

Algebra 1 Student-Directed Review/Enrichment

The following activities are related to topics that you have learned about earlier this year. You may choose to work your way through all of the activities in order, or to prioritize working on activities for topics that you don't remember as well or that you struggled with earlier in the year.

If you need extra support in any of these topics, log into Mathspace (<https://bit.ly/fcpsmathspace>) using your regular FCPS username and password, and navigate to the associated topic in the eBook. You will find explanations and videos there.

Contents of this Packet:

Unit 1 – Expressions

Simplifying Numerical Expressions with Square and Cube Roots

Preparing for Renovations

Unit 2 – Equations and Inequalities

Literal Equations

Solving Multistep Linear Inequalities (including Error Analysis)

Unit 3 – Functions

Transformation Investigation

Unit 4 – Lines

Applications of Linear Equations

Unit 5 – Systems

Parking Lot Task

What Can I Buy?

Road Trip

Saving Money

Salaries

Rocks Task

Graphing Systems of Inequalities

Trampoline Task

Simplifying Numerical Expressions with Square and Cube Roots

Name _____

Date _____

I. Determine each sum/difference.

1.) $3\sqrt{5} - 2\sqrt{5} =$

2.) $8\sqrt{11} + 3\sqrt{11} =$

3.) $\sqrt[3]{9} + 4\sqrt[3]{9} =$

4.) $25\sqrt[3]{3} - 7\sqrt[3]{3} =$

5.) $-7\sqrt[3]{5} + \sqrt[3]{27} + 4\sqrt[3]{5} =$

6.) $\sqrt{18} - 5\sqrt{2} + 7 =$

7.) $2x\sqrt{5} - 8x\sqrt{2} + 2 =$

8.) $13a^2\sqrt{3} - 2a\sqrt{3} + 5a\sqrt{27} - 4a^2\sqrt{3} =$

II. Determine each product. Make sure that your answer is in simplest radical form.

9.) $(4\sqrt{5})(2\sqrt{3}) =$

10.) $(-2\sqrt[3]{4})(7\sqrt[3]{-3}) =$

11.) $(-3\sqrt{8})(-5\sqrt{2}) =$

12.) $(5\sqrt[3]{4})(9\sqrt[3]{4}) =$

III. Use the concept of the product of radicals.

13.) What are possible values of a and b , if $\sqrt{ab} = 5\sqrt{6}$?

14.) What are possible values of x and y , if $2\sqrt[3]{3xy} = -4\sqrt[3]{18}$?

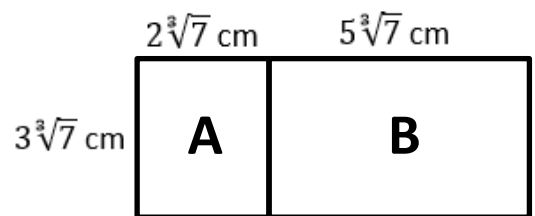
III. For 13 – 16, use the diagram to the right.

15.) Determine the area of region A.

16.) Determine the area of region B.

17.) Determine the total area of the rectangle.

18.) Determine the perimeter of the entire figure.



Preparing for Renovations

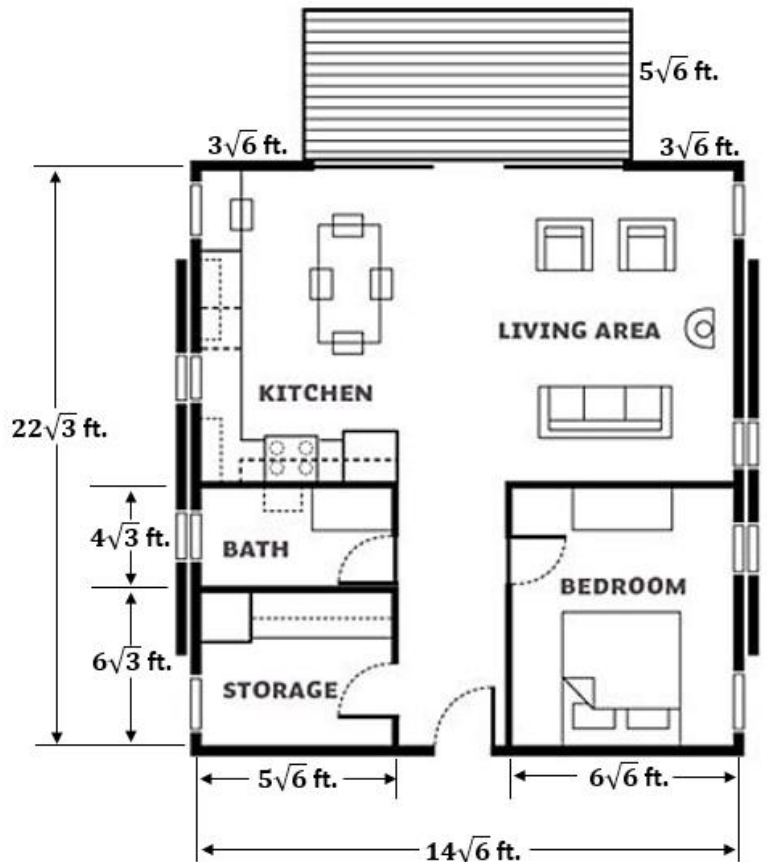
Name _____

Date _____

A couple recently purchased a new home. The floor plan can be seen below. The couple wants to put new carpet in the bedroom and new hardwood flooring in the kitchen, living area, and center hallway. They also plan to put a fresh coat of stain on the deck.

Show all calculations as you determine each measurement requested.

1. Find the length of the bedroom.
2. Determine the minimum square footage of carpeting that the couple will need to purchase.
3. Calculate the dimensions for both the kitchen/living area and the center hallway.



Kitchen/living area:

- a. Add the lengths of the bath and storage.
- b. Find the length of the kitchen/living area by subtracting your sum in part a from the total length of the house.

Center hallway (length was determined in part a above):

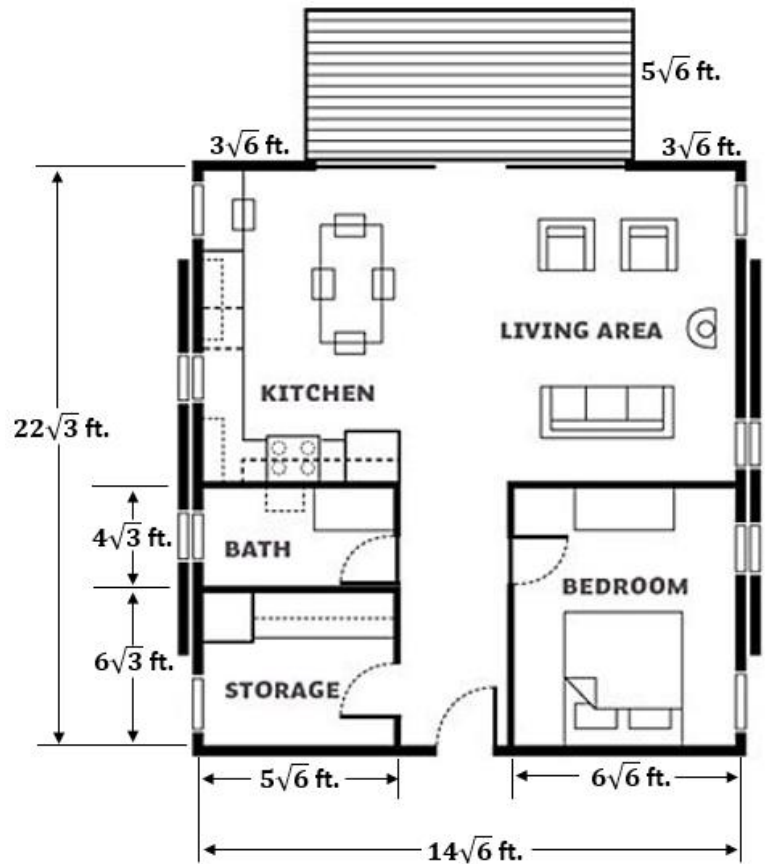
- c. Add the width of the bedroom and storage.
- d. Find the width of the center hallway by subtracting your sum in part c from the total width of the house.

Kitchen/living area: _____ x _____

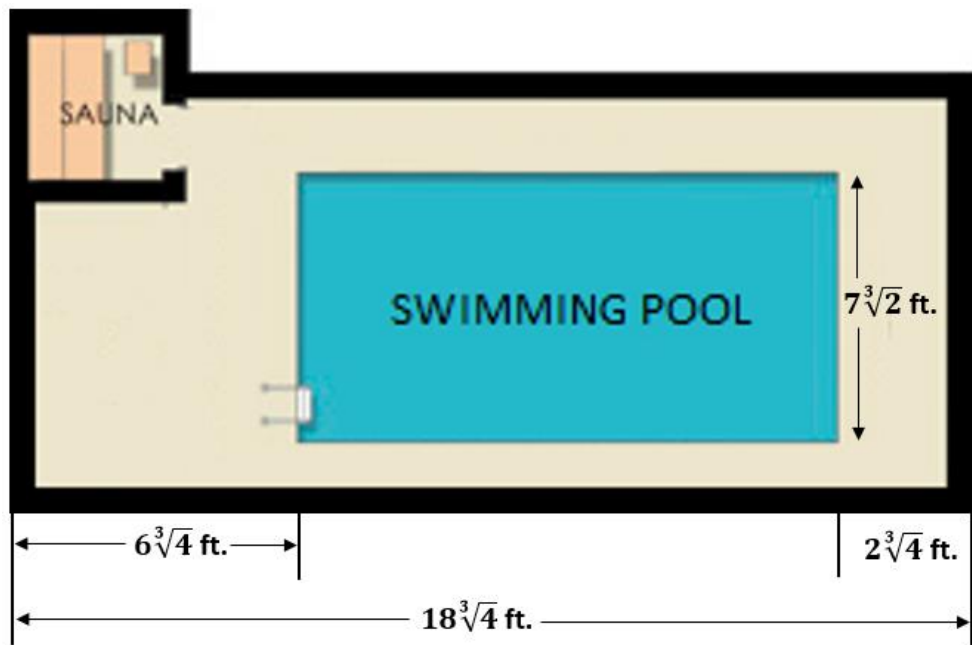
Center hallway _____ x _____

4. Determine the minimum square footage of hardwood flooring that will need to be purchased.

- a. Determine the square footage needed to cover the kitchen/living area.
 - b. Determine the square footage needed to cover the center hallway.
 - c. Determine the total square footage of hardwood flooring needed.
5. Find the width of the deck.
- a. Add the two measurements of $3\sqrt{6}$ feet.
 - b. Subtract the sum determined in part a from the total width of the house.
6. Determine the square footage for the deck that the couple will need to cover with stain.
7. If stain costs \$0.55, on the average, to cover each square foot of decking, how much should the couple expect to pay for the stain?



The couple also plans to add a pool and sauna outside the house in the near future. A sketch of their plan is provided.



10. Determine the length of the swimming pool.

- Add the lengths of $6\sqrt{4}$ ft and $2\sqrt{4}$ ft.
- Subtract your sum from part *a* from the total of $18\sqrt{4}$ ft.

9. How many square feet is the couple planning to allot for a swimming pool?

- 10. Extension:** The couple could add decorative tiling around the perimeter of the pool. If they do decide to follow through with the tiling, how many feet of tile will they need?

Literal Equations

Name: _____ **Date:** _____

Directions: Solve for the indicated variable in each formula below. Assign a shape to represent each variable. Rearrange the shapes, using the properties of equality, to solve for the indicated shape. Write your algebraic solution in the space provided.

1. $i = prt$ (interest = principal \cdot rate \cdot time)
 - a) Solve for p : _____ b) Solve for r : _____ c) Solve for t : _____

2. $V = \pi r^2 h$ (volume of a cylinder = $\pi \cdot \text{radius}^2 \cdot \text{height}$)
 - a) Solve for h : _____ b) Solve for r : _____

3. $A = \frac{1}{2}bh$ (area of a triangle = $\frac{1}{2}$ base \cdot height)
 - a) Solve for b : _____ b) Solve for h : _____

4. $A = \frac{1}{2}h(b_1 + b_2)$ (area of a trapezoid = $\frac{1}{2}$ height \cdot [base₁ + base₂])
 - a) Solve for h : _____ b) Solve for b_1 : _____ c) Solve for b_2 : _____

5. $Ax + By = C$ (general form of a linear equation)
 - a) Solve for y : _____ b) Solve for x : _____

6. $y = mx + b$ (slope-intercept form for the equation of a line)
 - a) Solve for x : _____ b) Solve for m : _____ c) Solve for b : _____

Some values or coefficients for the formulas above have been determined. With some of these values given, solve for the indicated variable.

7. $3y = \frac{1}{2}x + b$. Solve for b :

8. $36 = -pt$. Solve for t :

9. $A = \frac{1}{2}h(2 + -4b)$. Solve for h :

11. $112 = \frac{1}{2}bh$. Solve for b :

10. $-7x + 7y = 21$. Solve for y :

12. $V = 9\pi h$. Solve for h :

Error Analysis. Students were given equations and asked to solve for specific variables. In each solution, a mistake has been made. For each, determine between which two consecutive steps were either the properties of real numbers or the properties of equality applied incorrectly.

<p>13. Solve for y in the equation: Step 0: $\frac{1}{2}(2x - 4y) = 3x + 4$</p> <p>Step 1: $x - 2y = 3x + 4$ Step 2: $x - x - 2y = 3x - x + 4$ Step 3: $-2y = 2x + 4$ Step 4: $\frac{-2y}{-2} = \frac{2x+4}{-2}$ Step 5: $y = x - 2$</p> <p>Error made between step _____ and step _____</p>	<p>14. Solve for x in the equation: Step 0: $\frac{2}{3}x = 3x + 4y$</p> <p>Step 1: $3\left(\frac{2}{3}x\right) = 3(3x + 4y)$ Step 2: $2x = 9x + 12y$ Step 3: $2x - 9x = 9x - 9x + 12y$ Step 4: $-7x = 12y$ Step 5: $\frac{-7x}{-7} = \frac{12y}{7}$ Step 6: $x = \frac{12}{7}y$</p> <p>Error made between step _____ and step _____</p>
<p>15. Solve for b in the equation: Step 0: $4a - 11 + c = 3(b - 5)$</p> <p>Step 1: $4a - 11 + c = 3b - 5$ Step 2: $4a - 11 + 5 + c = 3b - 5 + 5$ Step 3: $4a - 6 + c = 3b$ Step 4: $\frac{4a-6+c}{3} = \frac{3b}{3}$ Step 5: $\frac{4}{3}a - 2 + \frac{1}{3}c = b$</p> <p>Error made between step _____ and step _____</p>	<p>16. Solve for y in the equation: Step 0: $y - 3 = -2(x + 7)$</p> <p>Step 1: $y - 3 = -2x - 14$ Step 2: $y - 3 + 3 = -2x - 14 - 3$ Step 3: $y = -2x - 17$</p> <p>Error made between step _____ and step _____</p>

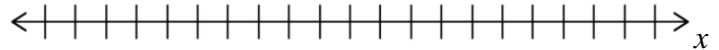
Solving Multistep Linear Inequalities

Name _____

Date _____

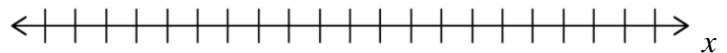
Directions: Solve each inequality in the space provided, graph the solution set on the blank number line provided, and list three possible solutions for each.

1.) $9x - 5 > -2(x - 3)$



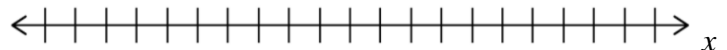
Three possible solutions: _____, _____, _____

2.) $5x - 5 - 9x < 3$



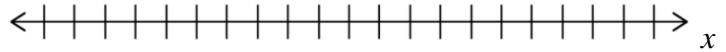
Three possible solutions: _____, _____, _____

3.) $3x - 5(x + 1) \geq -7$



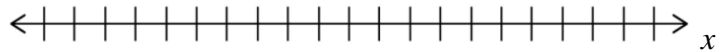
Three possible solutions: _____, _____, _____

4.) $\frac{3}{4}x - 10 + \frac{3}{8}x \leq \frac{1}{8}$



Three possible solutions: _____, _____, _____

5.) $\frac{3x-5}{8} > \frac{1}{2}$



Three possible solutions: _____, _____, _____

For each question below, write an inequality that could be used to answer the question. Then, solve each by applying the properties of real numbers and properties of inequality.

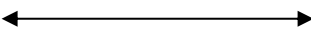
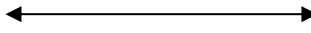
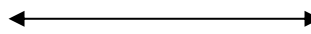
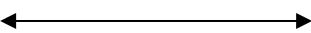
- 6.) Matthew has \$1,500 in his savings account. Currently, he pays \$20 each month for an app that he has subscribed to and \$30 each month at his favorite Italian restaurant. If he does not spend money on anything else or make any other deposits into his savings account, for how many months can he continue to make these purchases without going into debt?

- 7.) My twin sisters, Laura and Layla, just celebrated their birthday. At our family celebration, one set of grandparents gave them each a gift card. The other set of grandparents gave them each a \$50 check. Laura and Layla would not tell me how much was on their gift cards, just that combined they have a total of at least \$160 from our two sets of grandparents. What are the possible values for the gift card each of my sisters received?
- 8.) A submarine started at sea level and descended at a rate of -32 feet per minute for a given period of time, x . Then, the submarine slowed its descent to a rate of -12 feet per minute for another interval that lasted the same amount of time. If the current position of the submarine is, at most, 480 feet below sea level, describe the solution set for the number of minutes the submarine was travelling at each of these different speeds.
- 9.) Company A has a cellphone plan that charges a monthly fee of \$15 in addition to the \$0.40 they charge per minute for calls. Company B does not charge a monthly fee, but they charge \$0.50 per minute for calls. In a given month, describe the scenarios where Company B's plan would be less expensive.

Error Analysis

Name _____ Date _____

Directions: Identify the mistake in the first column and then correct it in the second. Once you make the correction and show the appropriate work, graph your solution.

Inequality	Correction	Graph
$6x - 4 > -2$ $\quad +2 \quad +2$ <hr/> $6x > -2$ $x > -\frac{1}{3}$		
$-x - 6 \leq 2 - (3x - 4)$ $-x - 6 \leq 2 - 3x + 4$ $-x - 6 \leq 6 - 3x$ $\quad +x \quad \quad +x$ <hr/> $-6 \leq 6 - 2x$ $\quad -6 \quad -6$ <hr/> $0 \leq -2x$ $0 \geq x$		
$2(x - 4) - 7x < 37$ $2x - 8 - 7x < 37$ $\quad +7x \quad +7x$ <hr/> $9x - 8 < 37$ $\quad +8 < 45$ $9x < 45$ $x < 5$		
$2x - 6 \geq 8 + 4x$ $\quad -4x \quad \geq \quad -4x$ <hr/> $-2x - 6 \geq 8$ $\quad +6 \quad +6$ <hr/> $-2x \geq 14$ $x \geq -7$		

Name: _____ Date: _____

Transformation Investigation – Activity Sheet

- Sketch a graph for $y = x$. (consider using a regular black lead pencil)
- Sketch a graph for each of the following equations – use the graphs attached and tables with each graph. (consider using different colored pencils to create each graph)

$$y_1 = x + 1 \quad y_2 = x + 4 \quad y_3 = x - 1 \quad y_4 = x - 3$$

- Complete the table below with the y -intercept and slopes for each equation.

	y	y_1	y_2	y_3	y_4
y-intercept					
Slope					

- What effect does changing b have on the parent function $y = x$?

- What generalizations can you make about the transformation seen when you change the y -intercept of a function?

- Sketch a graph for each of the following equations (consider using different colored pencils) – use the graphs and attached tables:

$$y_1 = 2x \quad y_2 = \frac{1}{2}x \quad y_3 = -5x \quad y_4 = -\frac{2}{3}x$$

Record data in the table and then answer the following questions:

	y	y_1	y_2	y_3	y_4
y-intercept					
Slope					

- Compare the data for y_1, y_2, y_3, y_4 to the data for the parent function. What effect(s) does changing the slope have on the parent function?

- What generalizations can you make about the transformation seen in a graph when you change the slope of a function?

6. Sketch a graph for each of the following equations. Go to www.desmos.com/testing to graph each linear equation. We will do this together... First graph $y = x$, then:

$y_1 = 2x$

$y_3 = -2x$

$y_2 = \frac{2}{5}x$

$y_4 = -\frac{2}{5}x$

Record data in a table and then answer the following questions:

	y	y_1	y_2	y_3	y_4
y-intercept					
Slope					

- What generalizations can you make about the transformation created when you graph two functions with opposite slopes?

Assessment

- **Questions**

- When the slope of a line is +1, what is the result of changing the y-intercept?

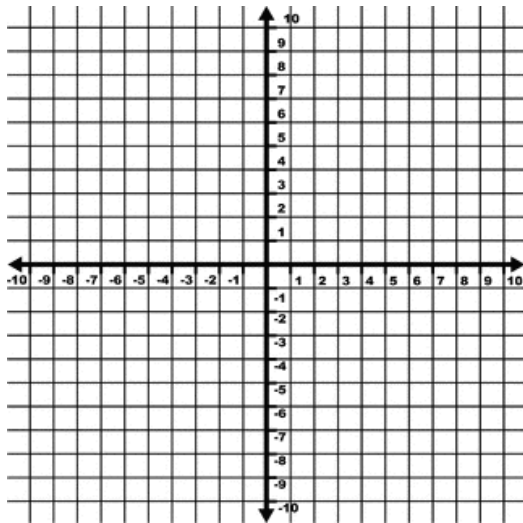
- When the slope (m) of a line is greater than 1, what is the effect on the parent function $y = x$?

- When the slope of a line is less than 1 but greater than zero, what is the effect on the parent function $y = x$?

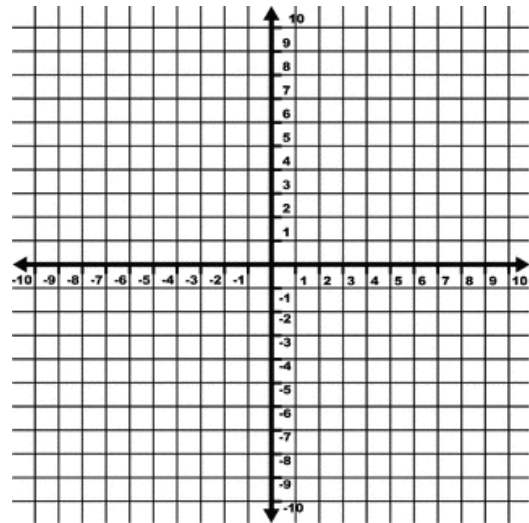
- When the slope of a line is -1 , what transformation is seen in relation to the parent function $y = x$?

- Compare and contrast the behaviors of the functions $y = x - 2$ and $y = -2x$ in relation to $y = x$.

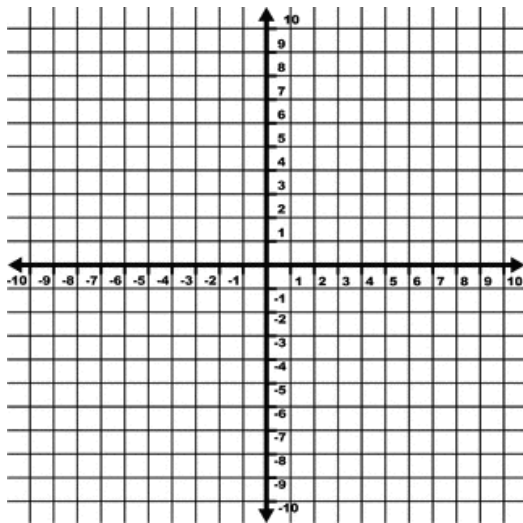
- How would the graph of the parent function, $y = x$, be transformed when graphing the function $y = -x + 2$.



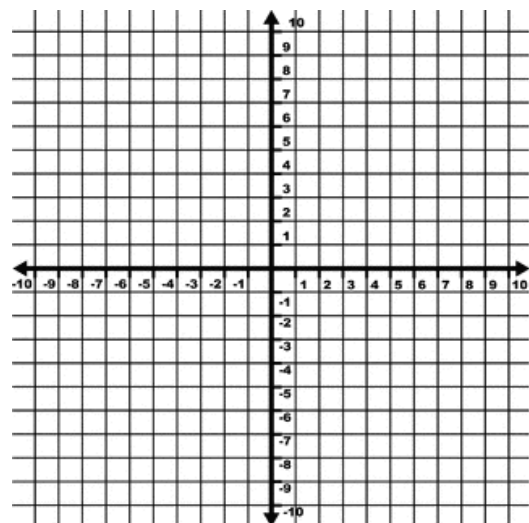
x	y



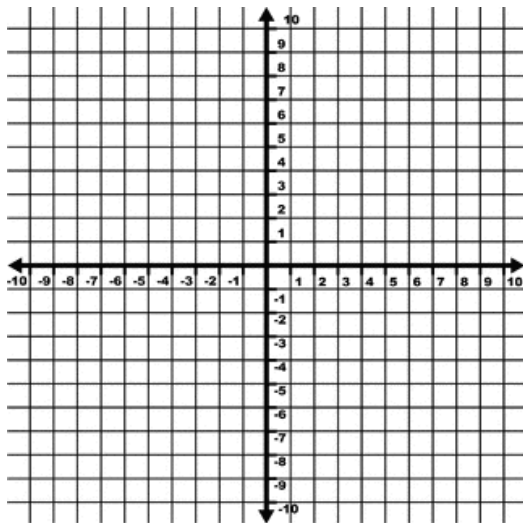
x	y



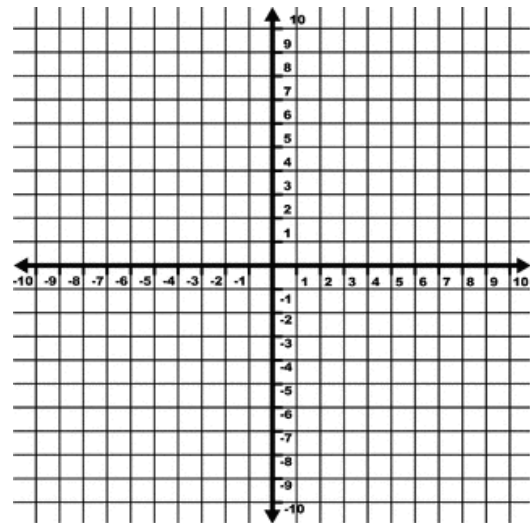
x	y



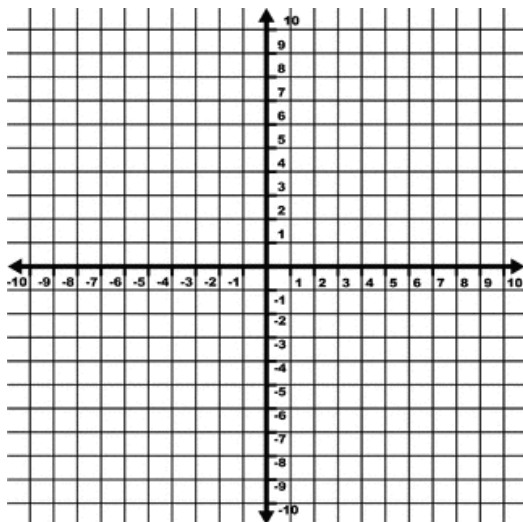
x	y



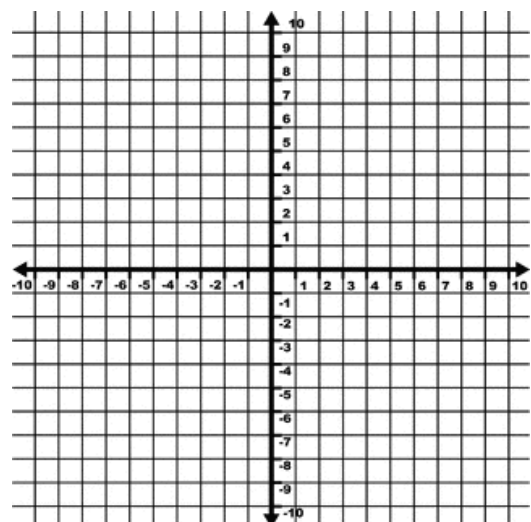
x	y



x	y

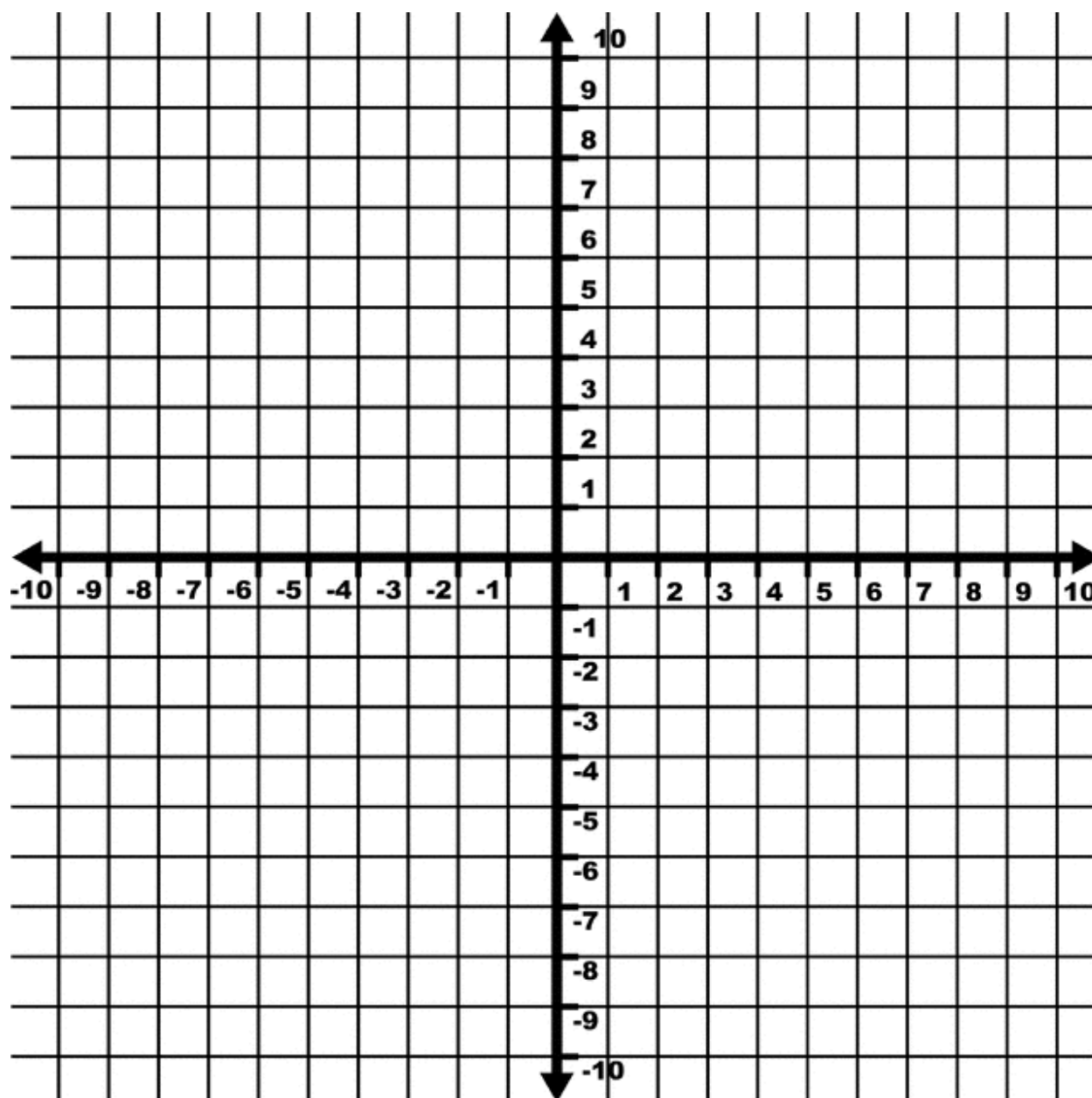


x	y



x	y

Use this graph for sketching the parent function, $f(x) = x$ or $y = x$.



x	y

Applications of Linear Equations

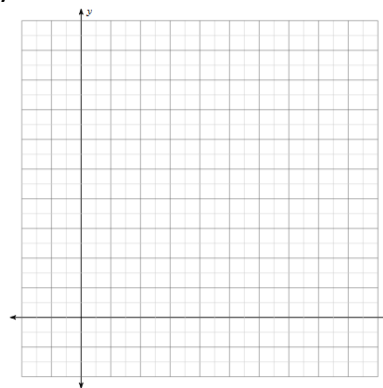
Directions: For each practical situation, write an equation that represents the situation. Identify the y -intercept and the rate of change. Briefly describe what the y -intercept and the rate of change represent in the context of the situation. Then graph the linear equation. **You will need to determine the intervals (scale) for your x - and y -axis, depending on the situation.**

1. You and your family need to take a taxi to get around town on your vacation. The taxi service charges \$7.50 for the initial pickup of you and your family and \$.25 per mile. Write and graph an equation to represent the cost of any taxi trip you take while on vacation.

equation: _____

y - intercept: _____

rate of change (slope): _____

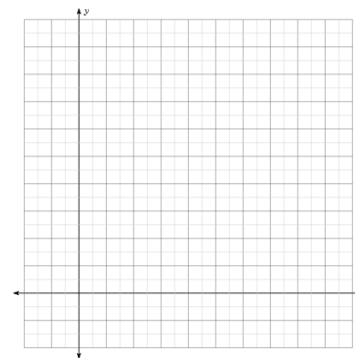


2. Each week at her job at the pet store, Maddison must empty the 180-gallon aquarium. With the hose she uses to drain the water, 25 gallons is emptied each hour. Write and graph an equation that represents the amount of water remaining in the tank over time.

equation: _____

y - intercept: _____

rate of change (slope): _____

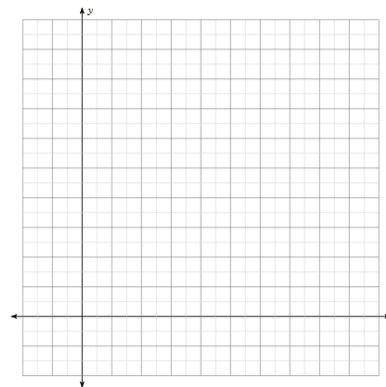


3. On average, a car loses half a gallon of gas each hour it is driven. The tank holds 13 gallons of gas initially. Write and graph an equation to represent how many gallons of gas remain in the tank over time.

equation: _____

y- intercept: _____

rate of change (slope): _____

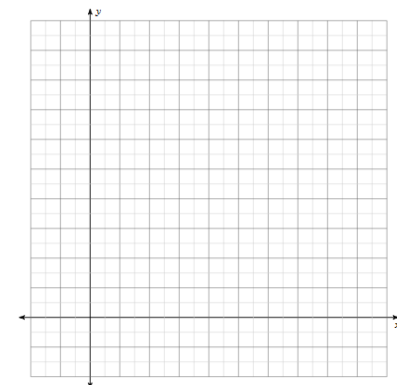


4. Frank is buying a laptop for \$650 to use for school. He is going to purchase the computer on credit—he'll pay \$45 per month toward the balance. Write and graph an equation to represent how much money Frank owes on his laptop over time.

equation: _____

y- intercept: _____

rate of change (slope): _____

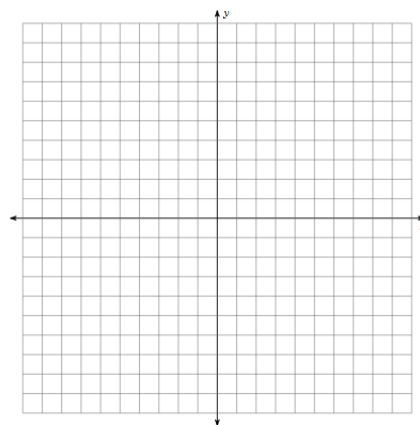


5. A scuba diver is 400 feet below sea level and rising at the rate of 10 feet every minute. Write and graph an equation to represent the scuba diver's location over time.

equation: _____

y- intercept: _____

rate of change (slope): _____

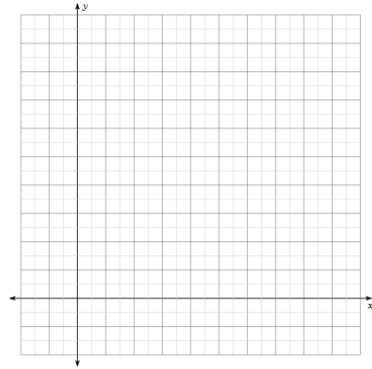


6. Aaliyah invests money into a retirement account. Initially, she invests \$400 into the account and anticipates 8 percent annual interest in return. Write and graph an equation to represent her annual return.

equation: _____

y- intercept: _____

rate of change (slope): _____



Name _____

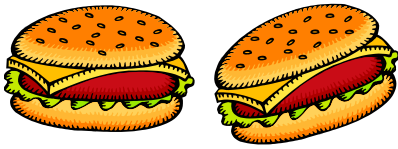
Date _____

Full Parking Lot

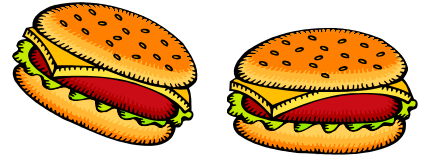
All 20 spaces in my favorite parking lot are filled by vehicles. Some are occupied by two-wheeled motorcycles, and others by cars. Each space has only one vehicle occupying it. To calm myself, I counted wheels and there were exactly 66.

How many cars and how many motorcycles have parked in my lot?

Show all work and explain how you arrived at your final solution.



What Can I Buy?



Name _____ Date _____

You are hungry, so you go to a fast-food restaurant. You have exactly \$15.02. You love Big Burgers and Cheeseburgers. Based on past experience, you know that you can eat only seven sandwiches. Big Burgers cost \$3.70, while Cheeseburgers cost \$.98. How many Big Burgers and how many Cheeseburgers can you buy? (Disregard the issue of sales tax in this problem.)

- Write a system of equations for this problem. Let B represent the number of Big Burgers and C represent the number of Cheeseburgers you can buy.

- Graph this system of equations. It is recommended that you use a graphing calculator to do this.

- You can buy _____ Big Burgers and _____ Cheeseburgers.

- Now, suppose you decide that you don't want to spend all of your money. Also, you realize that it would be fine to eat fewer than seven sandwiches. Write a system of inequalities for this new problem.

- Graph this system of inequalities.

- How many different sandwich combinations can you buy to fulfill your new criteria? Complete the chart at right, showing all of the possible combinations.

- Notice that systems of inequalities have *many* solutions.

Big Burgers	Cheeseburgers
0	1
0	2
0	
0	
0	
0	
0	
0	
1	
1	
1	
1	
1	
1	
1	
1	
2	
2	
2	
2	
2	
2	
3	
3	
3	
3	
4	



Road Trip

Name _____ Date _____

You are planning a one-day road trip, but you don't have a car. You have investigated rental cars available from companies in the area and have decided to rent a car from either Prestige Auto or Getaway Auto.

1. Prestige Auto charges \$35 a day plus 24¢ per mile. Fill in data in the chart below to indicate the charges you would incur for rental from Prestige Auto.

Miles Driven	Start-up Cost	Cost for Miles Driven	Total Cost of Trip
0			
20			
40			
60			
80			
100			
120			
140			
160			

- Which values change in this situation? _____
- What causes the values to change? _____
- What is the *independent* variable? (causes the change) _____
- What is the *dependent* variable? (is affected by the change) _____
- Write an equation in words to explain the situation. _____

- Write an equation in algebraic notation to explain this situation. _____

2. Getaway Auto charges \$51 a day plus 16¢ per mile. Fill in data in the chart below to indicate the charges you would incur for rental from Getaway Auto.

Miles Driven	Start-up Cost	Cost for Miles Driven	Total Cost of Trip
0			
20			
40			
60			
80			
100			
120			
140			
160			

- Which values change in this situation? _____
- What causes the values to change? _____
- What is the *independent* variable? (causes the change) _____
- What is the *dependent* variable? (is affected by the change) _____
- Write an equation in words to explain the situation. _____

- Write an equation in algebraic notation to explain this situation. _____

3. Complete the table below, using the equations you developed in number 1 and 2.

Miles Driven	Cost of Car from Prestige Auto	Cost of Car from Getaway Auto
50		
75		
100		
200		
250		
300		
325		

- Is there a particular number of miles driven at which the cost of using Prestige is the same as using Getaway? _____ If so, what is it? _____
- Is there a range of values of miles driven in which the cost of using Prestige is less than using Getaway? _____ If so, what is it? _____
- When is it cheaper to use Getaway? _____

Saving Money



Name _____

Date _____

Nilda has \$480 dollars in her sock drawer. She plans to save \$30 per week from now on.

1. Complete the chart to show the amount of money Nilda has in her sock drawer.

No. of Weeks	Beginning Amount	Amount Added	Total Amount
0			
1			
2			
3			
4			
5			
6			

- Which values change in this situation? _____
- What causes the values to change? _____
- What is the *independent* variable? (causes the change) _____
- What is the *dependent* variable? (is affected by the change) _____
- Write an equation in words to explain the situation. _____

- Write an equation in algebraic notation to explain this situation. _____
- At this rate, after how many weeks will Nilda have \$690 in her sock drawer? _____
- After how many weeks will she have \$2,040 in her sock drawer? _____
- If Nilda's mom had put money in Nilda's sock drawer at the same rate each week, how long had Nilda's mom been saving before Nilda took over? _____
- Graph your equation using your graphing calculator. Do your answers match the graph? _____
Do your answers match the table? _____

Salaries

Name _____ Date _____



Manny just graduated from high school and has been offered a job. He will start at \$18,000 per year with a promise of a \$500 raise per year. Sonny just graduated from college and has been offered a job. He has been offered \$24,000 per year with a promise of a \$300 raise per year.

1. Complete the following chart.

Manny		Sonny	
Years' Experience	Salary	Years' Experience	Salary
0		0	
1		1	
2		2	
3		3	
4		4	
5		5	

- What is the *independent* variable? _____
- What is the *dependent* variable? _____
- What is the equation for each graph? _____
- Graph the equations on the same screen. Does Manny ever make more money than Sonny? _____. If so, when? _____. How do you know? _____

- At which point will Manny and Sonny earn the same amount of money? Show your solution algebraically.

Name _____

Date _____

Radical Rocks



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You and your friends are planning an adventure at Radical Rocks for a fun-filled day of rock climbing. The cost is \$8 per hour plus \$13 for full-day equipment rental. The rental includes a harness, shoes, belay device and a chalk bag.

Write an equation to represent your total cost for the day.

1) You found an online coupon that offers a \$6.00 discount on the full-day equipment rental. How does this change your equation above? Write a new equation.

2) Your friend received a coupon in the mail offering a 40% discount off the hourly rate? How does this change your original equation above? Write a new equation.

3) Graph the equations from Questions 1 and 2 above. Choose a scale and label the axes.



4) Which coupon offered the better deal? Use the graph to support your conclusion.

5) You have a total of \$35.00 to spend. How many hours can you purchase for the day?

- **Find the number of hours for the equations in Question 1 and Question 2 on the previous page.**

- **Does this support your conclusion from Question 4? Justify your answer.**

6) Refer to your graph, did the two lines intersect?

If so, what is the approximate coordinate for the point of intersection?

What does this point represent within the context of this problem?

Graphing Systems of Inequalities

Name _____ Date _____

Using sheets of graph paper (or a dry-erase board with the coordinate plane) and colored pencils or markers in different colors, complete each of the following systems of inequalities. Show your work.

Example 1

$$\begin{cases} 2x - y > -3 \\ 4x + y \geq 5 \end{cases}$$

1. Isolate the variable, y , in each inequality.
2. Graph each inequality on the same coordinate plane, using a different color for each.
3. Identify the solution set by highlighting the region on the graph.
4. Pick a point from the solution set, and test it in the system.

Example 2

$$\begin{cases} x - y \leq -2 \\ x - y > 2 \end{cases}$$

1. Isolate the variable, y , in each inequality.
2. Graph each inequality on the same coordinate plane, using a different color for each.
3. Identify the solution set by highlighting the region on the graph.
4. Check.

Example 3

$$\begin{cases} x < 1 \\ x \leq -2 \end{cases}$$

1. Graph each inequality on the same coordinate plane, using a different color for each.
2. Identify the solution set by highlighting the region on the graph.

Example 2
$$\begin{cases} x - y \leq -2 \\ x - y > 2 \end{cases}$$

1. Isolate the variable, y , in each inequality.

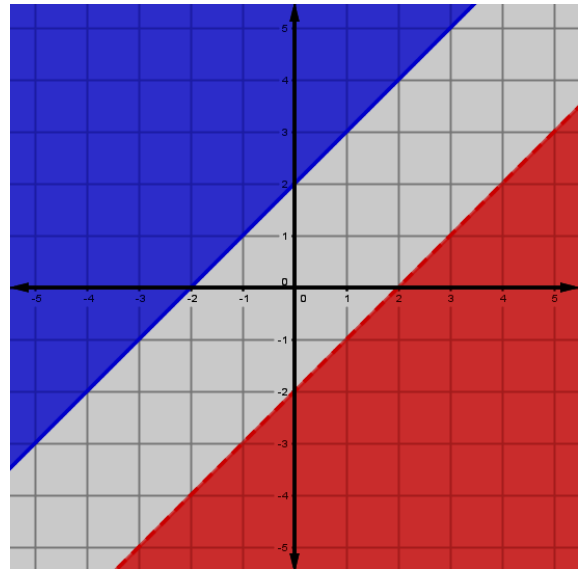
$$\begin{cases} y \geq x + 2 \\ y < x - 2 \end{cases}$$

2. Graph each inequality on the same coordinate plane, using a different color for each.

3. Identify the solution set by highlighting the region on the graph.

This system of inequalities has no solution.
There is no place where the colors of shading overlap.

4. Check.

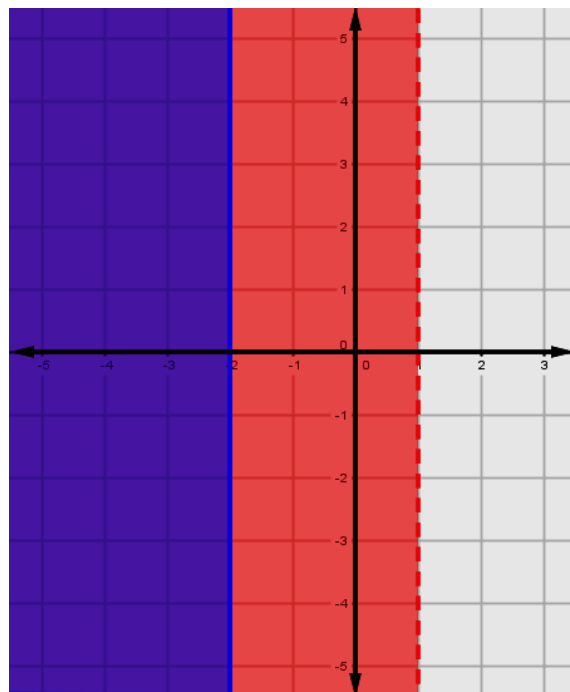


Example 3
$$\begin{cases} x < 1 \\ x \leq -2 \end{cases}$$

1. Graph each inequality on the same coordinate plane, using a different color for each.

2. Identify the solution set by highlighting the region on the graph

The solution to this system of inequalities is the region where the colors of shading overlap.



Name _____ Date _____

Trampoline Party

For your birthday, you want to take a group of friends to an indoor trampoline center. There are two trampoline parks available on your date.

Pricing Information:

Sky High: \$50 for up to 10 people and \$5 per person after that.

Jump it Up: \$70 for a party set up fee and \$2 per person.

1. Which trampoline center would you choose for the following number of friends. Show all work and give justification for your solutions, including any representations you used.
 - a. 15 friends
 - b. 20 friends
 - c. 25 friends
2. What is the minimum number of friends for which Jump it Up is the less expensive choice. Show all work and give justification for your solutions, including any representations you used.
3. Use the pricing information given to model algebraically the situation where Jump it Up is less expensive than Sky High.