

Unit Title: Absolute Value Function with Transformations

Grade Level: 11-12

Subject Area: Math (Algebra 2, College Algebra, College Precalc)

Duration/Length/Number of class periods: 2-3 class periods

Description:

Students will use this activity to determine how the values of a , h , and k affect the absolute value functions when graphed on a coordinate plane.

Established Goals (National, State, Local):

ACT College & Career Readiness Standards

AF 604: Given an equation or function, find an equation or function whose graph is a translation by a specified amount up or down.

AF 706: Given an equation or function, find an equation or function whose graph is a translation by specified amounts in the horizontal or vertical directions.

Minnesota K-12 Academic Standards in Mathematics

9.2.1.9: Understand the concept of function and identify important features of functions and other relations using symbolic and graphical methods where appropriate. *Benchmark:* Determine how translations affect the symbolic and graphical forms of a function. Know how to use graphing technology to examine translations. (Example: Determine how the graph of $f(x) = |x - h| + k$ changes as h and k change)

9.2.2.6: Recognize linear, quadratic, exponential and other common functions in real-world and mathematical situations; represent these functions with tables, verbal descriptions, symbols and graphs; solve problems involving these functions, and explain results in the original context. *Benchmark:* Sketch the graphs of common non-linear functions such as square root, absolute value, reciprocal, cubic, and translations of these functions (h and k). Know how to use graphing technology to graph these functions.

ISTE Standards

1C: Students use technology to seek feedback that informs and improves their practice and to demonstrate their learning in a variety of ways.

3C: Students curate information from digital resources using a variety of tools and methods to create collections of artifacts that demonstrate meaningful connections or conclusions.

What Enduring Understandings are desired?

- Change is fundamental to understanding functions
- The properties of functions and function operations are used to model and analyze real world applications and quantitative relationships.
- Students will understand how to represent absolute value functions.

Functions can be represented in a variety of ways, such as graphs, tables, equations, or words. Each representation is particularly useful in certain situations. Some important families of functions are developed through transformations of the simplest form of the function.
What Essential Questions will be considered? - How does the equation of a function affect its graphical representation? - How does changing the equation of a function in more than one way affect its graphical representation? - How can I use the equation of a function to graph the function without using ordered pairs? - How do you represent absolute value functions? - How do you use transformations to help graph absolute value functions?
Students will know / be able to: Students will know: - how the a-term affects the parent function - how the h-term affects the parent function - how the k-term affects the parent function Students will be able to: - describe what transformations are happening based on equation given - graph an absolute value function when transformations are given

Description	For ma tive	Su m ma tive	Intro duct ory Activ ity	Lear ning Activ ity	Stud ent Tech nolo gy Use d	Teach er Tech nolog y Used	ISTE Stand ards
Warm Up: Geogebra Slider Link - Students use sliders to determine how a, h, and k affect the parent graph of $y = a x - h + k$. - Assign this using a class code so I can observe student answers and know if students are making the correct observations.			X		X	X	1C
Activity 2 - Introduction to the a-term Geogebra Link -- a-term Students use the tools provided to create a line segment along one side of the graph given and then calculate the slope of the line segment.	X			X	X	X	1C

- Students are then asked if they see a relationship between the graph and the equation of the graph given. - Students can create a “New Graph” to see if their conjecture is true.							
Activity 3 - Given graph - determine a, h, and k values Geogebra Link – a, h, and k-term - Students asked to enter in values for a, h, and k of a graph that is given. - The activity allows students to see immediately if each number they type in is correct or not. If it is incorrect, they may try again with the same graph. - Students may choose to have a new graph appear by clicking the “New Graph” button. - Assign this using a class code so I can observe student answers and know if students are making the correct observations.	X			X	X	X	1C
Activity 4 - Graphing Absolute Value Functions if Equation is Given Graphing Absolute Value Functions in Form $y = a x - h + k$ Students will watch a video explaining how to sketch an Absolute Value Function if the equation in the form $y = a x - h + k$ is given	X			X	X		3C
Homework: Absolute Value Function with Transformations - Assign Quizizz - Absolute Value Function with Transformations - Assign this with 3 attempts with redemption questions allowed	X			X	X	X	1C
Final Assessment: QUIZ: Absolute Value Function with Transformations - Quiz: Absolute Value Function with Transformations - This will be given in paper form		X					
Extension: Parent Graph Transformations Students will watch a video explaining how the transformations discovered through the Absolute Value activities can be applied to other Functions (i.e. square root, cubic, quadratic, reciprocal, and step)				X	X	X	3C

Materials, tools and resources:

Students: Laptop, Internet, YouTube, Geogebra, Pencil

Teacher: Laptop, Internet, YouTube, SMART Board (to show students how to use Geogebra), Copies of quiz

Unit Plan Author (name, school and optional email address or hyperlink to teacher's web page):

Amy Larsen

Tracy Area Public Schools

larsena@tracy.k12.mn.us