Name:_____Date:_____Period:_____

Parabolas: Roots (Zeros) by Graphing

The process for finding the solutions for a quadratic equation is to find the values for which the equation is equal to zero. For example, for the quadratic equation

$y = x^2 + 6x - 7$, the solutions are given by
$0 = x^2 + 6x - 7$, where **y** is substituted with **0**.

The solutions of a quadratic equation are called the **ROOTS** of the equation. The **ROOTS** of a quadratic equation can be identified graphically by finding the point where the graph crosses the x-axis, that is the x-intercepts of the related quadratic function. (***Roots** are also called **ZEROS** since the y value of the graph is 0 at the points where the graph crosses the x-axis*)

To find the **Zeros** of a quadratic equation you must first graph it on your calculator. Once you have it graphed, and the window is set so you can see the two points where the graph crossed the x-axis, you need to follow the steps below:

1) Enter the quadratic equation in [y=]. $y = x^2 - 2x - 3$
2) [2nd] [TRACE] [2: zero]
3) Left Bound: To find to zero or root scroll to the left of the spot. Then hit [ENTER]
4) Right Bound: Scroll to the right of the spot. Then hit ENTER .
5) Guess: Scroll to where you think the graph crosses the x-axis. Then hit [ENTER]
6) Record the first root. In this example it would be (-1, 0).
7) Repeat steps **1 thru 5** for the other root or zero. (3, 0)

Try another one on your own. Find the roots for $y = -x^2 + 4x + 12$.

Did you get the answers (-2, 0) and (6, 0)? If you did, please continue. If you didn't, go back and redo the problem until you get the right answer.

Find the roots or zeros of each quadratic function:

1) $x^2 + 7x + 12 = 0$ Roots: (,) (,)

2) $x^2 - 16x = 0$ Roots: (,) (,)

3) $x^2 + 6x + 7 = 0$ Roots: (,) (,)

4) $x^2 - 10x = -21$ Roots: (,) (,)

5) $12x^2 - 26x = 30$ Roots: (,) (,)

6) $2x^2 - 2x = -2$ Roots: (,) (,)

7) $x^2 + 16 = 8x$ Roots: (,) (,)

8. The height *h*, in feet, of a rocket *t* seconds after blast-off is given by the formula $h = 1440t - 16t^2$. After how many seconds will the rocket reach the ground again?

9. The height *h*, in feet, of a rocket *t* seconds after blast-off is given by the formula $h = -16t^2 + 1440t$. After how many seconds will the rocket reach its maximum height?

10. The equation that describes the path of a rocket after it is shot into the air is $h = 48t - 6t^2$ where *h* is the height, in feet, above ground level after *t* seconds. After how many seconds will the rocket be at back in the ground?

12. The length of time required by a high-speed printer to print a large set of documents is given by the equation $x^2 - 3x - 54 = 0$ where *x* is the time in hours. How many hours are required to print the set of documents?