

## Additional Practice

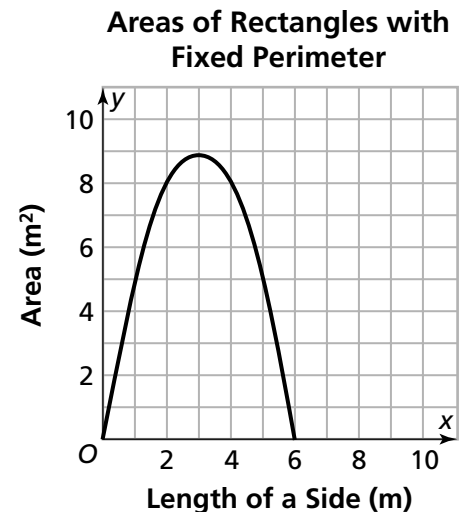
### Investigation 1

#### Frogs, Fleas, and Painted Cubes

1. The area  $A$  of a rectangle with a side of length  $\ell$  meters and a fixed perimeter is given by the equation  $A = \ell(240 - \ell)$ .
  - a. Suppose one dimension of the rectangle is 180 meters. What is the other dimension? What is the area of the rectangle?
  - b. Suppose one dimension of the rectangle is 110 meters. What is the other dimension? What is the area of the rectangle?
  - c. What are the dimensions of the rectangle with the greatest area possible for this perimeter? Explain how you found your answer.
  - d. What are the dimensions of the rectangle with this perimeter and an area of 8,000 square meters? Explain your answer.
  - e. What is the fixed perimeter for the rectangles represented by this equation? Explain how you found the perimeter.

2. The graph shows length and area data for rectangles with a fixed perimeter.

- a. What are the dimensions of the rectangle with this perimeter and an area of 8 square meters?
- b. What are the dimensions of the rectangle with this perimeter and an area of 5 square meters?
- c. What is the greatest area possible for a rectangle with this perimeter? What are the dimensions of this rectangle?



**Additional Practice** *(continued)***Investigation 1****Frogs, Fleas, and Painted Cubes**

3. Find the maximum area for a rectangle with a perimeter of 10 meters. Include the following in your answer and explain how each piece of evidence supports your answer:

- Sketches of rectangles with a perimeter of 10 meters that do not have the maximum area and a sketch of the rectangle you think does have the maximum area.
- Make a table of the length of a side and the area for rectangles with a perimeter of 10 meters. Use increments of 1 meter for the lengths.
- Make a graph of the relationship between length and area of rectangles with a perimeter of 10 meters.

4. Find the maximum area for a rectangle with a perimeter of 200 meters. Include the following in your answer and explain how each piece of evidence supports your answer:

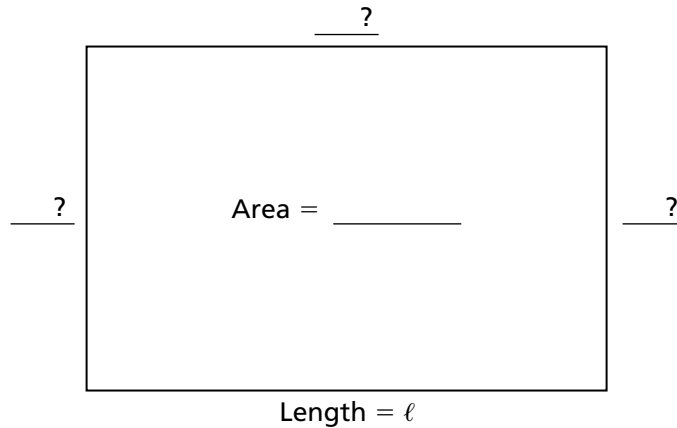
- Sketches of rectangles with a perimeter of 200 meters that do not have the maximum area and a sketch of the rectangle you think does have the maximum area.
- Make a table of the length of a side and the area for rectangles with a perimeter of 200 meters. Use increments of 10 meters for the lengths.
- Make a graph of the relationship between length and area of rectangles with a perimeter of 200 meters.

**Additional Practice** *(continued)*

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5. The rectangle below has a perimeter of 60 meters and a side length  $\ell$  meters.



- a. Express the lengths of the other sides in terms of  $\ell$ .
  - b. Write an equation for the Area  $A$  in terms of  $\ell$ .
  - c. Make a graph of your equation.
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- d. Use your equation to find the area of the rectangle if the length of one side is 10 meters.
  - e. Describe how you could use your graph to find the area of the rectangle if the length of one side is 10 meters.
  - f. Describe how you could use a table to find the area of the rectangle if the length of one side is 10 meters.
  - g. What is the maximum area possible for a rectangle with a perimeter of 60 meters? What are the dimensions of the rectangle with maximum area?

**Additional Practice** *(continued)*

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6. a. Use your results to Exercises 3–5 above to describe the shape of a rectangle with maximum area.
- b. What are the dimensions of a rectangle with maximum area if the perimeter is 100 meters?
- c. What are the dimensions of a rectangle with maximum area if the perimeter is 10 meters?
- d. What are the dimensions of a rectangle with maximum area if the perimeter is 1 meter?
- e. What are the dimensions of a rectangle with maximum area if the perimeter is 0.1 meter?