Advanced Algebra

Unit 4 Quadratics- Assignment #21

Quadratic Models #2:

1) Omar is on the school shot-put team. The path of the shot-put is modelled by a quadratic equation $y=1.5+0.75x-0.05x^2$, where y is the height of the shot-put in meters and $x>0$ is the horizontal distance travelled in meters.

$y = -.05x^2 + .75x + 1.5$

a) Find the maximum height that the shot put reaches.

4.3125 meters

$\frac{-.75}{2(-.05)} = (7.5, 4.3125)$

b) Write down the equation of the axis of symmetry.

$x = 7.5$

c) Find the positive value for x when the graph crosses the x-axis and explain what this value represents.

16.8 meters

$y = -.05(x-7.5)^2 + 4.3125$

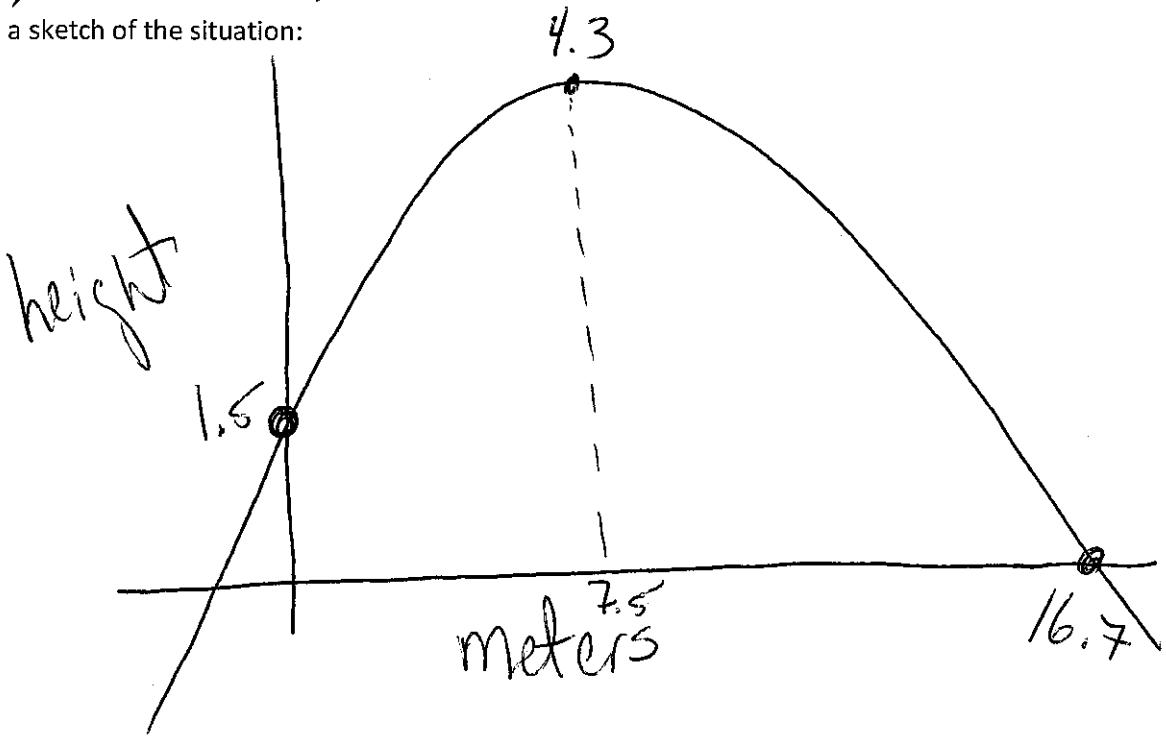
$x = 7.5 \pm \sqrt{\frac{-4.3125}{-.05}}$

7.5 ± 9.3 → 16.8, −1.8

d) Find the y- intercept and explain what this value represents.

* starting height of the shot-put
* did not start at ground level!!!

Make a sketch of the situation:



2) Zedd is the goalkeeper for his soccer team. He takes a free kick from the goal and the path of the ball is modelled by the function $f(x) = -0.06x^2 + 1.2x$ where f(x) is the height of the ball in meters and x is the horizontal distance travelled by the ball in meters.

a) Find the maximum height that the ball reaches.

6 meters

$X = \frac{-1.2}{2(-.06)}$ (10, 6)

VARS (10) =

b) Write down the equation of the axis of symmetry

$X = 10$

c) Find the x-intercepts and explain what these values represent.

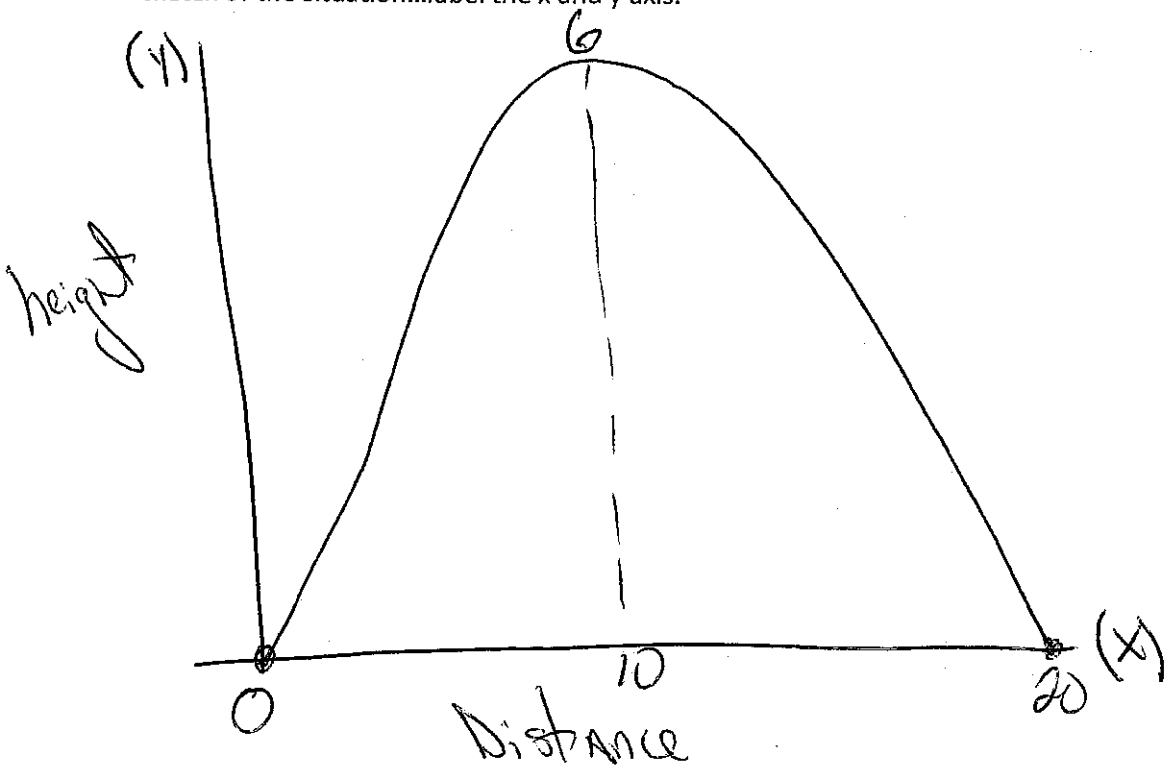
0 and 20 ← Total distance Traveled

$X(-.06x + 1.2) = 0$

$X = 0$

$\frac{-1.2}{-.06}$ 20

Make a sketch of the situation...label the x and y axis.



3) A ramp in a skateboard park is modelled by a curve with the equation $f(x) = 10.67-1.67x+0.0417x^2$ where x is the horizontal distance in meters and f(x) is the height above the ground in meters.

Make a sketch of the situation:

$y = .0417x^2 - 1.67x + 10.67$

a) Find the maximum depth of the run.

Vertex !!

-6.05

$x = \frac{1.67}{2(.0417)} = 20.02$

b) Find the x- intercepts and explain what these values represent.

VARS $(20.02) = -6.05$

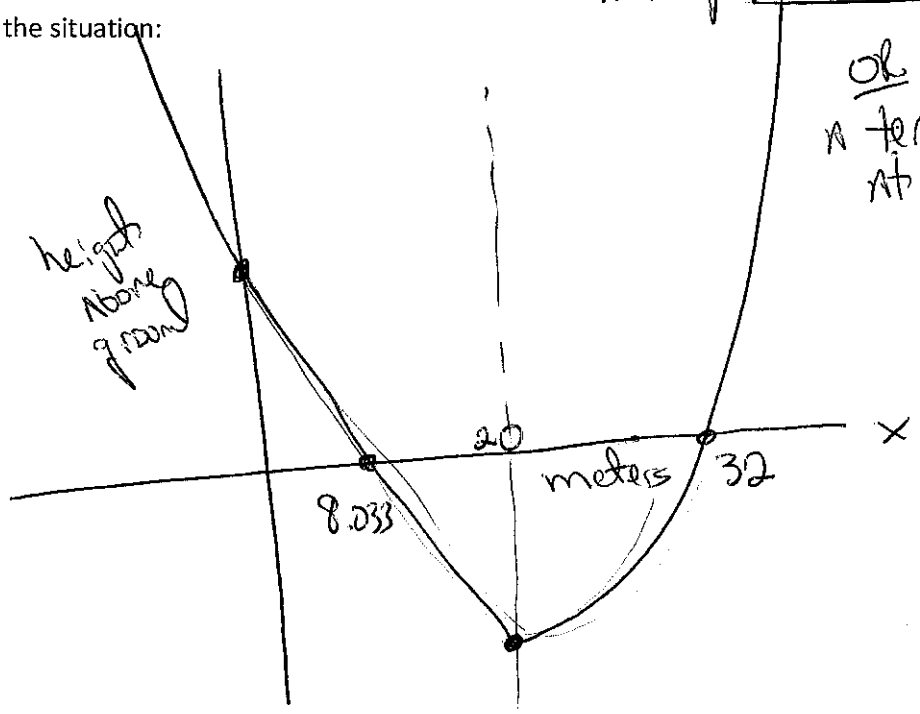
$$\frac{1.67 \pm \sqrt{1.67^2 - 4(.0417)(10.67)}}{2(.0417)}$$

$$\frac{1.67 \pm 1.00}{.0834} < \begin{matrix} 32 \\ 8.033 \end{matrix} >$$

These represent the distances from the y intercept (where the skater starts) when he is back at ground level.

Think Half pipe snow board

Make a sketch of the situation:



OR The edge of a terrain park at a ski hill

-6.05

4) Rancher Gonzales has 800 feet of material to construct a 4 sided rectangular fence.

a) Define the length in terms of the width, x

X And 400 − X

b) Write the function to represent the area of the fence

$x(400-x)$

c) What are the x intercepts of this function

0 And 400

d) What is the vertex? What does the vertex represent in this scenario.

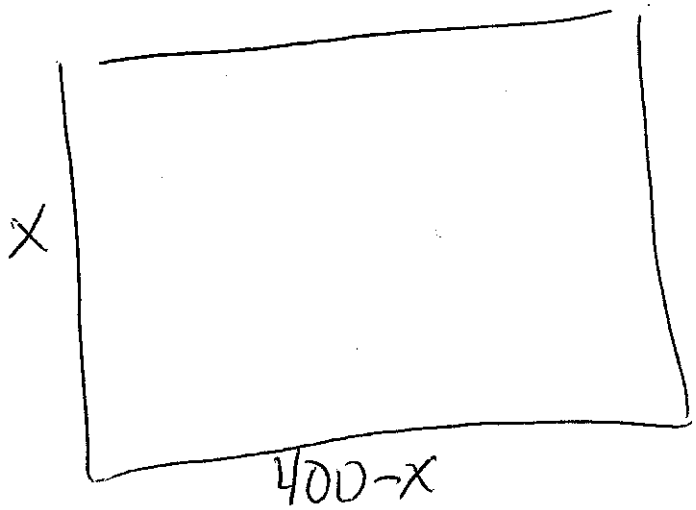
(200, 40,000)

MAX Area for fence
X Represents the best width to maximize Area

e) What are the dimensions of the best way to construct this fence to maximize the area.

200 by 200

Make a sketch of the situation



$\frac{800-2x}{2}$