

Before we begin, are there any questions from last day's work?

Today's Learning Goal(s):

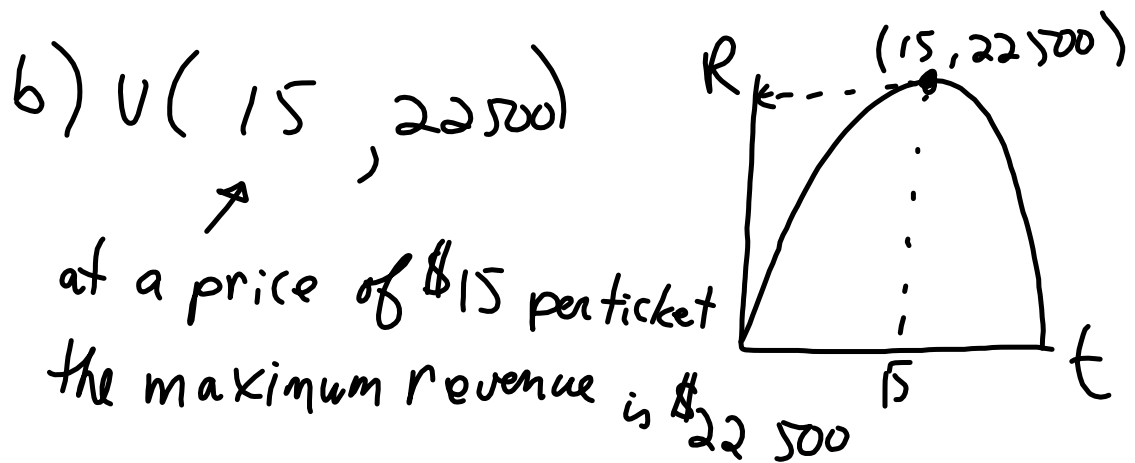
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By the end of the class, I will be able to:

- a) apply the skills learned so far to "real world" applications of quadratic relations.

Do Next Week (Fall 2016)
Complete "Learning Skills" self-assessment

$$p. 215 \# 7 \quad R = -100(p-15)^2 + 22500$$



Today's plan:

Collect Gizmos Lab booklet *Already Done Fall 2016* (Mark while writing quiz.)

Complete "Learning Skills" self-assessment *Do Next Week (Fall 2016)*

Correct Quiz 4.1

Do Quiz 4.2 (on sketching)

Do today's lesson

4.5 Interpret Graphs of Quadratic Relations

November 4, 2016

MBF 3C1

4.5 Interpret Graphs of Quadratic Relations

Date: Nov. 4, 2016

Ex.1: A football player kicks a football held 0.5 m above the ground.
The football reaches a maximum height of 36.5 m,
at a horizontal distance of 18 m from the player.



- a) Determine the equation of a quadratic relation that models the path of the ball.
b) At what horizontal distance from the kicker does the football hit the ground? (round to 2 decimals)

Solution

- a) Let y represent the height of the ball above the ground, in m.
Let x represent the horizontal distance from the kicker, in m.
Recall: the equation in vertex form is: $y = a(x - h)^2 + k$
∴ the maximum height of the ball is 36.5 m
∴ the vertex for the parabola must be (18, 36.5)
∴ so, the new equation is + 36.5

What else do we know about this situation?

When the kicker is still holding the ball, it is 0 m away from him,
and 0.5 m above the ground.

(0, 0.5) is a point we can substitute into our "family" equation.

$$0.5 = a(0 - 18)^2 + 36.5$$

$$0.5 = a(-18)^2 + 36.5$$

$$0.5 = a(324) + 36.5$$

$$0.5 - 36.5 = 324a$$

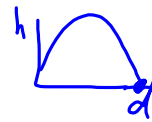
$$\frac{-36}{324} = \frac{324a}{324}$$

$$-\frac{1}{9} = a$$

$$\therefore y = -\frac{1}{9}(x - 18)^2 + 36.5$$

is the equation.

- b) ball hits ground
when $y = 0$ (height = 0)



$$0 = -\frac{1}{9}(x - 18)^2 + 36.5$$

$$-36.5 = -\frac{1}{9}(x - 18)^2$$

$$\textcircled{2} \quad 9(-36.5) = 9\left(-\frac{1}{9}(x - 18)^2\right)$$

$$\textcircled{3} \quad \sqrt{328.5} = \sqrt{(x - 18)^2} \quad \textcircled{4}$$

$$18.124 = x - 18$$

$$18.12 + 18 = x$$

$$36.12 = x$$

- ∴ the ball hits the ground 36.12 m from the kicker.

Students must copy these on the back of the handout.

Ex. 2: Find the y-intercept of each relation: For y-intercept, always set $x = 0$.

a) $y = -7x^2 + 3x - 6$

$$\begin{aligned} y &= -7(0)^2 + 3(0) - 6 \\ &= -6 \end{aligned}$$

b) $y = -4(x+2)^2 - 11$

$$\begin{aligned} y &= -4(0+2)^2 - 11 \\ y &= -4(2)^2 - 11 \\ &= -4(4) - 11 \\ &= -16 - 11 \\ &= -27 \end{aligned}$$

c) $y = -1.1(x-3)^2 + 9.9$

$$\begin{aligned} y &= -1.1(0-3)^2 + 9.9 \\ &= -1.1(-3)^2 + 9.9 \\ &= -1.1(9) + 9.9 \\ &= -9.9 + 9.9 \\ &= 0 \end{aligned}$$

Entertainment: p. 216 #9abc

(also on unit outline) pp. 222-225 #1aceg, 2ab, 4, 5
(use graph paper for #5), 7
p. 228 #9