

Objectives

The student will be able to:

1. graph linear functions.
2. write equations in standard form.

Graphing Steps

- 1) Isolate the variable (solve for y).
- 2) Make a t-table. If the domain is not given, pick your own values.
- 3) Plot the points on a graph.
- 4) Connect the points.



1) Review: Solve for y

1. Draw “the river”
2. Subtract $2x$ from both sides

$$\begin{array}{r|l} 2x + y = 4 & \\ - 2x & - 2x \\ \hline & y = -2x + 4 \end{array}$$

2) Solve for y:

1. Subtract $4x$
2. Simplify
3. Divide both sides by 2
4. Simplify

$$\begin{array}{r|l} 4x + 2y = -6 & \\ - 4x & - 4x \\ \hline & 2y = -4x - 6 \\ & \frac{2}{2} \quad \frac{2}{2} \\ & y = -2x - 3 \end{array}$$



3) Solve for y :

1. Subtract x
2. Simplify
3. Divide both sides by -3
4. Simplify

$$\begin{array}{r} x - 3y = 6 \\ -x \qquad \qquad -x \\ \hline -3y = -x + 6 \\ \hline -3 \qquad \qquad -3 \\ \hline y = \frac{-x + 6}{-3} \\ \text{or} \\ y = \frac{x}{3} - 2 \end{array}$$

Review: Make a t-table

If $f(x) = 2x + 4$, complete a table using the domain $\{-2, -1, 0, 1, 2\}$.

x	f(x)	<u>ordered pair</u>
-2	$2(-2) + 4 = \mathbf{0}$	$(-2, 0)$
-1	$2(-1) + 4 = \mathbf{2}$	$(-1, 2)$
0	$2(0) + 4 = \mathbf{4}$	$(0, 4)$
1	$2(1) + 4 = \mathbf{6}$	$(1, 6)$
2	$2(2) + 4 = \mathbf{8}$	$(2, 8)$



Given the domain $\{-2, -1, 0, 1, 2\}$,
graph $3x + y = 6$

1. Solve for y:

Subtract $3x$

$$\begin{array}{r} 3x + y = 6 \\ - 3x \quad \quad - 3x \\ \hline y = -3x + 6 \end{array}$$

2. Make a table

<u>x</u>	<u>$-3x + 6$</u>	<u>ordered pair</u>
-2	$-3(-2) + 6 = 12$	$(-2, 12)$
-1	$-3(-1) + 6 = 9$	$(-1, 9)$
0	$-3(0) + 6 = 6$	$(0, 6)$
1	$-3(1) + 6 = 3$	$(1, 3)$
2	$-3(2) + 6 = 0$	$(2, 0)$



5) Given the domain $\{-2, -1, 0, 1, 2\}$,
graph $3x + y = 6$

3. Plot the points
 $(-2, 12)$, $(-1, 9)$, $(0, 6)$, $(1, 3)$,
 $(2, 0)$

4. Connect the points.

Bonus questions!

What is the x-intercept?

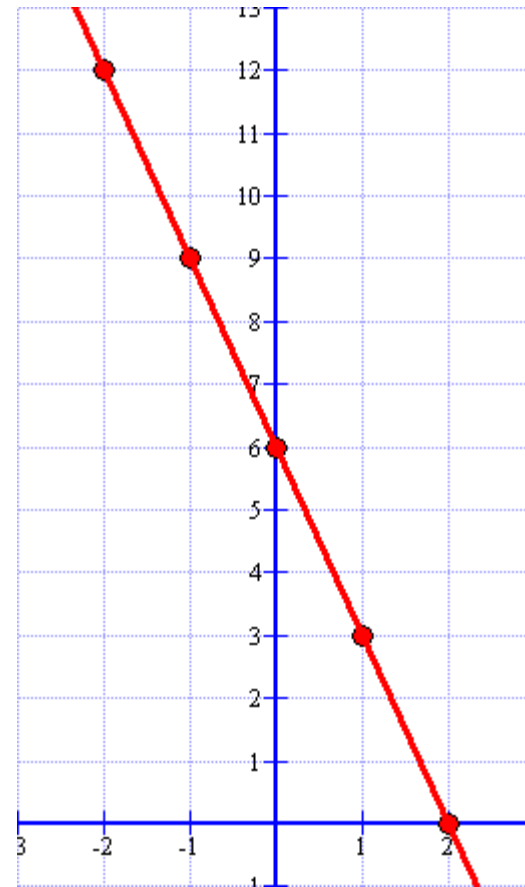
$(2, 0)$

What is the y-intercept?

$(0, 6)$

Does the line increase or decrease?

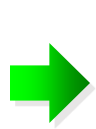
Decrease



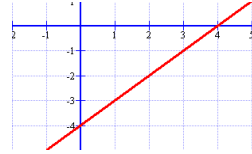


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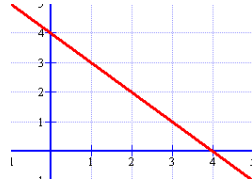
Which is the graph of $y = x - 4$?



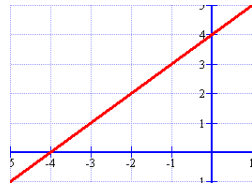
1.



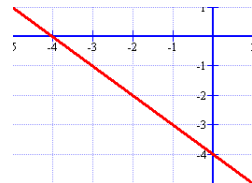
2.



3.



4.





Standard Form

$$Ax + By = C$$

A, B, and C have to be integers

An equation is LINEAR (the graph is a straight line) if it can be written in standard form.

This form is useful for graphing (later on...).



Determine whether each equation is a linear equation.

1) $4x = 7 + 2y$

Can you write this in the form

$$Ax + By = C?$$

$$4x - 2y = 7$$

$$A = 4, B = -2, C = 7$$

This is linear!



Determine whether each equation is a linear equation.

2) $2x^2 - y = 7$

Can you write it in standard form?

NO - it has an exponent!

Not linear

3) $x = 12$

$$x + 0y = 12$$

$$A = 1, B = 0, C = 12$$

Linear



Here's the cheat sheet! An equation that is linear does NOT contain the following:

1. Variables in the denominator

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

2. Variables with exponents

$$y = x^2 - 3$$

3. Variables multiplied with other variables.

$$xy = 12$$



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Is this equation linear?

$$x = 4y + 3$$

- ✓ 1. Yes
- 2. No

Standard Form

$$x - 4y = 3$$



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Is this equation linear?

$$9 = 4y^2 + x$$

1. Yes
- ✓ 2. No

Exponents are
not allowed!



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$$y = -3$$

- ✓ 1. Yes
- 2. No

Standard Form

$$0x + y = -3$$