

Teacher Notes



Activity 6

The Standard Form of a Quadratic Equation

Objective

- ◆ Students will develop an understanding of the relationship between the factors, zeros and x -intercepts of the quadratic equation $y = ax^2 + bx + c$.
- ◆ Students will develop an understanding of the y -intercept and vertex of the quadratic equation $y = ax^2 + bx + c$.

Applicable TI InterActive! Functions

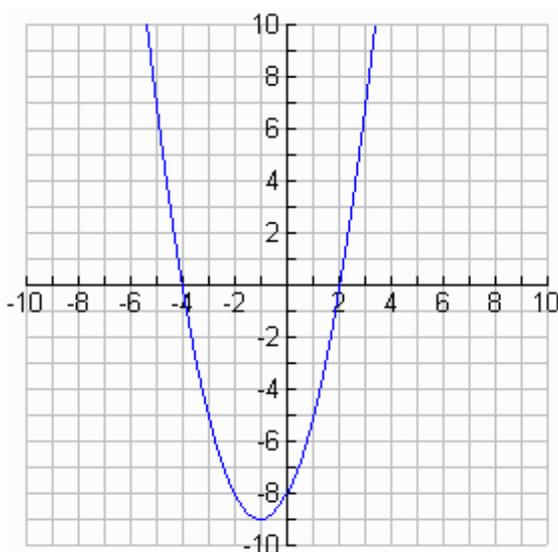
- ◆ Graph 
- ◆ Trace 
- ◆ Table 
- ◆ Zeros (expression, variable)
- ◆ Factor (expression, variable)

Problem

The quadratic function in standard form is $y = ax^2 + bx + c$. It can be factored into two linear factors that can be used to determine the zeros or x -intercepts of the function. The y -intercept and vertex can also be determined from the graph. In this activity students will explore how the zeros, y -intercept, and vertex are related to the graph of the quadratic function.

Explorations

2.



Analysis

1. The x -intercepts are $x = -4$ and $x = 2$.
2. They are the points at which the graph crosses the x -axis.
3. The y -intercept is $y = -8$.
4. It is the point at which the graph crosses the y -axis.
5. The point is $(-1, -9)$.
- 6.

x	$y_1(x)$ $x^2 + 2x - 8$
-4	0
-1	-9
0	-8
2	0

8. The zeros are $x = -4$ and $x = 2$.
9. The factors are $(x + 4)$ and $(x - 2)$.
10. One of the factors must be zero.
11. The zeros of the two factors are $x = -4$ and $x = 2$.
12. They are the same.
13. They are the same.
14. Find the factors of the equation and then find the zeros of the factors.
15. They are the same.
16. Trace on the graph to the lowest value of y . The ordered pair at that point is the vertex.

Additional Exercises

1. $y = x^2 + 4x + 3$

Zeros: $x = -3$ and $x = -1$

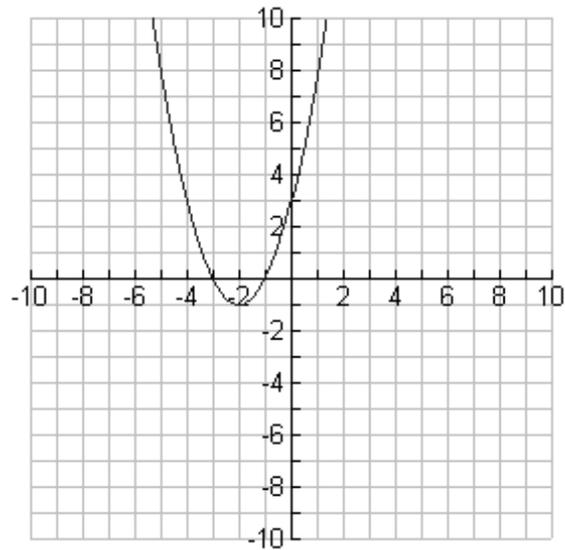
Factors: $(x + 3)$ and $(x + 1)$

x -intercepts: $x = -3$ and $x = -1$

$x = 0, y = 3$

y -intercept: $(0, 3)$

Vertex: $(-2, -1)$



2. $y = 2x^2 - 10x + 8$

Zeros: $x = 4$ and $x = 1$

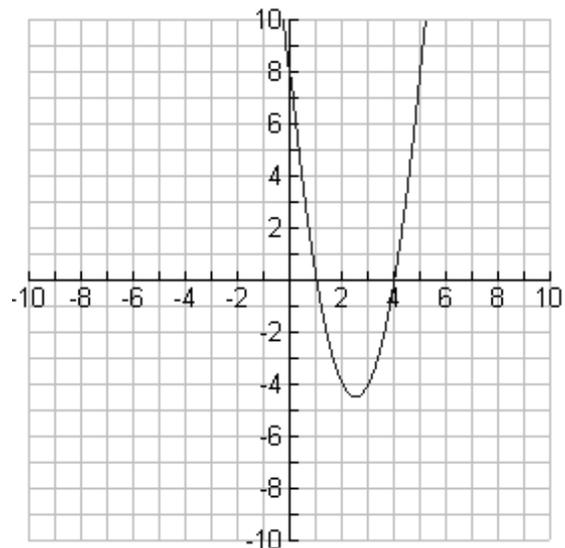
Factors: $2, (x - 4)$ and $(x - 1)$

x -intercepts: $x = 4$ and $x = 1$

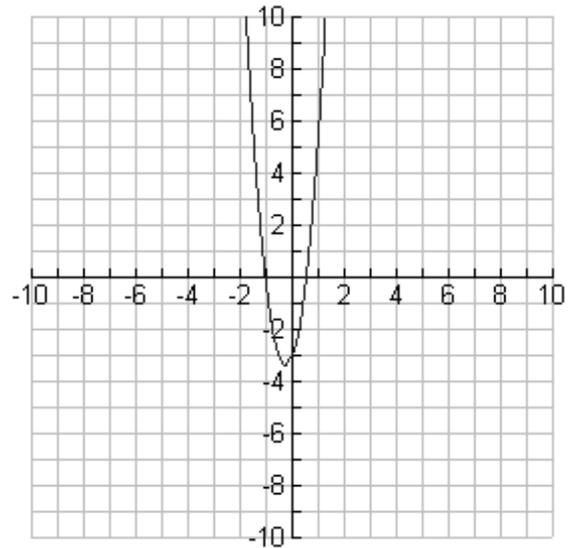
$x = 0, y = 8$

y -intercept: $(0, 8)$

Vertex: $(2.5, -4.5)$



3. $y = 6x^2 + 3x - 3$

Zeros: -1 and $x = 1/2$ Factors: $3, (x + 1)$ and
 $(2x - 1)$ x -intercepts: $x = -1$ and $x = 1/2$ $x = 0, y = -3$ y -intercept: $(0, -3)$ Vertex: $(-.25, -3.375)$ 

4. The factors can be used to find the zeros of the function, which are the x -intercepts.
5. By determining the value of y when $x = 0$, the y -intercept is found.
6. By finding the lowest value of y , the vertex of the quadratic is found.

