Name: _____
Date: _____ Period: ____

Quadratic Formula Word Problems

1. Jason jumped off of a cliff into the ocean in Acapulco while vacationing with some friends. His height as a function of time could be modeled by the function $h(t) = -16t^2 + 16t + 480$, where t is the time in seconds and h is the height in feet.

$-16(t^2 - t - 30)$

$-16(t-6)(t+5)$

zeros: $t=6, t=-5$

$h = \frac{6+-5}{2} = \frac{1}{2}$

a. How long did it take for Jason to reach his maximum height?

½ a second

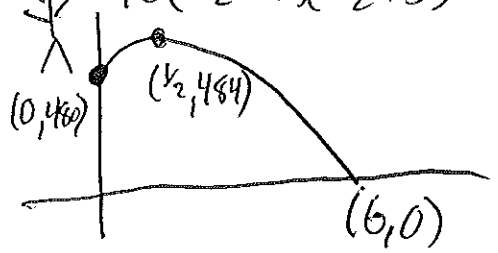
b. What was the highest point that Jason reached?

484 Ft.

$-16(\frac{1}{2}-6)(\frac{1}{2}+5) = 484 = K$

c. Jason hit the water after how many seconds?

6 seconds



2. If a toy rocket is launched vertically upward from ground level with an initial velocity of 128 feet per second, then its height *h* after *t* seconds is given by the equation $h(t) = -16t^2 + 128t$ (if air resistance is neglected).

$-16(t^2 - 8t)$

$-16(t)(t-8)$

a. How long will it take for the rocket to return to the ground?

8 seconds

zeros: $t=0, t=8$

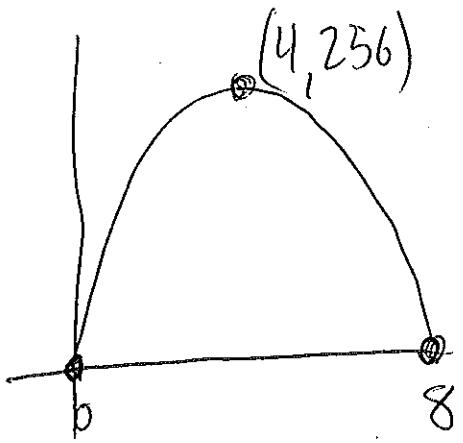
$h = \frac{0+8}{2} = 4$

~~b.~~ After how many seconds will the rocket be 112 feet above the ground?

$-16(4)(4-8) = 256 = K$

c. How long will it take the rocket to hit its maximum height?

4 seconds



d. What is the maximum height?

256 Feet.

~~3.~~ SKIP

~~3.~~ A rocket is launched from atop a 101 – foot cliff with an initial velocity of 116 ft/s.

a. Substitute the values into the vertical motion formula $h(t) = -16t^2 + vt + h_0$. Let h(t) = 0

b. Use the quadratic formula to find out how long the rocket will take to hit the ground after it is launched. Round to the nearest tenth of a second.

4. You and a friend are hiking in the mountains. You want to climb to a ledge that is 20 ft. above you. The height of the grappling hook you throw is given by the function $h(t) = -16t^2 + 32t + 48$. What is the maximum height of the grappling hook? Can you throw it high enough to reach the ledge?

$y = -16t^2 + 32t + 48$

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

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

Zeros: $t = 3, t = -1$

$h = \frac{3 + -1}{2} = \frac{2}{2} = 1$.

Plug in h to find k

$k = -16(1-3)(1+1)$

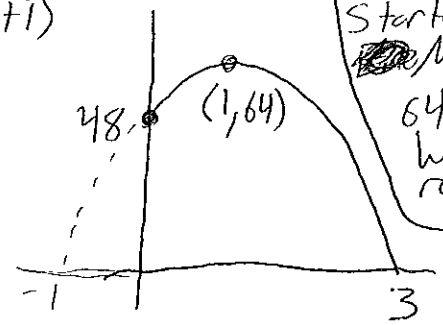
$k = -16(-2)(2)$

$k = 64$

Zeros are 3 & -1

Vertex is (1, 64)

y-int is 48.



Started at 48, Max is 64. 64 − 48 = 16. Will not reach ledge.

5. You are trying to dunk a basketball. You need to jump 2.5 ft. in the air to dunk the ball. The height that your feet are above the ground is given by the function $h(t) = -16t^2 + 12t$. What is the maximum height your feet will be above the ground? Will you be able to dunk the basketball?

$y = -16t^2 + 12t$

$y = -16(t^2 - \frac{3}{4}t)$

$y = -16(t)(t - \frac{3}{4})$

Zeros: $t = 0, t = \frac{3}{4}$

$h = \frac{0 + 3/4}{2} = \frac{3}{8}$.

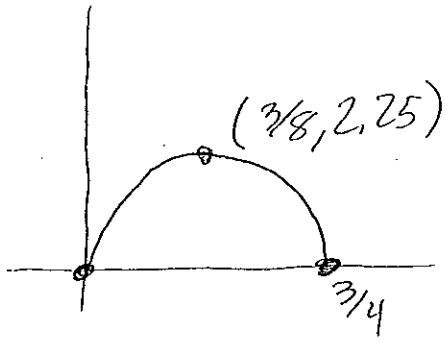
Plug in h to find k

$k = -16(\frac{3}{8})(\frac{3}{8} - \frac{3}{4})$

$-16(\frac{3}{8})(-\frac{3}{8})$

$k = \frac{9}{4} = 2.25$

Need to jump 2.5, only jumped 2.25. Can't Dunk.



6. A diver is standing on a platform 24 ft. above the pool. He jumps form the platform with an initi8al upward velocity of 8 ft/s. Use the formula $h(t) = -16t^2 + vt + s$, where h is his height above the water, t is the time, v is his starting upward velocity, and s is his starting height. How long will it take for him to hit the water?

$y = -16t^2 + 8t + 24$

$y = -8(2t^2 - t - 3)$

$y = -8(2t - 3)(t + 1)$

Zeros: $t = 3/2, t = -1$

$h = \frac{3/2 + -1}{2} = \frac{1/2}{2} = 1/4$

$K = -8(2(1/4) - 3)(1/4 + 1)$

$-8(-2.5)(1.25)$

$K = 25$

Zeros are 3/2 & -1

Vertex is (1/4, 25)

y-int is 24