Area of Basic Geometric Figures

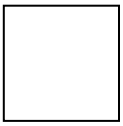
The area of a figure measures the surface of the figure. The unit of measurement for area cannot be a linear unit. To measure area, we use <u>square units</u> such as:

The Square Inch

1 inch

1 inch

The Square Foot

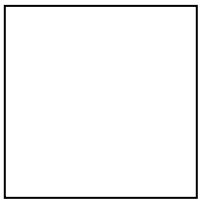


1 foot

1 foot

The Square Yard

1 yard



1 yard

The abbreviations that are used in mathematics are:

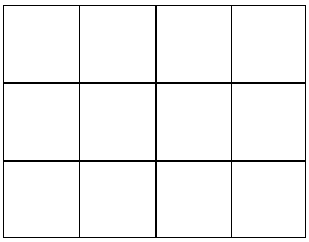
square inch: in^2 square yard: yd^2 square foot: ft^2

square meter: m^2 square mile: mi^2 square centimeter: cm^2

<u>AREA FORMULAS:</u> these are the most used formulas, knowing them will come in handy.

A. RECTANGLE

To start to understand the formula for the area of rectangle, find the area of the rectangle shown here.



3 inches

4 inches

This simply means: "how many square inches cover the surface of this rectangle?" We can draw lines at each inch along the width and length. We can then count the little squares that are formed. (What is the size of each little square?)

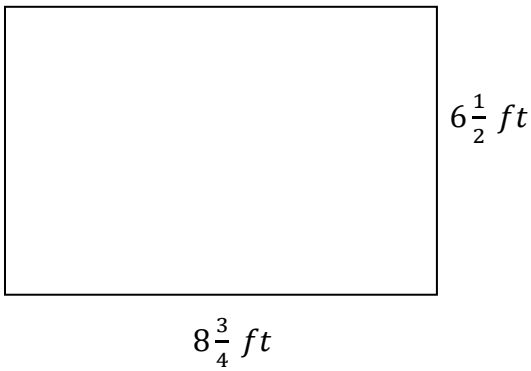
The area is the number of these square inches.

There are 12 squares. Each square is a square inch. The area is 12 square inches. We will write 12 in^2. It is 12 square inches, since there are 12 of these little squares.
You could also find the area by multiplying the number of squares on the bottom by the side. Each row has 4 squares, 3 rows, gives us 12 squares. Or otherwise, you can think of this as multiplying the length times the width.

<u>Area of a Rectangle</u>: AREA = LENGTH × WIDTH **or** A = LW

EXAMPLE: Find the area of the rectangle shown.

Area = length × width



Area $= 8\frac{3}{4}\ ft. x\ 6\frac{1}{2}\ ft.$

$= \frac{35}{4}\ ft.\ x\ \frac{13}{2}\ ft.$

$= \frac{455}{8}\ ft^2$ or

$= 56\frac{7}{8} ft^2\ or\ 56.875\ ft^2$

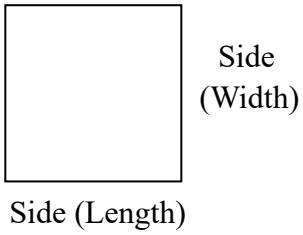
REMEMBER, area doesn't tell the length of a line segment; it tells how many square units cover this flat surface. The area is measured in square units.

B. SQUARE

REMEMBER a square is a special rectangle. We can use AREA = LENGTH × WIDTH. Since the length and width are the same, we call each one a side

Area of a Square: .

AREA = SIDE × SIDE
or AREA = (SIDE)²
or A = s²



The area of a square which is 0.7 cm on each side is

AREA = SIDE × SIDE or AREA = $(side)^2$

$= 0.7cm\ \times\ 0.7cm$ $= (0.7\ cm)^2$

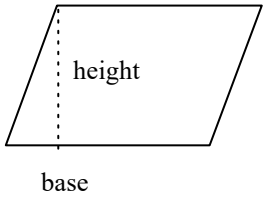
$= 0.49\ cm^2$ $= 0.49\ cm^2$

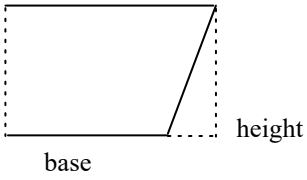
$$\boldsymbol{Area\ =\ 0.49\ cm^2}$$

C. PARALLELOGRAM

EXPLANATION: If we cut this parallelogram along the dotted line, and place the small triangle at the other end, we will form a rectangle.

The length of the rectangle is the base × height.



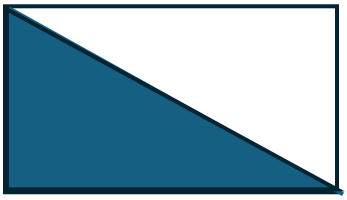


The area of the parallelogram is base × height.

Area of a Parallelogram: AREA = BASE X WIDTH or A = LW or $A = b \cdot h$

D. TRIANGLE

Now if we draw a rectangle and cut it into two triangles that are the same size, we can see where the one-half comes from looking at the area of a rectangle.



The area of a triangle is found by multiplying $\frac{1}{2} x\ base\ x\ height$.

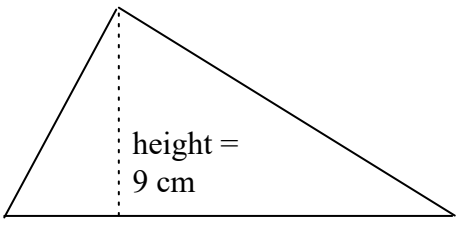
The area of one triangle is half the area of the rectangle.

$$Area = \frac{1}{2}\ x\ base\ x\ height$$

$$Area = \frac{1}{2}bh$$

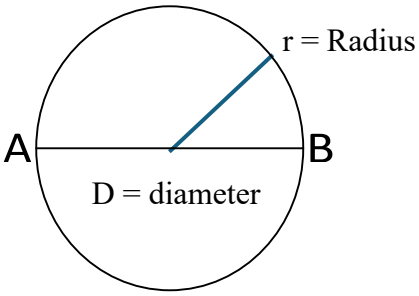
EXAMPLE: Find the area of the triangle shown.

AREA = $\frac{1}{2}\ (12\ cm)(9cm) = \mathbf{54\ cm^2}$



base = 12 cm

D. CIRCLE



The radius is the distance from the center to the outside of the circle. If we double this, we get the diameter.

The formula **Area = πr^2**, however, each example will tell you whether to let $\pi = 3.14$, $\frac{22}{7}$, or just to use the pi key on your calculator. Watch your directions!

Area of circle.

Area = π × radius × radius **or** Area = π × (radius)² **or** A = πr²

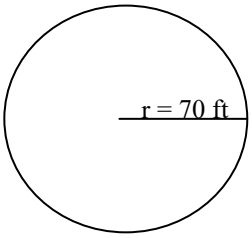
EXAMPLE: Find the area of a circle with a radius of 70 ft and use $\pi = \frac{22}{7}$.

A = π r²

$A = (\frac{22}{7})(70\ ft)^2$

$A = (\frac{22}{7})(70\ ft)(70ft)$

$A = 15400\ ft^2$



You Try:

1. Draw the figure and write in the given measures.
2. Write the area formula.
3. Replace the parts of the formula with the given measures and simplify.
4. The answer will be in square units! The directions will tell how to round.

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1. Find the area of a rectangle that is 4.6 m long and 1.4 m wide.
2. Find the area of a square that is ½ meter on each side.
3. Find the area of a pizza that has a 12-inch diameter. Use π = 3.14.
4. Find the area of a triangle which has a base of 38 inches and a height of 14 inches.

ANSWER KEY:

1. 6.44 m² 2. .25 m² 3.113.04 in² 4. 266 in²