INVESTIGATING ABSOLUTE VALUE TRANSFORMATIONS

Graph each set of 4 functions on the same graph using Desmos.
Transfer the image of each set of absolute value functions into the table below.
Discuss your observations about the relationship between the functions in
each group and their equations in pairs.

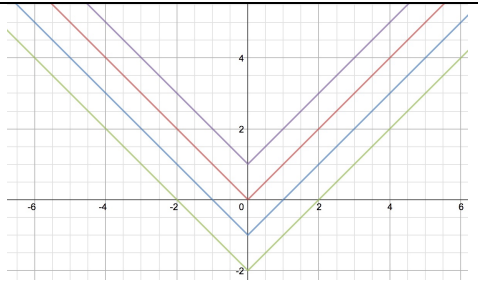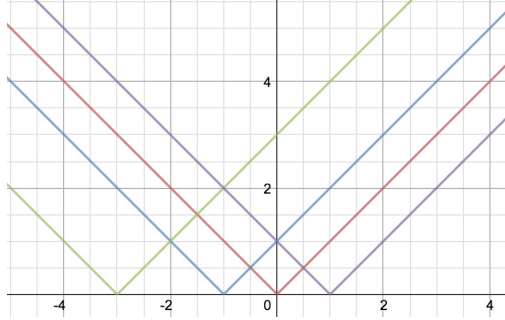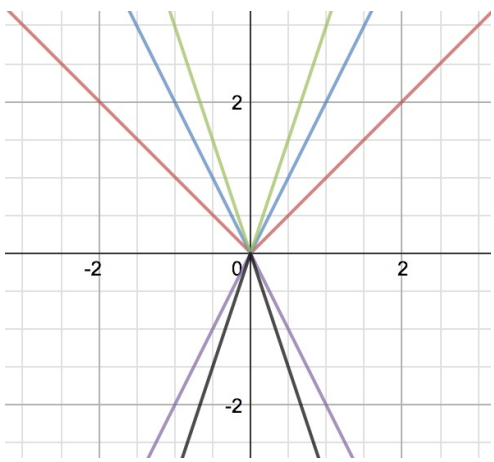| Absolute value transformations	Sketched graphs	Observations How did the graphs change? What in the equations caused this change?
1. $y = \|x\|$ 2. $y = \|x\| - 1$ 3. $y = \|x\| - 2$ 4. $y = \|x\| + 1$		
1. $y = \|x\|$ 2. $y = \|x + 1\|$ 3. $y = \|x + 3\|$ 4. $y = \|x - 3\|$		
1. $y = \|x\|$ 2. $y = 2\|x\|$ 3. $y = 3\|x\|$ 4. $y = -2\|x\|$ 5. $y = -3\|x\|$		

With another group, discuss how changes in the parent function $y = |x|$ affect the graph of the transformed function.

$y = |x| + c$ (outside changes)
$y = |x - h|$ (inside changes)
$y = a|x|$ (coefficient changes, think about both sign and size)

INVESTIGATING ABSOLUTE VALUE TRANSFORMATIONS – Possible Answers

Absolute value transformations	Sketched graphs	Observations

1. $y = \lvert x \rvert$
2. $y = \lvert x \rvert - 1$
3. $y = \lvert x \rvert - 2$
4. $y = \lvert x \rvert + 1$
	
	1. Red
	2. Blue
	3. Green
	4. Purple
		$y = \lvert x \rvert + c$ (outside changes) to the parent function cause the function to:
		    Shift up for $c > 0$ or
		    Shift down for $c < 0$

1. $y = \lvert x \rvert$
2. $y = \lvert x + 1 \rvert$
3. $y = \lvert x + 3 \rvert$
4. $y = \lvert x - 3 \rvert$
	
	1. Red
	2. Blue
	3. Green
	4. Purple
		$y = \lvert x - h \rvert$ (inside changes) cause the parent function to:
		    Shift left for $h < 0$
		    Shift Right for $h > 0$

1. $y = \lvert x \rvert$ 2. $y = 2\lvert x \rvert$ 3. $y = 3\lvert x \rvert$ 4. $y = -2\lvert x \rvert$ 5. $y = -3\lvert x \rvert$	 1. Red 2. Blue 3. Green 4. Purple 5. Black	$y = a\lvert x \rvert$ (coefficient changes, think about both sign and size) causes the parent function to narrow as a increased and the function to reflect about the x axis when a is negative.