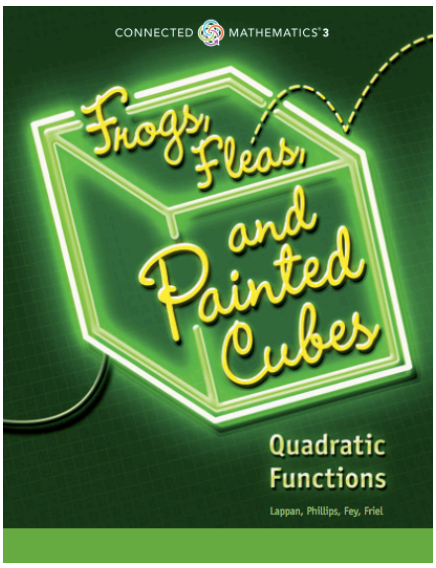
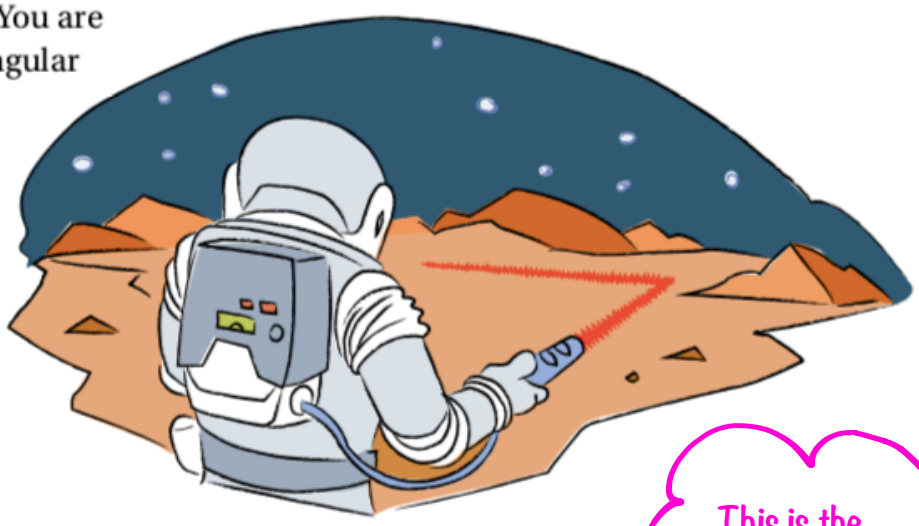


1.1 Staking a Claim

Maximizing Area

Suppose it is the year 2100, and a rare and precious metal has just been discovered on Mars. You and hundreds of other adventurers travel to the planet to stake your claim. You are allowed to claim any rectangular piece of land that can be surrounded by 20 meters of laser fencing. You want to arrange your fencing to enclose the maximum area possible.

I definitely would, would you?



What are the dimensions of a rectangle with the greatest area for a fixed perimeter?

This means the total perimeter will always be the same no matter the combinations of length and width.

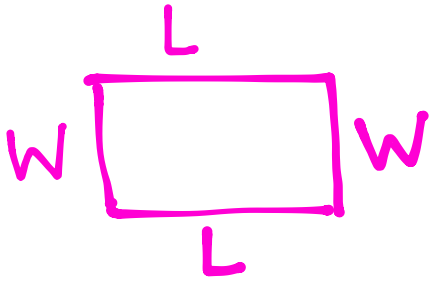
This is the question we will be able to answer at the end of the problem.

Problem 1.1

Draw at least 5.
Scale does not matter.

A 1. Sketch several rectangles with a perimeter of 20 meters. Include some with small areas and some with large areas. Label the dimensions of each rectangle.

Things to remember:



Perimeter is the distance all the way around a shape.

$P = 2L + 2W$

$\text{Area} = L \cdot W$

A2. Make a table showing the length, width, and area for every rectangle with a perimeter of 20 meters and whole number side lengths.

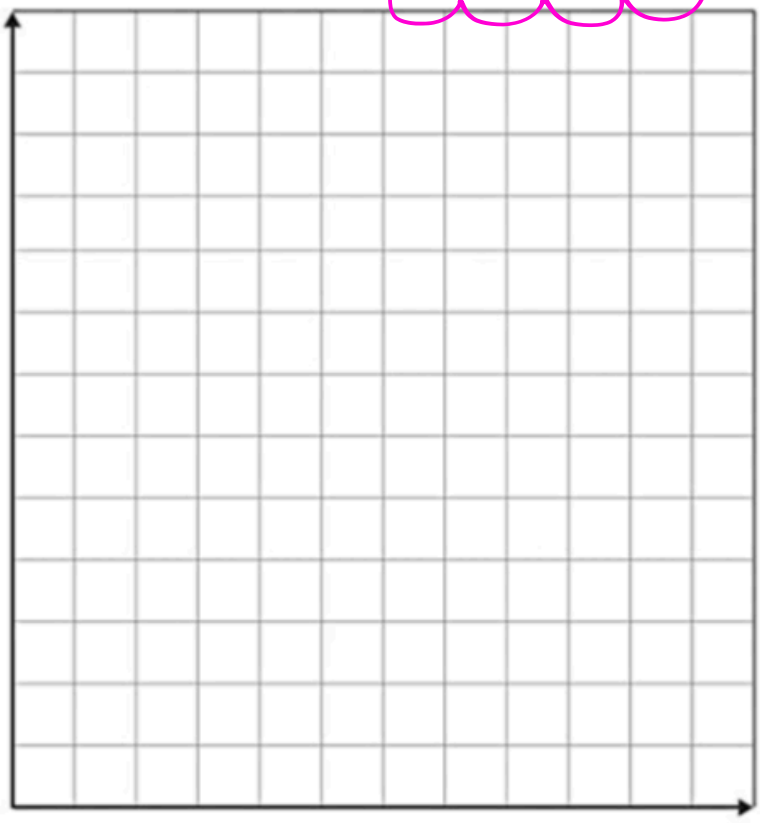
A3. Make a graph of the data (*length, area*).

Yes, this is correct!
Why doesn't it add up to 20?

Length	Width	Area
1	9	9
2		
3		
4		
5		
6		
7		
8		
9		
10		

Why do you think I stopped here?

Don't forget to have your graph fill the "page."



A2. What are some patterns you notice in the table?

A3. Describe what the shape of the graph looks like.

A4. How does the pattern you noticed in the table match up with the graph you created?

B **1.** What rectangle dimensions give the greatest possible area? Explain.

2. Suppose the dimensions were not restricted to whole numbers. Would this change your answer? Explain.

What if the length was 6.5? 7.2?
Would it change your answer to B1?

Can you draw a conclusion?

If you enclosed an area with a fixed perimeter,
the shape that would enclose the greatest area is a _____.