| -1 | -1 |
| 0 | -3 |
| 1 | -5 |
| 2 | -7 |
| x |  $-x - 2$ |
| -2 | 0 |
| -1 | -1 |
| 0 | -2 |
| 1 | -3 |
| 2 | -4 |

c)

1  $2x + 3y = 6$

2  $y = 4x - 5$

What about c)?



What are solutions to syst

Take Action: Part 1

$$\begin{array}{l} 1 \\ 2 \end{array} \left. \begin{array}{l} 2x + 3y = 6 \\ y = 4x - 5 \end{array} \right\}$$

Choose a method, from below, and find the solution to this system of linear equations.

Method 1: Graphing Tech

Use the Desmos app

(or website: www.desmos.com)



Method 2: Graph by hand (grid on the next slide)

Note: Eqn 1 needs to be put into a 'graph-ready' form. Follow the instructions for Method 3.

Method 3: Solve using a table of values (template on next slide)

Note: Eqn 1 ($2x + 3y = 6$) is in standard form.

-Two options for getting the equation 'graph-ready':

i) convert to $y = mx + b$ form

ii) Get the x- and y-intercepts

To get the x- and y-intercepts, ask and answer the following, two questions:

If $x = 0$, what would $y = ?$ $y\text{-int} = (0, 2)$

$$2(0) + 3y = 6 \rightarrow 3y = 6 \rightarrow y = 2$$

If $y = 0$, what would $x = ?$

$$2x + 3(0) = 6 \rightarrow 2x = 6 \rightarrow x = 3$$

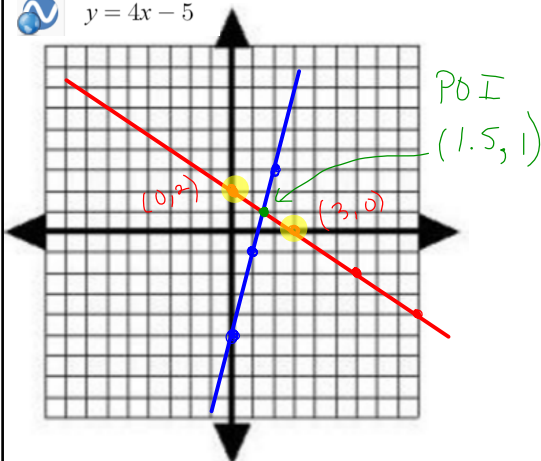
$$x\text{-int} = (3, 0)$$

Take Action: Part 1 (contd.)

Method 2: Graph by Hand

$$1 \quad 2x + 3y = 6 \rightarrow y = -\frac{2}{3}x + 2$$

$$2 \quad y = 4x - 5$$



Method 3: Using a Table of Values

| x | $-\frac{2}{3}x + 2$ | x | $4x - 5$ |
|------|--------------------------|------|----------|
| -1 | $-\frac{2}{3}(-1) + 2$ | -1 | -9 |
| -0.5 | $-\frac{2}{3}(-0.5) + 2$ | -0.5 | -7 |
| 0 | 2 | 0 | -5 |
| 0.5 | $-\frac{2}{3}(0.5) + 2$ | 0.5 | -3 |
| 1 | | 1 | -1 |
| 1.5 | | 1.5 | 1 |
| 2 | | 2 | 3 |

E.g. $x = -1$:

$$4(-1) - 5 = -4 - 5 = -9$$

The solution is: $(1.5, 1)$

$$2x + 3y = 6$$

$$2x + 3y = 6$$

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

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

y-int
slope

| LS | RS |
|--------|--|
| y 1 | $4x - 5$ $4(1.5) - 5$ $6 - 5$ 1 |

If POI is $(x, y) = (1.5, 1)$ then we should be able to substitute $x = 1.5$ and $y = 1$ into both equations to see if the left and right sides equal each other.

| LS | RS |
|--|----|
| $2x + 3y$ $2(1.5) + 3(1)$ $3 + 3$ 6 | 6 |

x- and y-intercepts (for graphing lines)

- a better way to graphing standard form equations, $Ax + By = C$
- e.g., Find the x- and y-intercepts, then sketch the graph of the system

$$x + 2y = -5 \quad (1)$$

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

For (1):

Set $x = 0$:

$$0 + 2y = -5$$

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

$$y = -2.5$$

$\therefore (0, -2.5)$ is the y-int.

Set $y = 0$:

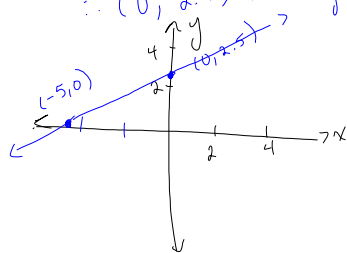
$$x + 2y = -5$$

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

$$x + 0 = -5$$

$$x = -5$$

$\therefore (-5, 0)$ is the x-int.



Skill Building Practice

For each system below, ...

- get the system 'graph-ready'
 - > i.e., if an equation is in standard form, ...
 - convert it to $y = mx + b$ form OR
 - find its x- and y-intercepts
- graph the system on grid paper
- record the solution to the system (i.e., the coordinates for the point of intersection, (x, y))
- verify the point of intersection using graphing technology (e.g., Desmos)

a)

b)

c)