

How much space does a rectangle encompass? How long of a string would we need to make a certain rectangle?

We will investigate formulas for the perimeters and areas of certain shapes, waiting for future sections for other shapes. Let's get some definitions before we get too far along.

Definition: Polygon: a closed planar figure containing three or more angles and bounded by three or more *straight* sides. The word polygon means "many sides".

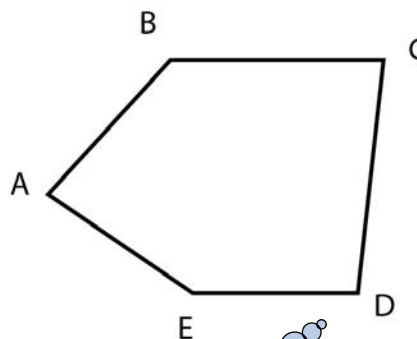
Draw a polygon or two. Be sure there are *no* curved sides.

What does closed mean?

Just as we saw with triangles, the corners are called **vertices** (plural of **vertex**). Here is a **polygon** (pentagon) as an example.

The **sides** are labeled by using the two vertices that make it up, like \overline{AB} or \overline{CD} . Notice, this uses the **line segment** symbol.

The **diagonals** are (line) segments that connect two *nonconsecutive* vertices. Draw in the diagonals of this trapezoid.



We can call this side \overline{ED} or \overline{DE} .

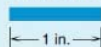
Definition: Perimeter: the sum of all sides of a shape. I like to think of this measurement as the length an ant would walk if it were to walk around the outside of the shape.

Definition: Area: the number of square units of surface within the shape.

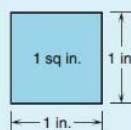
Recall, we discussed linear versus square units before.

Visualizing Units

It is helpful to have a visual understanding of measurement units and the "dimension" of a measurement.



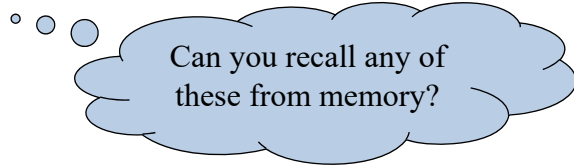
The length unit **inch**, in., specifies a **one-dimensional** or linear measurement. It gives the length of a straight line.



The area unit **square inch**, sq in., specifies a **two-dimensional** measurement. Think of a square inch as giving the area of a square whose sides are one inch in length.

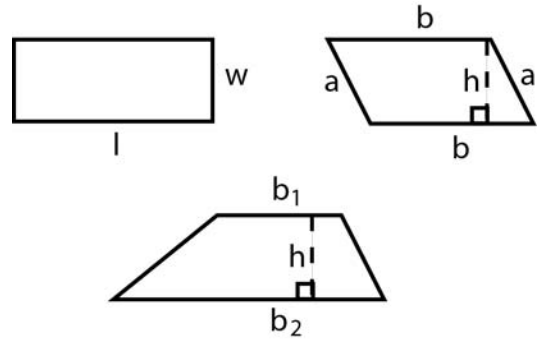
Formulas:

Area of a rectangle A with width w and length l :



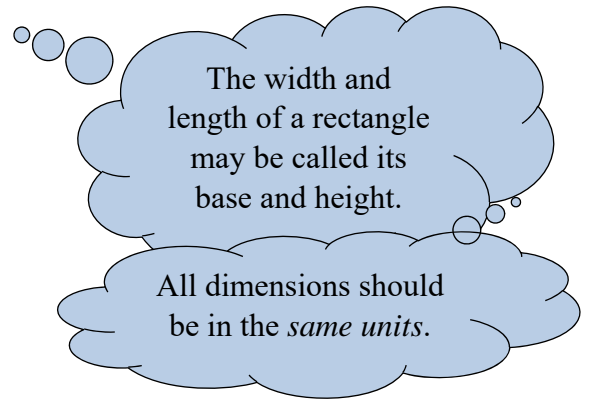
Perimeter of a rectangle P with width w and length l :

Area of a parallelogram A with height h and base b :



Perimeter of a parallelogram P with sides of length a and b :

Area of a trapezoid A with bases (parallel sides) b_1 and b_2 and height h :



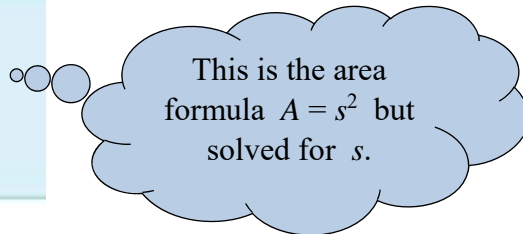
Squares:

The book gives formulas for the area and perimeter of a square too. However, those given for rectangles will work just fine.

There is one formula concerning squares that I will include here.

If you are given the area of a square and asked for its side length, use the following.

Side of a Square

$$s = \sqrt{A}$$


Definitions of Specific Shapes:

Definition: Quadrilateral: a polygon with four sides.

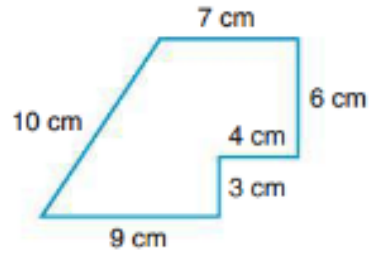
Definition: Parallelogram: a quadrilateral whose opposite sides are parallel and equal in length.

Definition: Rectangle: a parallelogram in which the four corners are right angles.

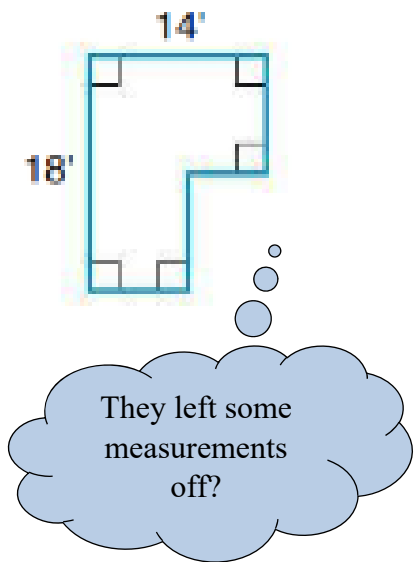
Definition: Square: a rectangle in which *all* sides are the same length.

Definition: Trapezoid: a quadrilateral that has *only one pair* of parallel sides.

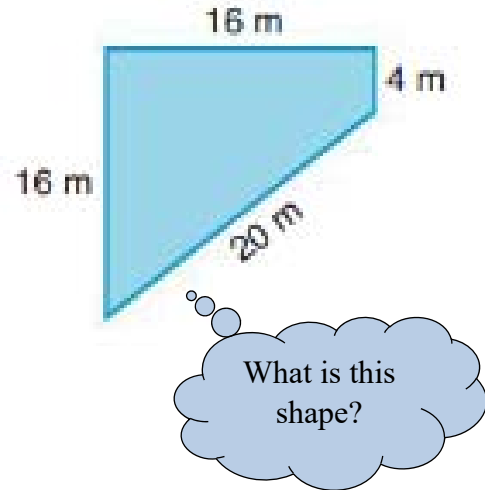
expl 1: Find the perimeter of this polygon. Include units.



expl 2: Find the perimeter of this polygon. Include units.



expl 3: Find the area of the polygon. Round to the nearest tenth if needed. Include units.



expl 4: The Johnson's rectangular living room is 9 feet by 13 feet and is to be carpeted. How many square *yards* of carpet is required? If the carpet costs \$42 per square yard, how much will the Johnson's have to pay?

expl 5: The parcel of land shown here is being sold at \$2000 per square acre. How much is the entire parcel worth, to the nearest dollar? (Hint: One acre equals 43,560 square feet.)

