

**Topic:** Parent Functions and Transformations, 90 min

**Grade Level:** 10<sup>th</sup>-12<sup>th</sup> grade

**Subject:** Algebra II

**Notes:** 8<sup>th</sup> period will do this lesson on Thursday

**Objectives:**

- Apply transformations to points and sets of points. Apply transformations to the linear, quadratic, absolute value and square root parent functions. Interpret transformations of real-world data.
- Identify parent functions from graphs and equations. Use parent functions to model real-world data and make estimates for unknown values.
- Transform functions. Recognize transformations of functions. Identify the domain and range of relations and functions

Behavioral objective(s):

- 2.A.4A: Identify and sketch graphs of parent functions, including linear, quadratic, absolute value, and square root.
- 2.A.4B: extend parent functions with parameters such that as  $a$  in  $f(x)=a/x$  and describe the effects of the parameter changes on the graph of parent functions

**Purpose:** By understanding how to describe the transformations on a parent graph, students could write an equation that could later be used for prediction. For example: how high a ball or object is at any given time after tossing, how far an object traveled, or the speed of a moving object.

**Materials**

For the students	For the teacher
Warm up handout	ELMO
Practice packet	Warm-up handout
Foldable	Practice Packet
Journal	Quizzes to pass out
Pen/pencil	Pen
Calculator	Calculator
	laptop
	foldable

**Procedures/Activities**

<b>Warm up (10-15 min)</b>

Sketch the given equation on the graph provided.  
What is the parent function?  
Draw a table to help

**Introduction/Anticipatory Set/Engagement and Exploration: (< 5 min)**

Use the warm up to segway into the notes.  
It easier to graph after creating a table of specific points.  
Students should be able to identify the vertex or center by looking at the equation.

Possible Homework review from LTF Packet (1<sup>st</sup> page front and back)

**Model:**

Inform students that they will work on practice, covering the information that will be on the quiz.  
They can work with a partner that is near them if needed.  
Students may speak quietly; I should not hear them across the room.

**Check for Understanding/Explanation:**

Should I be able to hear your conversation from (give a location on opposite side of the room)?

**Essential vocabulary:** absolute-value parent function, restricted domain, , horizontal shift, stretch, compression, inverse

**Supporting vocabulary:** absolute-value, reflection, vertex, minimum/maximum, vertical shift

**Guided Practice/Exploration:**

Notes (warm up writing a table)

Teacher will work through 1-2 practice problems on packet : focus on creating table before sketching graph

Will work through 3.a.  $f(x) = 2|x - 3| + 2$

What is the parent function?

- Absolute value

What is the vertex?

- Vertex: (3,2)

Let's draw a table:

Table

$x$	0	1	2	3	4	5	6
$f(x)$	8	6	4	2	4	6	8

5a. Evaluate each function at  $f(-2)$ ,  $f(0)$ , and  $f(3/2)$

$g(x) = -4x + 2$

$$g(-2) = -4(-2) + 2 = 8 + 2 = 10$$

$$g(0) = -4(0) + 2 = 0 + 2 = 2$$

$$g\left(\frac{3}{2}\right) = -4\left(\frac{3}{2}\right) + 2 = -6 + 2 = 4$$

You will finish the rest and at the end of the class you will have a quiz, covering this material.

**Independent Practice/Elaboration:**

Student will finish practice problems.  
Call student up with pop. Sticks  
Teacher will use leading questions  
What is the parent graph  
How did this function change  
    Did it move to the left or right  
    Did it move up or down  
    Is it stretched or compressed  
Read the directions, what are we supposed to do?  
Did you highlight the parent function?  
Is it possible to have the square root of a negative number?  
What is the  $(a, h, \text{ or } k)$  value?  
Where does it go in the equation?  
Where is the vertex (based on equation)?  
Have you created a table? (for given equation)

**Re-Teaching:**

Look over notes  
Review and show examples of the translations  $a, h,$  and/or  $k$  have on any given function  
$$y = a(x - h) + k$$
  
Stretch/compression ( $a$ ), horizontal translation ( $h$ ), vertical translation ( $k$ )  
Leading questions that are listed above  
Show other examples as necessary

**Closure/Evaluation:**

Last 20 minutes will be Parent functions and Transformations quiz 2

**Planned Modifications and Differentiation:** 3<sup>rd</sup> period will be split into 2 groups for small group instruction.

**Assessment of Student Learning:** ; Monitoring students' independent and group work, Summative: Unit Test (following week) Answers to pop sticks.

**Data Collection and Analysis:**

Mueller, Felice  
Algebra II, Travis HS

10/15/13  
Fall 2013

**Resources:** team generated lesson plan

**Post-Lesson Reflection:**