Zeros of a Quadratic Function

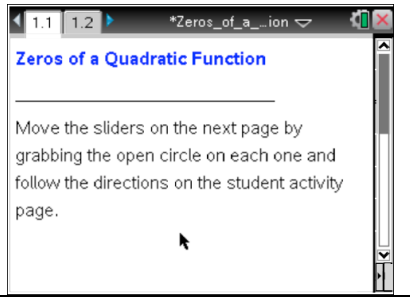
Student Activity

Name _____

Class _____

Open the TI-Nspace document
Zeros_of_a_Quadratic_Function.tns.

In this activity, you will observe graphs of pairs of linear functions and the related quadratic function. You will investigate the points at which the functions cross the *x*-axis and the zeros of the functions.



Move to page 1.2.

Press ctrl ▶ and ctrl ◀ to navigate through the lesson.

1. Use the sliders to set $y_1 = 2x + 2$ and $y_2 = 1x - 2$. Observe that the graph of $y_1 = 2x + 2$ appears to cross the *x*-axis at $x = -1$. When $x = -1$, $y_1 = 0$ because $2(-1) + 2 = 0$. $x = -1$ is called a *zero* of the function $y_1 = 2x + 2$.
   a. Where does the graph of $y_2 = 1x - 2$ appear to cross the *x*-axis?

   b. Verify that this value of *x* is a zero of y_2.

2. a. When $y_1 = 2x + 2$ and $y_2 = 1x - 2$, what is the function y_3?

   b. How many times does the graph of $y_3 = 2x^2 - 2x - 4$ cross the *x*-axis?

   c. What are the zeros of y_3?

   d. Write a conjecture about the relationship between the zeros of the linear functions and the zeros of the quadratic function.

3. a. Given the information below, use the sliders of the .tns document to fill in the rest of the table.

y_1	y_2	Zeros of y_1	Zeros of y_2	y_3	Zeros of y_3
$2x + 4$	$x - 1$				
$3x + 3$			-4		
					-5 and 4
				$x^2 - 2x - 15$	

   b. What is the relationship between the zeros of the quadratic function and the zeros of the linear functions? Compare this to the conjecture you made in question 2d.

4. Factor each of the quadratic functions below.
   a. $2x^2 + 2x - 4$

   b. $3x^2 + 15x + 12$

   c. $x^2 + x - 20$

   d. $x^2 - 2x - 15$

5. How do the factors in question 4 relate to the information in the table in question 3?

6. Write a pair of linear functions whose product yields a quadratic function with zeros of 3 and –2. What is the corresponding quadratic function? Describe the process you used to determine your answers.

7. Given the quadratic function $y = x^2 - 11x + 30$, determine its zeros. Describe the process you used to obtain your solutions.

8. Samuel says, "I can solve $x^2 - 11x + 30 = 0$ by factoring it, setting each factor equal to zero, and solving for x." Is this a valid method? Explain.