

Algebra 2 Graphing Project

Directions:

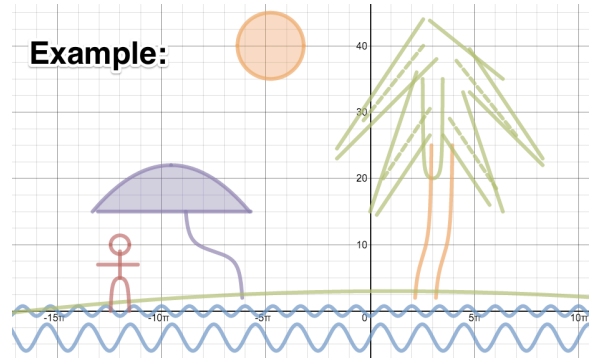
1. You must create a picture or artistic design using the graphs of at least 10 different functions and relations.
2. Your picture must include at least one of each of the following:

- A linear function with positive slope
- A linear function with negative slope
- A horizontal line
- A vertical line
- A quadratic function
- An absolute value function
- A polynomial of degree 3 or higher
- A square root function
- A cube root function
- A circle (which we haven't talked about this year, but I'll refresh your memory)

Want other shapes (wavy trig functions, etc.)? Go for it, but make sure you have all of the above first!

3. Your picture must include functions that show each of the kinds of transformations we have talked about:
 - A vertical translation
 - A horizontal translation
 - A vertical shrink
 - A vertical stretch
 - A reflection over the x-axis
 - A reflection over the y-axis

4. Besides your graph, you must also fill out the table later in this document describing your functions & transformations. I would recommend filling out the **“sketch the general shape and describe its shape in your own words”** column of this table before working on your graph so you can refer to it and look at possible shapes you might need. I have done one for you.



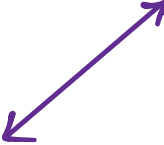
1	$y = -.001(x - 3)^2 + 3$
2	$(x + 15)^2 + (y - 40)^2 \leq$
3	$y \leq -.05(x + 30)^2 + 22$
4	$y = 15\{-41 \leq x \leq -18\}$
5	$y = 7\{-41 \leq x \leq -35\}$
6	$x = -12\pi\{5 \leq y \leq 9\}$
7	$(x + 12\pi)^2 + (y - 10)^2$
8	$y = \csc(x - 12.5\pi) + 6\{$

The technical details of how to create your graph:

1. Open the Desmos App on your iPad (download from Self-Service if you don't have it)
2. Click the link to "Sign In" in the upper right hand corner and log in with your school Google email and password
3. Click "Untitled Graph" in the upper left and then give your graph a name
4. Type the equations of your functions into the expressions bar on the left.
 - In order to get a cube root ($\sqrt[3]{\quad}$), you must hit the "functions" button and go under misc.
 - You can get single points just by typing in the coordinates (x, y) .
 - If you only want to show a part of your function, like just the part of the line $y = 2x + 1$ between the x values of 1 and 5, type the following: $y = 2x + 1 \{1 < x < 5\}$ to restrict your domain or use y instead of x to restrict the range.
The braces are under "A B C."
5. You can edit an equation by tapping on.
6. To delete an equation, hit the x .
7. To move your view, drag or pinch and drag to zoom. Hit the home button to get the zoom back to normal.
8. If you want a different color, hit the gear and then tap the equation's colored circle to change it.
9. **BE SURE TO HIT THE "SAVE" BUTTON (in the upper left) OFTEN!**
10. If you close and come back in, you may have to log in again and hit the three horizontal lines in the upper left to reopen your graph.

After your graph is finished:

11. **SAVE** it one last time.
12. Open the Desmos website INSTEAD OF THE APP: <http://desmos.com>
13. Hit the "Start Graphing" button and log in and open your graph using the 3 horizontal lines in the top left corner.
14. Hit the share arrow in the upper right.
15. Choose email and send it to amcnabb@knox1.us. Make sure to put your name.
16. Complete the table on the next pages.

Type of Function	Sketch the general shape and describe its shape in your own words	List ONE of your equations of this type
Linear – positive slope $y = mx + b$ where $m > 0$	 <p>A straight line that rises from left to right</p>	
Linear – negative slope $y = mx + b$ where $m < 0$		
Horizontal line $y = a$ where a is a constant		
Vertical line $x = a$ where a is a constant		
Quadratic $y = a(x - h)^2 + k$ OR $y = ax^2 + bx + c$		
Absolute value $y = a x - h + k$		

Type of Function	Sketch the general shape and describe its shape in your own words			List ONE of your equations of this type
Polynomial of Degree 3 or Higher $y = ax^n + bx^{n-1} + \dots + gx + h$		Even Degree	Odd Degree	
	Negative Leading Coeff.			
	Positive Leading Coeff.			
Square root $y = a\sqrt{x - h} + k$				
Cube root $y = a\sqrt[3]{x - h} + k$				
Circle $(x - h)^2 + (y - k)^2 = r^2$ where (h, k) is the center and r is the radius				

Fill out the following describing your transformations. You may use the same equation for more than one translation.

Example: For Vertical Translation, $y = |x| + 1$, translated up 1 unit

Type of Transformation	List ONE of your equations that demonstrates this transformation	Describe the transformation in words
Vertical translation		
Horizontal translation		
Vertical shrink		
Vertical stretch		
Reflection across the x-axis		
Reflection across the y-axis		

Scoring Guide for Algebra 2 Graphing Project

General:

- ___ At least 10 functions graphed that create a picture or pattern (10 pts)
- ___ In class work time is used productively and appropriately (6 pts)

Required types of functions present on graph, listed on table, & correctly described in table: (4 pts each)

- ___ A linear function – positive slope
- ___ A linear function – negative slope
- ___ A horizontal line
- ___ A vertical line
- ___ A quadratic function
- ___ An absolute value function
- ___ A polynomial of degree 3 or higher
- ___ A square root function
- ___ A cube root function
- ___ A circle

Required transformations present on graph, listed on table, & correctly described in table: (4 pts each)

- ___ A horizontal shift
- ___ A vertical shift
- ___ A vertical shrink
- ___ A vertical stretch
- ___ A reflection over the x-axis
- ___ A reflection over the y-axis

Bonus (1 pt): ___ Graph includes another type of function (circle, trig function, etc.)

Total
80