MFM 2P   **Quadratics in Factored Form**   Date: _____

Part A (answer each of the following)

1. In the Gizmo^{tm}, use the slider to set $a = 1$. (To quickly set a slider to a specific number, type the number into the field to the right of the slider, and then press Enter.)

Observe how the graph changes as you vary the values of r_1 and r_2.

       a. How does the graph change as the values of r_1 and r_2 are varied?

       _____

       b. What features of the graph do the values of r_1 and r_2 relate to?

       _____

2. Vary the r_1 and r_2 sliders to find a quadratic equation in factored form for each of the following pairs of x-intercepts.

Check each of your answers by turning on 'Show x-intercepts' and dragging the blue points to the given x-intercepts.

Write the equation you find beside each pair of x-intercepts.

       a. (2, 0) and (−1, 0)   Equation: $y = ($_____$)($_____$)$

       b. (−3, 0) and (3, 0)   Equation: $y = ($_____$)($_____$)$

       c. (−2, 0) and (1, 0)   Equation: $y = ($_____$)($_____$)$

3. Set $a = 1$ and vary the values of r_1 and r_2 to find several parabolas that have <u>only one</u> x-intercept.

       a. What do you notice about r_1 and r_2 when the graph only has one x-intercept?

       _____

       b. When there is only one x-intercept, what special point of the parabola does the x-intercept relate to?

       _____

c. What is the factored form for a quadratic equation with its vertex at the origin? Check your answer using the Gizmo. Write your equation below.

Equation: $y = ($ _____ $)($ _____ $)$

Click on 'Show polynomial form' to get the simplified version of the equation. Write this equation below.

Simplified equation: $y =$ _____

4. Vary the value of a.

a. When you change the value of a, what effect does it have on the shape of the parabola?

_____

b. What does the parabola look like when a is positive? When a is negative?

_____

Part B—Extending Your Understanding

If you click on 'Show polynomial form', the function $y = a(x - r_1)(x - r_2)$ is expanded (i.e., process of multiplying terms together) and simplified so that you can see it written in …

standard form, $y = ax^2 + bx + c$.

'Factoring a quadratic equation algebraically means performing the reverse operation: changing the quadratic from standard form to factored form.

5. With 'Show polynomial form' turned on, set $a = 1$ and examine the standard form of the function as you change the values of r_1 and r_2.

a. How do the values of r_1 and r_2 combine to get the value of c in the standard form $y = ax^2 + bx + c$? Provide an example using the gizmo.

_____

Example:

b. How do the values of r_1 and r_2 combine to get the value of b in the standard form of the equation? Provide an example using the gizmo.

_____

<u>Part C—Assessment Questions</u>

Using the gizmo where necessary, complete and submit the 5 assessment questions. These questions are located underneath the gizmo.