Secondary Math 2                                  Name_____

# Unit 8 Functions Review

Date_____    Period____

**Identify the vertex and min/max value of each.**

1) $y = x^2 - 12x + 43$

2) $y = -x^2 + 8x - 6$

3) $y = -2x^2 + 20x - 48$

4) $y = x^2 - 20x + 98$

**Transform the given function $f(x)$ as described and write the resulting function as an equation.**

5) $f(x) = x^2$
   translate right 1 unit
   translate up 1 unit

6) $f(x) = x^2$
   expand vertically by a factor of 2
   translate down 2 units

7) $f(x) = |x|$
   translate left 3 units
   translate down 3 units

8) $f(x) = x^2$
   reflect across the x-axis
   translate right 2 units

**Describe the transformations necessary to transform the graph of $f(x)$ into that of $g(x)$.**

9) $f(x) = |x|$
   $g(x) = 3|x| + 3$

10) $f(x) = x^2$
   $g(x) = \frac{1}{3}(x + 1)^2$

**For each problem, find the average rate of change of the function over the given interval.**
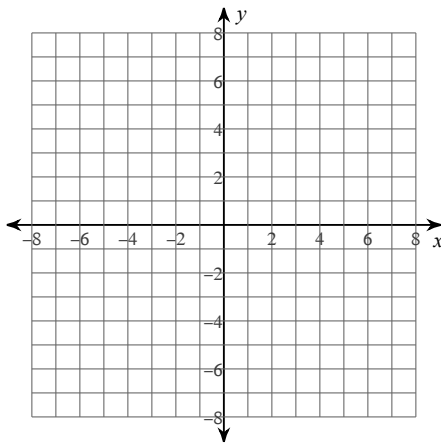
11) $y = 2x^2 + 2x + 2; \quad [0, \frac{1}{2}]$

12) $y = x^2 - x + 2; \quad [-1, 2]$
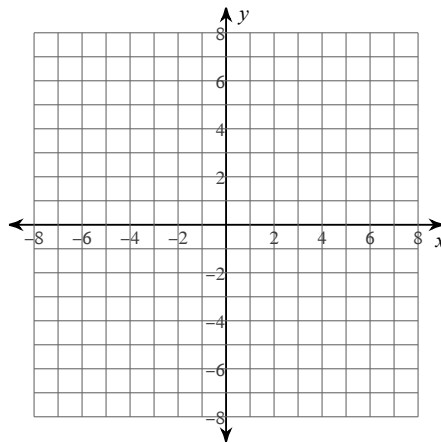
13) $y = 2x^2 + x + 2; \quad [-1, 1]$

14) $f(x) = 2x^2 + 2; \quad [1, \frac{4}{3}]$

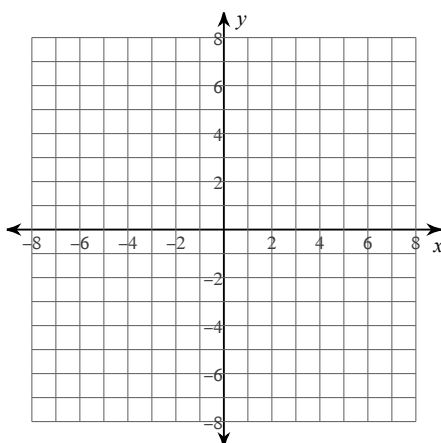**Sketch the graph of each function. Then state the domain and range.**
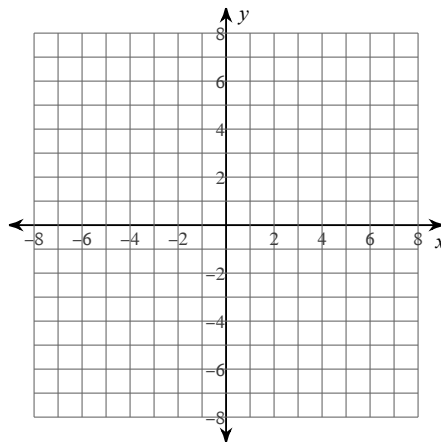
15) $g(x) = -(x + 3)^2$



16) $g(x) = -|x - 2|$
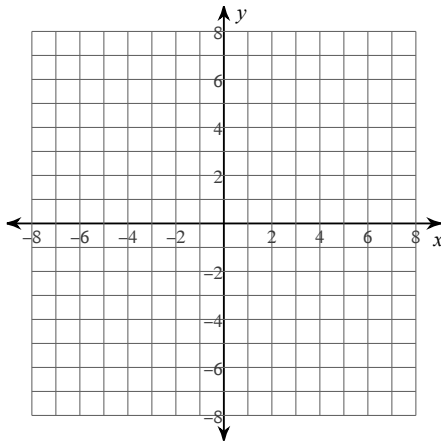


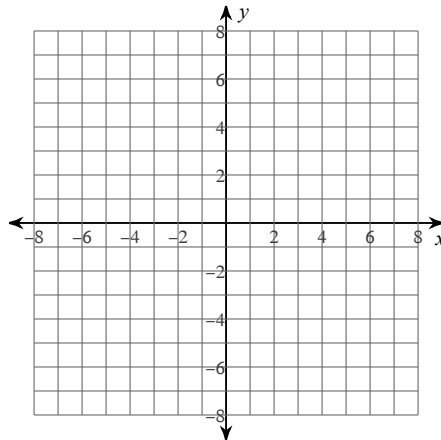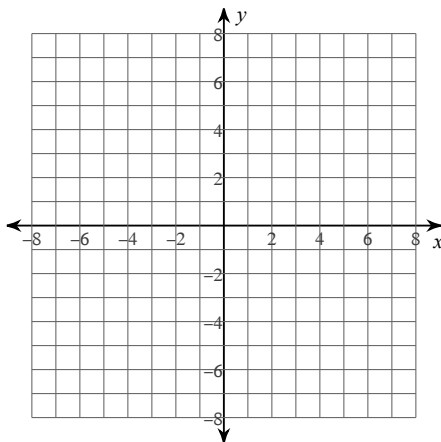17) $g(x) = -\frac{1}{2} \cdot |x|$



18) $g(x) = 3(x + 3)^2$

**Sketch the graph of each function.**

19) $f(x) = \begin{cases} x + 4, & x < -4 \\ -1, & -4 \le x < 4 \\ (x-4)^2, & x > 4 \end{cases}$
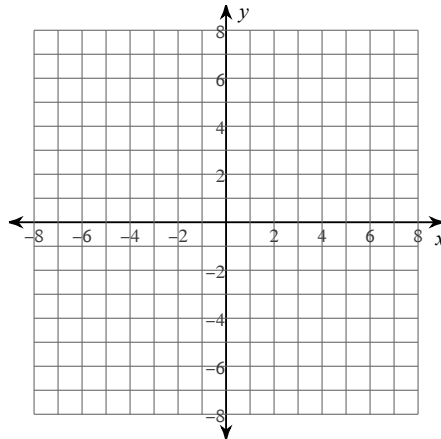
20) $f(x) = \begin{cases} -4, & x \le 4 \\ x - 4, & x > 4 \end{cases}$

21) $f(x) = \begin{cases} x - 1, & x < -3 \\ x + 2, & -3 \le x < 3 \\ (x-4)^2, & x \ge 3 \end{cases}$

22) $g(x) = \begin{cases} (x+2)^2, & x < -1 \\ |x| + 2, & x > -1 \end{cases}$

23) Name the kinds of functions (linear, quadratic, exponential) that have the slowest and the fastest growth rate.

**Determine if the following are linear, quadratic, or exponential.**

24) $\{(-2,-2), (-1,1), (0,4), (1,7), (2,10)\}$

25) $\{(3,8), (4,24), (5,72), (6,216)\}$

26) A business model that reaches a maximum profit, but decreases earnings after that.

27) Earning a $40,000 salary with 15% commission.

28) A tournament where 1/3 of candidates are cut each round.

29) A gumball machine that gives out 5 gumballs for every dime you put in.

30) Two seagulls dive into the ocean.  The given functions represent the height of each seagull above the surface of the ocean as a function of the seagull's horizontal distance from a certain buoy.  For each set of functions, determine which bird descends deeper into the ocean.

        a.  $y = 3(x - 5)^2 - 9$        or        g={(-8,0), (-6,-12), (-4,0)}

        b.                      or        $g = 2(x + 4)^2 + 1$
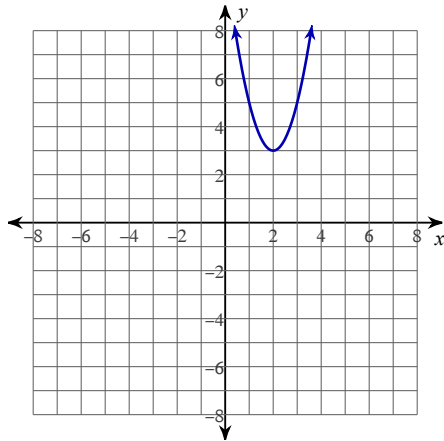


31) Three students are shooting wads of paper with a rubber band, aiming for a trash can in the front of the room.  The height of each student's paper wad in feet is given as a function of the time in seconds.  Which student's paper wad flies the highest?

        Alejandro:  $y = -x^2 + 2x + 7$

        Melissa:  $g = -(x - 3)^2 + 7$

        Connor:  After 3 seconds his wad achieves a maximum height of 6.5 feet