**Modeling with Quadratic Functions in Vertex Form**

Recall the effects of parameters *a*, *h,* and *k* on the graph of a quadratic function in vertex form. Use your knowledge of parameters to model the following situations with quadratic functions in vertex form. A grid is provided so you can create a graph of each function.

1. A WNBA player takes a three-point shot 22 feet away from the basket. The ball reaches its highest point, 16 feet above the floor, when it is 12 feet (horizontal distance) away from the player. As the ball approaches the basket, it is 13.6 feet above the floor when it is 18 feet away from the player.
2. Write a function in vertex form to model the shot of the basketball. (Let *x* be the horizontal distance from the player and *y* be the height of the basketball above the floor).



1. If the shot was aimed toward the center of the basket, would it go through the hoop that is 10 feet above the floor? Justify your answer with calculations.
2. A diver jumps from a diving board that is 10 feet above the water. She reaches the peak of her dive 0.875 seconds after leaving the diving board and she is 22.25 feet above the water. She is still 16 feet above the water 1.5 seconds after the jump.
3. Write a function in vertex form to model the relationship between time from the beginning of the jump (*x*) and the height of the diver above the water (*y*).



1. How many seconds will it take for the diver to splash into the water?

**Extension:** Show how you can use algebraic manipulation to calculate a precise value of the parameter ‘*a*’. Describe how this process is analogous to using a point and a slope to calculate the *y*-intercept in a linear function.