Topic 4: Understand Linear Relationships

Term	Meaning	Example
Proportional Relationship		
Constant of Proportionality		
Line		
Slope		
Linear Equation		
Y-Intercept		
Slope-Intercept Form		
System of Linear Equations		
Solution of a System		
Parallel Lines		

Lesson 1: Connect Proportional Relationships & Slope

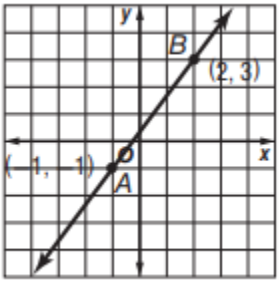
*Goal: Find the **slope of a line** using different strategies*
*Interpret a slope and relate it to **steepness on a graph***

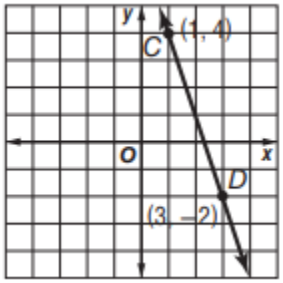
Slope describes the _____ of a line.

Slope= ---------- Slope (m) = ----------

Positive Slope: _____ line Negative Slope: _____ line

It does not matter which point is #1 and #2, however the coordinates need to be used in the same order.





Find the slope of the line passing through:

1. (0,1) & (3,4)

2. (1, -2) & (3,2)

3. (4, -4) & (2, 2)

x	y
-2	-7
-1	-4
0	-1
1	2
2	5

x	y
-2	3
-1	2.5
0	2
1	1.5
2	1

Lesson 2: Linear Equations { y= mx }

*Goal: Understand how slope and the **constant of proportionality** relate in an equation*
***Write an equation** in the form y=mx when given the slope*
***Graph an equation** in the form y=mx*

y=mx m: _____

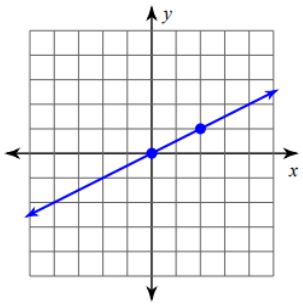
y = kx k = _____

Identify the slope of a line written in S-I form

y= -7x y= x y= ⅔ x

Write an equation in Slope-Intercept form

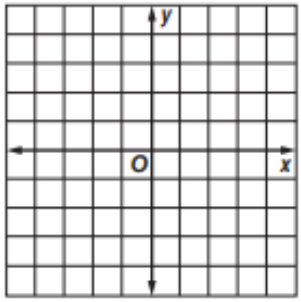
Slope is -1 Slope is ⅓ Slope is -¾



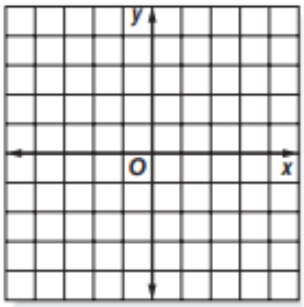
Graph a line using the Slope:

1. Place a point at the origin (this is your y-intercept)
2. Move from that point using the slope (rise then run)

y = -3x



y = ⅓ x



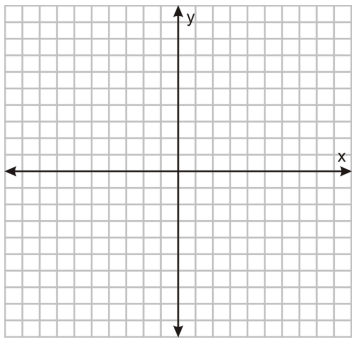
Lesson 3: Understand the y-intercept of a Line

Goal: ***Interpret & extend*** *the table or graph of a linear relationship to find the y-int.*
Analyze *graphs to* ***determine and explain*** *the meaning of the y-int.*

The y-intercept is the point on a graph where the line crosses _____

Determine the y-intercept of a graph by extending the graph to cross the y-axis

x	y
2	-8
4	-4
6	0
8	4



Proportional relationships have a _____ and always intersect

the _____

Are these relationships proportional? What is the y-intercept?

Price, x	$5	$10	$15	$20
Tax, y	$0.41	$0.82	$1.23	$1.64

Hours, x	11	12	13	14
Distance, y (miles)	154	167	180	193

Age, x	8	9	10	11
Grade, y	3	4	5	6

Lesson 4: Write and Graph Linear Equations (y= mx+b)

Goal: ***Graph a line from an equation*** *in the form y=mx+b or a* ***table of values***
Write an equation *in the form y=mx+b that represents a graph or table of values*

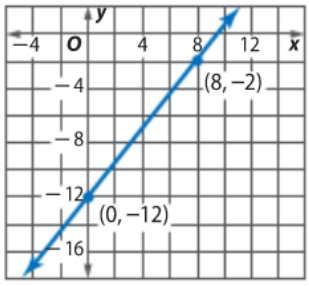
y=mx+b m: _____ b: _____

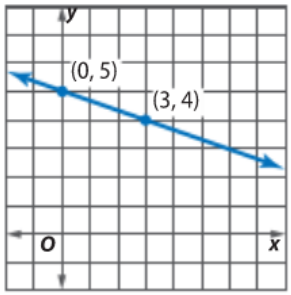
Identify the slope and y-intercept of a line written in S-I form

y= -13x +3 y= x -4 y= ¼ x -8

Write an equation in Slope-Intercept form

Slope is -7 and the y-intercept is 1 Slope is ⅓ and y-intercept is -3

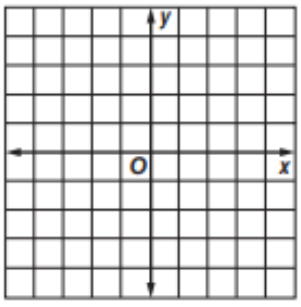




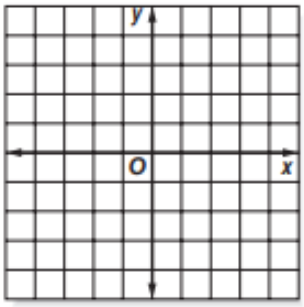
Graph a line using the Slope and y-intercept:

1. Place a point at y-intercept
2. Move from that point using the slope (rise then run)

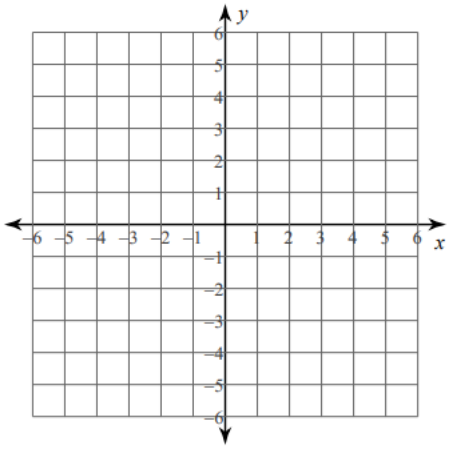
$y = -2x + 2$



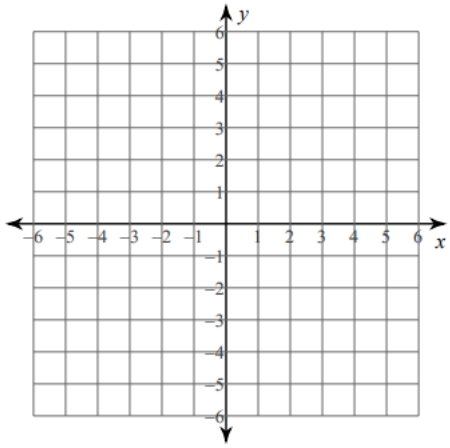
$y = \frac{1}{2}x + 2$



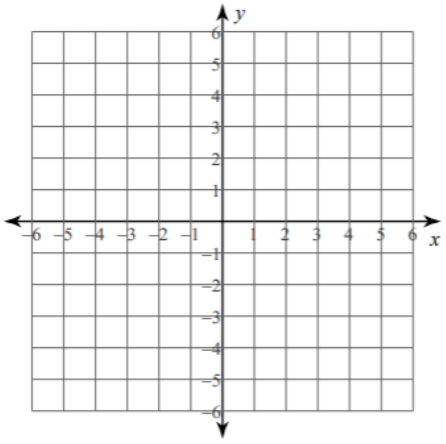
$y = \frac{7}{2}x - 2$



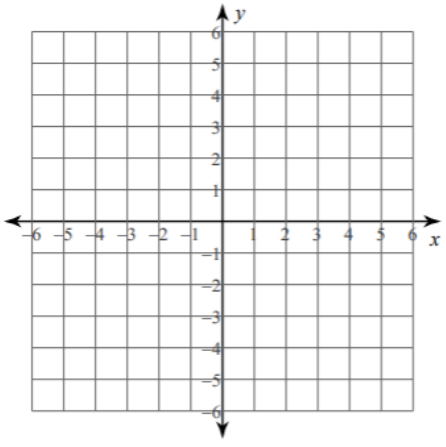
$y = -6x + 3$



x	-2	-1	0	1	2
y	3 ½	3	2 ½	2	1 ½



x	3	1	-1	-3	-5
y	7	3	-1	-5	-9

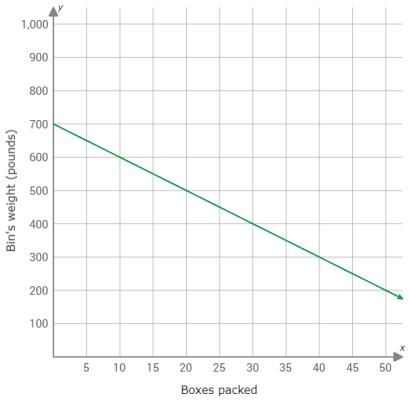


Lesson 5: Interpret Slope and y-intercept of a Linear Relationship

Goal: ***Determine and interpret*** *the slope and y-intercept of a linear relationship from a* ***table, equation or graph***

Raul bought a palm tree to plant at his house. He records the growth over many months and creates the equation **h= 0.21m + 4.9**, where h is the height of the palm tree in feet and m is the number of months. Interpret the slope and y-intercept from his equation.

At Sunshine Citrus Co., workers take oranges from a large bin and pack them into smaller boxes for shipment to stores. The bin gets lighter as the boxes are packed. This situation can be modeled as a linear relationship. What does the slope tell you about the situation?



Sammie adds money to her savings each week to save enough for a new video game console. The amount of money grows over time. What does the slope and y-intercept tell you about the situation?

# of Weeks	Amount Saved
0	$50
10	$150
20	$250

Lesson 6: Understand Systems of Equations

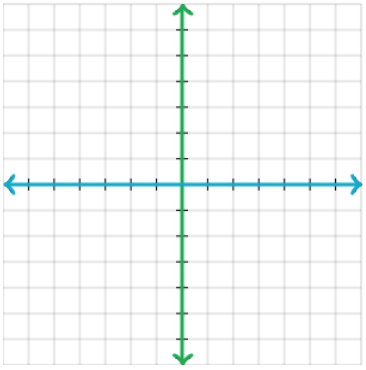
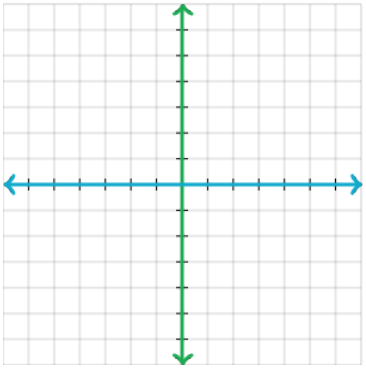
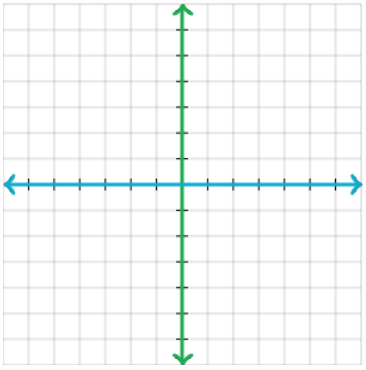
Goal: ***Examine*** *the graphs of a* ***linear system*** *to determine the* ***number of solutions***
Evaluate the accuracy *of an estimated solution to a system.*

System of Equations: _____

The _____ to the system is the place where the two lines meet.

That solution will make both equations _____ when checked.

Types of Systems of Equations

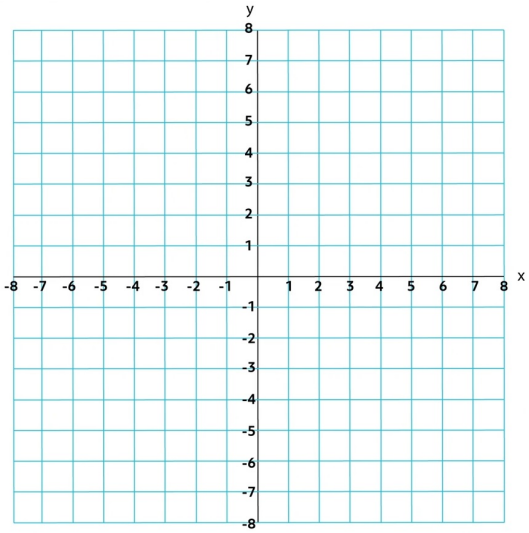
Lines intersect at **1 point**	Lines **do not** intersect	Lines are the **same** (overlap)
# of Solutions:	# of Solutions:	# of Solutions:
Example Graph: 	Example Graph: 	Example Graph: 
Solution:	Solution:	Solution:

Lesson 7: Solve Systems by Graphing

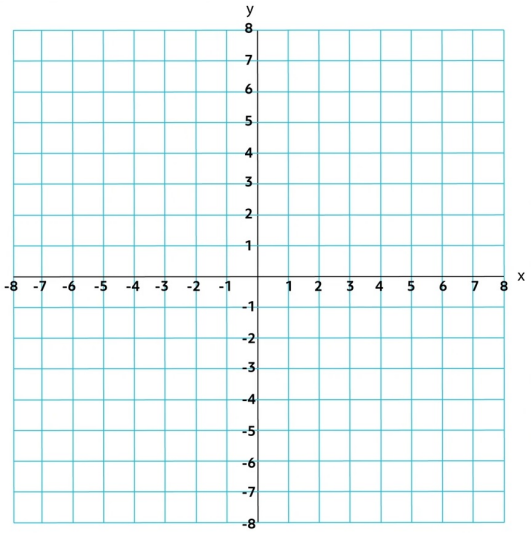
Goal: ***Create and examine*** *graphs of* ***linear systems*** *to determine the* ***solution.***

1. Graph each equation on the coordinate plane.
2. Check the point where the 2 lines intersect

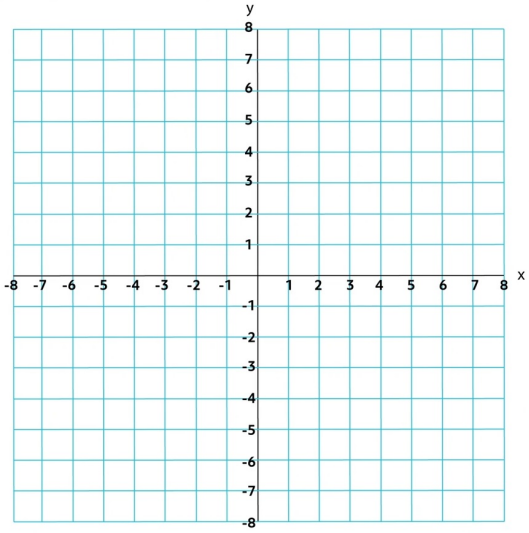
y = 2x +5
y = -x + 8



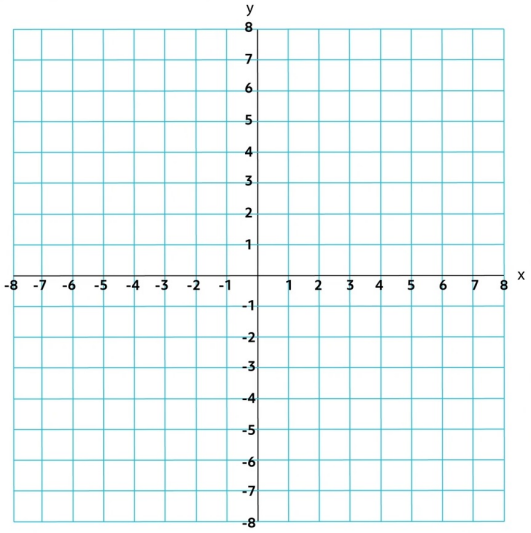
y = -x - 3
y = x + 1



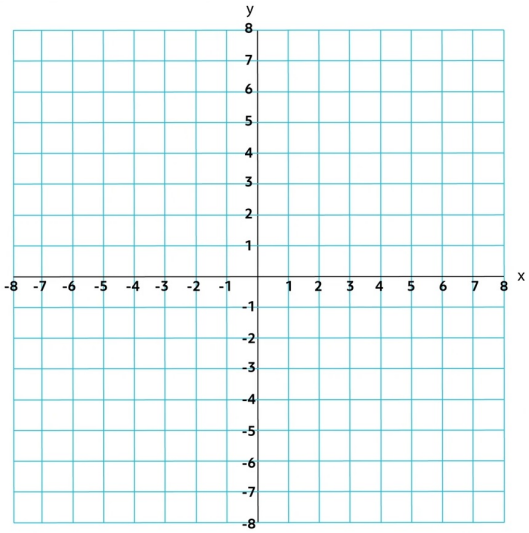
y = ¼ x +1
y = ¼ x - 6



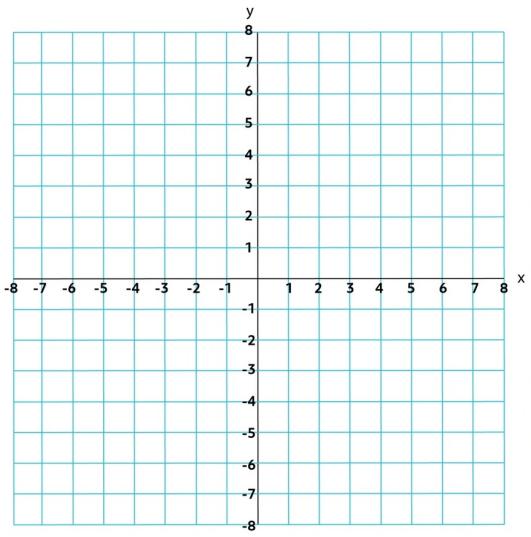
y = -4x
y = - ½ x - 7



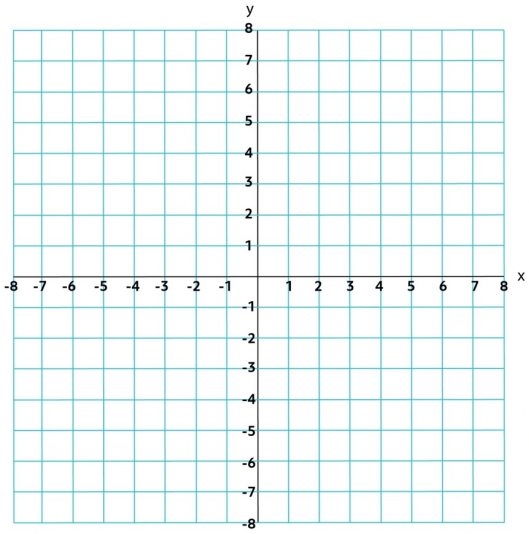
y = x +3
y = ⅔ x + 4



y = -2x - 3
2 x + y = - 3



y = 3x - 4
y = -½ x + 3



Write a system with the solution (4, -3)