Quadratic Functions

Algebra for Students

Guided Practice Worksheet

Exploring Quadratic Functions

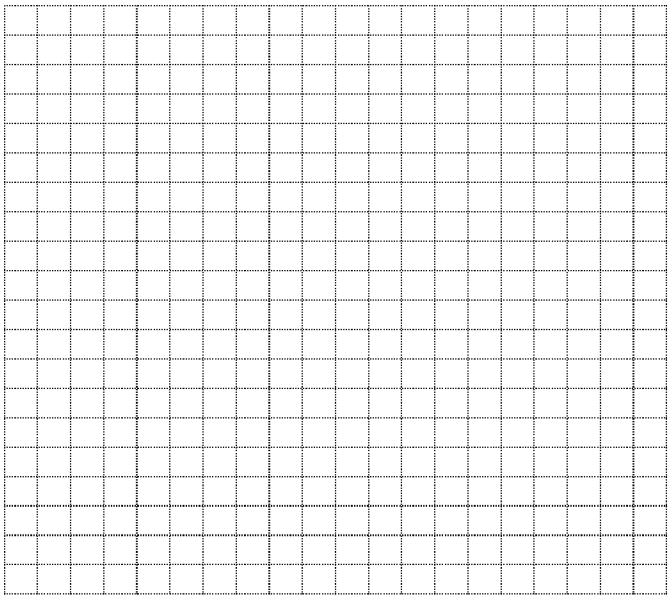
The quadratic function $y = -0.05x^2 + 1.5x$ can be used to represent the path of a football kicked 30 yards down the field. The variable x represents the distance, in yards, the ball has traveled down the field. The height, in yards, of the football in the air is represented by the variable y.

1. Use the quadratic function to calculate the height of the ball as it travels down the field. Round your answers to the nearest hundredth of a yard.

Distance Down the Field (yds)	Height in the Air (yds)
0.0	
2.5	
5.0	
7.5	
10.0	
12.5	
15.0	
17.5	
20.0	
22.5	
25.0	
27.5	
30.0	

2. What is the maximum height of the football during the kick? How far down the field has the football traveled when it reaches its maximum height?

3. Use the information in the table to graph the path of the football kick.



4. If you were shown only the graph of this quadratic function, how could you determine the maximum height of the football during the kick and how far down the field the football has traveled when it reaches its maximum height?

5. Find the vertex (h,k) of the parabola from Question #3 by using the quadratic function itself to determine the values of h and k.

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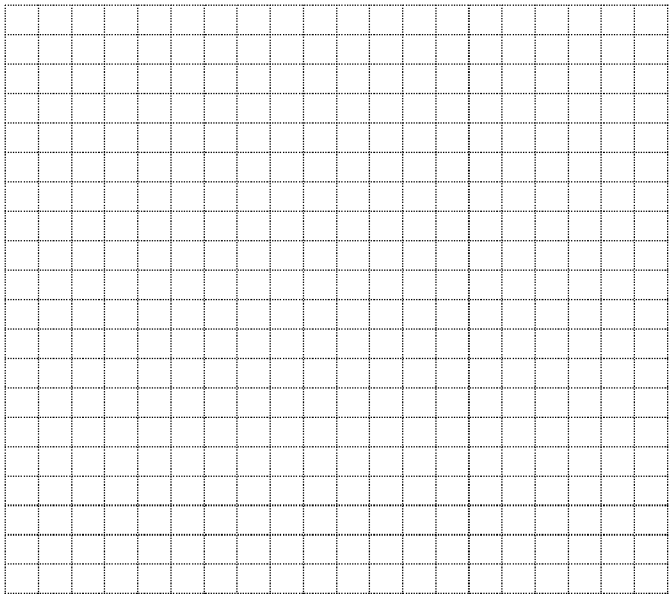
Exploring Parabolas

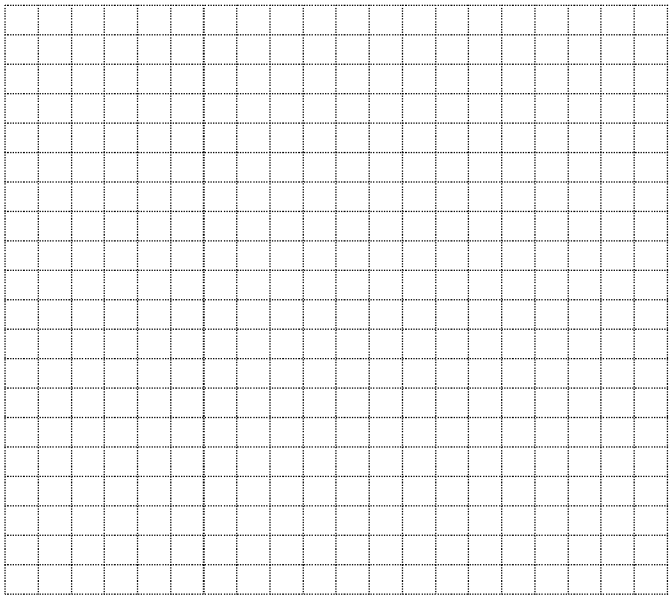
1. Graph the quadratic functions $y = x^2$ and $y = -x^2$. How are the graphs of these two functions similar? How are they different?



2. Consider the quadratic functions $y = 2x^2$, $y = 4x^2$, and $y = 6x^2$.

   a. Which quadratic function would you expect to have the narrowest parabola? Explain your answer.

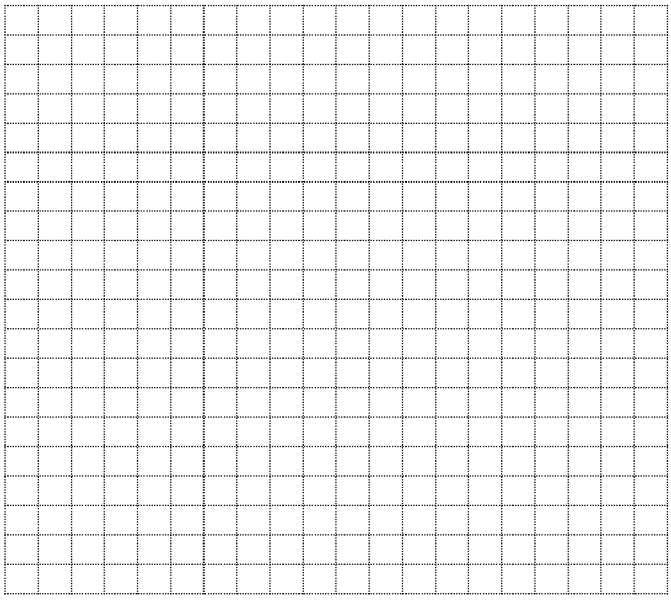
   b. Graph the three quadratic functions.



3. Consider the quadratic functions $y = 2x^2$, $y = x^2$, and $y = \frac{1}{2}x^2$.

   a. Which quadratic function would you expect to have the widest parabola? Explain your answer.

   b. Graph the three quadratic functions.



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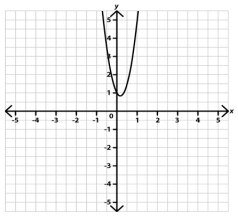
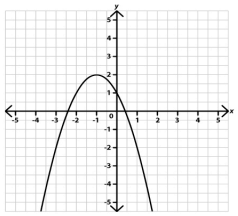
Exploring Parabolas (cont'd.)

4. Which of the following graphs shows the quadratic function $y = -x^2 - 2x + 1$? Explain your answer.

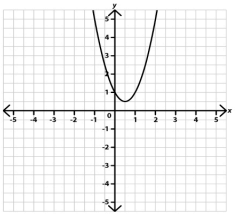
A



B



C



Using the Quadratic Formula

The parabolic path of a typical fireworks shell is described by the quadratic function $y = -16x^2 + bx + c$, where c is the launch speed in feet per second, c is the height in feet from which the fireworks shell is launched, x is the time in seconds, and y is the height of the fireworks shell in feet.

1. A fireworks shell is launched at a speed of 94 feet per second from a 12-foot high platform. Write a quadratic function that describes the path of the fireworks shell.

2. Use the quadratic formula to calculate the length of time the fireworks shell is in the air.

3. Graph the quadratic function from Question #1. How could you use this graph to determine the length of time the fireworks shell was in the air?