**Study Guide and Intervention**

***Transforming and Analyzing Quadratic Functions***

 **Describe the transformation.**

**What transformations of the quadratic parent function, *f(x) = x2*, will result in the graph of the quadratic function *g(x) =* 2(x + 3)2?**

**Solution**

**Step 1 Rewrite the equation of g(x) in general form to determine the values of the parameters a, b, c, and d.**

*g(x) =* 2(x + 3)2

*g(x) =* 2(x – (-3))2

Therefore, a = 2, b = 1, c = -3, and d = 0

**Step 2 Use the values of the parameters to describe the transformations of the quadratic parent function f(x) that are necessary to produce g(x).**

a = 2, so |a| > 1. The range values (y-coordinates) of the quadratic parent function are multiplied by a factor of 2 in order to vertically stretch the graph

b = 1, so there is no change.

c = -3, so c < 0. The graph of the quadratic parent function will translate |$\frac{-3}{1}$| = 3 units to the left

d = 0**,** so there is no change

**Exercises**

**For questions 1-4, describe the transformation of the quadratic parent function, f(x) = x2 that will result in the graph of the quadratic function given.**

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

**3.** h(x) = $\frac{1}{3}$(2x – 5)2 - 4

**2.** h(x) = ($\frac{1}{2}$x)2 – 1

**4.** h(x) = -2(3x + 10)2 + 3

**Study Guide and Intervention**

***Transforming and Analyzing Quadratic Functions (cont.)***

**Identify the domain, range, x-intercept, y-intercept and vertex of the quadratic function described by the equation shown below. Write the domain and range as inequalities, as intervals, and in set builder notation.**

**f(x) = (4x – 1)2 – 2**

**Solution**

**Step 1 Determine the domain and range of f(x).**

Since this is a quadratic function, the domain is *all real numbers*; the range is found using the equation*.* Since a is positive, the graph opens up. Since d = -2, the range contains all real values that are greater than or equal to -2.

 As an inequality

Domain: -∞ < x < ∞, Range: -2 ≤ y < ∞

 As an interval

Domain: (-∞, ∞) Range: [-2, ∞)

 Set builder notation

Domain: {x|x$ \in $ $R$} Range: {y|y$ $≥ -2}

**Step 2 Determine the x-intercept of f(x).**

x-intercepts are located at ($\frac{c\pm √(\frac{-d}{a})}{b}$, 0)

($\frac{c\pm √(\frac{-d}{a})}{b}$, 0)

($\frac{1\pm √(\frac{-(-2)}{1})}{4}$, 0)

($\frac{1\pm √2}{4}$, 0)

($\frac{1+√2}{4}$, 0), ($\frac{1-√2}{4}$, 0)

**Step 3 Determine the y-intercept of f(x).**

y-intercepts is located at (0, ac2 + d)

(0, ac2 + d)

(0, 1\*12 - 2)

(0, 1 - 2)

(0, -1)

**Step 4 Determine the vertex of the parabola**

The vertex is located at ($\frac{c}{b}, d)$

($\frac{c}{b}, d)$

($\frac{1}{4},$ -2)

**Exercises**

**For questions 5-10, identify the domain, range, x-intercept, y-intercept and vertex of the quadratic function described by the equation shown below. Write the domain and range as inequalities, as intervals, and in set builder notation.**

**5**. f(x) = -($\frac{1}{2}$x – 3)2 – 1 **6.** f(x) = 2(x + 1)2 – 8 **7.** f(x) = (x - 2)2 - 9

**8.** f(x) = -3(4x)2 + 7 **9.** f(x) = $\frac{-1}{2}$(-10x + 4)2 + 6 **10.** f(x) = 6(2x – 10)2 – 3