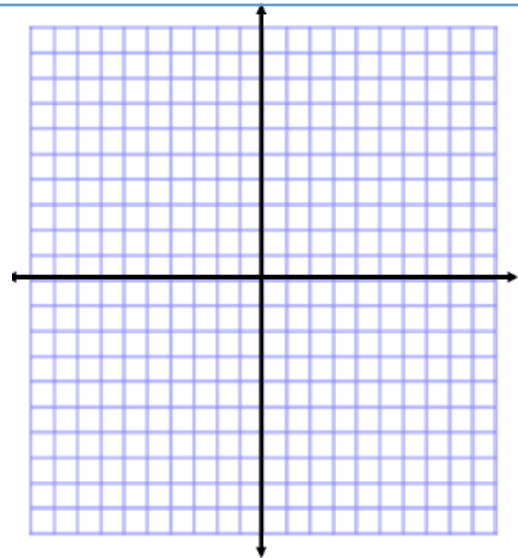Name _____

2.3 Absolute Value Functions

Parent Function $y = |x|$

"V" shape

Identify key features of the parent function:

In different groups graph the following on the same coordinate plane and state the domain and range for each graph:

Group 1

$f(x) = |x + 2|$

$f(x) = |x - 3|$

$f(x) = |x + 4|$

$f(x) = |x - 1|$

Group 2

$f(x) = |x| + 2$

$f(x) = |x| - 3$

$f(x) = |x| + 4$

$f(x) = |x| - 1$

Group 3
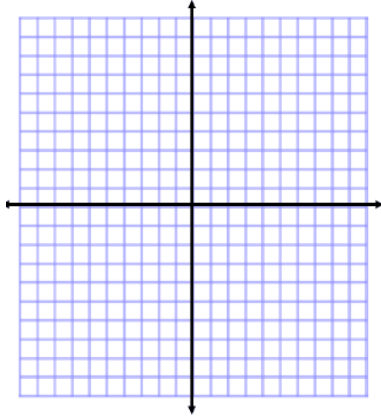
$f(x) = -|x|$
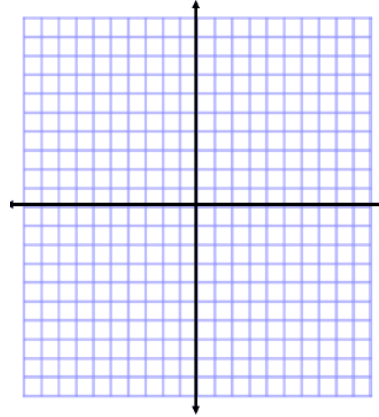
$f(x) = ¼|x|$

$f(x) = 2|x|$

$f(x) = -3|x|$

$$y = a|x - h| + k$$
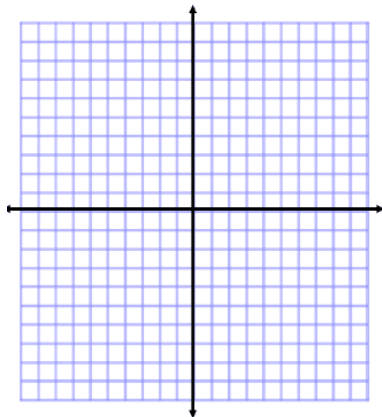
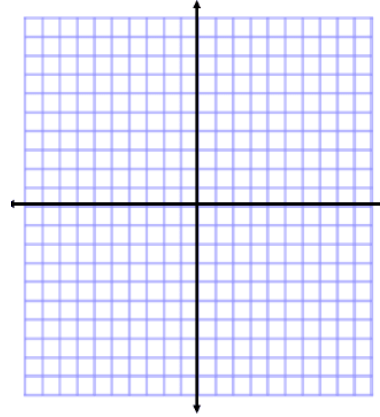**#1- 4: Graph the following using transformations.**

1. $f(x) = \frac{2}{3}|x| - 3$

2. $f(x) = 2|x| + 1$
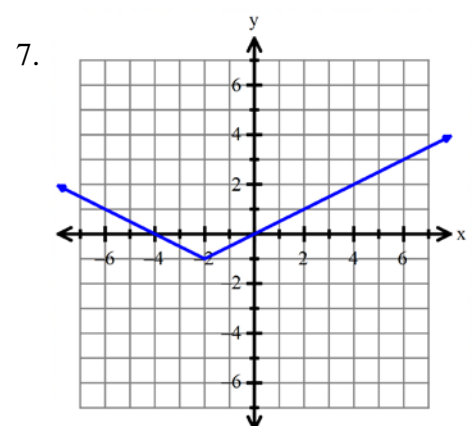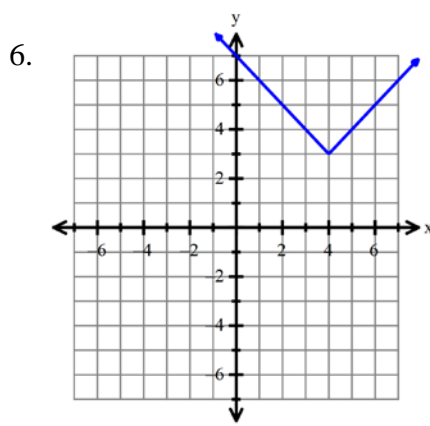
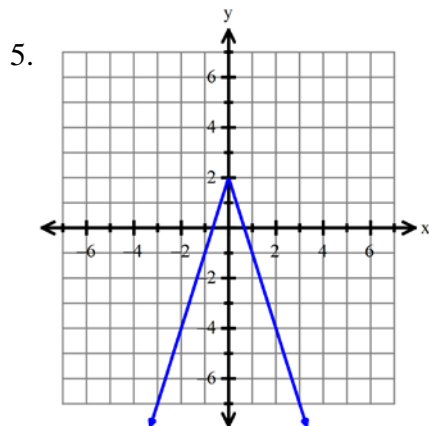3. $f(x) = -|x + 1| - 3$

4. $f(x) = -\frac{1}{2}|x - 4| + 5$

#5 – 7: Write the equation of the following graphs and state the D & R.

5.

6.

7.

D: D: D:

R: R: R:
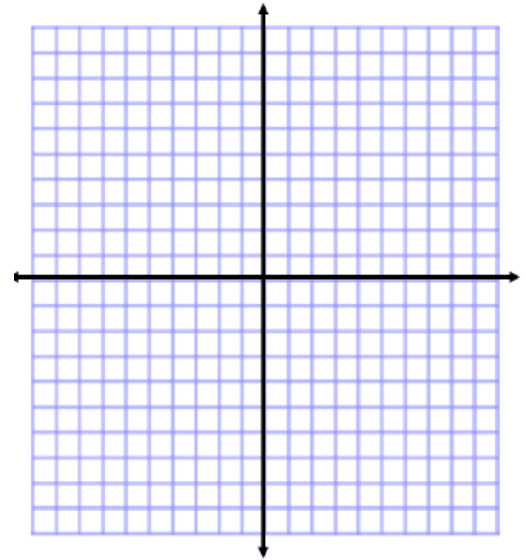
8. The vertex of an absolute value equation is at (-2, -3) and goes through the point (-1, -7). Write the equation of the function.

9. A snowstorm begins with light snow that increases to very heavy snow before decreasing again. The snowfall r (in inches per hour) is given by r(t)=-0.5$|t - 4|$+2 where t is the time (in hours).
   a. Graph the function

   b. When is the snowfall heaviest?

   c. What is the max snowfall rate?

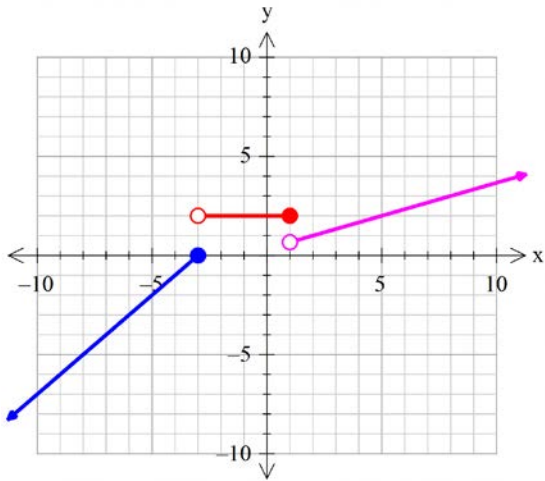   d. How are your answers related to the graph?

   e. The total snowfall is given by the area of the triangle formed by the graph r(t) and the t-axis. What is the total snowfall?

10. Write an equation of an absolute value function that has a vertical shift, a stretch or compression and a horizontal shift.

7. Write the piecewise function and state the domain and range

12. The Mad Hatter is ordering cups from Teacups Limited for his tea party. The Teacups Limited catalog prices cups according to the number of cups ordered. For orders of 20 or fewer cups, the price is $1.40 per cups plus $12 for shipping and handling for the order. For orders more than 20 cups, the price is $1.10 per cup plus $15 shipping and handling.

    a. Write a function to describe the price of cups

    b. How much will it cost the Mad Hatter to order 16 cups?

    c. If the Mad Hatter wants to spend at most $45, what is the maximum number of cups he can order?

13. A wholesale t-shirt manufacturer charges the following prices for t-shirt orders:

    a. Write the function

    b. You have ordered 40 shirts and must pay $10 for shipping and handling. How much is your order?

    > $20 per shirt for up to 20 shirts
    > $15 per shirt for 21-40 shirts
    > $10 per shirt for 41-80 shirts