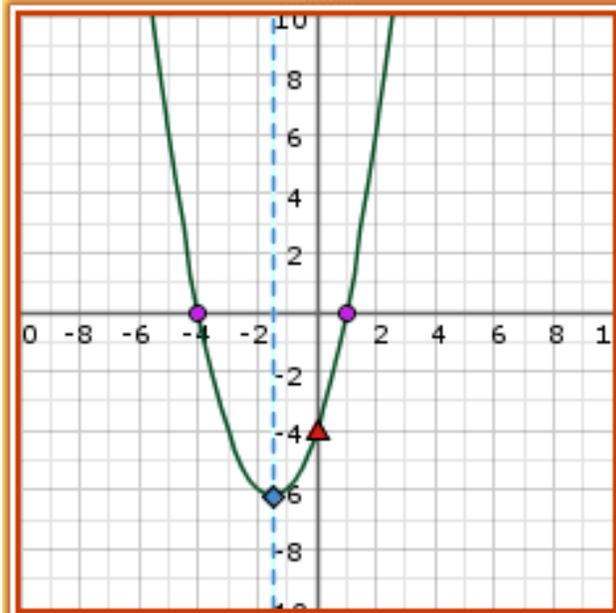**Unit 11 Review: *Applications of Quadratics***

Name and label the key features of the parabola:

How can you find the vertex by hand?

How can you find the vertex on the calc?

What are key words to look for when you need to find the vertex?

How can you find the solutions from a picture of a graph?

How can you find the solutions on the calc?

What are key words to look for when you need to find the solutions?

How can you find the y-int on the calc? What are key words if you need the y-int?

Describe what you would do if the problem said "How high was the ball after 4 seconds?"

Describe what you would do if the problem said " When was the rocket 180 ft in the air?"

1. Define the following characteristics of the quadratic function $y = x^2 + 2x - 3$.

Vertex: _____

Minimum or Maximum?

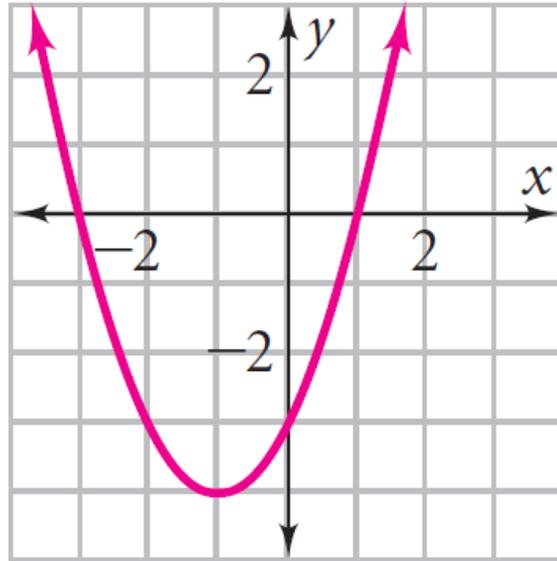Axis of symmetry: _____

X-intercepts: _____

Y-intercept: _____

Domain: _____

Range: _____

Increasing: _____

Decreasing: _____

How many solutions does the related quadratic equation $x^2 + 2x - 3 = 0$ have? _____

Solve $x^2 + 2x - 3 = 0$ using the graph. _____

2. Define the following characteristics of the quadratic function $y = 2x^2 - 12x + 9$.

Vertex: _____   Minimum or Maximum? *(Circle one)*

X-intercepts: _____

How many solutions does the related quadratic equation have? _____

Solve $2x^2 - 12x + 9 = 0$ by graphing. _____

3. Find the A. O. S. and vertex by hand:

a) $y = x^2 - 10x + 2$ b) $x^2 = 2x + 1$

4. Solve each quadratic equation for x by graphing.

a) $4x^2 + 12x + 5 = 0$ b) $3x^2 + 10 = 8$ c) $4x^2 - 12x + 9 = 0$

5. Projectile Motion Alexus and Dante are hiking in the mountains. Alexus wants to climb to a ledge that is 20ft above her. The height the grappling hook can be thrown is given by the function **h = -16t² + 32t + 5**.

    a) What is the maximum height the grappling hook can reach?

    b) Can she throw it high enough to reach the ledge?

    c) When will the hook be 15 feet from the ground?

    d) When will the hook hit the ground?

6. More with Projectile Motion A volcanic eruption blasts a boulder upward with an initial velocity of 240 feet per second. This is modeled by the equation $h(t) = -16t^2 + 240t.$

    a) How long will it take the boulder to hit the ground?

    b) How high was the boulder after 5 seconds?

    c) When was the boulder 500 feet in the air?

7. A girl is **swinging** on a swing in her back yard. Her path can be modeled by the quadratic function:
$$y = 2t^2 - 4t + 5.$$
    a) How high off of the ground is the girl at 1 second?

    b) What was the girls initial height off of the ground?

    c) At what time will the girl be back up to her initial height?

8. A grocery store wants to **maximize profit** from selling buckets of hot chicken wings. Their profit can be modeled by the equation $P(c) = c(55 - 6c) - 20$ Where P(c) is the profit that can be made in an hour and c is the price for a bucket of chicken.

    a) What is the maximum hourly profit they can make from chicken wings?

    b) What price will they have to sell their chicken wings for to make this maximum profit?

    c) If they sell their buckets of chicken for only $1 what is the profit they will make?

    d) If they sell their buckets of chicken for $7 what is the profit they will make?

    e) Between what prices will they have to charge for their chicken in order to make an hourly profit of at least $50?