Warm Up:
Solve the following:

$\frac{15}{x} = \frac{2.5}{7}$

$\frac{105}{2.5} = \frac{2.5x}{2.5}$

$x = 42$

$\frac{y}{12} = \frac{77}{84}$

$84y =$

Because percents can be expressed as ratios, you can use the proportion $\frac{\text{percent}}{100} = \frac{\text{part}}{\text{whole}}$ to solve percent problems.

Just use the above formula for solving word problems. The percent stays a whole number and think what is the whole group and what is the percentage group?

A poll taken one day before an election showed that 22.5% of voters planned to vote for a certain candidate. If 1800 voters participated in the poll, how many indicated that they planned to vote for that candidate?

$$\frac{\%}{100} = \frac{\text{Part}}{\text{Whole}}$$

$$\frac{22.5}{100} \times \frac{x}{1800}$$

$$\frac{100x}{100} = \frac{40503}{100}$$

$$x = 405$$

At Clay High School, 434 students, or 35% of the students, play a sport. How many students does Clay High School have?

$$\frac{35}{100} \times \frac{434}{x}$$

$$\frac{35x}{35} = \frac{43400}{35}$$

$$x = 1240$$

A **rate** is a ratio that involves two different units. You are familiar with many rates, such as miles per hour (mi/h), words per minute (wpm), or dollars per gallon of gasoline. Rates can be helpful in solving many problems.

Ryan ran 600 meters and counted 482 strides. How long is Ryan's stride in inches? (*Hint:* 1 m ≈ 39.37 in.)

$$\frac{600}{482} = 1.24 \text{ m}$$

$$1.24 \cdot 39.37$$

$$= 48.81 \text{ in}$$

Luis ran 400 meters in 297 strides. Find his stride length in inches.

$1m = 39.37in$

$\frac{400}{297} = 1.35\,m \cdot 39.37in$

$= 53.02in$

I need a volunteer. This room is 9 meters long.

$\in 1:$

Volunteer walk from back white board to front. How many strides?

12.5

What is their stride length in inches?
1m=39.37in

$\frac{9}{12.5} = .72 \cdot 39.37 =$

Similar figures have the same shape but not necessarily the same size. Two figures are **similar** if their corresponding angles are congruent and corresponding sides are proportional.

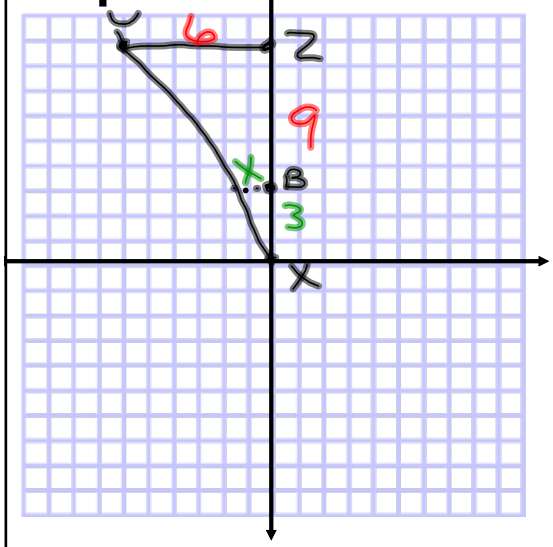
You can use knowledge from Geometry to find similar figure lengths. To solve these problems:
1) Graph what you are given
2) Set up a proportion to find missing side lengths.

$$\frac{\Delta 1}{\Delta 2} = \frac{\Delta 1}{\Delta 2}$$

ΔXYZ has vertices $X(0, 0)$, $Y(-6, 9)$ and $Z(0, 9)$.

ΔXAB is similar to ΔXYZ with a vertex at $B(0, 3)$.

Graph ΔXYZ and ΔXAB on the same grid.



$$\frac{\Delta 1}{\Delta 2} = \frac{\Delta 1}{\Delta 2}$$

$$\frac{x}{6} = \frac{3}{9}$$

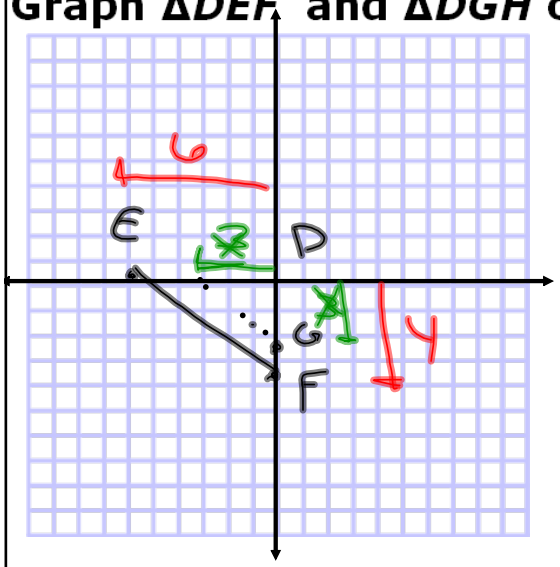
$$9x = 18$$

$$x = 2$$

ΔDEF has vertices $D(0, 0)$, $E(-6, 0)$ and $F(0, -4)$.

ΔDGH is similar to ΔDEF with a vertex at $G(-3, 0)$.

Graph ΔDEF and ΔDGH on the same grid.



$$\frac{3}{6} = \frac{x}{4}$$

$$12 = 6x$$

$$x = 2$$

You can also estimate heights and lengths using similar triangles. To solve these problems:

1) Draw a picture (it helps to see)
2) Set up a proportion using similar sides and solve.

The tree in front of Luka's house casts a 6-foot shadow at the same time as the house casts a 22-fot shadow. If the tree is 9 feet tall, how tall is the house?

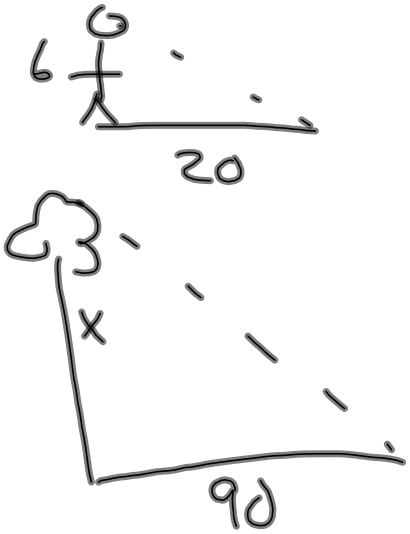
$$\frac{9}{6} = \frac{x}{22}$$

$$\frac{9}{x} \times \frac{6}{22}$$

$$\frac{6x}{6} = \frac{198}{6}$$

$$x = 33$$

A 6-foot-tall climber casts a 20-foot long shadow at the same time that a tree casts a 90-foot long shadow. How tall is the tree?



$$\frac{6}{x} = \frac{20}{90}$$

$$540 = 20x$$

$$x = 27$$

2-3 Graphing Linear Functions

Objectives

Determine whether a function is linear.

Graph a linear function given two points, a table, an equation, or a point and a slope.

2-3 Graphing Linear Functions

Vocabulary

linear function
slope
y-intercept
x-intercept
slope-intercept form

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Functions that are linear have a constant change, also known as a constant slope.
To find if a table is linear:

1) Find the differences between consecutive x and y values.
2) Is the difference of y divided by the difference of x the same for all?

Determine whether the data set could represent a linear function.

		+2	+2	+2
x	−2	0	2	4
$f(x)$	2	1	0	−1
		−1	−1	−1

Linear

Determine whether the data set could represent a linear function.

	+1	+1	+1	
x	2	3	4	5
$f(x)$	2	4	8	16
	+2	+4	+8	

Not Linear

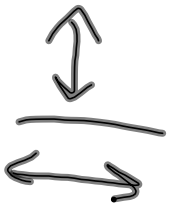
Determine whether the data set could represent a linear function.

	+7	+7	+7	
x	4	11	18	25
$f(x)$	−6	−15	−24	−33
	−9	−9	−9	

Determine whether the data set could represent a linear function.

x	10	8	6	4
$f(x)$	7	5	1	−7

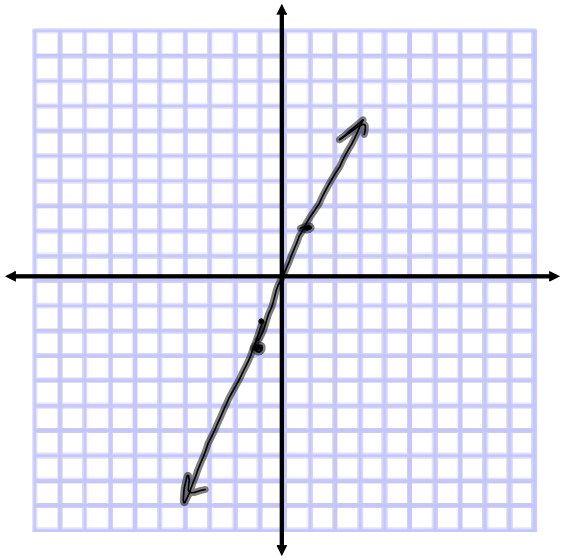
The slope of a linear function is the constant ratio of y divided by x, also known as...

$\frac{-1}{4} \rightarrow \frac{-1}{4}$ $\frac{\text{rise}}{\text{run}}$ 

To graph with a point and slope:
1) Plot point.
2) Use slope to plot more points and connect. The top number is your rise (up/down), the bottom number is run (left/right)

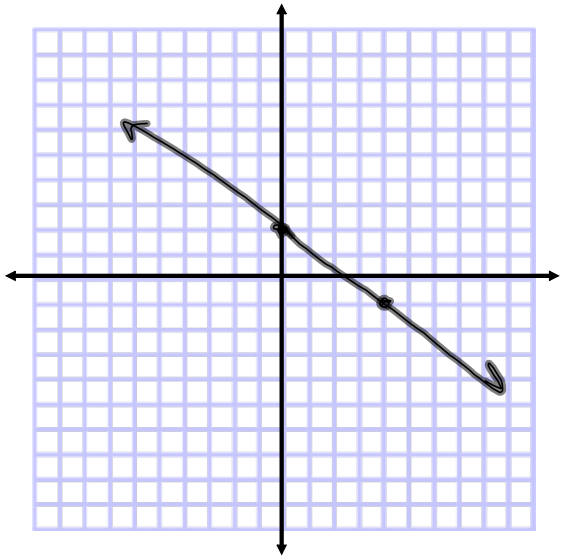
Graph the line with slope $\frac{5}{2}$ that passes through (–1, –3).

$\frac{5}{2}$ → ↑5, → →2

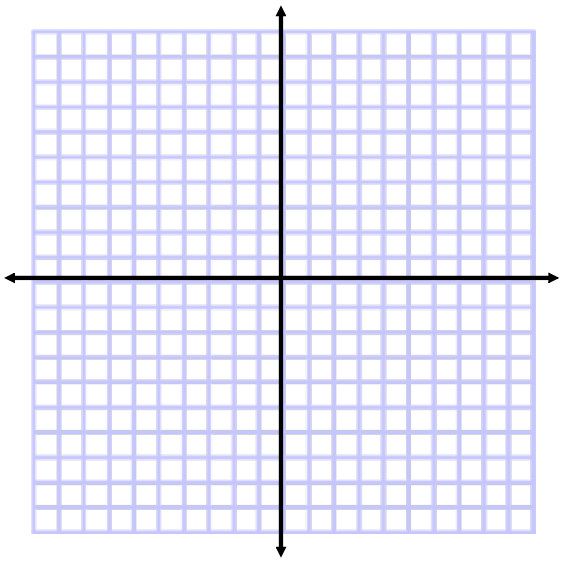


Graph the line with slope $-\frac{3}{4}$ that passes through (0, 2).

$\frac{-3}{4}$ → ↓3, → →4

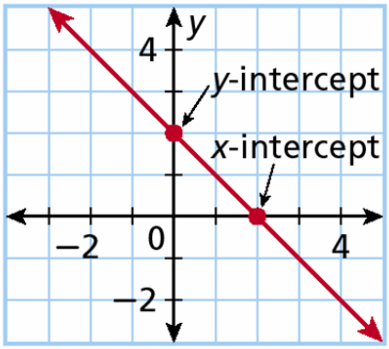


Graph the line with slope $\frac{4}{3}$ that passes through (3, 1).



Choose a point. Choose a slope. Now graph it.

The ***y*-intercept** is the *y*-coordinate of a point where the line crosses the *x*-axis.



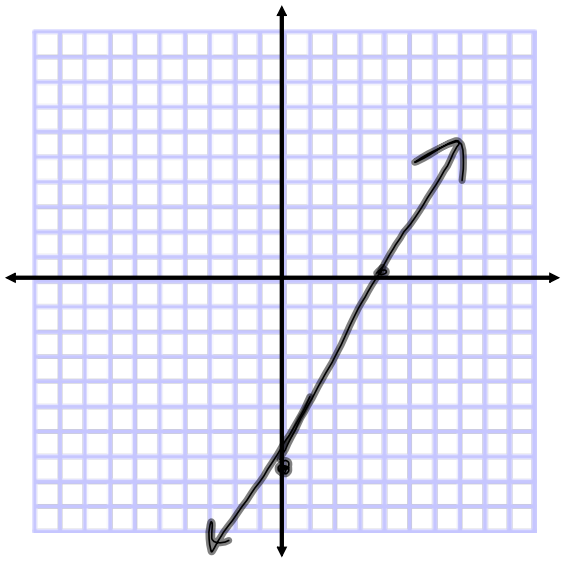
The ***x*-intercept** is the *x*-coordinate of a point where the line crosses the *y*-axis.

To find the intercepts:

1) To find x-intercept: Plug in 0 for y, and solve for x

2) To find y-intercept: Plug in 0 for x, and solve for y.

Find the intercepts of $4x - 2y = 16$, and graph the line.



y-int:

$4 \cdot 0 - 2y = 16$

$-2y = 16$

$y = -8$

$(0, -8)$

x-int:

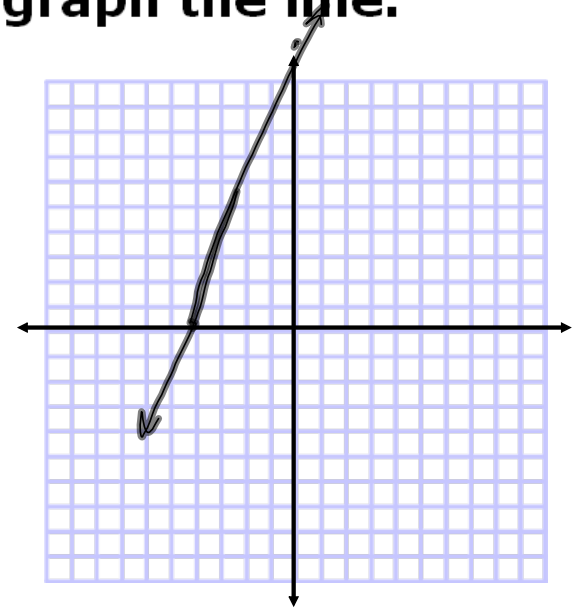
$4x - 2 \cdot 0 = 16$

$4x = 16$

$x = 4$

$(4, 0)$

Find the intercepts of $6x - 2y = -24$, and graph the line.



x-int:

$6x = -24$

$x = -4$

y-int:

$-2y = -24$

$y = 12$

Write your own equation.
Find the intercepts.

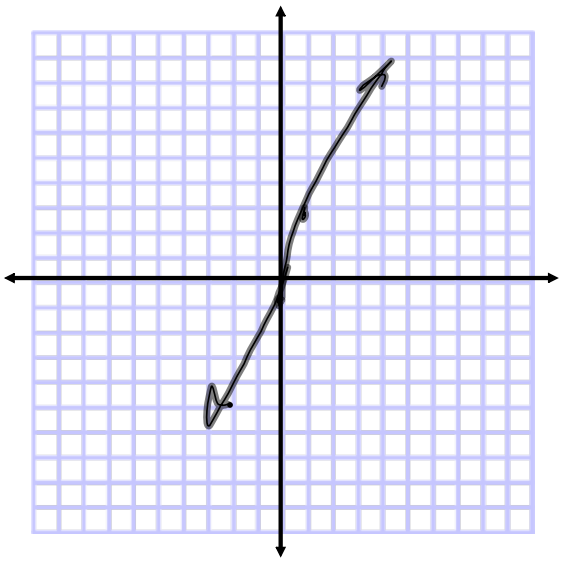
Linear functions can also be expressed as linear equations of the form $y = mx + b$. When a linear function is written in the form $y = mx + b$, the function is said to be in **slope-intercept form** because m is the slope of the graph and b is the y-intercept. Notice that slope-intercept form is the equation solved for y.

m → slope
b → y-intercept

To write in slope-intercept form:

1) Solve for y to get y= __x +__

Write the function $-4x + y = -1$ in slope-intercept form. Then graph the function.

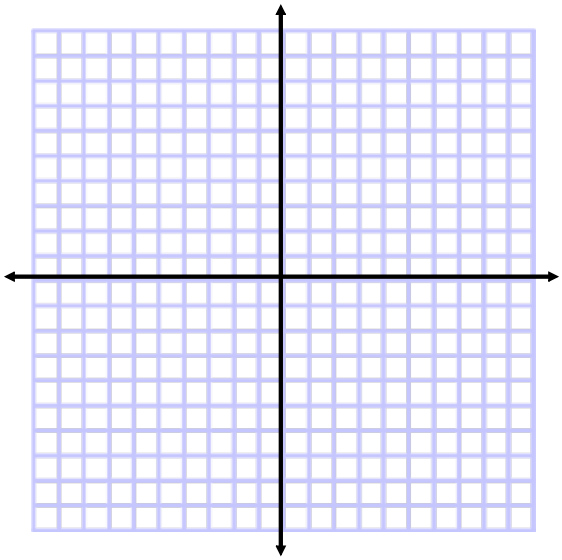


$-4x+y=-1$

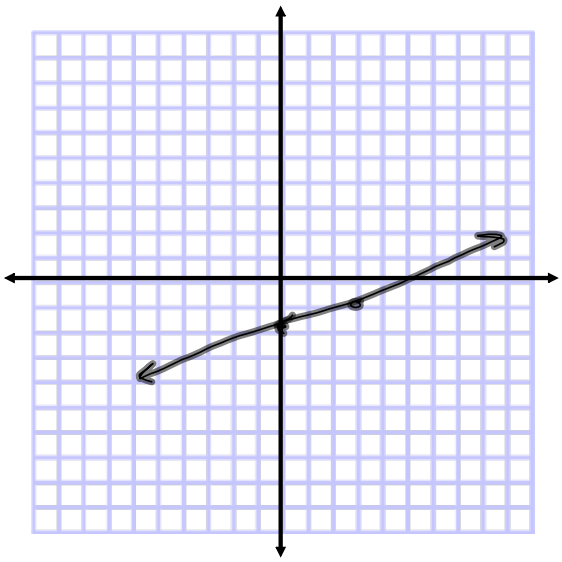
$+4x \quad +4x$

$y=4x-1$

Write the function $x + \frac{3}{4}y = 6$ in slope-intercept form. Then graph the function.



Write the function $5x = 15y + 30$ in slope-intercept form. Then graph the function.

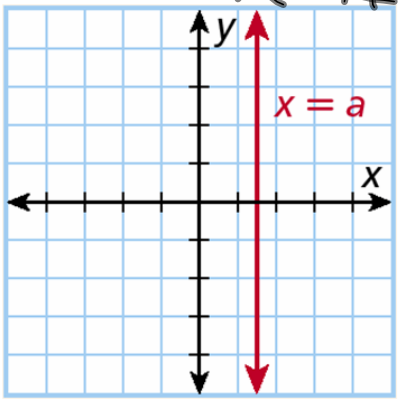


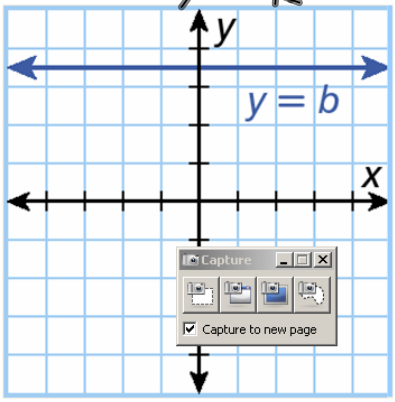
$y = \frac{1}{3}x - 2$

2-3 Graphing Linear Functions

Vertical and Horizontal Lines

Vertical Lines	Horizontal Lines
The line $x = a$ is a vertical line at a.	The line $y = b$ is a vertical line at b.





2-3 Graphing Linear Functions

Example 5: Graphing Vertical and Horizontal Lines

Determine if each line is vertical or horizontal.

A. $x = 2$

Vert

B. $y = -4$

Horz

2-3 Graphing Linear Functions

Check It Out! Example 5

Determine if each line is vertical or horizontal.

A. $y = -5$

B. $x = 0.5$

Homework:

p. 101 #18-21, 30, 33
p. 110 # 22-38 (evens), 50, 52

Present: p.101 #33
p.110 #50