

Area and Volume 1

This is the first class in this chapter. It contains basic area and perimeter.

Area and Perimeter

There are a number of different shapes we have to deal with.

- (i) Square or Rectangle.
- (ii) Circle or part of a circle.
- (iii) Triangles and parallelograms.
- (iv) Double shapes.

When doing any of the questions on area and volume it is a good idea to follow the following steps.

Step 1 Write out the information in the question i.e. radius, height or length.

Step 2 Write down a formula.

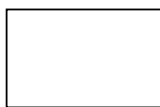
Step 3 Put the figures from the question into the formula to give you an answer.

Note If it will make it clear then draw a diagram.

The most important thing to remember is that the answer is in the question so use your eyes and use the right formula. Some of the formulae are in the math's tables but more of them must be learnt off.

The Square or Rectangle

A rectangle has two sets of equal sides:

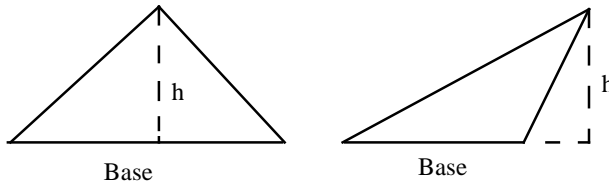


b

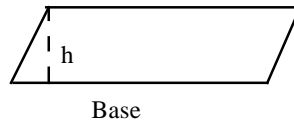
Area = length \times breath. Area $l \times b$

Perimeter = 2(length + breath). Perimeter = $2(l+b)$

Triangles and Parallelograms



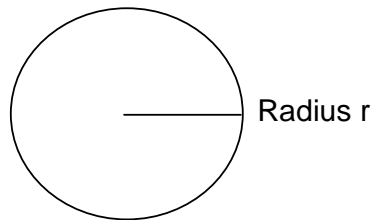
Area of triangle = $\frac{1}{2}$ base by perpendicular height.



Area of parallelogram = base by perpendicular height.

The circle

All of the following formulae are on page 6 and 7 of the Maths tables.



$$\text{Circumference} = 2\pi r$$

$$\text{Area} = \pi r^2$$

All of the formulae here deal with the radius so always try to write down what the radius is.

Note Remember the diameter is twice the radius $D = 2r$

Note All of the formulas contain π . In the questions we are going to do π can have 3 different values.

$\pi = \pi$ We use this when we are asked to write the answer "in terms of π ".

$$\pi = 3.14$$

$$\pi = \frac{22}{7}$$

Note Be careful of the word “circumference”, which is the distance around the outside of a circle, because the maths tables and a lot of questions use the word “length” or even “perimeter”.

Note When you look up the formula for the area of a circle in the math’s tables they call the circle a ‘disc’.

Example 1 A rectangle of area 60cm^2 has a length of 18cm find its breath.

This is a very easy question to start with but you must get in good habits early so follow the method outlined above no matter how easy or how hard the question may appear.

Rectangle $l = 18$, $A = 60$ find b

$$\text{Area} = l \times b$$

$$60 = 18b \quad \text{swap sides}$$

$$18b = 60 \quad \text{divide by 18}$$

$$b = \frac{60}{18} = 3\frac{1}{3}$$

Note Answers do not always have to be nice whole numbers.

Example 2 Find the area and circumference of a circle of diameter 4m when $\pi = 3.14$

Circle $r = 2$, $\pi = 3.14$ find A

$$\text{Area} = \pi r^2$$

$$= 3.14(2^2) \text{ square first the multiply}$$

$$= 3.14(4) = 12.56$$

$$\text{Circumference} = \text{length} = 2\pi r$$

$$2(3.14)(2) = 12.56$$

Example 3 A circle has an area of 200.96m^2 find its radius.

Circle A = 200.96 , $\pi = 3.14$ find r

$$\text{Area} = \pi r^2$$

$$200.96 = 3.14r^2 \quad \text{swap both sides}$$

$$3.14r^2 = 200.96 \quad \text{divivde by 3.14}$$

$$r^2 = \frac{200.96}{3.14}$$

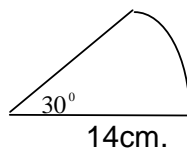
$$r^2 = 64 \quad \text{to get rid of square find the square root}$$

$$r = 8$$

Sector of a circle

Make a fraction by using $\frac{\text{Given angle}}{360}$

Example 4 Find the area and perimeter of the sector below when $\pi = \frac{22}{7}$ to 1 decimal place.



Find the area of a full circle and then decide what fraction of a circle we have.

Circle $r = 14$, $\pi = \frac{22}{7}$ find A

$$\text{Area} = \pi r^2$$

$$= \frac{22}{7}(14)^2$$

$$= \frac{22}{7} \left(\frac{14}{1} \right) \left(\frac{14}{1} \right) \text{ divide 7 on bottom into 14 on top}$$

$$= 22(2)(14) = 616$$

$$30^\circ = \frac{30}{360} = \frac{1}{12} \text{ on a calculator put in } 30 \left[\frac{a}{b} \right] \frac{c}{360} = \text{ and it will give 1 r 12}$$

$$\text{Answer } \frac{616}{12} = 51.3$$

To find the length of the curve part (arc) find the circumference of a full circle and divide by 12.

$$\text{Length} = 2\pi r$$

$$= 2 \left(\frac{22}{7} \right) \left(\frac{14}{1} \right) \text{ divide 7 into 14}$$

$$= 2(22)(2) = 88$$

$$\text{Arc length} = \frac{88}{12} = 7.3$$

Perimeter is the total distance around the outside, which consists of 2 straight lengths and the arc length.

$$\text{Perimeter} = 14 + 14 + 7.3 = 35.3$$

Note If you do not like using $\pi = \frac{22}{7}$ you can use $\pi = 3.14$ but you may lose marks in the exam.