Measure IT!
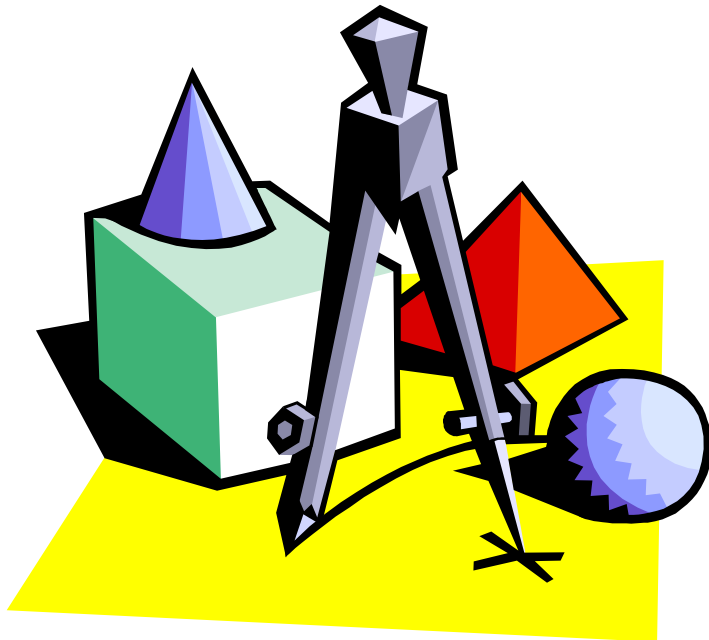
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Using Your Measurement Tools

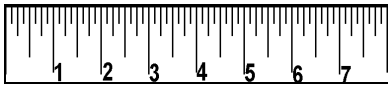Using the measurement tools you made in the first activity, find the length of the following in inches and in centimeters with a partner.

Object	Partner #1 Length (in inches)	Partner #2 Length (in inches)	Partner #1 Length (in centimeters)	Partner #2 Length (in centimeters)
Your foot				
Your nose				
Your height				
Your arm span (the distance between your outstretched fingertips)				
Your "pinkie" finger				
Your thumb				

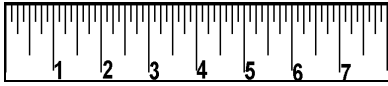1.   a.   Compare your height to your arm span in inches.

         b.   Compare your height to your arm span in centimeters.

2.   A person whose height and arm span are the same or about the same is called a "square." Are you a square? Explain.

3. Compare your measurements with your partner's.

4. What did you discover from taking the measurements?

Scavenger Hunt

Find objects that are approximately the following lengths <u>without</u> using the measurement tools you made in the first activity. Identify each object and draw its picture.

1.   less that 12 inches

2.   more than 30 inches

3.   about 10 inches

4.   between 5 and 9 inches

5.   about 4 inches longer than your foot

6.   between 12 and 24 inches
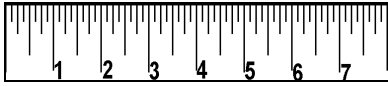
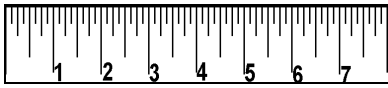7.   about 16 inches

8.   less than 10 centimeters

9.   more than 50 centimeters

10.   between 5 and 9 centimeters
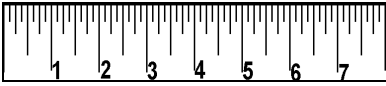
11.   about 24 centimeters

12.   about 4 centimeters longer than your foot

13. between 60 and 70 centimeters
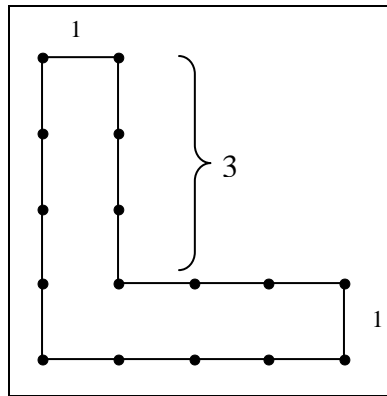
14. about 16 centimeters

Measure each of the objects. How accurate were your estimates?

Perimeter on a Geoboard

The distance around a closed figure is called its *perimeter*.

1. The following figure has a perimeter of 16 units. What are the lengths of the unlabelled sides? Explain how you found the missing lengths.


2. On a 5 x 5 geoboard, make all the different figures that have a perimeter of 10 units with your partner. The figures do not all have to be rectangles. Record your figures on geoboard dot paper. Carefully label the length of each side of your figures and calculate the perimeter of each figure to confirm that the perimeter is 10 units in length.
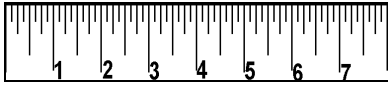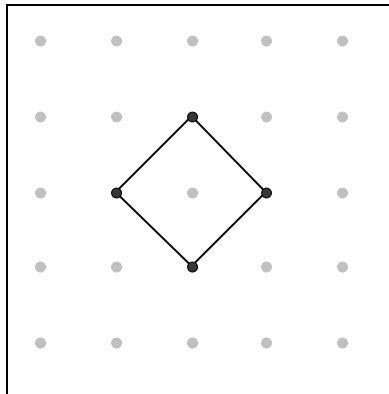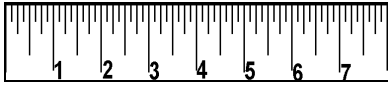
3.   Challenge:

The following figure has a perimeter of 4 units.
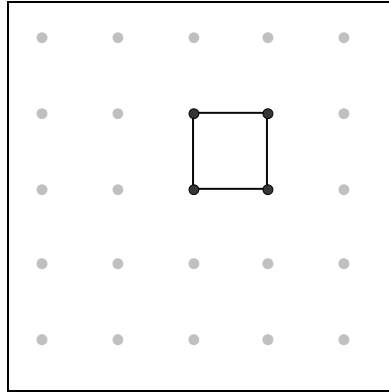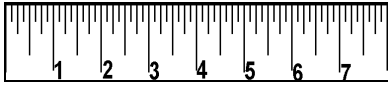
The following figure does not.

Explain why.

## Further Investigations of Perimeter

With a partner, complete the following table. Use the measurement tools you made in the first activity or a ruler, yard stick or meter stick.

Object	Drawing	Lengths of Sides	Perimeter
Sheet of notebook paper			
Door			
Window			
Face of a computer monitor			
Chalkboard			
Top of the filing cabinet			

1.   Describe the shapes whose perimeters you found.

2.   Can you find the perimeter without measuring all four sides? How?
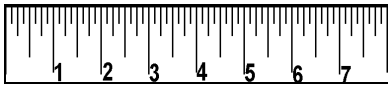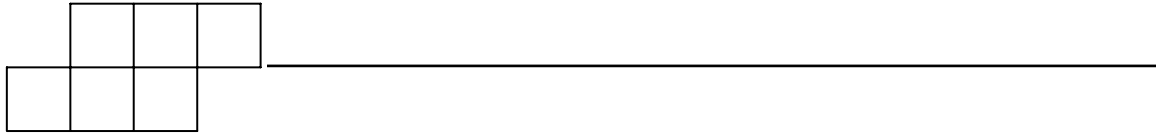
Investigating Circumference

The distance around a circle is called its *circumference*.
The *diameter* of a circle is a line segment that connects two points of a circle and contains the center of the circle.

Using tape measures, you and your partner should each carefully measure the length of the circumference and the length of a diameter of each of your objects. Each of you should get the same measurement for the circumference and the same measurement for the diameter. If your measurements do not match, measure again until you agree. After you have completed the measurements, divide the length of the circumference by the length of the diameter for each of your objects and record the quotient in the third column in the table below. Use a calculator to perform the division.

Length of the Circumference	Length of the Diameter	(Length of Circumference)/ (Length of Diameter)

1.   What do you observe about the quotients recorded in the third column of the table above?

2. How many diameter lengths fit along the circumference for each of your objects?

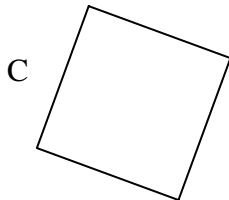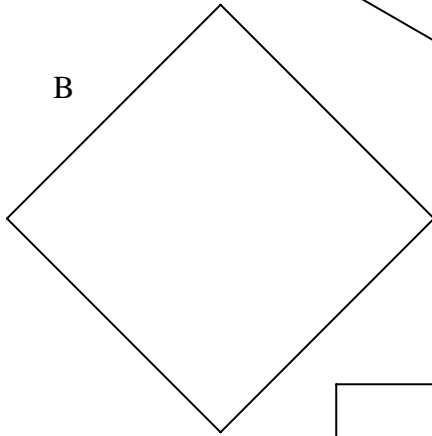3. Describe the relationship between the circumference and the diameter of a circle.
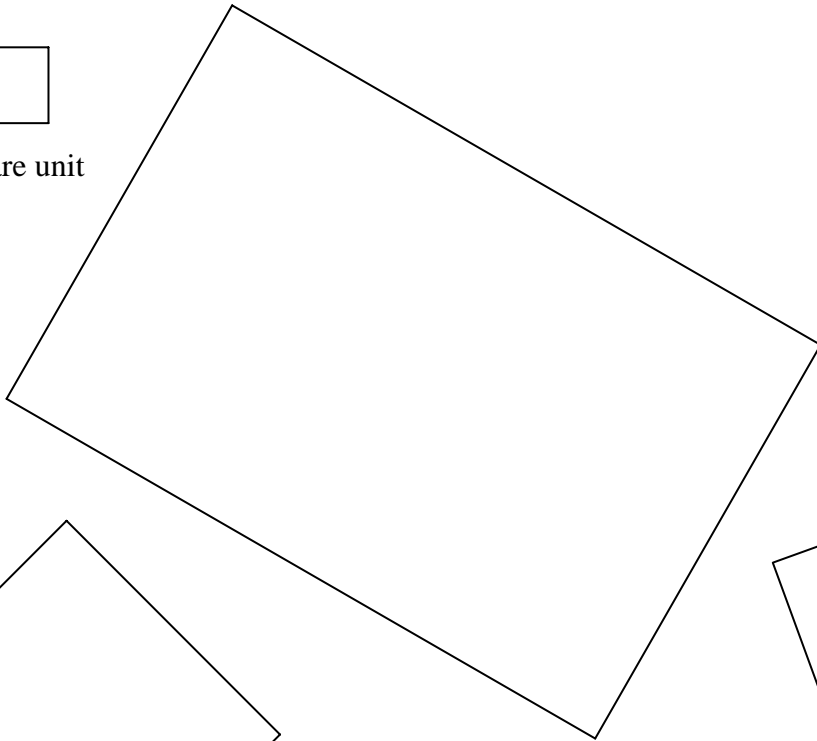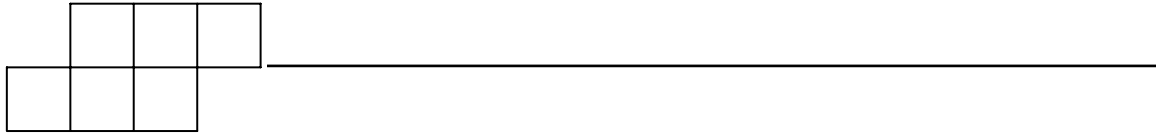
What is Area?

1.   Determine the number of square units needed to cover each of these rectangular regions.

1 square unit

B

C

D
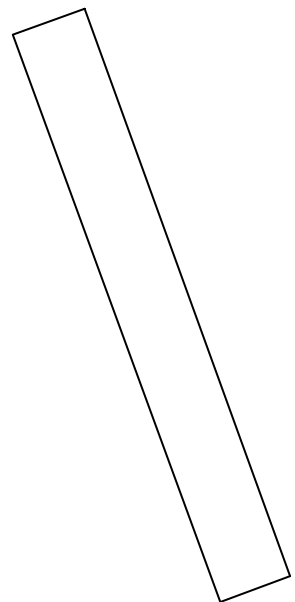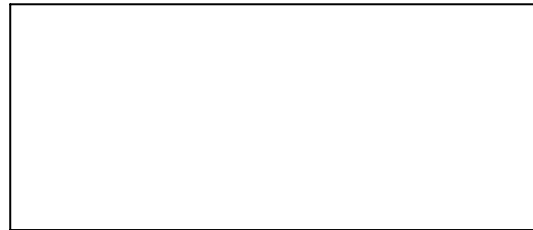
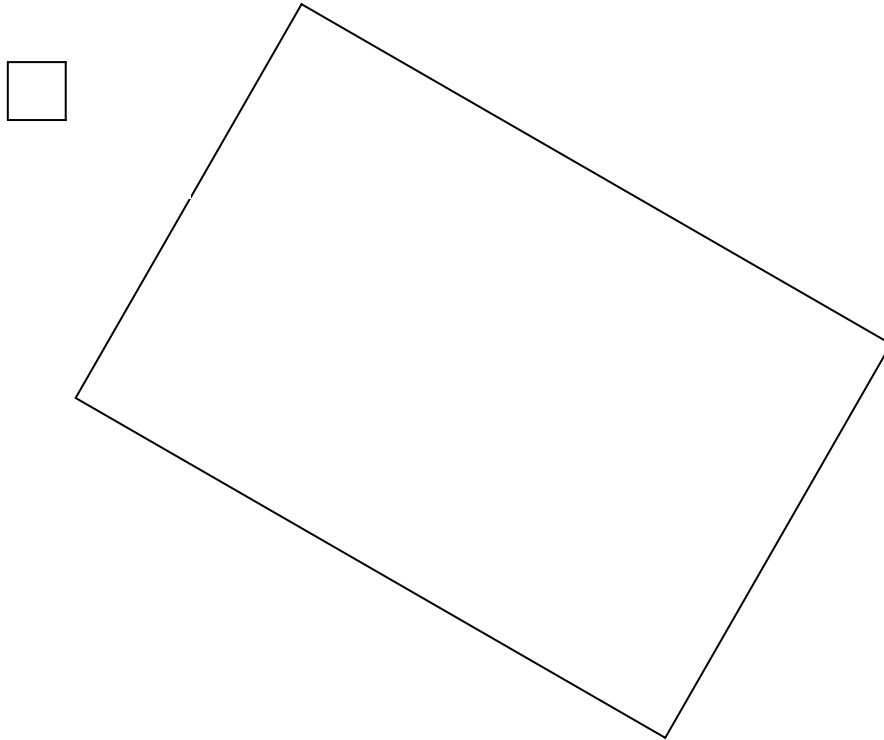2. Determine the number of square units needed to cover this rectangular region.

3. Using the new square unit from # 2, estimate the area of rectangles B, C, D and E in # 1.

4. Is it necessary to draw all the square units to determine the number of square units that cover the rectangular region? Explain.

5. How is finding the area of a rectangle related to the process of multiplication? Explain.
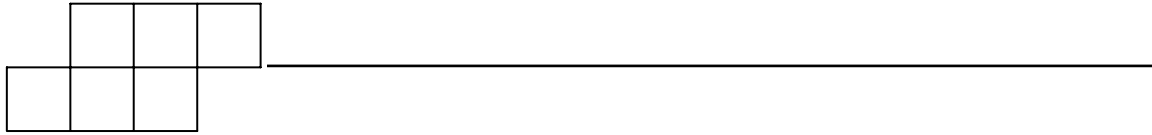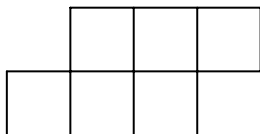
Area of Irregular Shapes

1.   Trace your hand in the space below.

2.   Using the given unit square, what is the area of your hand? Explain how you calculated it.

1 square unit

3. Compare your results with your other class members.

4. Now trace your foot on a sheet of 8.5 in. by 11 in. paper.

5. What is the area of your foot? Explain how you calculated it.

6. Compare your results with your other class members.

7. Which class member has the hand with the greatest area? The smallest area?

8. Which class member has the foot with the greatest area? The smallest area?
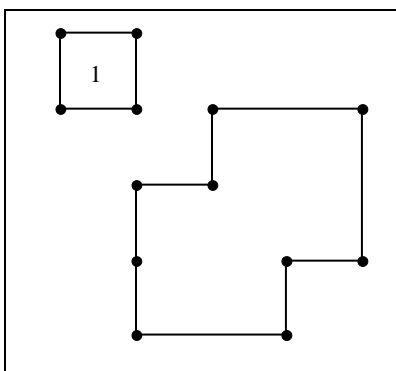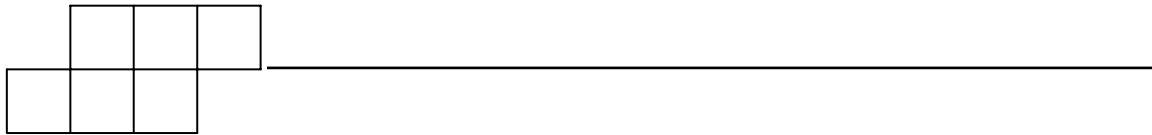
Area on a Geoboard

1. Make the figure below on your 5 x 5 geoboard. One square unit is shown.
    What is the area of the larger figure?

2. How did you find the area of the larger figure in #1?

3. Find the perimeter of each of the figures in #1.

On your geoboard, enclose figures with areas of 2, 3, 6, 9, and 10 square units. The figures do not all have to be rectangles. Record your figures on geoboard dot paper. Carefully label the lengths of the sides of your figures and calculate the areas of the figures to confirm their areas.

4. Describe two ways to calculate the areas of the figures that you made.

5. How many different figures can you make that have an area of 6 square units?

6. Record all your different figures from #5 on geoboard dot paper and explain why each figure has an area of 6 square units.
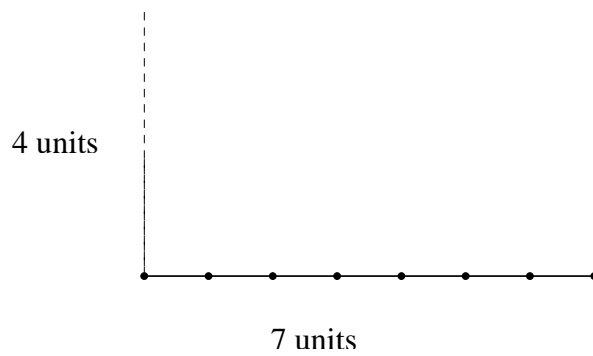
Areas of Rectangles

For each of the following, create a rectangle with the given dimensions, marking off each unit on the sides of the rectangle as shown in # 1, Then create a grid of square units in each rectangle to determine the area. The first square unit in the grid for # 1 is shown.
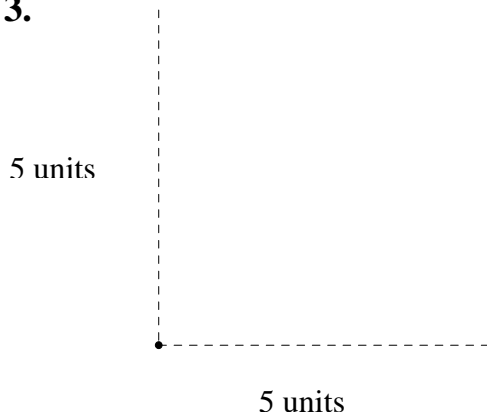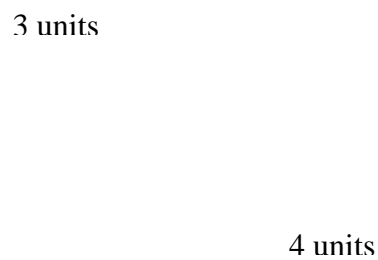
1.

5 units

3 units

Area = _____

2.

4 units

7 units

Area = _____

3.
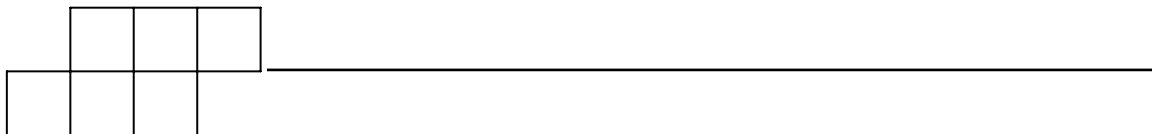
5 units

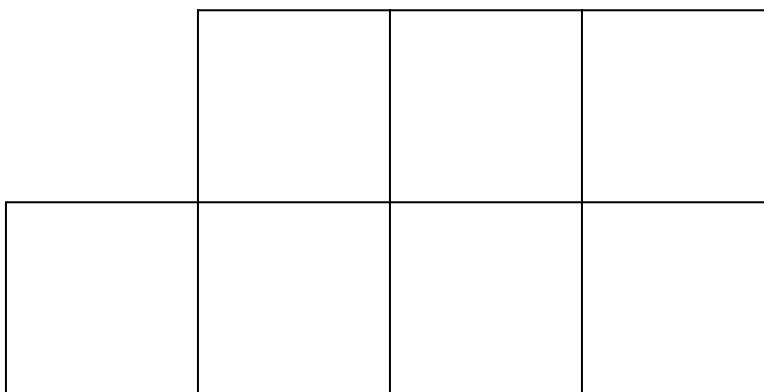5 units

Area = _____

4.
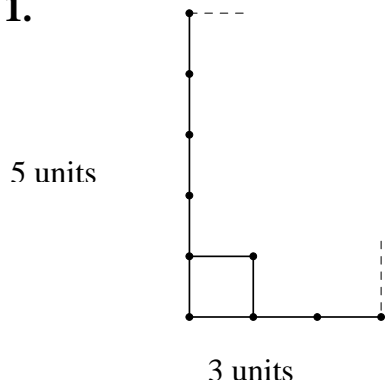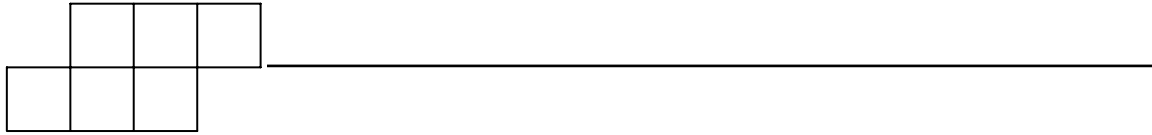
3 units

4 units

Area = _____

Exploring Area and Perimeter

Assume that the edges of the small squares in the figure below are 1 unit in length. Add squares so that the figure has a perimeter of 18 units. When squares are added, they must meet exactly along at least one edge of the figure.

Record your figure on grid paper. Can you make a different figure that has a perimeter of 18 units? Make several. Record your answers to the following questions.

1.   Are any figures more interesting than the others? Which ones?

2.   Which figure used the fewest number of squares?

3.   What is the fewest number of squares that must be added to make a perimeter of 18 units?
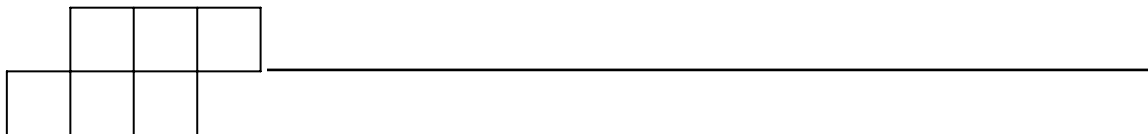
4.   What is the greatest number of squares that you can add and keep the perimeter 18 units?

5.   Can the perimeter remain the same when a square is added? Explain.

6.   Can the perimeter increase by one unit (or by two units, or by three units) when a square is added? Explain.

7.   Can the perimeter decrease when a square is added? Explain.

Rectangle Investigation

Assume that the edges of the color squares are 1 unit in length.

1. Make all the rectangles that have a perimeter of 18 units. Record them on your grid paper.

2. How many rectangles with perimeters of 18 units are there?

3. Which rectangles used the fewest number of squares?

4. Which rectangle has the smallest area?

5. Which rectangles used the greatest number of squares?

6. Which rectangle has the greatest area?

7. Is there a relationship between the perimeter of the rectangle and its area? Explain.
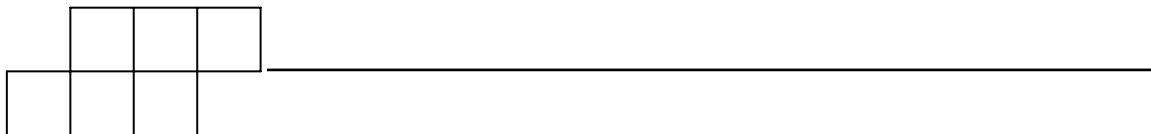
Geoboard Perimeter and Area

1. Construct a square with sides of 4 units. Record your figure on geoboard dot paper.

    a. What is its perimeter?

    b. What is its area?

2. Construct a square of 4 square units. Record your figure on geoboard dot paper. What is its perimeter?

3. Construct a rectangle of 3 square units. Record your figure on geoboard dot paper.

    a. What are the lengths of the sides?

    b. What is its perimeter?

4. Construct a rectangle, 2 units on one side and 3 units on the other side. Record your figure on geoboard dot paper.

    a. What is the perimeter of the rectangle?

    b. What is the area of the rectangle?
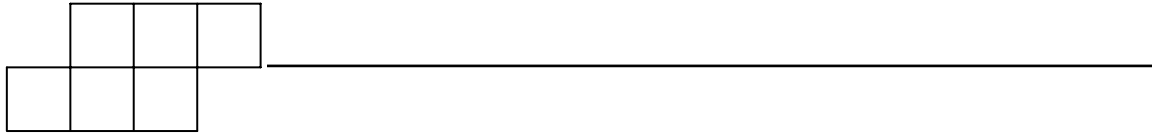
5.   Construct a rectangle whose area is 12 square units. Record your figure on geoboard dot paper.

   a.   What is the perimeter of the rectangle?

   b.   What is the area of the rectangle?

   c.   Make a different rectangle whose area is 12 square units. Record your results.
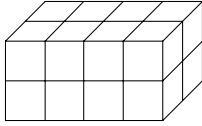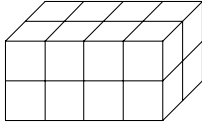
What is Volume?

1.   Use the rainbow or centimeter cubes to build the box pictured below.
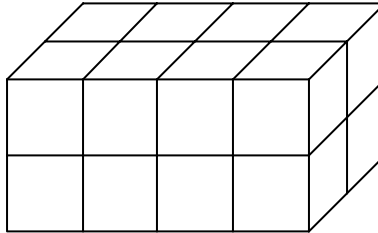
2.   How many cubes did it take to build the box?

3.   What is the volume of the box?

4.   Explain the relationship between the number of cubes it took to build the box and the volume of the box.

5.   Build other boxes using the cubes. In the table below, draw a picture of each box, record its length, width, and height, and calculate its volume.

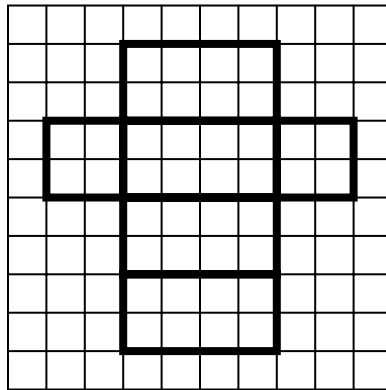| Drawing of the Box	Length	Width	Height	Volume

6.   Without building a box, explain how you can find its volume.
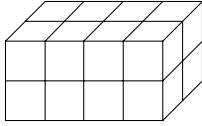
Exploring Volume with Nets

You will explore volume using nets which are two-dimensional patterns that can be folded to form solids.

1.   Using centimeter grid paper, build the box from the net below.

2.   Predict how many cubes will fit into the box.

3.   Check your prediction by filling the box with centimeter cubes.

4.   What is the volume of the box, i.e., what is the total number of cubes necessary to fill the box?
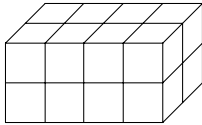
5. Re-create each of the following nets on centimeter paper then cut out the net and create the box. Then complete the table below.

Net	Drawing of Your Box	Volume of Your Box