

Name: _____ Class: _____

Intermediate II Functions (Chapters 3 & 4)

Note: All homework assignments are worth 10 points unless otherwise stated, and are due the next class day. No credit will be given for anything turned in after the test.

Date	Objective	Assign. #	Assignments	HW Checked
	<i>8.F.4</i> Finding Y-Intercepts	WS 3.3e	Worksheet 3.3E: The Y-Intercept	
	<i>8.EE.6, 8.F.3, 8.F.4</i> Slope-Intercept Form	3.4	p. 203-206 (1-12, 25-35)	
	<i>8.F.3</i> Graphing Slope-Intercept	WS 3.4f	Worksheet 3.4F: Graphing Slope-Intercept	
	Chapter 4 Quiz			
	<i>8.F.4</i> Forms of Functions	WS 4.0g	Worksheet 4.0G: Forms of Functions	
	<i>8.F.1, 8.F.3, 8.F.4</i> Linear Functions	4.4	p. 301-304 (1-3, 5-7, 10, 17-20)	
	<i>8.F.1, 8.F.4</i> Using Function Notation	4.3	p. 291-294 (1-13, 22-26 evens)	
	<i>8.F.2, 8.F.4</i> Comparing Functions	4.5	p. 315-318 (1-21 odd)	
	Review	4.R	Worksheet 4.R: Functions Review	
	Functions Test (Ch. 4)			

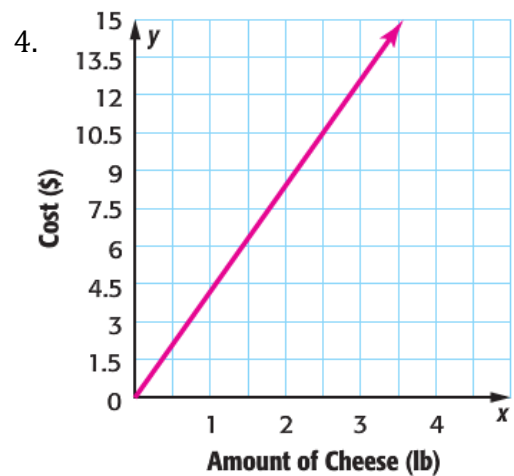
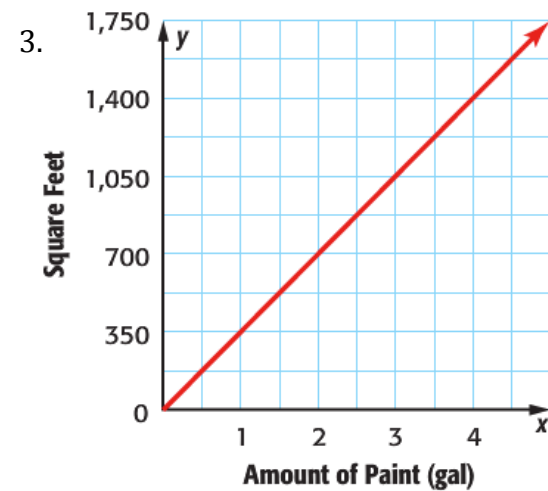
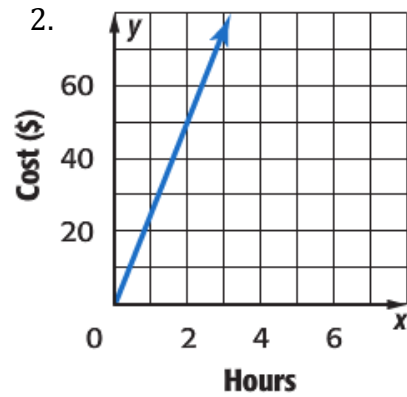
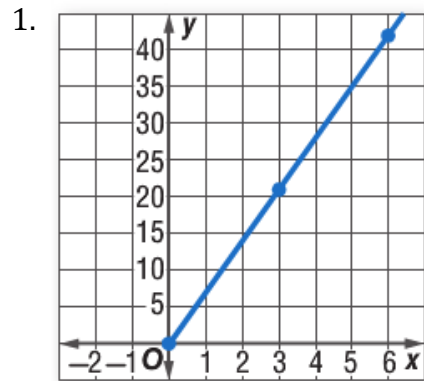
Understanding the Y-Intercept | Ch 3 Lesson 3

A. Proportional Relationships

The formula for a proportional relationship is:

What do we change in this relationship? What does this represent?

1-6 Using this knowledge, find the equation to represent the following relationships:



5.

Homework Completed, x	8	12	16	20
Test Score, y	40	60	80	100

6.

Time Elapsed, x	8	12	16	24
Laps Completed, y	4	6	8	12

7. What does each of these relationships have in common?

Name: _____ Date: _____ Class: _____

Understanding the Y-Intercept | Ch 3 Lesson 3

B. Introduction of the y-intercept

Jane and Emma both babysit.

Jane gets paid \$10 for each hour. Emma gets paid a \$5 “THANK YOU!” fee once and then \$10 per hour.

1. Which job would you rather have? Why?

2. The following table shows Jane’s babysitting job. Fill in the blanks.

Hours Worked, x	0	1	2	3	4
Money Earned, y					

a. What is the constant rate of change?

b. Where does this relationship begin?

c. What is the equation for this relationship?

However, not all linear relationships are proportional. Some do not start at zero.

3. Use the following table to represent Emma’s babysitting job.

Hours Worked, x	0	1	2	3	4
Money Earned, y					

a. What is the constant rate of change?

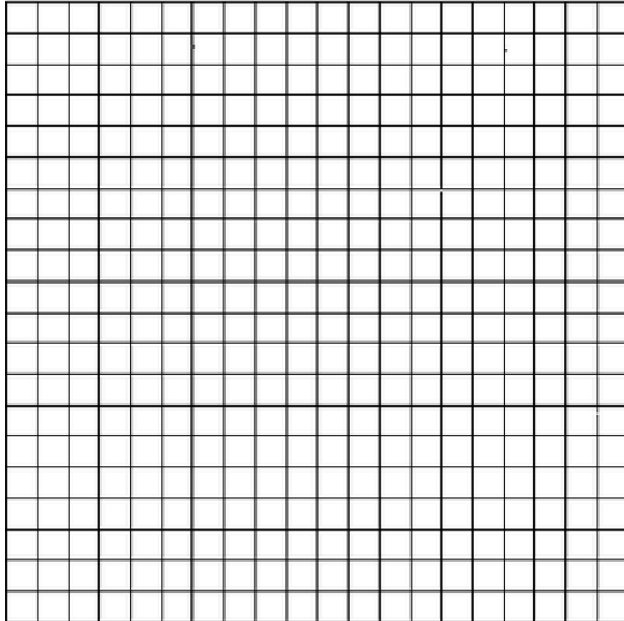
b. Where does this relationship begin?

4. What do you notice when comparing Jane and Emma’s jobs on the tables? Does this support your reasoning in Question #1?

Understanding the Y-Intercept | Ch 3 Lesson 3

C. Defining

1. Using the grid below, represent each of their jobs (use your tables to help). Let the money earned be y , and the hours worked be x .



2. Does this graph support your answer to Question 1 on the last page? How?

3. What makes Emma's job more appealing than Jane's? Be specific.

You may have noticed that Emma's pay-rate did not start with \$0. Her pay-rate (and her graph) began at the earned amount of \$5.

4. Look back at the graph. What do you notice about this beginning point? Where is it?

5. Does every line cross through the point (0,0)?

Understanding the Y-Intercept | Ch 3 Lesson 3

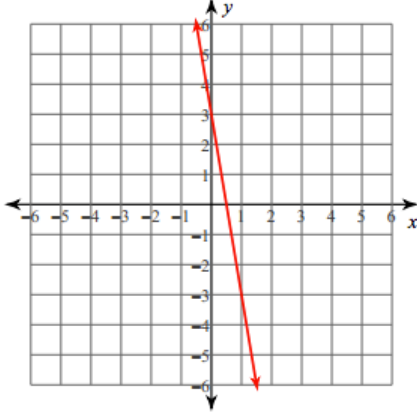
Definition | The _____ of a line is the point where the line crosses _____.

D. Practicing

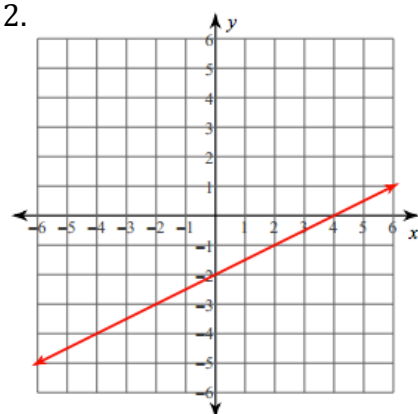
Note | Because we often think of the y-intercept as the “beginning point”, the y-intercept is labeled as the variable “b”.

Find the y-intercept, b , in each of the following relationships.

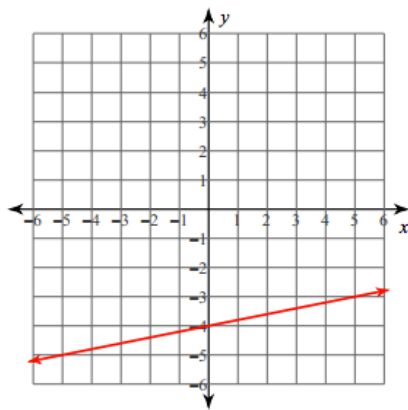
1.



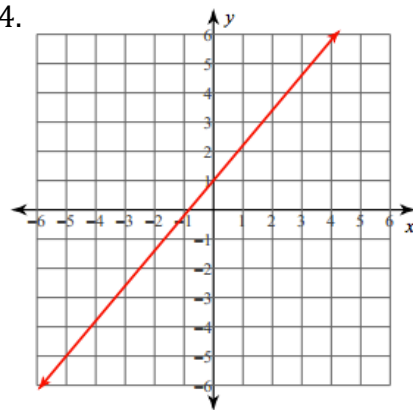
2.



3.



4.



5.

x	0	4	8	12
y	5	9	13	17

6.

x	-2	-1	0	3
y	16	14	12	6

7.

x	-1	1	3	5
y	-4	4	12	20

Name: _____ Date: _____ Class: _____

Slope-Intercept Form | Ch 3 Lesson 4

Each student has different pay-rates for their summer jobs.

David asks for \$10 per lawn regardless of how many hours he mows the lawn.

Lizzie asks for a flat rate of \$2 per hour while babysitting.

Alana asks for a \$3 donation (for supplies like gloves) plus \$2 per hour while weeding gardens.

A. Representing the Relationships

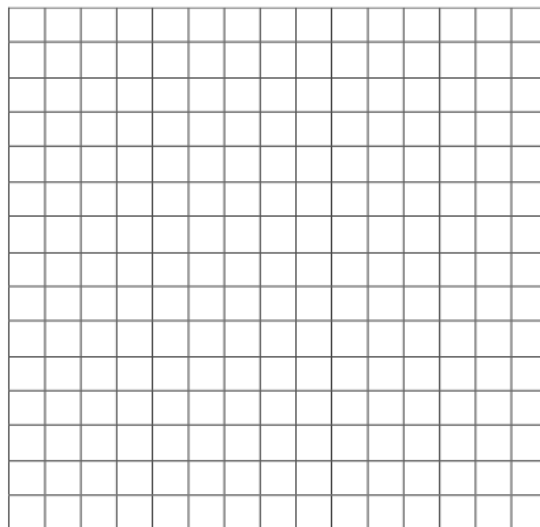
1. Make a table for each student's pay-rate, showing the amount of money each would earn if he or she worked from 0 to 6 hours.

Hours, x							
Money, y							

Hours, x							
Money, y							

Hours, x							
Money, y							

2. Graph the three pay-rates on the same coordinate axes below. Use a different color for each plan.



Name: _____ Date: _____ Class: _____

Slope-Intercept Form | Ch 3 Lesson 4

B. Bringing it Together

1. What equation can we use to represent David's pay-rate? How do you know this?

2. What equation can we use to represent Lizzie's pay-rate? How do you know this?

3. In Alana's plan, how is the fixed \$3 donation represented in

a. The table?

b. The graph?

c. At any given hour?

4. What is the mathematical term for the "beginning point" of a relationship?

5. What if Alana didn't ask for the donation? What would her pay-rate equation be?

6. Now, what can we do to show that \$3 donation in Alana's equation?

Name: _____ Date: _____ Class: _____

Slope-Intercept Form | Ch 3 Lesson 4

C. Slope-Intercept Form

The equation for proportional relationships is _____.

We have learned that not all linear equations are proportional. This means that not all linear equations go through the origin, (0,0).

Each of these relationships still have a constant rate of change, or _____, which can be represented by _____.

Each of these equations also have a beginning point, or _____, which can be represented by _____.

Using the knowledge above, answer the following questions.

1. I think that the equation for any linear relationship should be:

2. I think this because:

The name of the equation for non-proportional linear relationships is the **Slope-Intercept Form**.

Definition | Slope-Intercept Form is

D. Practicing Slope-Intercept Form

1. Label the slope, m , and y-intercept, b , in each of the following equations.

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

b) $y = -5x + 3$

c) $y = -x + 5$

2. Write the equation of a line in slope-intercept form.

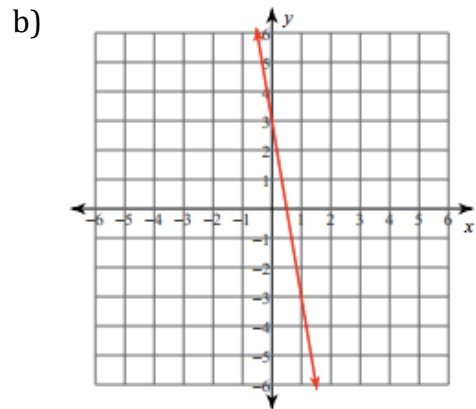
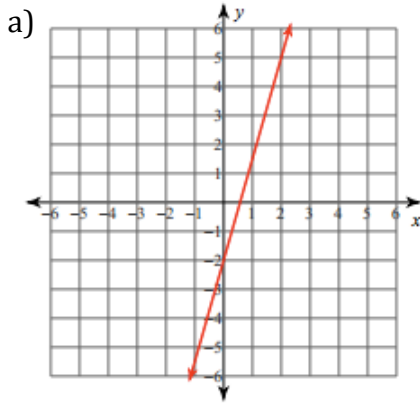
a) slope = -3 and y-intercept = -4

b) slope = $-\frac{1}{2}$ and y-intercept = 14

c) slope = 3 and y-intercept = -5

Slope-Intercept Form | Ch 3 Lesson 4

3. Write the equation of a line in slope-intercept form by finding the slope and y-intercept of the following.



c)

x	y
-3	6
-2	9
-1	12
0	15

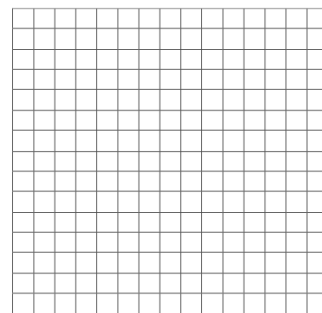
d)

x	y
3	18
6	12
9	6
12	0

4. Write the equation of a line in slope-intercept form. Then graph the equation.

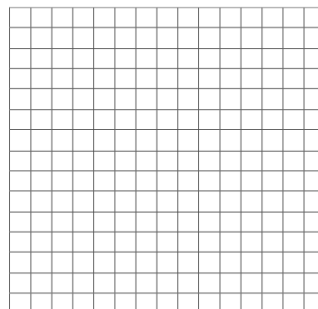
a) Student council is selling T-shirts during spirit week. It costs \$20 for the design and \$5 to print each shirt.

Slope = m =
Y-intercept = b =



b) A taxi fare is \$3.50 for the starting fee, and then \$0.50 for each mile.

Slope = m =
Y-intercept = b =



Graphing Slope-Intercept Form | Ch 3 Lesson F

A. State the Slope-Intercept Form below. Explain each part of it by answering the questions below.

- i. What does m represent?
- ii. What does b represent?
- iii. What does x represent?
- iv. What does y represent?

***Note:** We say that the slope is the *coefficient* of x .

B. State the slope and the y -intercept of the graph of the following equations:

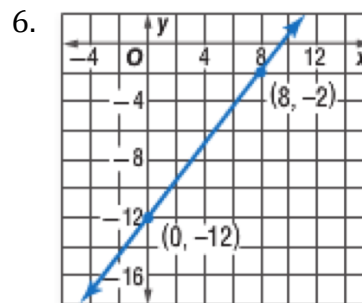
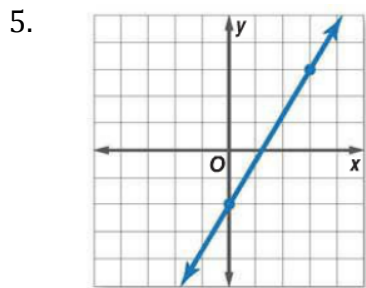
1. $y = -5x + 3$

3. $y = \frac{1}{4}x - 6$

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

4. $y = -x + 5$

Write the equation of a line in slope-intercept form given the following. Explain how you know that your equation is true.



7.

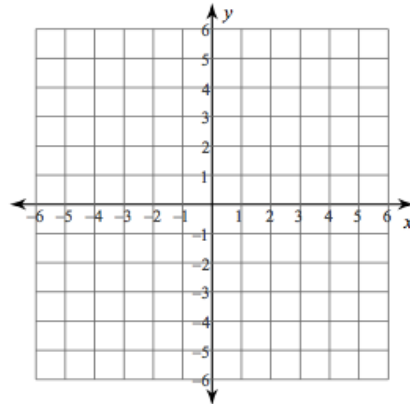
x	-2	-1	0	1
y	-5	-8	-11	-14

8. Slope of $\frac{3}{4}$ and a y -intercept of -3

Graphing Slope-Intercept Form | Ch 3 Lesson F

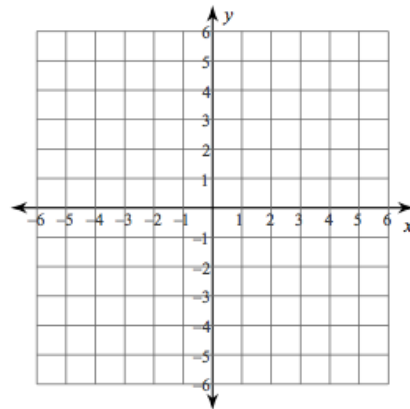
C. Using the equations below, create a graph. Do 1-2 on the same grid, and 3-4 on the same grid. There are many ways to do this.

1. $y = 4x$



2. $y = 4x - 5$

3. $y = -x$



4. $y = -x + 6$

D. Answer the following questions based on your experience from doing the problems above.

1. What is the difference between the graphs on #1-2?

2. What is the difference between the graphs on #3-4?

3. What is it that makes these differences? How can we see this in the equation?

4. What are the steps to graphing from an equation?

Name: _____ Date: _____ Class: _____

Graphing Slope-Intercept Form | Ch 3 Lesson F

E. GRAPHING TIME! Get out a piece of graph paper. Fold it in half vertically, and then into thirds so that you have six equal blocks. Use these blocks to graph the following equations.

1. $y = 2x + 3$

4. $y = 4x + 6$

2. $y = \frac{1}{2}x - 4$

5. $y = -\frac{3}{2}x + 2$

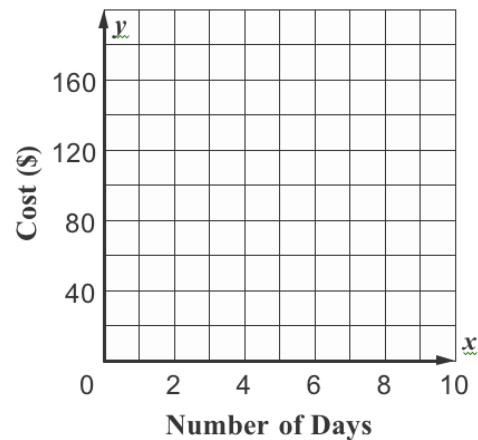
3. $y = -5x + 6$

6. $y = x - 3$

F. For the following, use the information and the grid given.

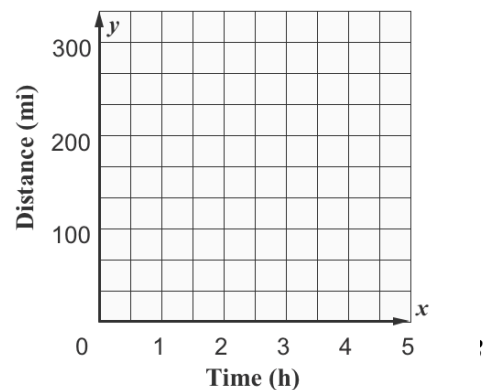
Ace Car Rentals charges \$20 per day plus a \$10 service charge to rent one of its compact cars. In this situation, x is the number of days and y is the total cost.

1. What is the slope and y -intercept? Explain how to use the slope and y -intercept to graph the equation. Then graph the equation.



Thomas is driving from Oak Ridge to Lakeview, a distance of 300 miles. He drives at a constant 60 miles per hour. The variable y can be used to represent distance, where x is the number of hours since he left.

2. What is the slope and y -intercept? Explain how to use the slope and y -intercept to graph the equation. Then graph the equation.



Forms of Functions | Ch 4 Lesson G

A function is a relation in which one input is paired with one output.

A. Functions can exist in stories, in tables, and in graphs. We have been working with functions in Slope-Intercept Form.

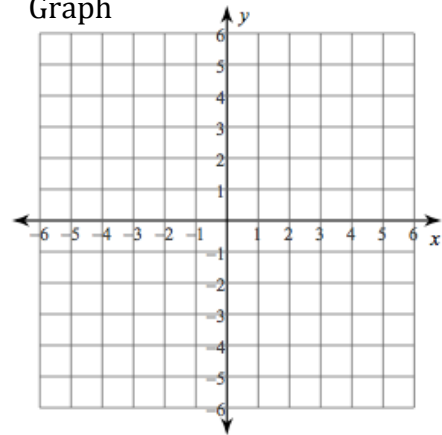
B. Label the table and graphs below appropriately. In each table and graph, **point out both the y-intercept and slope.** Then fill out the graphic organizer below.

1. Brandi started 3 feet from the motion detector. You looked up and she was at 9 feet at the 2nd second.

Table

x	y

Graph



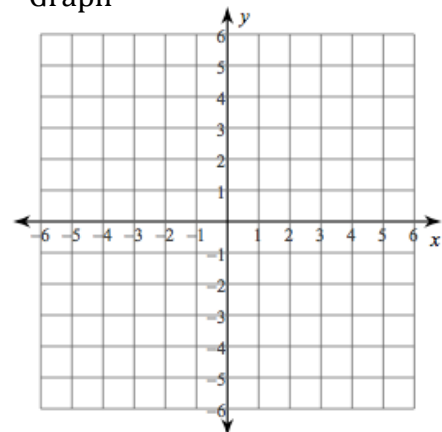
- a. Write the function for the relationship above:

2. Marissa has \$32 in her wallet. After 3 hours of shopping, she has \$8 left.

Table

x	y

Graph



- a. Write the function for the relationship above:

Name: _____ Date: _____ Class: _____

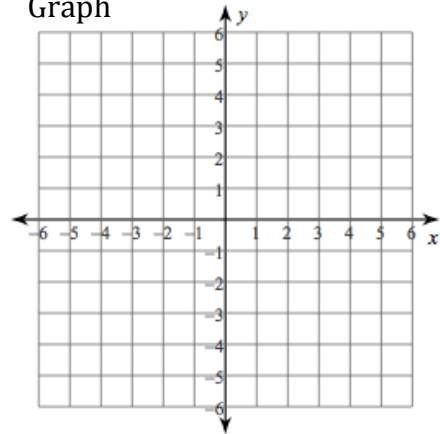
Forms of Functions | Ch 4 Lesson G

3. You looked up and Reid was walking. He was at the 8 foot mark at the 1st second and the 3 foot mark at the 2nd second.

Table

x	y

Graph



- a. Write the function for the relationship above:

- b. Complete the graphic organizer below by explaining where you see the slope and y-intercept in the previous representations:

Representations:	Slope	Y-intercept
Table		
Graph		
Equation		

Linear Functions | Ch 4 Lesson 4

Definition | Function: A relation in which each input is paired with exactly one output.

A. Sometimes functions are written using two variables. One variable, usually x , represents the independent variable (domain) and the other, usually y , represents the dependent variable (range). When a function is written in this form it is an equation.

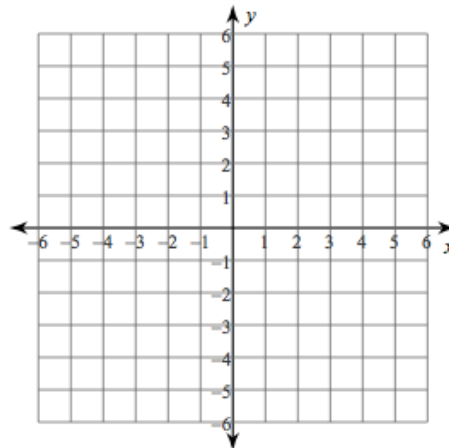
Functions can be represented in:

- Words
- Ordered Pairs
- Tables
- Graphs
- Equations

Example: The school store sells book covers for \$2 each and notebooks for \$1. McKell has \$5 to spend. The function $f(x)=5-2x$ represents the number of book covers x and notebooks y she can buy.

a) Make a table and a graph to show how we can “input” one value and get an “output”. Make as many as needed.

x	$f(x)=5-2x$	$y=f(x)$
0		
1		
2		
3		



b) What are the combinations of notebooks and book covers she can buy? Use the table and/or graph to help you.

A function is LINEAR when the graph forms a straight line. Therefore, the equation of the form $y=mx+b$ is what we call a *linear function*.

Linear Functions | Ch 4 Lesson 4

B. A function can be either **continuous** or **discrete**.

Continuous: no space between values

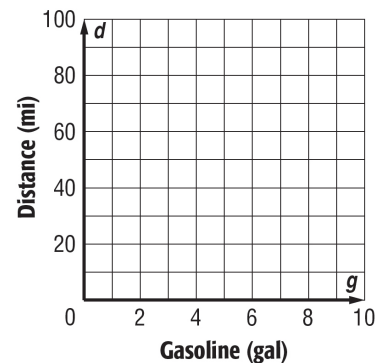
Discrete: have space between values

So, a function is discrete if the input values are only integers (... -1, 0, 1, 2, 3, 4...) and a function is continuous if the input values are any number (-1, -0.89, -0.52631, 0, 0.234567, etc.).

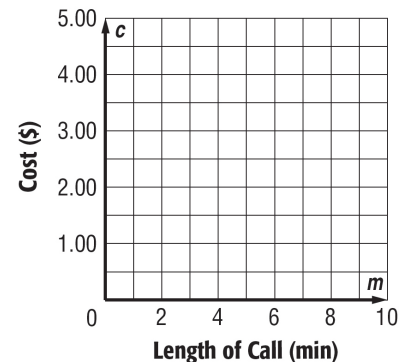
Is our example on the previous page continuous or discrete? Explain.

C. Below are examples of linear functions. Use your knowledge of input/output and slope-intercept form to help you answer the questions.

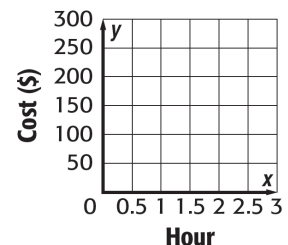
- The function $d = 18g$ describes the distance d that Rick can drive his truck on g gallons of gasoline. Graph this function. Why is it sufficient to graph this function in the upper right quadrant only? How far can Rick drive on 2.5 gallons of gasoline?



- The function $c = 0.5m + 1$ describes the cost c in dollars of a phone call that lasts m minutes made from a room at the Shady Tree Hotel. Graph the function. Use the graph to determine how much a 7-minute call will cost.

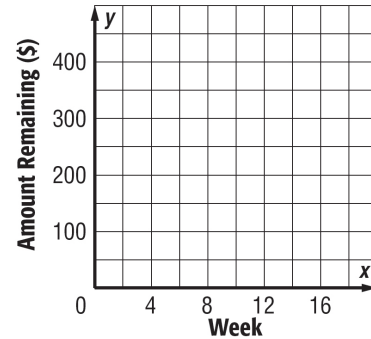


- A computer store charges \$45 for materials and \$50 an hour for service to install two new programs and a connection. The cost $C(h)$ is a function of the number of hours h it takes to do the job. Graph the function $C(h) = 45 + 50h$. How much will a 3-hour installation cost?



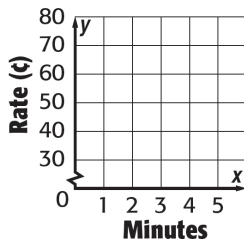
Linear Functions | Ch 4 Lesson 4

4. Jonah received \$300 in cash gifts for his fourteenth birthday. The function $y = 300 - 25x$ describes the amount y remaining after x weeks if Jonah spends \$25 each week. Graph the function and determine the amount remaining after 9 weeks.



5. Explain how you can use your graph in Exercise 4 to determine during which week the amount remaining will fall below \$190. Then find the week.

6. Ron got a cell phone rate of $C(a) = 0.22 + 0.10a$. Graph the cost per minute. How much will a five-minute call cost?

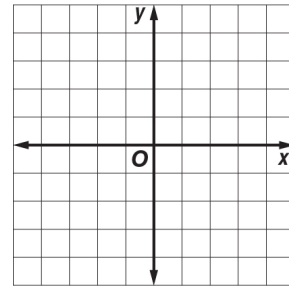


Linear Functions | Ch 4 Lesson 4

Complete the function table. Then graph the function.

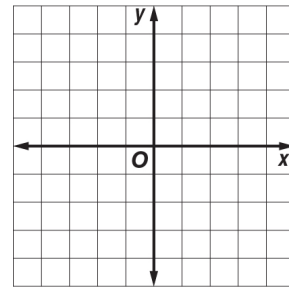
1. $y = x + 4$

x	$x + 4$	y
-2		
-1		
0		
1		



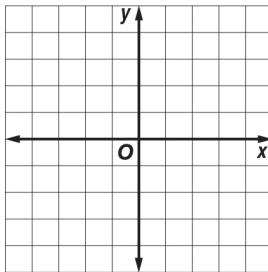
2. $y = 2x - 1$

x	$2x - 1$	y
-1		
0		
1		
2		

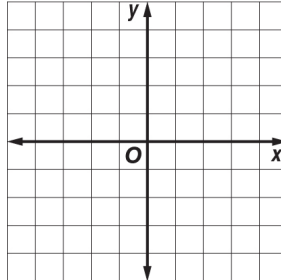


Graph each function.

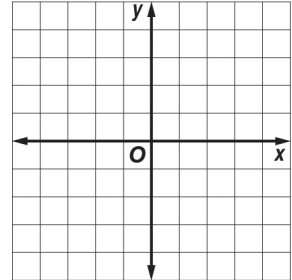
3. $y = x - 6$



4. $y = 2x - 3$



5. $y = 1 - x$

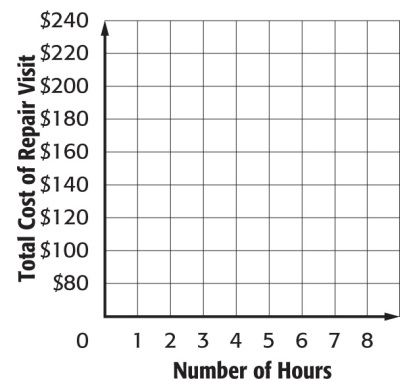


6. **REPAIRS** An appliance repairman charges \$60 for a service call plus an additional \$40 per hour to repair appliances.

a. Write a function to represent the situation.

b. Make a function table to find the total cost for 1, 2, 3, or 4 hours of work on an appliance.

x	1	2	3	4



c. Graph the function. Is the function continuous or discrete? Explain.

Using Function Notation | Ch 4 Lesson 3**A. Remembering the past**

Independent:

Dependent:

Identify the independent and dependent variables. Then create a function to represent each situation.

- 1. JACKETS** The school baseball team wants to have each player's name imprinted on the player's jacket. The cost is \$75 plus \$8.50 for each name. Write a function to represent the cost for the player's names.

What is the cost to have names imprinted on 25 jackets?

- 2. LEMONADE** Gene sold 10 glasses of lemonade while setting up his lemonade stand. After opening, he sold an average of 20 glasses each hour. Write a function to represent the approximate number of glasses sold after any amount of hours.

About when did he sell the 100th glass of lemonade?

B. Function notation.**Find each function value.**

1. $f(6)$ if $f(x) = 4x$

2. $f(8)$ if $f(x) = x + 11$

3. $f(3)$ if $f(x) = 2x + 4$

4. $f(5)$ if $f(x) = 3x - 2$

5. $f(-6)$ if $f(x) = 4x + 7$

6. $f(-14)$ if $f(x) = 2x - 3$

7. $f\left(\frac{2}{9}\right)$ if $f(x) = 3x + \frac{1}{3}$

8. $f\left(\frac{3}{4}\right)$ if $f(x) = 2x - \frac{1}{4}$

9. $f\left(\frac{4}{5}\right)$ if $f(x) = 4x - \frac{1}{5}$

Name: _____ Date: _____ Class: _____

C. Function Tables

Choose four values for x to make a function table for each function.

1. $f(x) = 5x - 4$

x	$5x - 4$	$f(x)$

2. $f(x) = 2 - 3x$

x	$2 - 3x$	$f(x)$

3. $f(x) = 6 + 2x$

x	$6 + 2x$	$f(x)$

4. $f(x) = x - 7$

x	$x - 7$	$f(x)$

5. $f(x) = 9x$

x	$9x$	$f(x)$

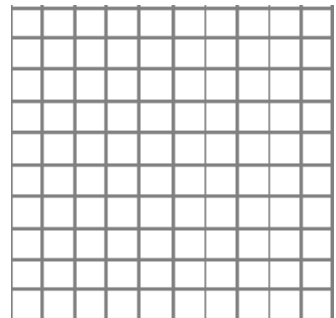
6. $f(x) = 3x + 5$

x	$3x + 5$	$f(x)$

D. Function from stories.

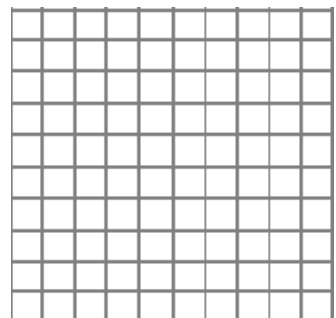
Create a function for the following problems. Then create a graph for each of the following functions.

- Courtney belongs to a health club that charges a monthly fee of \$20, plus \$85 to join.
 - Graph and write a function to represent her costs.



- How much has she paid after six months?

- The amount that Sunrise Library charges for an overdue book is \$0.25 per day plus a \$1 service charge. Write a function using two variables for this situation.
 - Graph and write a function to represent the charges.



- How much would you owe if you had a book for three weeks?

Compare Properties of Functions | Ch 4 Lesson 5

A. Table Comparisons

Carlos and Stephanie belong to the science museum. Carlos's membership can be represented by the function $y = 9.99x$, where y represents the cost in dollars. The cost of Stephanie's membership is shown in the table.

Months	Cost (\$)
1	5
2	10
3	15
4	20
5	25

1. Make a table to represent Carlos's membership.

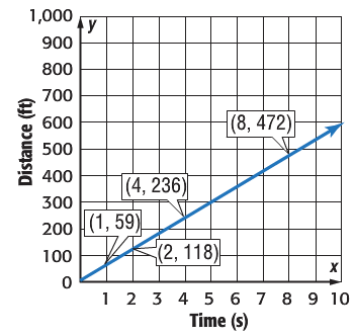
Months	Cost (\$)

2. Describe the rate of change for each function.
3. Who pays more for a two month membership? Explain.
4. Who pays more for a six month membership? Explain.

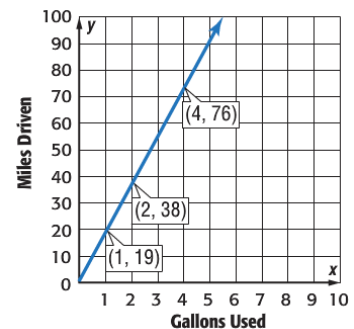
Functions can be represented by a table, graph, equation, or words. You can compare two functions represented in different forms.

B. Comparing Graphs to Words

1. A zebra's main predator is a lion. That's why Scar brings a zebra to the hyenas in The Lion King. Scar can run at a speed of 53 feet per second over short distances. The graph at the right shows the speed of a zebra. Compare their speeds.



2. Miss Adams's car has a gas mileage of 22 miles per gallon. The gas mileage of a certain sport utility vehicle is represented by the function shown. Compare their gas mileage.

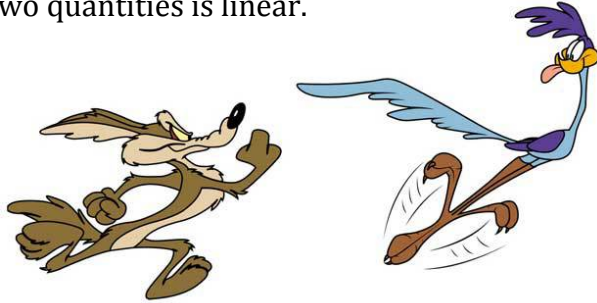


Compare Properties of Functions | Ch 4 Lesson 5

C. Compare tables to words.

1. The function $y=26x + 5$, where y is the miles traveled in x hours, represents the speed of Wile E. Coyote. The speed of Roadrunner is given in the table below. Assume the relationship between the two quantities is linear.

Hours	Miles
1	32
2	64
3	96



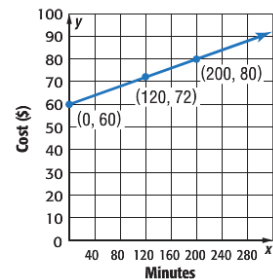
- Compare the functions' y -intercepts and rates of change.
 - After one mile, how close is Wile E. Coyote to catching Roadrunner?
 - If each character runs for 5 hours, how far apart will they end up?
2. The number of new movies a Redbox receives per week can be represented by $y=7x+2$, where y represents the number of movies and x represents the number of weeks. The number of games the same Redbox receives is shown in the table.

Weeks	Number of New Games
1	3
2	6
3	9

- Compare the functions' y -intercepts and rates of change.
- How many new movies and games will the store have after six weeks?

D. Comparing Graphs and Equations

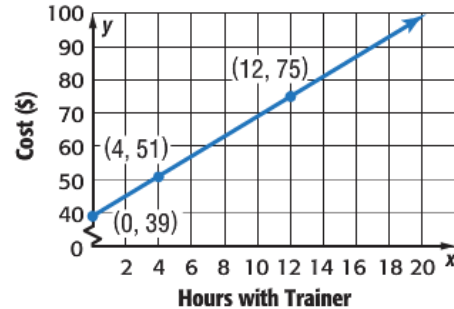
1. Mr. Smith and Mr. Paulsen each have a monthly cell phone bill. Mr. Smith's monthly cell phone bill is represented by the function $y=0.15x+14$, where x represents the minutes and y represents the cost. Mr. Paulsen's monthly cost is shown on the graph.



- Compare the y -intercepts and rates of change.
- What will be the monthly cost if they each used up 200 minutes?

Compare Properties of Functions | Ch 4 Lesson 5

2. Thor and Captain America each have memberships to the gym. Thor's membership is represented by the function $y = 3x + 29$, where x represents the hours with a personal trainer and y represents the cost. The cost of Captain America's membership is shown in the graph.

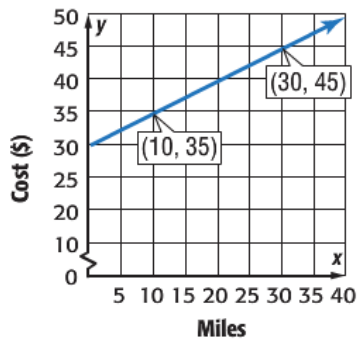


- Compare the y -intercepts and rates of change.
- Write an equation for each membership.
- What's the difference in cost if Thor and Captain America each work out for four hours?

E. Comparing Graphs and Tables

1. Billy Bob Joe needs a taxi ride to the airport. The cost for ExpressAIR is shown on the table. The cost for QuikRide is shown in the table.

ExpressAIR



QuikRide

Miles	Gallon
10	25
20	50
30	75

Which service should Billy Bob Joe choose if he's riding forty miles?