Algebra 2 Applications of Forms of Quadratic Functions Names: _____

- Objective 1: I can write quadratics in different forms. Assignment # _____

Use the following situation for questions below. The formula for the height of a thrown object can be approximated by the formula: $h(t) = -16t^2 + v_0 t + h_0$ where *h(t)* is the height of the object in feet after *t* seconds, v_0 is the initial velocity in feet/second and h_0 is the initial height in feet. Suppose you throw a football at an initial velocity of 32 ft/s from a cliff that is 48 feet high.

a) Write a quadratic function to model the height of the football after t seconds.

$h(t) = -16t^2 + 32t + 48$

b) Write the function in factored form.

$h(t) = -16(t^2 - 2t - 3)$

$a = 1 \quad b = -2 \quad c = -3$

$1 \cdot -2 = -3 \quad 1 + -3 = -2$

$h(t) = -16(t+1)(t-3)$

c) What are the zeros of the function? What does that tell us about the football?

$-16(t+1)(t-3) = 0$

$t+1=0$ $\quad$ $t-3=0$

$t = -1$ $\quad$ $t = 3$ time when the ball hits the ground

time before the ball was thrown

d) What is the vertex of the function? What does that tell us about the football?

$h(t) = -16t^2 + 32t + 48$

vertex $-\frac{b}{2a} = -\frac{32}{2(-16)} = -\frac{32}{-32} = 1$

$-16(1)^2 + 32(1) + 48$

$= -16 + 32 + 48$

$= 64$

vertex $(1, 64)$

the vertex is the maximum point. At 1 second, the ball reaches its maximum height of 64 ft.

e) Write the function in vertex form.

$h(t) = a(x-h)^2 + k$

$h(t) = -16(x-1)^2 + 64$