Name: _____ Date: _____ **Unit 5 Class Work**

Happy Monday!!!

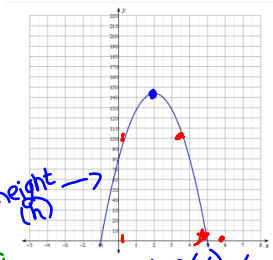
*Please take a Real-World Problem-Solving Sheet & have your HW and log out

*While I am checking your HW...
~ Ask me any questions you had.
AND
~ Write your thoughts for ALL parts of the real-world problem.
You may discuss with your peers, of course! ☺

*Quick Quiz Still May Be Today... ☺

Real World Problem-Solving

A rocket carrying fireworks is launched from a hill 80 feet above a lake. The rocket will fall into lake after exploding at its maximum height.
The rocket's height (h) above the surface of the lake t seconds after the launch is given by $\mathbf{h = -16t^2 + 64t + 80}$.



height depends on time

1. What is the maximum height the rocket will reach? How do you know?

144 ~~145~~ ft (highest y-value) (2 seconds)

2. About how high is the rocket 2 seconds after being launched? $-16(4)+64(2)+8$

144 ~~145~~ ft $= 144$ ft

3. How long will it take for the rocket to be 100 feet high in the air? How do you know? ≈ 0.5 sec

4. How long is the rocket in the air for? How do you know?

5 seconds $h = 0$, $t = ?$

5. What are the solutions to the equation $0 = -16t^2 + 64t + 80$, and what do they represent in terms of this context?

$t = -1$ not reasonable

$t = 5$ seconds when rocket hits the ground

More Practice

6. When $t=0$, $h=80$ meaning it starts 80 ft above ground

y-intercept

Jan 17-8:40 AM

Try the bonus! If you need 5 minutes more, I will allow 5 minutes at the end of class tomorrow! :)

Take HW worksheet (2 problems)

Hand in old journals today or any day this week. :) Thanks!!!

Jan 17-8:52 AM

$0 = -16t^2 + 64t + 80$

$0 = 16(-t^2 + 4t + 5)$

$a = -1$
$b = 4$
$c = 5$

$t = \frac{-4 \pm \sqrt{16 - 20}}{-2}$

$16 - 20$
$16 + 20$

$t = \frac{-4 \pm \sqrt{36}}{-2}$

$t = \frac{-4 \pm 6}{-2}$

$t = \frac{2}{-2}$
$t = 1$

$t = \frac{-10}{-2}$
$t = 5$

Jan 17-8:35 AM

3) $100 = -16t^2 + 64t + 80$

$0 = -16t^2 + 64t - 20$

$0 = 4(-4t^2 + 16t - 5)$

$a = -4$
$b = 16$
$c = -5$

$t = \frac{-16 \pm \sqrt{256 - 80}}{-8}$

$t = \frac{-16 \pm \sqrt{176}}{-8}$

$t \approx 0.34$ seconds

$t \approx 3.6$ seconds

Jan 17-8:28 AM

Name: _____ Date: _____ **Unit 5 Class Work**

1. Your friend throws a ball straight up, from 4 feet above the ground with an initial velocity in feet per second. The height of the ball can be modeled by the function $h = -0.05x^2 + 0.4x + 4$, where x is the horizontal distance, in feet, from the point where your friend is standing.

Part A: Determine the vertex of the graph of the function. What does this mean in terms of context?
Part B: Is the height you found in part A a maximum or a minimum height, and how do you know?
Part C: You are three feet away from your friend. How high would you have to reach to catch the ball? Would this occur before or after the vertex?
Part D: Assuming no one catches or interferes with the ball, how far away from your friend would you expect the ball to land? Explain.

2. Lenka makes and sells crystal jewelry. She determined that her monthly profit is determined by the price she chooses to sell each bracelet for. The function $P = -b^2 + 80b - 500$ models the monthly profit she makes from selling bracelets at any given price, b.

Part A: What issues could Lenka run into if she charges too high of a price?
Part B: Determine the maximum profit Lenka can expect to make on monthly bracelet sales, as well as the price that she should charge per bracelet in order to do so.

Concept Learned:

One Specific Example:

Relevance:

Homework:

p. 283 # 37 and 39 (ignore "completing the square," but rather determine the vertex by the $x = -b/2a$ method) and p. 296 # 14

Solutions

37. a. (60, 5000) b. $5000 c. $60

39. a. (59, 36.81) b. 36.81 feet c. when x is 5, h is 7.65 feet

d. when h is zero, $x = 120$ feet (by quadratic formula)

e. The ball never falls back down in the linear model.

14. After 4.25 seconds, the rocket reaches a maximum height of 144.5 meters