Warm-Up

1. Using $f(x) = 3x^2 + 4x - 9$, describe what each transformation does and write equation for g(x)

a.) g(x) = f(x) - 4

b.) g(x) = -f(x)

c.) g(x) = 1/2f(x)

2. Using the following equation: $y = 3x^2 + 4x - 9$

a.) Find the zeros using the calculator

b.) Find the max/min point using the calculator

Sep 25-7:22 AM

From vertex form to standard form:

$y = \frac{1}{2}(x-4)^2 + 8$

$y = \frac{1}{2}(x^2 - 8x + 16) + 8$

$y = \frac{1}{2}x^2 - 4x + 8 + 8$

$y = \frac{1}{2}x^2 - 4x + 16$

$(x-4)(x-4)$

$x^2 - 4x - 4x + 16$

$x^2 - 8x + 16$

Oct 9-8:10 AM

Graph each. Identify key features (a.o.s. vertex y-intercept zeros, Domain and Range)

1) $y = x^2 + 6x + 2$

$a=1 \quad b=6 \quad c=2$

$x = \frac{-b}{2a} = \frac{-6}{2(1)} = -3$

V: (-3, -7)

x	y
-5	-2
-4	-7
-3	-7
-2	-6
-1	-3

y-int: 2

zeros: (calc)

Domain: $(-\infty, \infty)$

R: $[-7, \infty)$

2)

Vertex

Axis of symmetry $x = -3$

Oct 8-4:43 PM

Quadratic modeling word problems often ask about the maximum or minimum or *when* the function will be the max or min. You need to find the vertex to answer these questions. Make sure you know whether to answer with the x or the y! (h, k) (x, y)

The models are often about an object falling to the ground. What is the **height** of the ball when it hits the ground??

Oct 8-5:03 PM

Ex. 3

Application: A model for a company's revenue is $R = -2.5p^2 + 500p$, where p is the price in dollars of the company's product.

a) What price will maximize revenue?

b) Find the maximum revenue

$a = -2.5 \quad b = 500$

$x = \frac{-500}{2(-2.5)} = \frac{-500}{-5} = 100$

V: (100, 25000)

P R

$-2.5(100)^2 + 500(100)$

25000

Revenue

price

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Ex. 4:

A rock club's profit from booking local bands depends on ticket price. Using past receipts, the owners find that the profit p can be modeled by the function $p = -15t^2 + 600t + 50$ where t represents the ticket price in dollars.

a) What price yields the maximum profit?

B) What is the maximum profit?

$a = -15 \quad b = 600 \quad c = 50$

x: t → ticket price

y: P → profit

$x = \frac{-600}{2(-15)} = \frac{-600}{-30} = 20$

V: (20, 6050)

$P = -15(20)^2 + 600(20) + 50$

$P = -6000 + 12000 + 50$

$P = 6050$

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Ex. 6

A eagle drops a stick from 30 ft. above the earth. Use the equation $h = -16t^2 + 30$ to determine when the stick hits the ground.

When a stick hits the ground, $h = 0$

$0 = -16t^2 + 30$

$-30 = -16t^2$

$t^2 = \frac{30}{16} = 1.875$

$t = \sqrt{1.875} = 1.4$ seconds

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Ex. 7 Now, your turn .. try to solve.

A squirrel drops an acorn from 24 ft. in a tree. Use the equation $h = -16t^2 + 24$ to state how high the acorn is after 1 second.

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Ex. 8

A diver dives from a 3 meter springboard. His altitude y can be approximated by the function $y = -2.2x^2 + 5.3x + 4$ where x is the number of seconds after he left the springboard. What is his maximum altitude?

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Ex. 9:

A small toy company markets a new toy. The function $s = -64p^2 + 1600p$ predicts, in dollars, the total sales (S) as a function of the price (p) of the toy.

a) What price will produce the highest total sales?

b) What is the maximum total sales predicted?

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Ex. 10:

Suppose $h(t) = -5t^2 + 10t + 3$ is the height of a diver above the water (in meters), t seconds after the diver leaves the springboard.

a) When does the diver reach the peak of the dive?

b) How many seconds after he leaves the springboard does he hit the peak?

c) When does the diver hit the water?

d) At what time on the diver's descent toward the water is the diver again at the same height as the springboard?

e) How high above the water is the springboard? Explain how you know.

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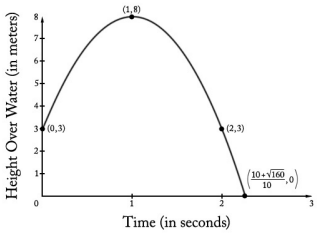

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