AFM **4.4 Translations and the Quadratic Family** Chapter 4

**Quadratic Functions:** A function whose highest power of x is x-squared. The graph of a quadratic function is in the shape of a parabola.

**Vertex:** A point \_\_\_\_\_\_\_\_\_\_\_ where the graph changes direction. The vertex of x2 is \_\_\_\_\_\_\_\_\_\_.

**Line (Axis) of Symmetry:** The line of symmetry, \_\_\_\_\_\_\_\_\_ divides the graph into mirror-image halves. Parabolas always have a line of symmetry through the \_\_\_\_\_\_\_\_\_\_\_.

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| **Translation:** A movement of a graph vertically, horizontally, or both. |
| y = (x – h)2 + kA translation of the graph y = x2 horizontally h units and vertically k units. |
| * If h is positive, then shift right
 | * If k is positive, then shift up
 |
| * If h is negative, then shift left
 | * If k is negative, then shift down
 |

**Example 1:** Describe the translation.

1. y = x2 + 5
2. y = (x + 7)2 + 3
3. y = (x – 4)2

**Example 2:** Find the vertex (turning point).

1. y = x2 + 9
2. y = -3 + (x + 11)2
3. y = (x + 6)2

**Example 3:** Find the translation of y = x2 when you replace…

1. y with y + 6
2. x with x + 8

**Example 4:** The graph shows a portion of a parabola. It represents a diver’s position (horizontal and vertical distance) from the edge of a pool as he dives from a 5 ft long board 25 ft above the water.



1. Identify points on the graph that represent when the diver leaves the board, when he reaches his maximum height, and when he enters the water.
2. Sketch a graph of the diver’s position if he dives from a 10 ft long board, 10 feet above the water. What is the image of his starting position?
3. Write a function to represent the translation of f(x) for this new scenario.
4. In the scenario described in part b, what is the diver’s position when he reaches his maximum height?

**Make My Graph**

Each graph below shows the graph of the parent function f(x) = x2 with the vertex at (0,0). Write a quadratic equation that produces the congruent graph with plotted points. Check your equation on your calculator.

a. b. c.

  

d. e. f.

  

Consider the graph below. Write the equation of each transformed graph. The parent function is the one with dotted lines.

