

3.1 Reading Graphs and Plotting Points

Need to Know



- Graph a Scatter Diagram
- Graph a Bar Graphs
- The Coordinate System
- Graphing Ordered Pairs

Rainfall Data for San Diego

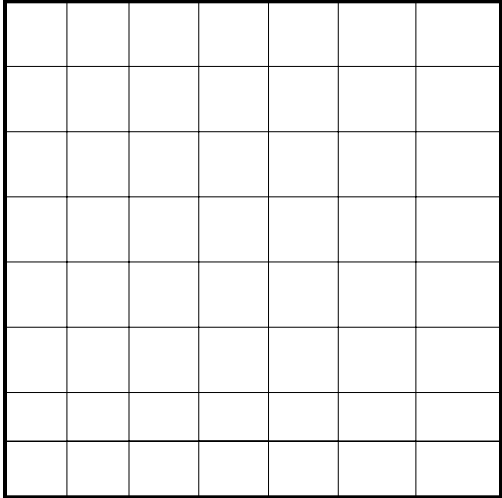
California Department of Water Resources
Monthly Precipitation for 2000.

San Diego Nws-Lindbergh	13' (SDG)	Precip Average %-avg	.18	3.68	1.00	2.05	1.92	1.61	9%	192%	62%															
.54	.00	.00	.00	.01	.00	.00	.04	.32	.76	.21	.07	.02	.09	.18	.42	1.13	1.91	71%	0%	0%	0%	11%	0%	0%	4%	17%

<http://cdec.water.ca.gov/cgi-progs/reports/PRECIPOUT.BSN.2000.html>

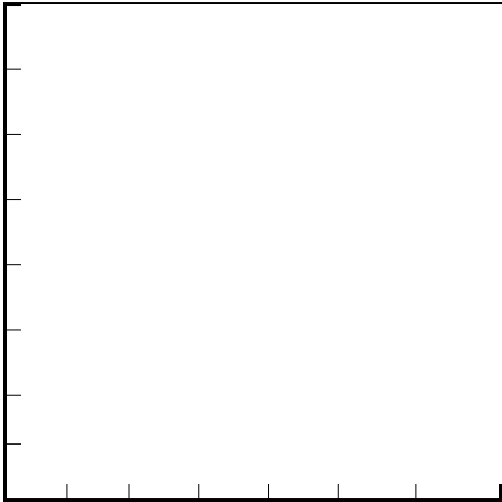
Graph a Scatter Diagram

Month	Rain(in)
Jan	2.05
Mar	1.61
May	.21
July	.02
Sept	.18
Nov	1.13



Graph a Bar Graph

Month	Rain(in)
Jan	2.05
Mar	1.61
May	.21
July	.02
Sept	.18
Nov	1.13



The Coordinate System

Vocabulary

X-axis

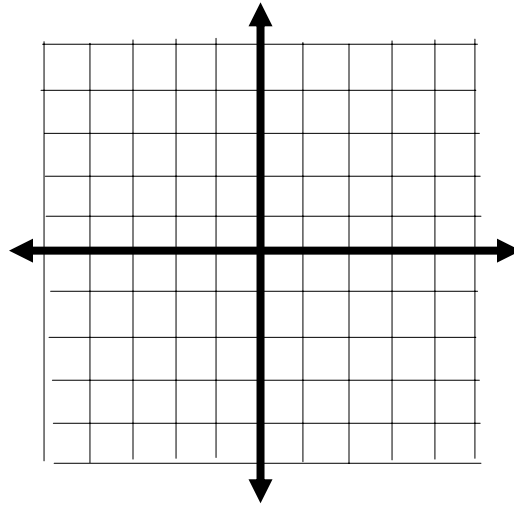
Y-axis

Ordered Pair

(x, y)

Origin $(0,0)$

Quadrants I,
II, III, IV



Graphing Ordered Pairs

Ordered Pairs

$(3, 2)$

$(3, -2)$

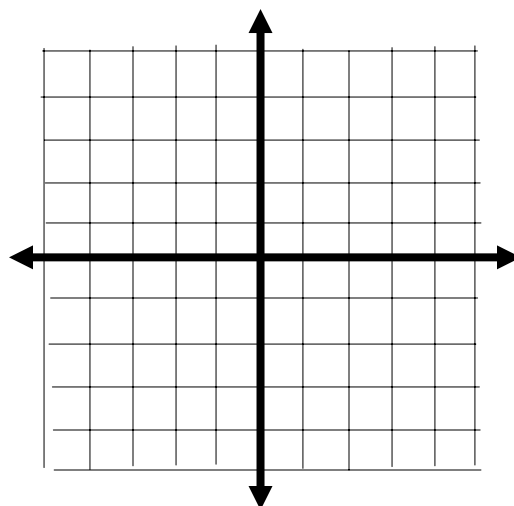
$(-3, 2)$

$(-3, -2)$

$(0, 4)$

$(-2, 0)$

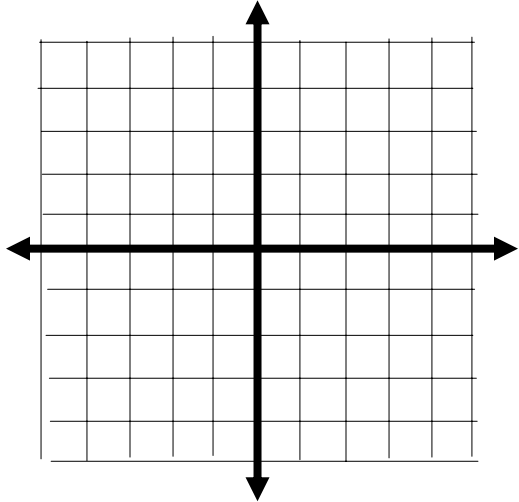
$(\frac{1}{2}, -4)$



Graphing Table Data

Table Data

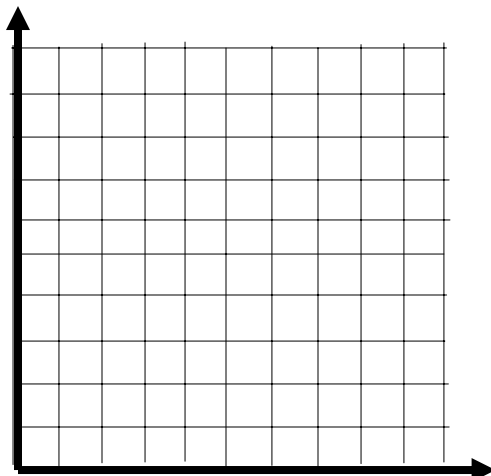
x	y
5	-3
-2	-2
-1	4
$3/2$	5



Analysis Example

U.S. college enrollment has grown from 60.3 mill. in 1990 to about 68.3 mill. in 2000.

- a) Approximate the enrollment for 96.
- b) Predict the enrollment for 2005.



3.2 Graphing Linear Equations

Need to Know



- Idea of solutions to linear equation in 2 variables
- Checking a solution to a linear equation in 2 variables
- How to find solutions to linear equation in 2 variables

The Main Idea - Solutions to 2 Variables Equations

One Variable Equation

$$x + 2 = 8$$

Two Variable Equation

$$x + 2y = 8$$

The Main Idea - Solutions to 2 Variables Equations

One Variable Equation

$$x + 2 = 8$$

Variables	
Solution	
Graph	

Two Variable Equation

$$x + 2y = 8$$

Variables	
Solutions	
Graph	

Linear Equations in 2 Variables

- Definition of a **linear equation**, is any equations that can be written in the form of

where m , b , A , B and C are constants.

- It's graph is always a line.



Checking a Solutions

Are the points solutions to the equation $2x - 3y = 12$?

$(3, -4)$

$(-3, -6)$

$(6, 0)$

$(8, -2)$



How to Find Solutions

Find a solutions to $2x + y = 8$

Think about the mental steps

1.

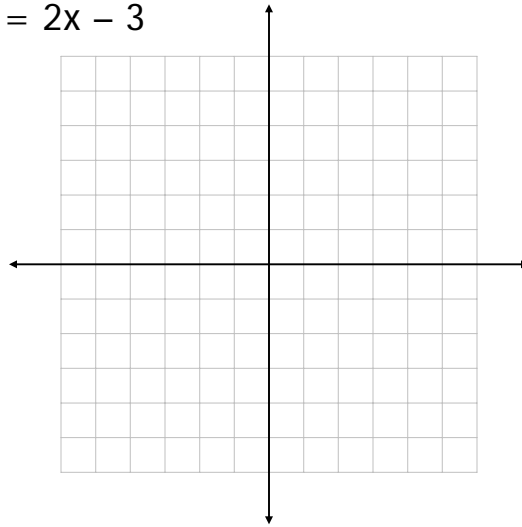
2.

3.



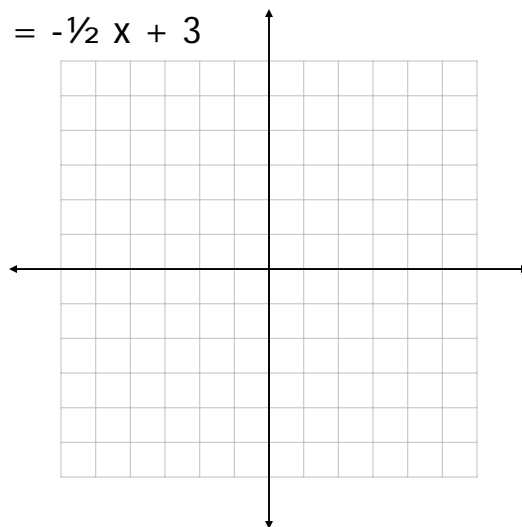
Graphing Linear Equations

Graph the equation $y = 2x - 3$



Graphing Linear Equations

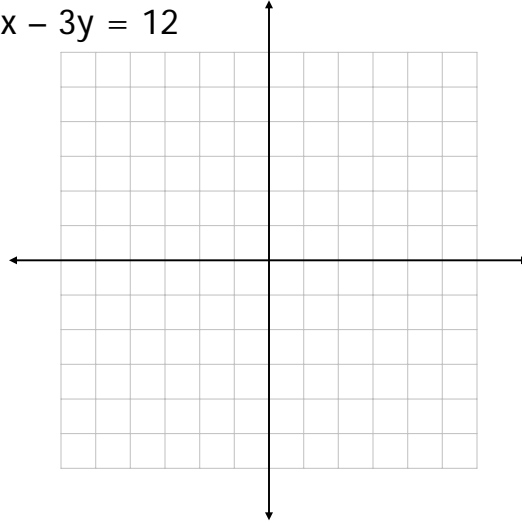
Graph the equation $y = -\frac{1}{2}x + 3$





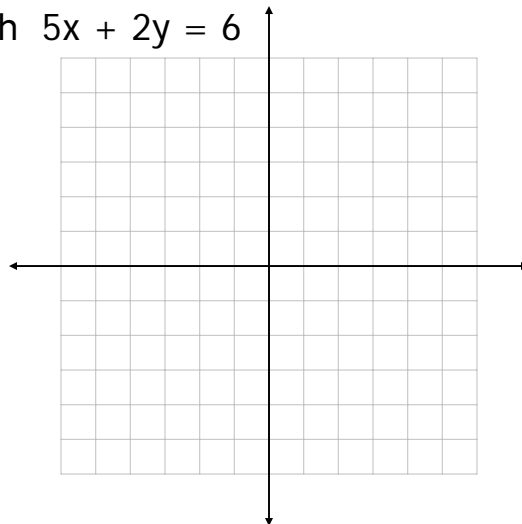
Graphing Linear Equations

Graph the equation $2x - 3y = 12$



Graphing Linear Equations

Solve for y then graph $5x + 2y = 6$



end

3.3 More Graphing: Intercepts

Need To Know



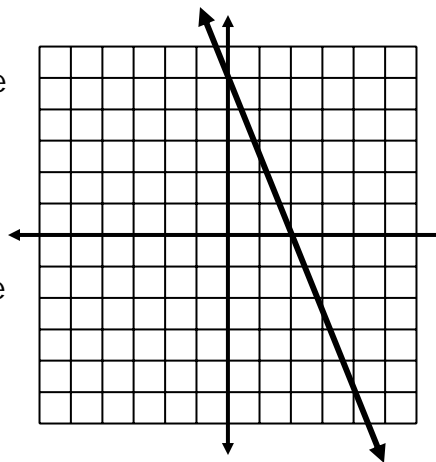
- What are the intercepts
- How to find intercepts
- How to graph with intercepts
- Graphing Special Equations

Intercepts – What are they?

Intercepts

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

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



Intercepts - How to find them?

- The **x-intercept**

Find the intercepts for:

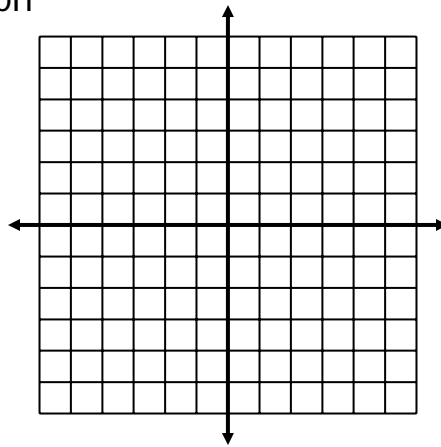
$$3x - 4y = -12$$

- The **y-intercept**

Practice Graphing w/ Intercepts

Find the intercepts and graph

$$-2x - y = -6$$

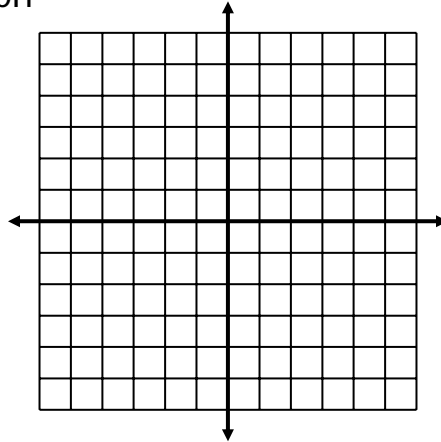




Practice Graphing w/ Intercepts

Find the intercepts and graph

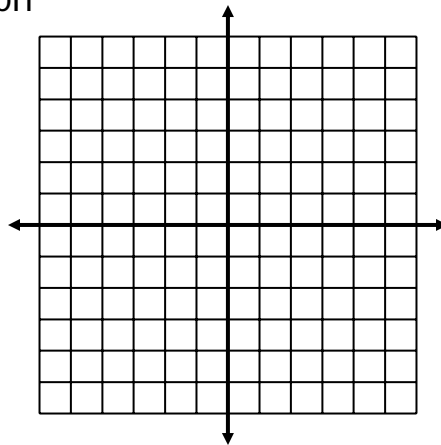
$$y = -\frac{2}{3}x - 4$$



Practice Graphing w/ Intercepts

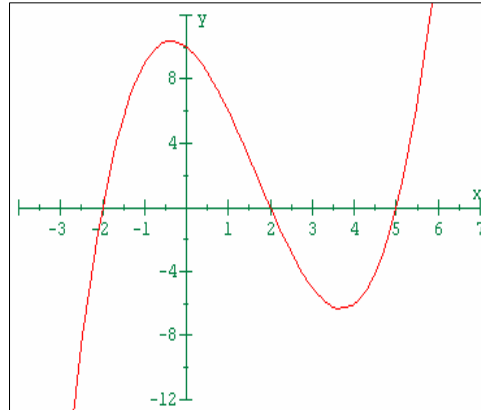
Find the intercepts and graph

$$y = \frac{1}{4}x$$



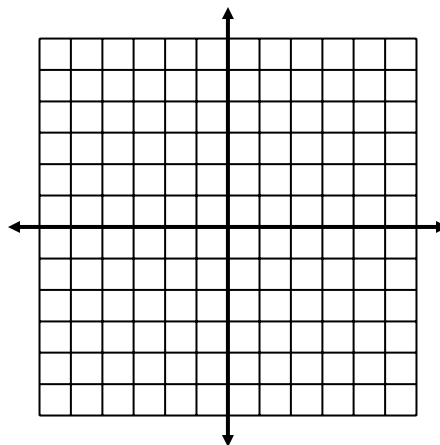
Finding Intercepts

This is a graph of a non-linear equation. Find the intercept points.



Graphing Special Equations

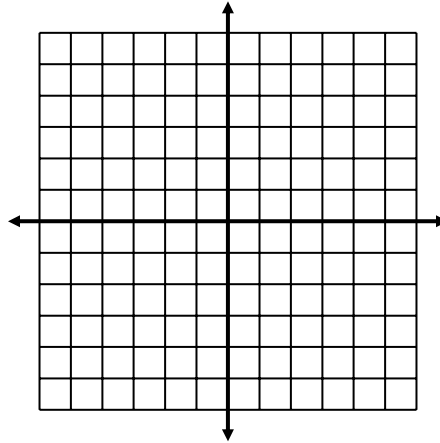
Graph the equation $y = -2$



X	Y

Graphing Special Equations

Graph the equation $x = 4$



X	Y

Conclusion

Always Remember:

$x = \text{number}$ is a vertical line

$y = \text{number}$ is a horizontal line

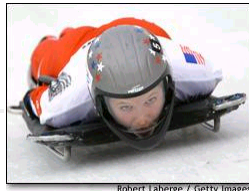
3.4 Rates

Need To Know



- Understanding Rate of Change
- Visualizing Rate of Change

Rate of Change



Definition:

A rate is a ratio that indicates how two quantities change with respect to each other.

Examples:

1. The virus is growing 2000 cells every minute.
2. My car is getting 25 miles per gallon.
3. Tristan Gale went 2.2 miles in 1 min 45.11 sec to win the gold medal in skeleton. (see <http://www.olympics.com>)

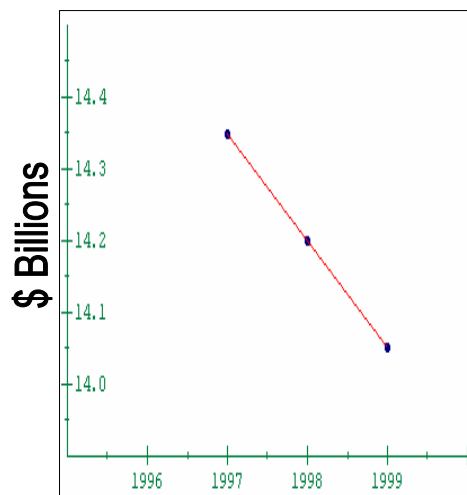
Women's Skeleton			COMPLETE RESULTS
MEDAL MEDAILLE	NATION PAYS	NAME NOM	RESULT RESULTAT
		GALE, Tristan	1:45.11

Calculating Rates

The company car you took on a business trip read 25,398 miles at the start and 25,719 miles at the end of the trip. You paid \$16.50 for 13 gallons to fill the car back up. What is the rate of gas consumption in miles per gallon?

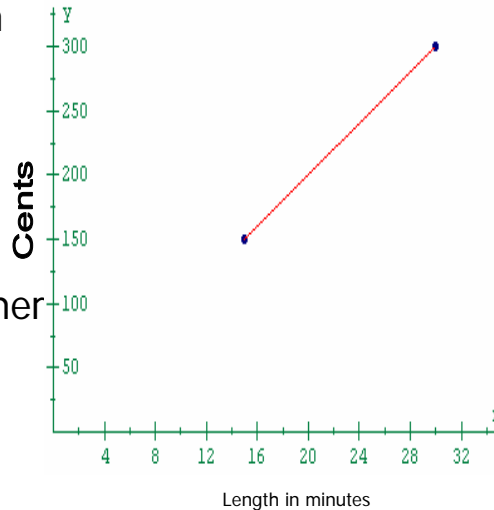
Visualizing Rates

Data regarding the spending for NASA is represented in the chart. At what rate is the amount spent on NASA changing?



Visualizing Rates

The following graph shows data from a recent AT&T phone call between Burlington, VT and Austin TX. At what rate was the customer being billed?



end

3.5 The Slope of a Line

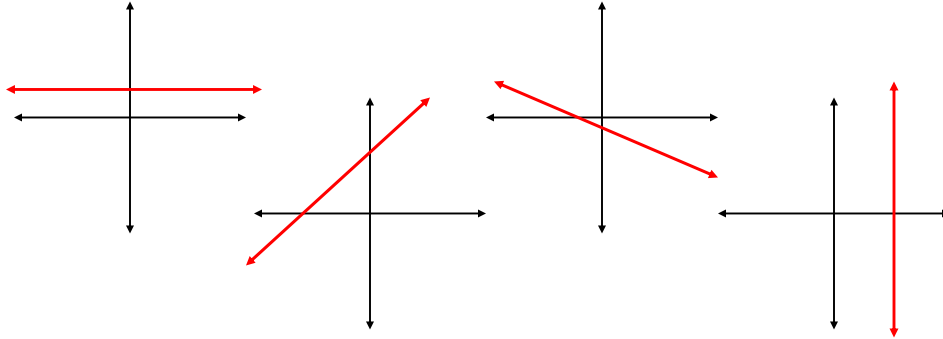
Need to Know

- The idea of slope
- Slope characteristics
- 3 ways to find slope



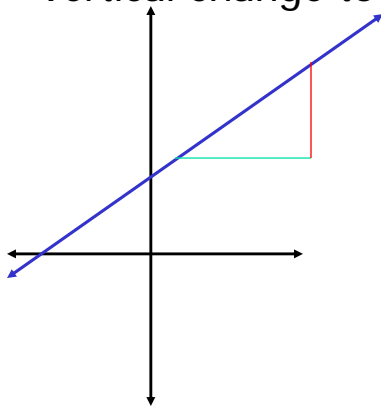
The Idea of Slope

Slope is the measure of the steepness of a line.



The Idea of Slope

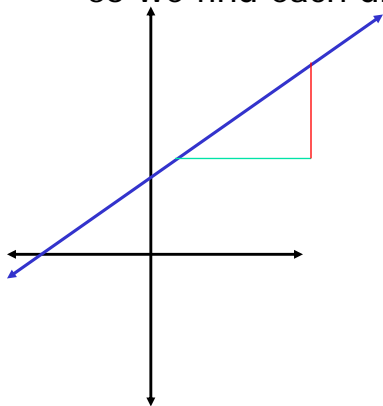
We can measure slope by comparing vertical change to horizontal change .



Slope = m
 = ratio of change
 = $\frac{\text{change in } y}{\text{change in } x}$
 = $\frac{\text{rise}}{\text{run}}$

The Measure of Slope

The ratio of change comes from two distances, so we find each distance by subtraction.



Practice – 3 Ways to Find Slope

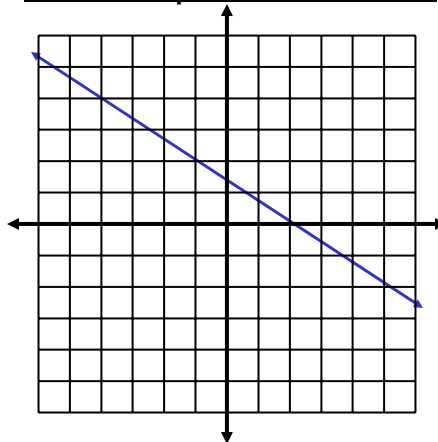
Find Slope

- From a picture

$$\frac{\text{rise}}{\text{run}}$$
- From the formula

$$\frac{y_2 - y_1}{x_2 - x_1}$$
- From an equation

Find Slope of the line.





Practice – 3 Ways to Find Slope

Find Slope

1. From a picture

$$\frac{\text{rise}}{\text{run}}$$
2. From the formula

$$\frac{y_2 - y_1}{x_2 - x_1}$$
3. From an equation

Find Slope of the line through (-5,1) and (4,-6)



Practice – 3 Ways to Find Slope

Find Slope

1. From a picture

$$\frac{\text{rise}}{\text{run}}$$
2. From the formula

$$\frac{y_2 - y_1}{x_2 - x_1}$$
3. From an equation

Find Slope of the line through (-2,-3) and (4,-4)

You try it!

3.6 The Equation of a Line

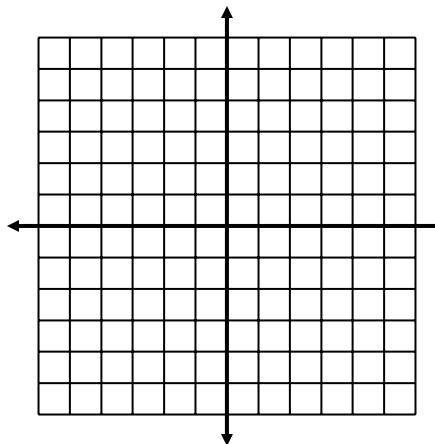
Need To Know



- Graphing with a slope and intercept point
- Idea of the slope-intercept form of the equation of a line
- How to write equations of lines

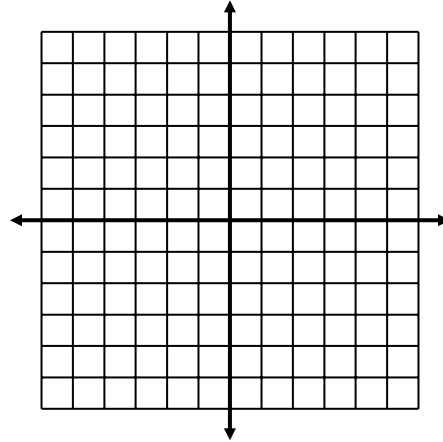
Graphing Slope and Intercepts

Graph the line with the slope of $-2/5$ and a y-intercept of 4.

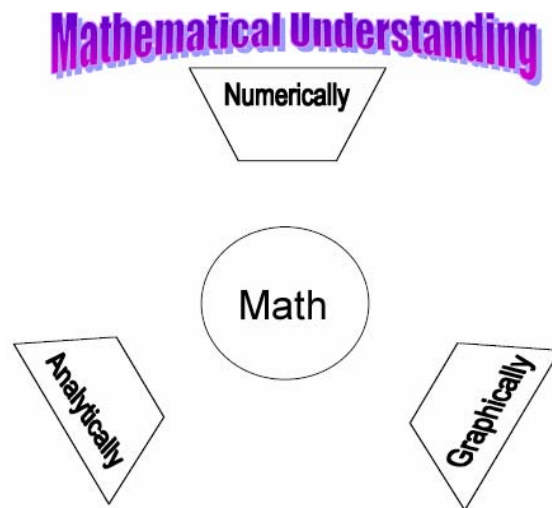


Graphing Slope and Intercepts

Graph the line with the slope of 3 and a y-intercept of -2.



A Model for Learning Math





Equations of lines

WINDOW

Xmin = -6 Xmax = 6

Ymin = -6 Ymax = 6

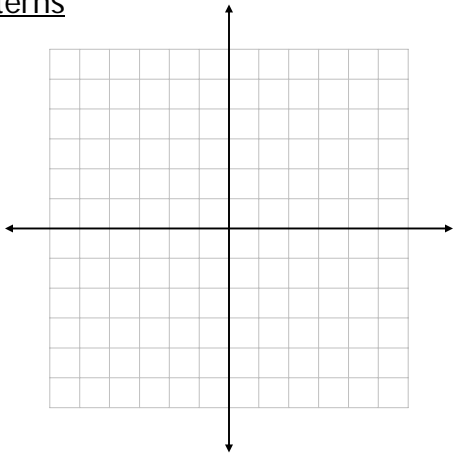
Graph and observe patterns

■ $Y = 2x + 3$

■ $Y = -1/3x + 3$

■ $Y = x + 3$

■ $Y = -4/5x + 3$



Equations of lines

WINDOW

Xmin = -6 Xmax = 6

Ymin = -6 Ymax = 6

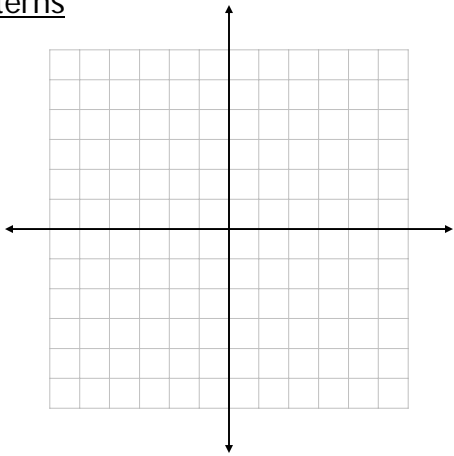
Graph and observe patterns

■ $Y = 1/2x + 1$

■ $Y = 1/2x + 3$

■ $Y = 1/2x - 2$

■ $Y = 1/2x - 4$



Slope-Intercept Form for the Equation of a Line

Slope-Intercept Form for the Equation of a Line

$$y = mx + b$$

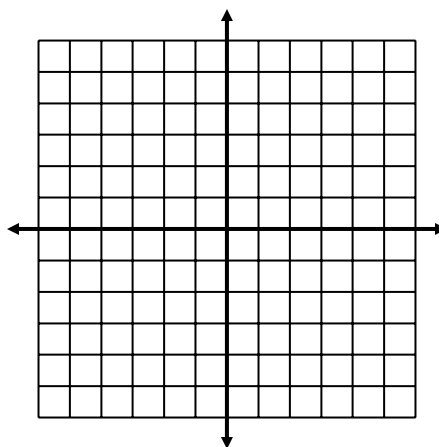
- m = the slope of the line
- b = the y coordinate of the y -intercept
or $(0, b)$ is the y -intercept point

Graphing $y = mx + b$

Find the slope and the
 y -intercept and graph

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

$$3x - 2y = 18$$





Writing an Equation for a Line

To write an equation of a line you ...

Write the equation of the line with a slope of -3 and a y-intercept through the point $(0, 5)$.

Write the equation of the line with a slope of $\frac{2}{3}$ and a y-intercept through the point $(0, -11)$.

Need:

1. A point
2. A formula
3. A slope

end



3.7 Point-Slope Form

Need To Know

- Idea of the point-slope form of the equation of a line
- How to write equations of lines
- Graphing with a point and a slope



Writing an Equation for a Line

$y = mx + b$ is **not** always the best way to write an equation for a line.

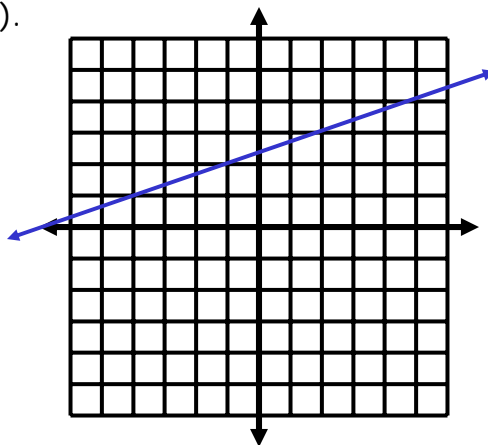
The next problem illustrates a dilemma which will lead us to a need for a new and better equation.


Writing an Equation for a Line

Write the equation of the line through the point $(-4, 1)$ and the point $(2, 3)$.

Need:

1. A formula:
 $y = mx + b$
2. A point
3. A slope





Point-Slope Form for the Equation of a Line

Point-Slope Form for the Equation of a Line

The equation of a line through (x_1, y_1)
with slope m is given by



Practice

Slope-Intercept

Write the equation of the line that
passes through $(-1, 6)$ and $m = 3/2$.

Need:

1. A formula
2. A point
3. A slope



Practice

Need:

1. A formula
2. A point
3. A slope

Write the equation of the line that passes through $(-5, 0)$ and $(-2, 6)$ and write equation in slope-intercept form.

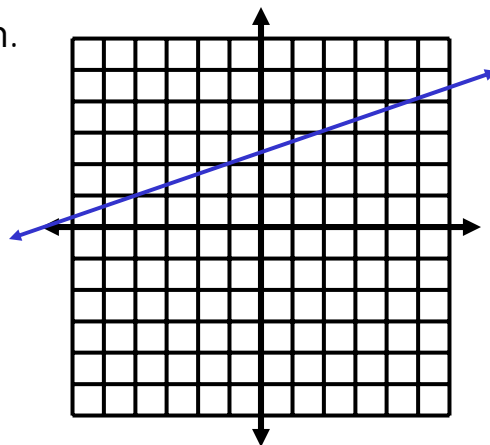


Practice

Need:

1. A formula
2. A point
3. A slope

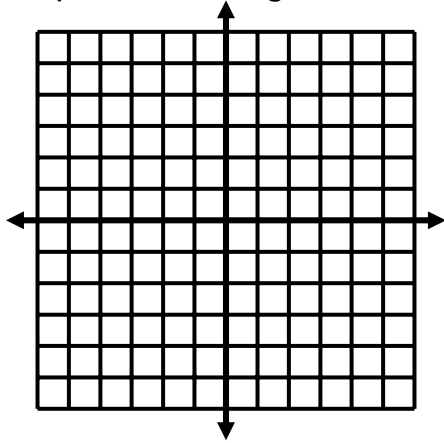
Write the equation of the line below in slope-intercept form.





Graphing

Graph the line with
 $m = -3/2$ and that
passes through $(1, 4)$



Graph the line from
the equation:
 $y + 3 = -\frac{2}{3}(x - 1)$

