$= 2(x+y)$

$= 2x + 2y$

Warm Up 10/03/13

$\left(\dfrac{b}{2}\right)^2$

1. Complete the square. $f(x) = \dfrac{2x^2}{2} - \dfrac{20x}{2} + \dfrac{53}{2}$

$\left(\dfrac{-10}{2}\right)^2 = (-5)^2 = 25$

$\dfrac{f(x)}{2} = x^2 - 10x + \dfrac{53}{2}$

$\dfrac{f(x)}{2} = (x^2 - 10 + 25) + \left(\dfrac{53}{2} - \dfrac{25}{1}\right)^2 = \dfrac{50}{2}$

$a(x+h)^2 + k$

$\dfrac{f(x)}{2} = (x-5)^2 + \dfrac{3}{2}$

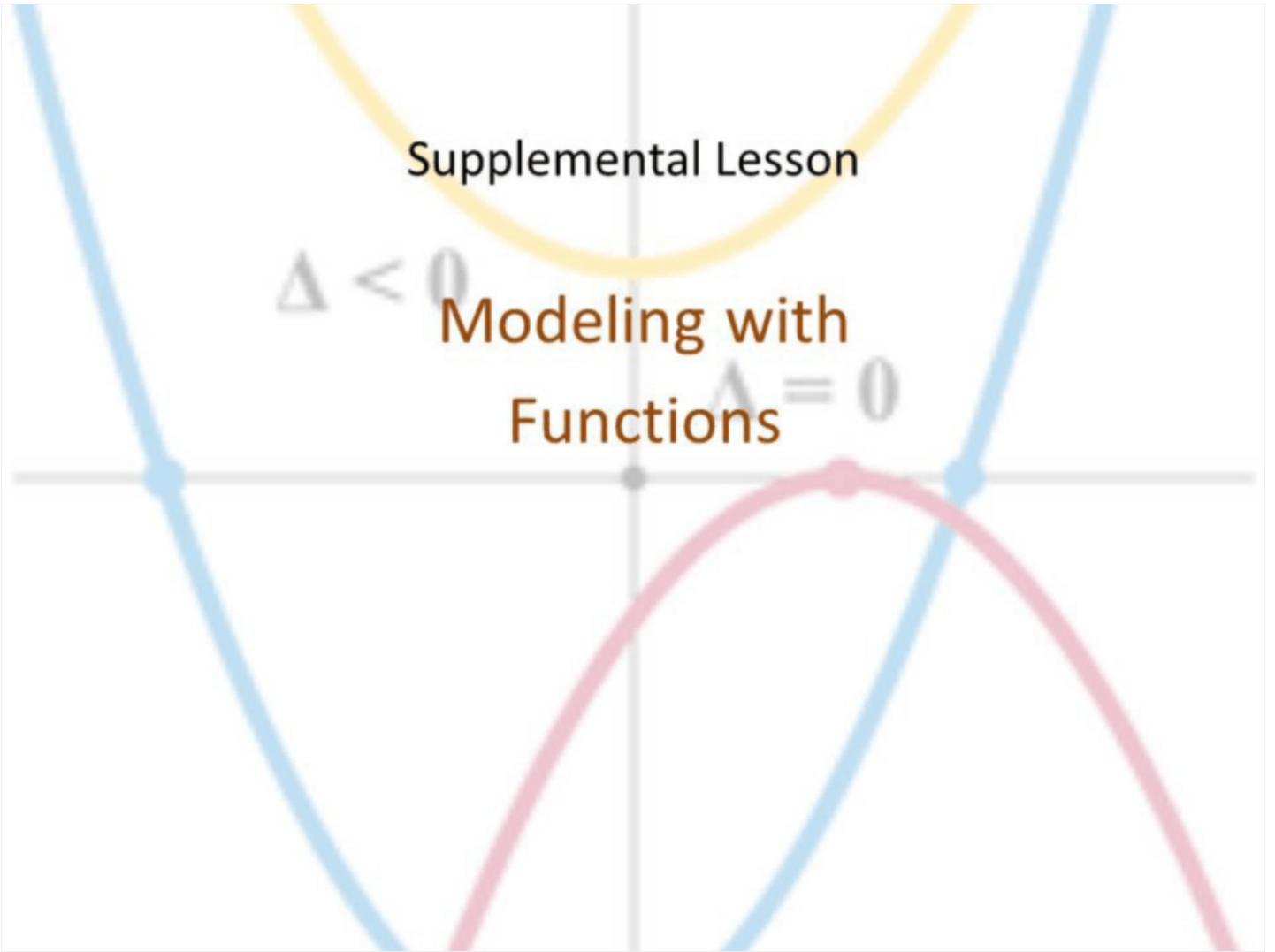$2\left((x-5)^2\right) + 2 \cdot \dfrac{3}{2}$

$2(x-5)^2 + 3$

Warm Up Solutions

1. Complete the square: $f(x) = 2x^2 - 20x + 53$

Supplemental Lesson

Modeling with
Functions

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.

(input, output) (x, y)

$\underline{\text{input}}$ $\underline{\text{Output}}$
time .   height.

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

(time, height) $\left(\dfrac{-b}{2a}, f\left(\dfrac{-b}{2a}\right) \right)$

$\dfrac{-16}{2(-16)} = \dfrac{1}{2}$ sec.

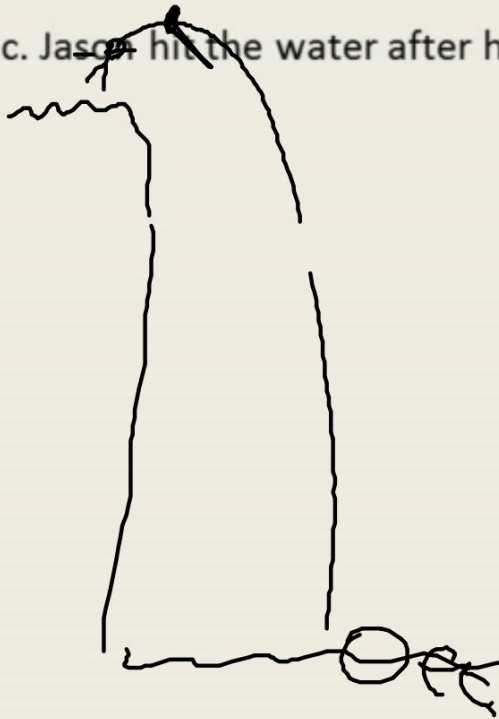b. What was the highest point that Jason reached?

$h\left(\tfrac{1}{2}\right) = -16\left(\tfrac{1}{2}\right)^2 + 16\left(\tfrac{1}{2}\right) + 480$

$4 + 480$

$= -16\left(\tfrac{1}{4}\right) + 16\left(\tfrac{1}{2}\right) + 480$
$= -4 + 8 + 480$

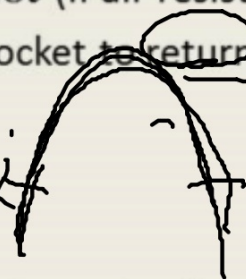484 ft.

c. Jason hit the water after how many seconds?

$$0 = -16t^2 + 16t + 480$$

$$0 = -16(t^2 - t - 30)$$

$$\frac{0}{-16} = \frac{-16}{-16}$$

$$0 = t^2 - t - 30$$

$$0 = (t+5)(t-6)$$

$$30$$
$$5 \times -6$$
$$-1$$

$$t+5 = 0 \qquad t-6 = 0$$

$$t = -5 \qquad t = 6$$

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).

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

$$0 = -16t^2 + 128t$$
$$0 = (-16t)(t - 8)$$

$-16t = 0 \qquad t - 8 = 0$

$t = 0 \quad , \quad t = 8$

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

$$112 = -16t^2 + 128t$$
$$-112 \qquad\qquad -112$$

$$0 = -16t^2 + 128t - 112$$
$$0 = -16(t^2 - 8t + 7)$$
$$0 = (t - 7)(t - 1)$$

$$t = 7, 1$$

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

d. What is the maximum height?

Guidelines for Modeling with Functions

You may use the following guidelines to aid you if you wish...

1. Express the model (formula) in words- Ex. Area = length x width

2. Choose the variable- Identify all the variables used to express the function. Key is writing it all using one variable instead of multiple.

3. Set up the model- Once you have it written all under one variable, write the function in mathematical language.

4. Use the model- Hard work is virtually done! You may use the function model to solve other applicable problems.

A gardener has 140ft of fencing to fence in a rectangular vegetable garden.

a. Find a function that models the area of the garden she can fence.

b. Find the dimensions of the largest area she can fence.

c. Can she fence a garden with area 1250ft^2 ?

1. A rectangular building lot is three times as long as it is wide. Find a function that models its area A in terms of its width w.

3. A rectangular box has a square base. Its height is half the width of the base. Find a function that models its volume V in terms of its width w.

Homework 9/30/13

TB pg. 210-211 #1, 3, 9, 22, 23 (challenge)