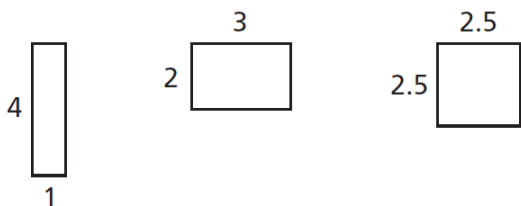


Frogs, Fleas, and Painted Cubes Answers

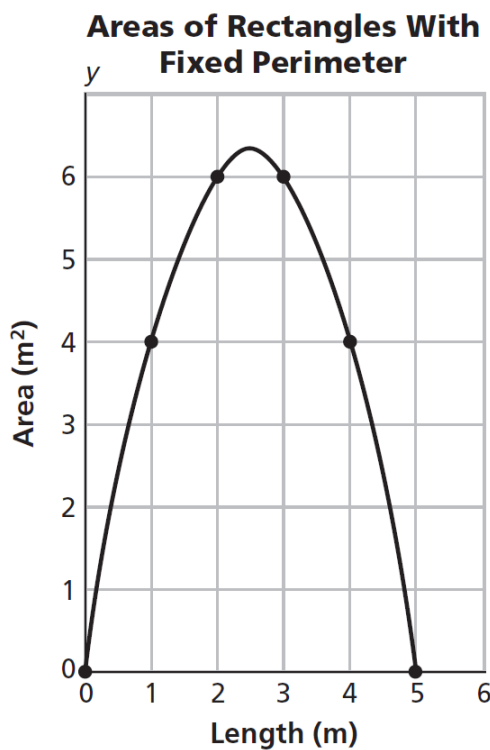
Investigation 1 Additional Practice

1. **a.** 60 meters and 10,800 square meters;
Let $\ell = 180$, then $240 - \ell = 60$ meters and thus $A = \ell(240 - \ell) = 180 \times 60 = 10,800 \text{ m}^2$.
 - b.** 130 meters and 14,300 square meters;
Let $\ell = 110$, then $240 - 110 = 130$ meters and thus area = $180(130) = 14,300 \text{ m}^2$.
 - c.** 120 meters by 120 meters; The greatest possible area is $14,400 \text{ m}^2$, which corresponds to a square with side lengths of 120 meters.
 - d.** 40 meters and 200 meters; The dimensions of a rectangle with an area of 8,000 square meters are 40 meters and 200 meters since $(40 + 200) = 240$ and $40(200) = 8,000$.
 - e.** 480 meters; Possible explanation: Since for part (a), one rectangle with this fixed perimeter and area defined by the equation $A = \ell(240 - \ell)$ had dimensions 60 meters and 180 meters. Substitute these dimensions into the equation $P = 2\ell + 2w$ thus giving a perimeter of $(2 \times 180 \text{ meters}) + (2 \times 60 \text{ meters}) = 480$ meters.
2. **a.** 2 meters and 4 meters
 - b.** 1 meter and 5 meters
 - c.** The greatest area possible is 9 square meters, which corresponds to a square with side lengths of 3 meters.
3. The maximum area for a rectangle with a perimeter of 10 meters is $2.5 \times 2.5 = 6.25$ square meters. Here are some examples of rectangles students may sketch:



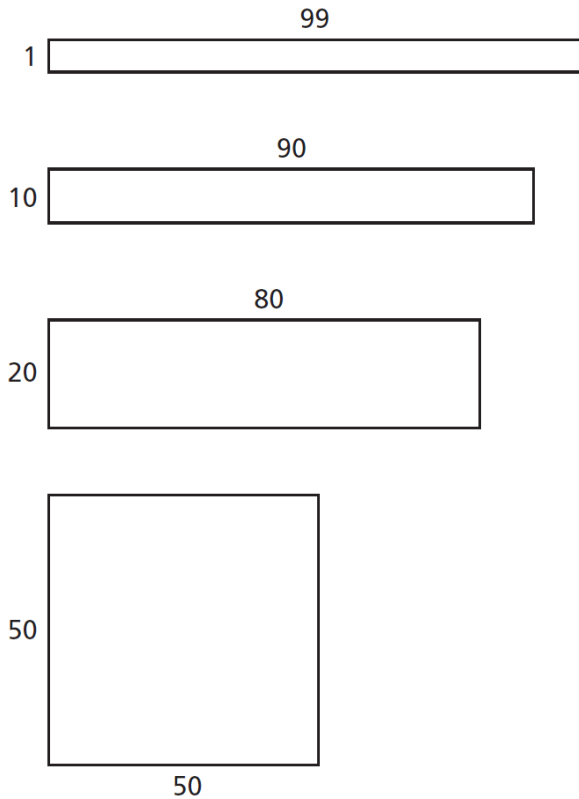
The rectangle with maximum area is the rectangle that is 2.5 meters by 2.5 meters. Table of lengths from 0 to 5 and areas of rectangles with fixed areas determined by taking length ℓ and multiplying by the other dimension, and having the sum of $\ell + w = 5$.

ℓ	A
0	0
1	4
2	6
3	6
4	4
5	0



Frogs, Fleas, and Painted Cubes Answers

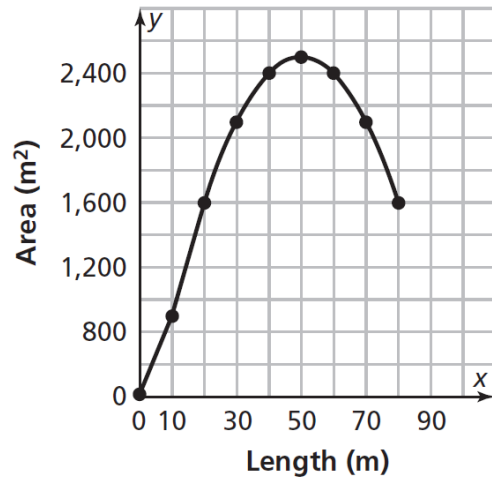
4. The maximum area for a rectangle with a perimeter of 200 meters is $50 \times 50 = 2,500$ square meters. Here are some examples of rectangles students may sketch:



The rectangle with maximum area is the rectangle that is $50 \times 50 = 2,500$ square meters. Table of lengths from 0 to 5 and areas of rectangles with fixed areas determined by taking length ℓ and multiplying by the other dimension, and having the sum of $\ell + w = 100$.

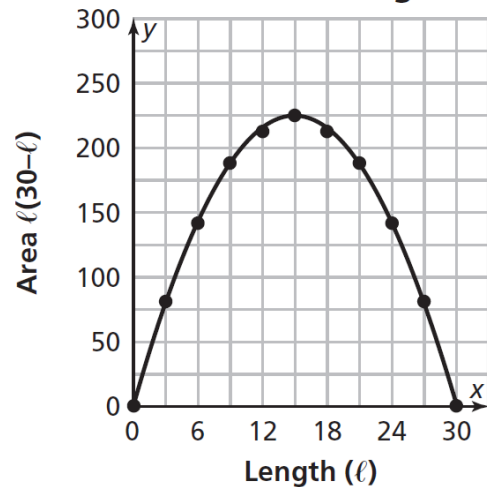
ℓ	A
0	5
10	900
20	1,600
30	2,100
40	2,400
50	2,500
60	2,400
70	2,100
80	1,600

Areas of Rectangles With Fixed Perimeter



5. a. $30 - \ell$; that is half the perimeter minus the length of the side. The sides are ℓ , $30 - \ell$, ℓ , and $30 - \ell$.
 b. $A = \ell(30 - \ell)$

Area of Rectangles



- c.
 d. $A = 10(20) = 200$ square meters
 e. Find the y -value on the graph of the parabola corresponding to the value of 10 on the x -axis.
 f. Find the A -value in the table corresponding the ℓ -value of 10.
 g. The maximum area is for a square with sides of 15 meters ($60 \div 4 = 15$); area is 225 square meters.

Frogs, Fleas, and Painted Cubes Answers

6. a. A square with side length s , each of which is $\frac{1}{4}$ the length of the perimeter.
- b. 25 by 25 with area of 625 square meters
- c. 2.5 by 2.5 with area of 6.25 square meters
- d. 0.25 by 0.25 with area of 0.0625 square meters
- e. 0.025 by 0.025 with area of 0.000625 square meters