Honors Algebra 2 **Name: _____**
Intro Ch.1 and 2a **Block: _____**

Measuring Water Height

Supplies:

- A glass container about half filled with water
- Marbles
- Centimeter Ruler
- Pencil

Complete steps 1-7 with your group. Be ready to share your results with the class.

1. Measure the water height, in centimeters, before you add any marbles and record this height in the table below.

2.

Number of Marbles	Water Height (cm)
0	
6	

3. Add marbles, six at a time, to the container. Measure and record the water height each time in the chart above.

4. Make a scatter plot of your data. Put the number of marbles on the horizontal axis and the water height on the vertical axis.

4. What do you notice about your data points?

5. Calculate the change in water height **per marble**.

6. Let n = the number of marbles and h = the water height. Use your data to write an equation of the form:

water height = starting ht. + change in water ht. per marble times the number of marbles

7. What is the name for the type (or form) of equation you wrote in question 6?

Extension

8. Using your textbook glossary as a resource, write the point-slope equation of a line.

9. Suppose another group did not follow directions. They forgot to measure their starting height, but they know that the height was 5.9 cm when they had 6 marbles in the container and the height was 6.2 cm when they had 9 marbles in the container.

a) What else would the group need to know to be able to write the equation for their line? Find it.

b) Explain how they could use the point-slope form of the equation of a line to write an equation for their data. You may want to use the same variables from the front…Let n = the number of marbles and h = the water height.

c) Did this group add their marbles six at a time? How do you know?

10. Complete the sentence for this experiment:
"_____ is a function of _____"

11. In which of the two equations you wrote (steps 6 & 9b) was h a function of n? Explain how you know.

12. Using the equation from the group who did not follow directions, we can rewrite their equation using function notation like this: $h(n) = 0.1(n-6)+5.9$ Use this function to find $h(18)$. Next find $h(18)$ you're your function from step 6. Compare the results.

13. Can you think of any limitations for possible values for either variable in this experiment? Explain.

Honors Algebra 2

1-4 Curve Fitting with Linear Models

Learning Targets

1. Fit scatterplot data using linear models with and without technology
2. Use linear models to make predictions.

Vocabulary:

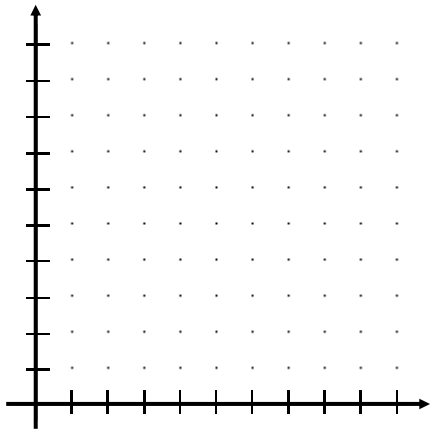
- Regression
- Correlation
- Line of Best Fit
- Correlation Coefficient

Properties of the Correlation Coefficient, *r*

-
-
-
-

Example 1: Make a scatterplot. Identify the correlation, sketch a line of fit and find its equation.

Points Scored in Ten Games										
Minutes Played	28	35	8	20	39	23	19	27	15	30
Points Scored	16	13	2	12	31	10	9	15	4	19



Example 2: Find the correlation coefficient and the equation of the line of best fit for the data above.

Example 3: Use your equation to predict…

a) The number of point scored if 25 minutes are played.

b) How many minutes are played if 31 points are scored.

Honors Algebra 2

1-1 Exploring Transformations

Learning Targets (2)

1.

2.

Vocabulary (5 – define in your own words)

1.

2.

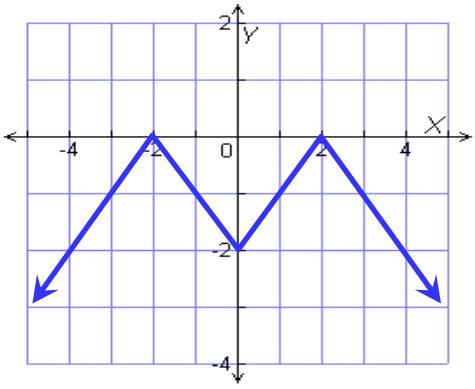
3.

4.

5.

After reading example 1 and example 2 in your textbook, try the problem below and answer the questions that follow…

***Example 1:** Use a table to perform each transformation of y=f(x). Use the same coordinate plane as the original function, but use two different colors for part A and part B. Note which transformation goes with which color.*



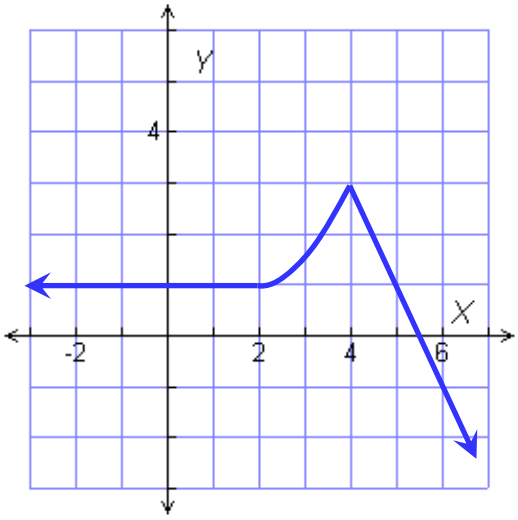
A) translation 2 units up

B) reflection across x-axis

- To which direction does an *x*-coordinate change correspond? A *y*-coordinate change?
- When translating two directions, does it matter if you go up/down or left/right first?
- What are the important points you used to transform the picture?
- Which coordinates change under a reflection across the *y*-axis? The *x*-axis?

After reading example 3 and example 4 in your textbook, try the problem below and answer the questions that follow…

***Example 2:* Use a table to perform the indicated stretch or compression. Graph the function and the transformation on the same coordinate plane, indicating which transformation goes with which color.**



A) ***horizontal stretch of the function y = f(x) by a factor of 3***

B) ***vertical compression of the function y = f(x) by a factor of ½***

- *Which coordinate changes under a horizontal stretch or compression? Under a vertical stretch or compression?*
- *How does this change to the coordinate differ from changes under a translation?*
- *How does a horizontal stretch differ from a vertical stretch?*
- *How can you tell whether the transformation will be a stretch or compression?*

THINK ABOUT THIS…

1. Describe two ways to transform (4, 2) to (2, 2).

2. Which transformation(s) maintain congruence (≅) to the original?

Honors Algebra 2

1-2 Intro to Parent Functions

Learning Targets

1. Identify parent functions from graphs and equations.
2. Use parent functions to model real world data and make predictions.

- Define Parent Function.

- What is a "Function Rule"?

- List the name of the 6 parent functions from the Exploration. Sketch their graphs and write their equations. Then, list the Domain and Range for each parent function.

Example 1: Identify the parent function for g from its function rule. Then describe what transformation of the parent function it represents. Verify with a graphing calculator.

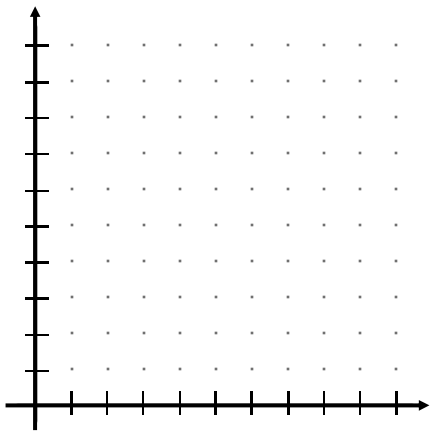
$$g(x) = |x| + 5$$

Example 2: Graph the data from this set of ordered pairs. Describe the parent function and the transformation that best approximates the data set. A scatterplot may be helpful.

{(–2, 12), (–1, 3), (0, 0), (1, 3), (2, 12)}

Example 3: Graph the relationship from year to sales in millions of dollars and identify which parent function best describes it. Then use the graph to estimate when cumulative sales reached $10 million.

Cumulative Sales	
Year	**Sales (million $)**
1	0.6
2	1.8
3	4.2
4	7.8
5	12.6



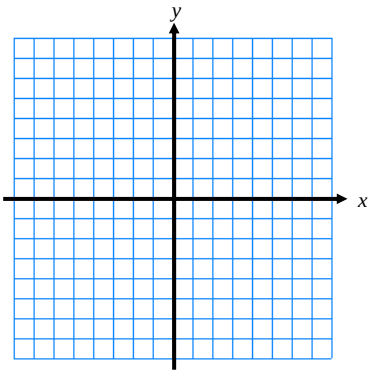
Honors Algebra 2

2-1 Using Transformations to Graph Quadratic Functions

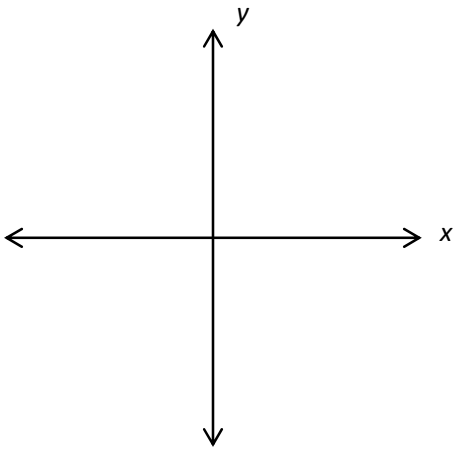
Learning Targets

1. Graph a quadratic function using a vertical shift.
2. Graph a quadratic function using a horizontal shift.
3. Graph a quadratic function using a vertical stretch/compression.
4. Graph a quadratic function using a horizontal stretch/compression.
5. Write a quadratic equation in vertex form given the description of a transformation.
6. Describe the transformations to $f(x) = x^2$ when given the transformed function.
7. Interpret transformations of real-world data.

Characteristics of $f(x) = x^2$



Vertex Form of a Quadratic Function

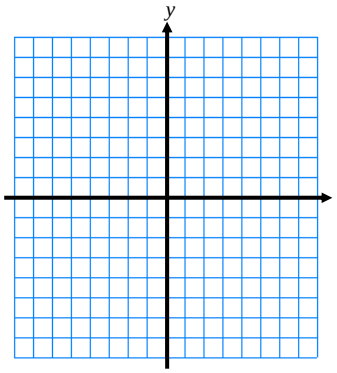


Graphing Strategies

Example 1: Using the graph of $f(x)=x^2$ as a guide, describe the transformation(s), and then graph the new function identifying at least 3 points.

a) $y=(x-2)^2+3$

Transformation(s): _____



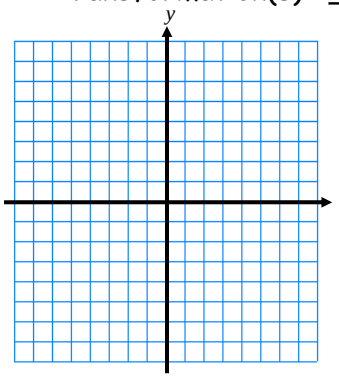
Vertex:_____

Opens? _____

Max/Min? _____

b) $y=(x+3)^2-4$

Transformation(s): _____



Vertex:_____

Opens? _____

Max/Min?_____

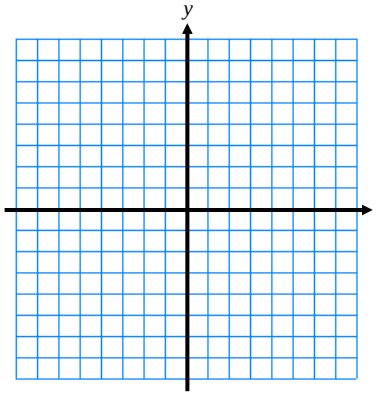
How does the operation sign INSIDE the parentheses affect the direction of a horizontal translation?

How does the operation sign OUTSIDE the parentheses affect the direction of the vertical translation?

Example 2: Using the graph of $f(x)=x^2$ as a guide, describe the transformation(s), and then graph the new function identifying at least 3 points.

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

Transformation(s): _____



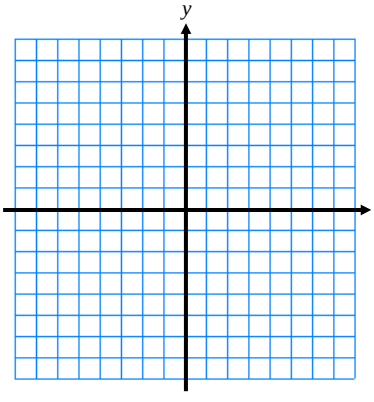
Vertex:_____

Opens?_____

Max/Min?_____

b) $y=(2x)^2$

Transformation(s): _____



Vertex:_____

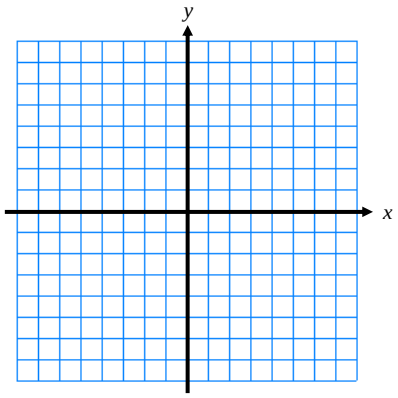
Opens? _____

Max/Min?_____

How does the sign of "a" affect the graph of a quadratic function?

Example 3: Using the graph of $f(x)=x^2$ as a guide, describe the transformation(s), then graph $y=-2(x+3)^2+5$ identifying at least 3 points.

Transformation(s): _____



Vertex:_____

Opens?_____

Max/Min?_____

Example 4: Use the description to write the quadratic function in vertex form.

a) "The parent function $f(x)=x^2$ is vertically stretched by a factor of $\frac{4}{3}$ and then translated 2 units left and 5 units down."

b) "The parent function $f(x)=x^2$ is reflected across the x-axis and translated 6 units down."

Example 5: On Earth, the distance *d* in meters that a dropped object falls in *t* seconds is approximated by $d(t)=4.9t^2$. On the moon, the corresponding function is $d_m(t)=0.8t^2$. What kind of transformation describes this change from $d(t)=4.9t^2$, and what does the transformation mean?

Honors Algebra 2
2-2 Properties of Quadratic Functions in Standard Form

Warm-up:
Give the coordinate of the vertex of each function.

1. $f(x)=(x-2)^2+3$
2. $f(x)=2(x+1)^2-4$

3. Give the domain and range of the following function:
   {(2, 4), (0, 6), (2, 8), (4, 10)}

Learning Targets
Given the standard form of a quadratic, $f(x)=ax^2+bx+c$ determine the following:

1) whether the graph upwards upward or downward.
2) the vertex
3) the axis of symmetry
4) the minimum or maximum (stating which it is)
5) the y-intercept
6) Domain and Range
7) And be able to graph the function with at least 3 points identified.

Rewriting the vertex form of the quadratic into standard form:

$f(x)=a(x-h)^2+k$

Standard Form of a Quadratic Function $f(x)=ax^2+bx+c$

*a =*_____ *b =*_____ *c =*_____

*h =*_____

and if a > 0, then _____

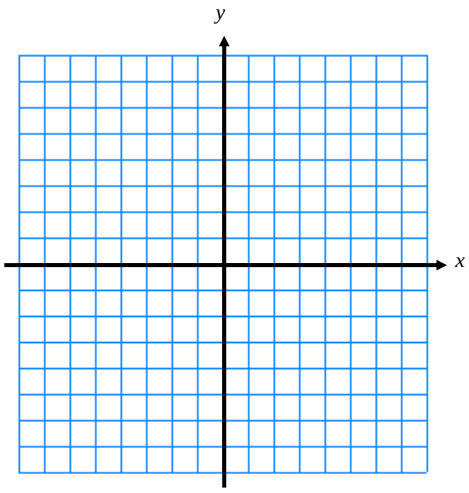
*and if a < 0, then*_____

vertex : (h, k) = _____ *the y-intercept =*_____ *axis of symmetry:*_____

minimum/maximum:

Domain/Range

1. Consider the function $f(x)=2x^2-4x+5$. Determine the following WITHOUT a calculator:



a) whether the graph upwards upward or downward.

b) the vertex

c) the axis of symmetry

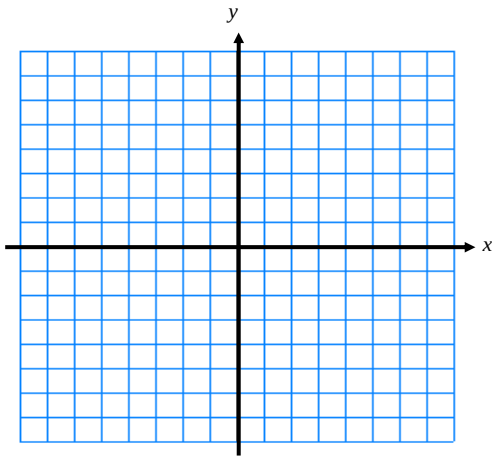
d) the minimum or maximum (stating which it is)

e) the y-intercept

f) graph the function with at least 3 points identified.

g) the Domain and Range

2. Consider the function $f(x)=-x^2+3x+1$ Determine the following WITHOUT a calculator:



a) whether the graph upwards upward or downward.

b) the vertex

c) the axis of symmetry

d) the minimum or maximum (stating which it is)

e) the y-intercept

f) graph the function with at least 3 points identified

g) the Domain and Range

3. The average height *h* in centimeters of a certain type of grain can be modeled by the function $h(r)=0.24r^2-1.28r+33.6$, where *r* is the distance in centimeters between the rows in which the grain is planted. Based on this model, use your graphing calculator to determine the minimum average height of the grain, and the row spacing that results in this height.