

Algebra 2 H
Chapter 3 Applications Review

Name

Round to the nearest hundredth if necessary

1) Solve for x: $(2x - 52)\left(\frac{7}{6}x - 7\right)\left(\frac{-2}{5}x + 14\right) = 0$

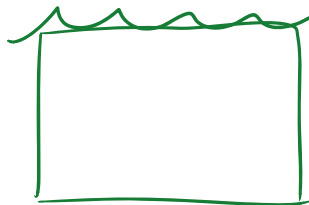
$2x - 52 = 0$ OR $\frac{7}{6}x - 7 = 0$ OR $\frac{-2}{5}x + 14 = 0$

$x = 26, 6, 35$

2) Mary is building a rectangular pen for her little lamb next to the river (so he has some water). The lamb can't swim so she doesn't need to put a fence on that side. She has 100ft of fencing to use and needs to use all of it.

$100 = 2y + x \rightarrow y = \frac{100 - x}{2} = 50 - \frac{1}{2}x$

a. Write an equation for $A(x)$, the area of the pen as a function of the width.



$A(x) = x \cdot y = x\left(-\frac{1}{2}x + 50\right)$

b. What is the domain of $A(x)$?

$0 < x < 100$

c. What dimension pen should she make to give her little lamb the greatest amount of area?

Avg x intercepts.

$x = \frac{0 + 100}{2} = 50$

$y = 25$

50 feet x 25 feet

3) You are dropping eggs from your bedroom window on Halloween. Your window is about 16 feet above the sidewalk.

a. Write the equation for $h(t)$, the height of the egg after time t .

$h(t) = -16t^2 + 16$

b. What is the domain of $h(t)$?

AKA "how long the egg is in the air" $0 \leq t \leq 1$

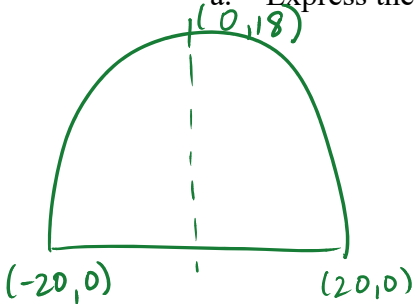
c. One egg accidentally hits your mom because she is looking up to see what is going on! If she was in a room 10 feet below you, after how many seconds did this occur?

$-16t^2 + 16 = 6$

After 0.79 seconds

4) The arch of a bridge is in the shape of a parabola. It is 18 feet high and 40 feet wide at the base.

a. Express the height of the arch $h(x)$ in terms of x , the horizontal distance.



$$h(x) = a(x-0)^2 + 18$$

$$0 = a(20-0)^2 + 18$$

$$-18 = 400a$$

$$-.045 = a$$

$$h(x) = -.045(x)^2 + 18$$

b. What is the widest 8-foot tall train that can fit under the bridge?

$$8 = -.045x^2 + 18$$

$$-10 = -.045x^2$$

$$222.22 = x^2$$

$$x = \pm 14.91$$

Therefore, the greatest width is 29.81 feet

5) An arrow shot vertically into the air reaches a maximum height of 324 feet after 4.5 seconds of flight. Let h represent the distance above ground (in feet) t seconds after the arrow is released.

a. Find the equation for $h(t)$, the height of the arrow after time t .

$$h(t) = -16(t-4.5)^2 + 324$$

b. Find the equation for $h(t)$ a second way.

$$h(t) = -16t^2 + v_0t + 0$$

$$324 = -16(4.5)^2 + v_0(4.5)$$

$$144 = v_0$$

$$h(t) = -16t^2 + 144t$$

c. Show that your answers in parts a and b are equal.

$$-16(t-4.5)^2 + 324$$

$$= -16(t^2 - 9t + 20.25) + 324$$

$$= -16t^2 + 144t - 324 + 324 = -16t^2 + 144t \quad \checkmark$$

d. What is the domain of $h(t)$?

AKA how long till ground? $0 \leq t \leq 9$

e. At what times will the arrow be 80 feet above the ground?

$$0.59 \text{ s OR } 8.41 \text{ s}$$