Assignment

Write

Fill in the blank.

1. The *x*-intercepts of a graph of a quadratic function are also called the _____ of the quadratic function.
2. A quadratic equation that models the height of an object at a given time is a _____.
3. The shape that a quadratic function forms when graphed is called a _____.
4. The _____ of an equation indicate where the graph of the equation crosses the *x*-axis.

Remember

The graph of a quadratic function is called a parabola. Parabolas are smooth curves that have an absolute maximum or minimum, both increasing and decreasing intervals, up to two *x*-intercepts, and symmetry.

Practice

1. The citizens of Herrington County have an existing dog park for dogs to play, but have decided to build another one so that one park will be for small dogs and the other will be for large dogs. The plan is to build a rectangular fenced in area that will be adjacent to the existing dog park, as shown in the sketch. The county has enough money in the budget to buy 1000 feet of fencing.

   a. Determine the length of the new dog park, *l*, in terms of the width, *w*.
   b. Write the function *A(w)* to represent the area of the new dog park as a function of the width, *w*. Does this function have a minimum or a maximum? Explain your answer.
   c. Determine the *x*-intercepts of the function. Explain what each means in terms of the problem situation.
   d. What should the dimensions of the dog park be to maximize the area? What is the maximum area of the park?
   e. Sketch the graph of the function. Label the axes, the maximum or minimum, the *x*-intercepts, and the *y*-intercept.
   f. Use the graph to determine the dimensions of the park if the area was restricted to 105,000 square feet.

Stretch

1. Sketch a graph of a quadratic function that has a maximum value of (0, 2) and x-intercepts when $x = \pm2$.
2. What is the quadratic function of your graph? Explain your reasoning.

Review

1. Rewrite each expression using a radical.

   a. $7^{\frac{3}{4}}$ b. $2^{\frac{1}{5}}$

2. Rewrite each expression using a rational exponent.

   a. $\left(\sqrt[6]{3}\right)^5$ b. $\left(\sqrt[3]{5}\right)^2$

3. If the basic function $f(x) = |x|$ is translated 3 units to the right and 4 units up, what is the transformed equation?

4. If the basic function $f(x) = 4^x$ is vertically stretched by a factor of 2 and translated 5 units down, what is the transformed equation?