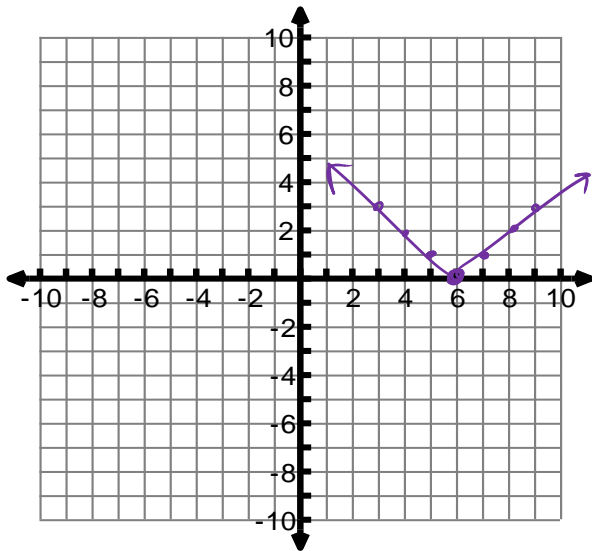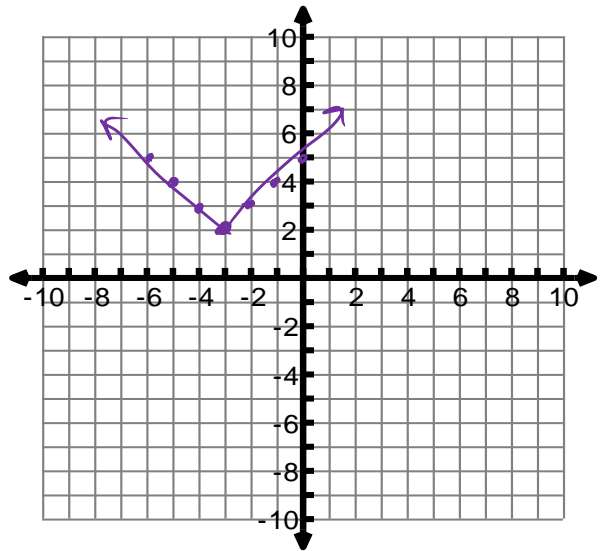# TRANSFORMATIONS CONTINUED

OBJECTIVES:
1) Draw conclusions about absolute value functions and transformations.
2) Discover how the parts of an absolute value function translate and transform the function.
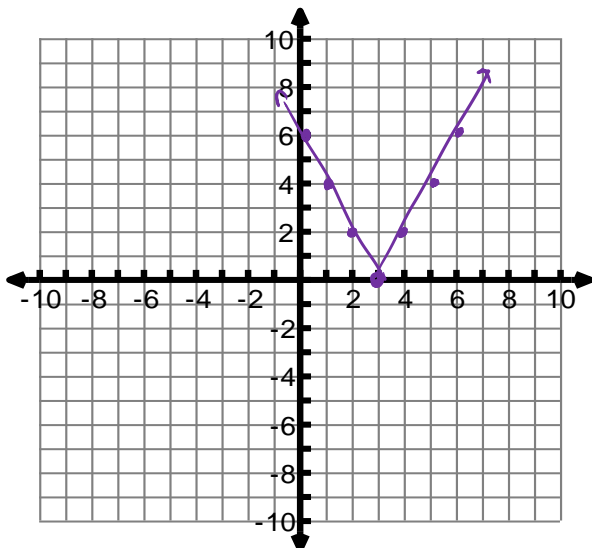
Graph and state the transformations that occur.
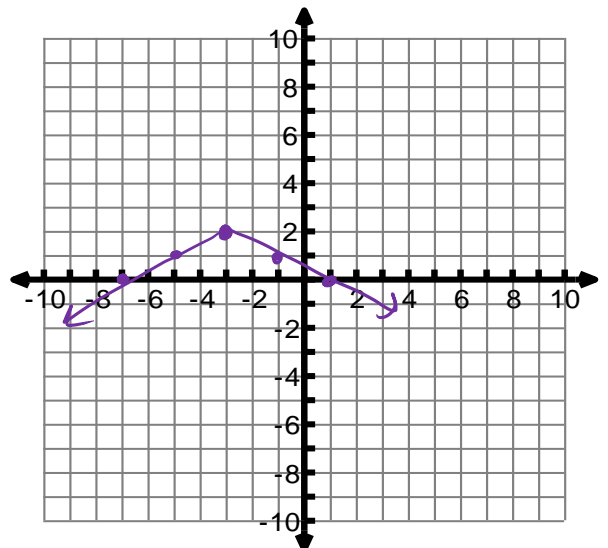
1) $y = |x - 6|$ shifted right 6 units

2) $y = |x + 3| + 2$ shifted left 3, up 2 units

3) $y = 2|x - 3|$ shifted right 3 units and stretched

4) $y = -\frac{1}{2}|x + 3| + 2$

CONCLUSIONS:

The general form of an absolute value function is as follows, $f(x) = a|x - h| + k$
where (h, k) is the <u>vertex</u>. Use the graphs which your group sketched to complete the following conjectures:

1. If h > 0 then the vertex shifts to the_____.

2. If h < 0 then the vertex shifts to the _____.

Use your Day 12 hw to help on this part!

3. If k > 0 then the vertex shifts _____.

4. If k< 0 then the vertex shifts _____.

5. If a is positive the graph opens_____.

6. If a is negative then the graph opens_____, i.e. it reflects over the____- axis.

7. If $0 < |a| < 1$, then the graph becomes_____.

8. If $|a| > 1$, then the graph becomes_____.

9. The <u>axis of symmetry</u> is the vertical line about which the absolute value graph is symmetric. Using the graphs you have already completed, make a conjecture about the general equation for the axis of symmetry of any absolute value function:

               Axis of symmetry:_____

<u>Assessing what you have learned: Discuss the impact of a, h, and k on the given.</u>

1. Compare the equation $y + 7 = -9|x - 3|$
    to the parent function of $y = |x|$.

2. Compare the equation $y - 2 = \frac{1}{4}|x + 3|$
   to the parent function of $y = |x|$.

3. Write an equation of an absolute value graph whose vertex is (2, -4) and is narrower/stretched vertically from the parent function of $y = |x|$ and opens down.

4. Write an equation of an absolute value graph that has been translated two units to the left and six units down from the origin and which opens up and is wider/vertically shrunk.

5. Write an equation of an absolute value graph that has been translated five units to the right, three units up, opens up, and is skinnier/stretched vertically than the parent function of $y = |x|$.

6. Write an equation of an absolute value graph that has been translated eight units down, eleven units to the left, opens down, and is wider/shrunk vertically from the parent function of $y = |x|$.

7. Write the equation of the absolute value function graphed below.

a)
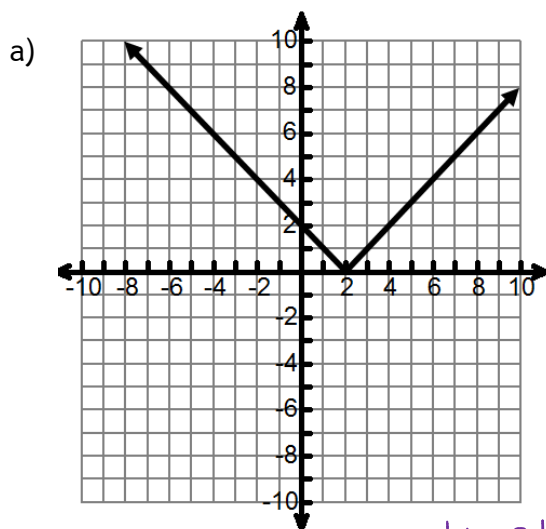
(2,0) vertex

$y = a|x-2|+0$

plug in (3,1) $1 = a|3-2|+0$

$1 = a|1|+0$

$a = 1$

$y = 1|x-2|+0$ ⟩ simplify

$\boxed{y = |x-2|}$

b)
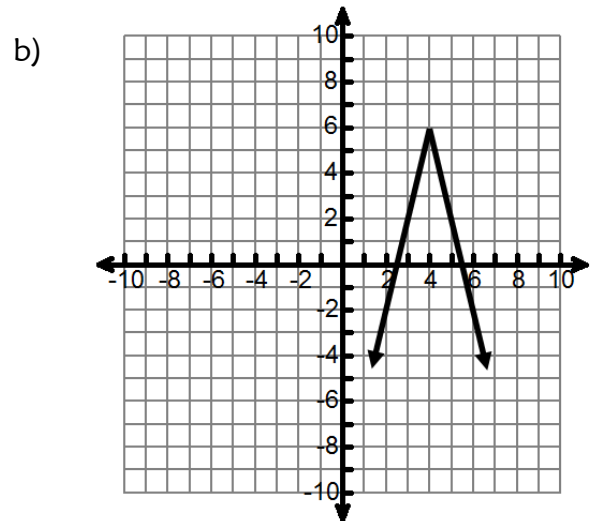
(4,6)

$y = a|x-4|+6$

plug in (6,-2)

$-2 = a|6-4|+6$

$-2 = 2a + 6$

$-e = 2a$

$a = -4$

$\boxed{y = -4|x-4|+6}$