23 Maximization/Minimization with Quadratic Functions

Due:
12/14/2015 at 06:00am EST.

Students will be able to:

- Set up quadratic function that models a real-life situation
- Determine if quadratic function has maximum or minimum
- Find the coordinates of the extreme point
- Interpret the coordinates of the extreme point in the context

Functions and symbols that WeBWorK understands.

Links to some useful WeBWorK pages for students

1. (1 pt) You have 264 feet of fencing to enclose a rectangular plot that borders on a river. If you do not fence the side along the river find the length and width of the plot that will maximize the area.

To solve this problem, set up the function $A(x)$ that calculates the area of the rectangular plot with width x feet.

$A(x) =$ ______________

Now find the coordinates of the vertex of the function you found above:

$h =$ _____ $k =$ _____

Now proceed with solving the problem...

The length is __________ft and the width is __________ft.

What is the largest area that can be enclosed?

The largest area is __________ft^2

2. (1 pt) You have 240 feet of fencing to enclose a rectangular plot that borders on a river. If you do not fence the side along the river find the length and width of the plot that will maximize the area.

The length is __________ft and the width is __________ft.

What is the largest area that can be enclosed?

The largest area is __________ft^2

3. (1 pt) A rectangular playground is to be fenced off and divided in two by another fence parallel to one side of the playground with 336 feet of fencing to be used. Find the dimensions of the playground that maximize the total enclosed area.

The length is __________ft and the width is __________ft.

What is the largest area?

The largest area is __________ft^2

4. (1 pt) Among all pairs of numbers whose difference is 48, find a pair whose product is as small as possible. What is the minumum product?

First, set up the function $P(x)$ that calculates the product of the two numbers described above with x being the larger of the two numbers.

$P(x) =$ ______________

Now determine the coordinates of the vertex of the function you found above:

$h =$ _____ $k =$ _____

Now proceed with solving the problem...

The minimum product is __________

5. (1 pt) Among all pairs of numbers whose difference is 80, find a pair whose product is as small as possible. What is the minumum product?

The minimum product is __________

6. (1 pt) A person standing close to the edge on the top of a 384−foot building throws a baseball vertically upward. The quadratic function

$s(t) = -16t^2 + 80t + 384$

models the ball's height above the ground, $s(t)$, in feet, t seconds after it was thrown.

After how many seconds does the ball reach its maximum height?

Time to reach maximum height is __________ seconds.

What is the maximum height?

The maximum height is __________ft.

How many seconds does it take until the ball finally hits the ground?

Time to reach ground is __________ seconds.