Quadratic Formula

QuadForm.tns

Name ______________________

Class ______________________

Exercise 1

1. Move to page 1.2. What are the zeros of the quadratic equation?

2. If you know the zero product property, demonstrate that here:

   $x + 2 = 0$ and $x - 2 = 0$

On page 1.3, the formula for **quad(a,b,c)** is already defined to be the quadratic formula with the "+" sign. The calculator cannot simplify both a "+" and a "–" at the same time, can you?

3. What do the values 1, 0, and –4 represent?

4. Complete the calculator entry for **quad(** as directed. What is the output?

However, this output only presents one solution from the quadratic formula. Move to page 1.4 and follow the directions.

5. What is the formula you used for **quad_minus(a,b,c)**?

6. What is the output?

7. What are the solutions to the equation $y = x^2 - 4$?

Exercise 2

8. Move to page 1.5. What are the zero(s) of the quadratic equation?

Now, the procedure is familiar. The formula for **quad(a,b,c)** and **quad_minus(a,b,c)** are both already defined. You only need to enter in the correct values for *a*, *b*, and *c*. This should confirm your answers for the *x*-intercepts.

9. What are the solution(s) to the equation $y = x^2 + x - 6$?

Exercise 3

10. Move to page 1.7. What are the zero(s) of the quadratic equation?

On page 1.8, use both **quad(** and **quad_minus(** to confirm your answers for the *x*-intercepts.

11. What are the solution(s) to the equation $y = x^2 - 4x + 4$?

Exercise 4

You may ask why this quadratic equation is not factorable and the previous examples were.

12. Make a conjecture about why you think this could be true:
    a. "Some quadratic equations are not factorable with integers because…"

    or

    b. "Quadratic equations are only factorable with integers when…"

Solve the following equations on pages 1.10 and 1.11 using the defined functions **quad** and **quad_minus**.

13. What are the solution(s) to the equation $y = x^2 - 2x - 7$?

14. What are the solution(s) to the equation $y = -3x + x + 3$?

Finally, the spreadsheet is used on page 1.12 to calculate the value of the discriminant for the previous two problems, whose solutions were irrational.

15. What are the values of the discriminant for the two equations? How do the values confirm that the equations are not factorable?

Extensions/Homework

Use the spreadsheet provided on page 1.12 to calculate the discriminant for several other quadratics. Special note, since this spreadsheet was already set up before you decided to use it again, you will receive an error message about a Dimension Mismatch in Column D. Ignore the message, click OK, and keep entering your values. Decide if the equation is factorable using integers, then solve it. Factor the quadratic if possible, if not, solve by the quadratic formula.

1. $y = x^2 - 6x + 9$

2. $y = 3x^2 + 4x + 5$

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

4. $y = 7x^2 + x - 8$

5. $y = 2x^2 - 5$

Look at the flow chart on page 2.2 and discuss with another student how to use it to answer these homework problems.

6. Sketch a different graph for each scenario, though one is already pictured.

If you wanted to get both answers using one formula, you could use curly brackets, i.e. **Define quad(*a*,*b*,*c*)** $= \left\{ \left(\dfrac{-\boldsymbol{b} + \sqrt{\boldsymbol{b}^2 - 4 * \boldsymbol{a} * \boldsymbol{c}}}{2 * \boldsymbol{a}} \right), \left(\dfrac{-\boldsymbol{b} - \sqrt{\boldsymbol{b}^2 - 4 * \boldsymbol{a} * \boldsymbol{c}}}{2 * \boldsymbol{a}} \right) \right\}$. Insert a new problem and try this out!

