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webwork → pcc005-32013 → undefined_set → 1

Undefined Set: Problem 1

This set is *hidden from students.*

ANSWERS ONLY CHECKED -- ANSWERS NOT RECORDED

Entered	Answer Preview	Correct	Result	Messages
235 ft^2	$235\ \text{ft}^2$	$770.997\ \text{ft}$	incorrect	The units for your answer are not correct
117.5 ft	$117.5\ \text{ft}$	$117.5\ \text{ft}$	correct	
27612.5 ft^2	$27612.5\ \text{ft}^2$	$27612.5\ \text{ft}^2$	correct	

At least one of the answers above is NOT correct.

(0 pts) **local/yao/August19-23/Section10.5/MaxMinApplication30.pg**

You will build a rectangular sheep pen next to a river. There is no need to build a fence along the river, so you only need to build three sides. You have a total of 470 feet of fence to use. Find the dimension of the pen such that you can enclose the maximum area.

The length of the pen should be 235 ft^2 .

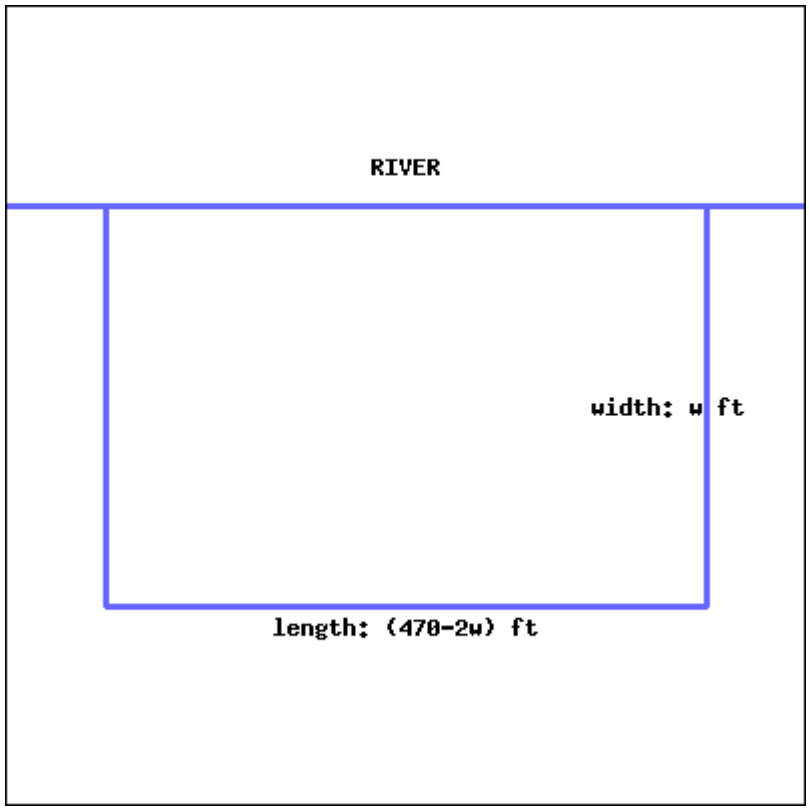
The width of the pen should be 117.5 ft .

The maximum area of the pen is 27612.5 ft^2 .

(Use **ft** for feet, and **ft^2** for square feet.)

SOLUTION: (Instructor solution preview: show the student solution after due date.)

Drawing a diagram should help us set up a function for the area of the pen.



Let the width be w ft, and the length be l ft. Since there are only three sides of the fence, we have:

$$l + 2w = 470$$
$$l = 470 - 2w$$

If the pen's width is w feet, then its length is $(470 - 2w)$ feet. Now we can build a function for the area of the pen:

$$f(w) = (470 - 2w)w$$

$$f(w) = -2w^2 + 470w$$

Identify that $a = -2, b = 470, c = 0$.

Each point on this function represents the area of the pen. The maximum area happens at this quadratic function's vertex.

To find the vertex, we first find the parabola's axis by the axis formula:

$$w = -\frac{b}{2a}$$
$$w = -\frac{470}{2(-2)}$$
$$w = 117.5$$

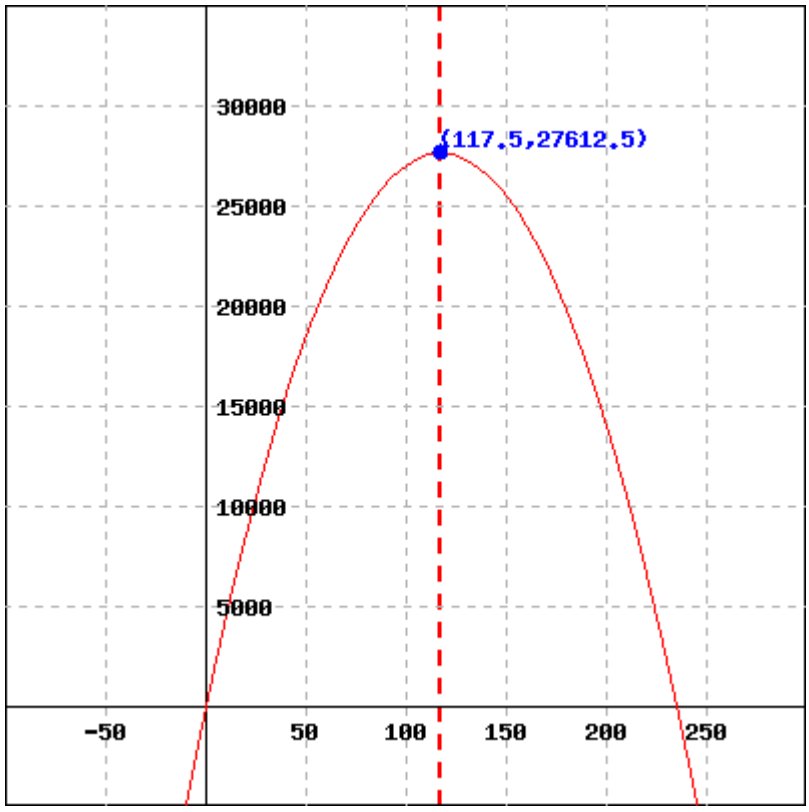
Next, we plug $w = 117.5$ into the parabola's equation, and we have:

$$f(w) = -2w^2 + 470w$$
$$f(117.5) = -2(117.5)^2 + 470(117.5)$$
$$f(117.5) = 27612.5$$

The parabola's vertex is $(117.5, 27612.5)$. This implies that the pen's maximum area is 27612.5 square feet. This happens when the width is 117.5 feet, and the length is $470 - 2 \cdot 117.5 = 235$ feet.

Solution: When the length is 235 feet and the width is 117.5 feet, the pen has a maximum area: 27612.5 square feet.

The following graph shows the function's graph and its maximum value.



Note: *You can earn partial credit on this problem.*

Edit1

☑ Show correct answers ☐ Show Solutions

Preview Answers | Check Answers | Submit Answers

You have attempted this problem 0 times.
You have unlimited attempts remaining.

Show Past Answers

Email instructor

This set is *hidden from students.*