Introduction

Area of a Circle

Area of a circle is πr^2, where π=22/7 or ≈3.14 (can be used interchangeably for problem-solving purposes)and r is the radius of the circle.

π is the ratio of the circumference of a circle to its diameter.

Circumference of a circle

The perimeter of a circle is the distance covered by going around its boundary once. The perimeter of a circle has a special name: CIrcumference, which is π times the diameter which is given by the formula $2\pi r$

The segment of a circle

A circular segment is a region of a circle which is “cut off” from the rest of the circle by a secant or a chord

A sector of a circle

A circle sector/ sector of a circle is defined as the region of a circle enclosed by an arc and two radii. The smaller area is called the minor sector and the larger area is called the major sector.

The angle of a Sector

The angle of a sector is that angle which is enclosed between the two radii of the sector.

Length of an arc of a sector

The length of the arc of a sector can be found by using the expression for the circumference of a circle and the angle of the sector, using the following formula:

$$L = (\theta/360°)\times 2\pi r$$

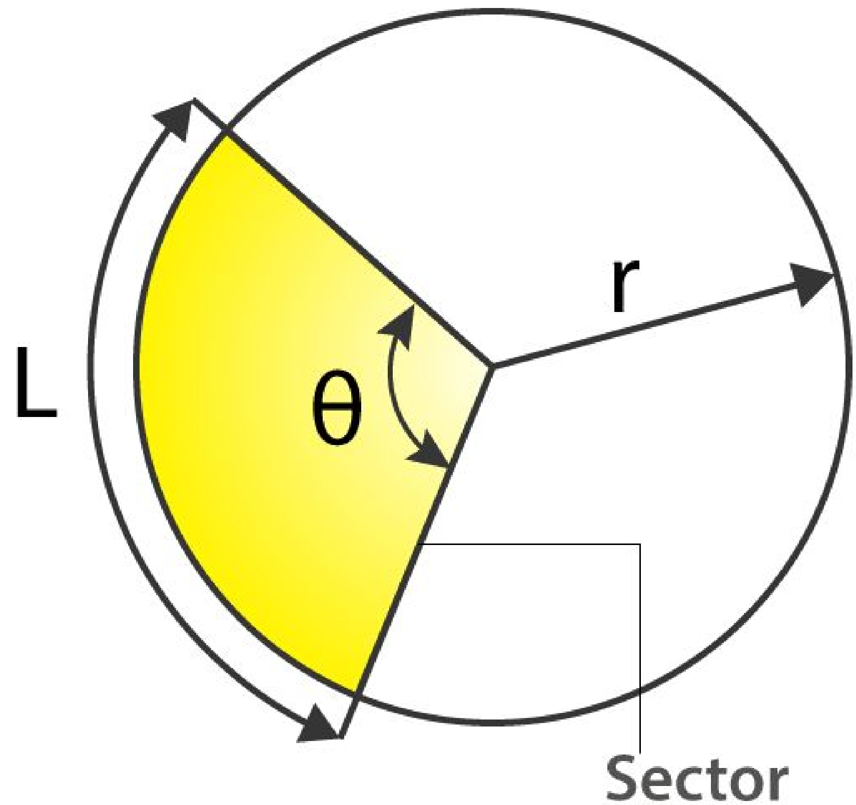
where θ is the angle of sector and r is the radius of the circle.

Area of a Sector of a Circle

Area of a sector is given by

$(\theta/360°)\times\pi r^2$

where $\angle\theta$ is the angle of this sector(minor sector in the following case) and r is its radius



Area of a sector

Area of a Triangle

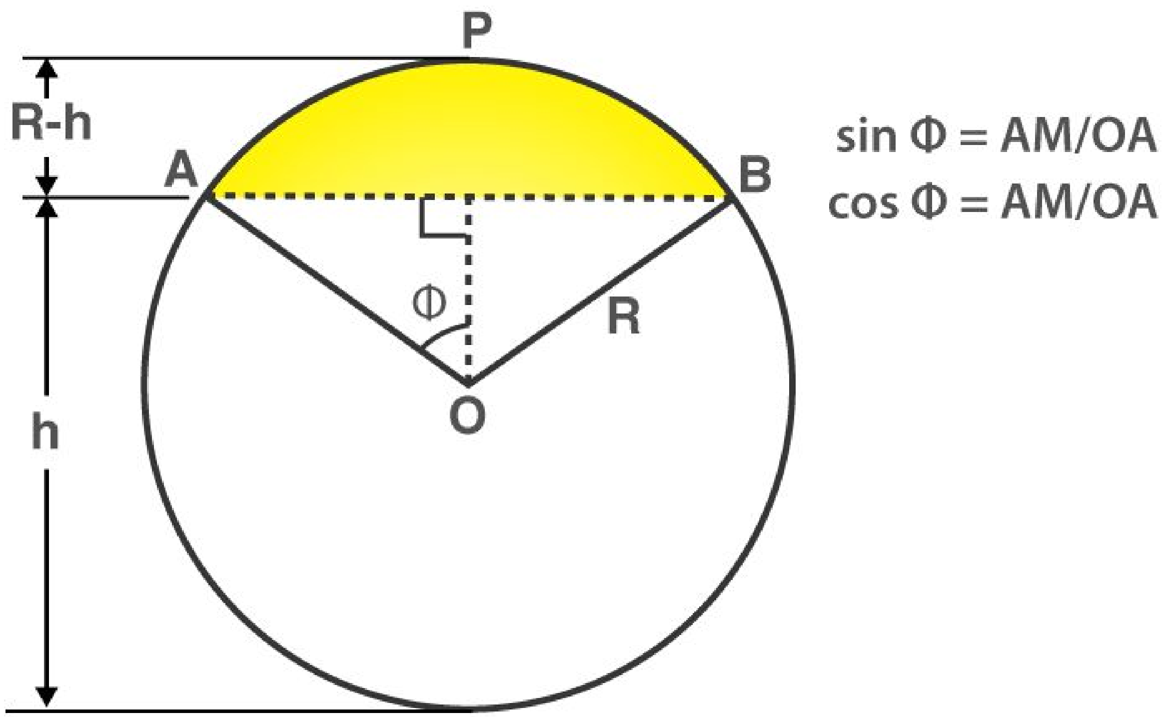
Area of a triangle is,

Area=(1/2)×base×height

If the triangle is an equilateral then

Area=$\sqrt{3}/4\times a^2$ where a is the side of the triangle.

Area of a Segment of a Circle



Area of the segment

Area of segment APB (highlighted in yellow)

= (Area of sector OAPB) – (Area of triangle AOB)

=[(2∅/360°)×πr2] – [(1/2)×AB×OM]

[To find the area of triangle AOB, use trigonometric ratios to find OM (height) and AB (base)]

Also, Area of segment APB can be calculated directly if the angle of the sector is known using the following formula.

=[(θ/360°)×πr2] – [r2×sin θ/2 × cosθ/2]

where θ is the angle of the sector and r is the radius of the circle

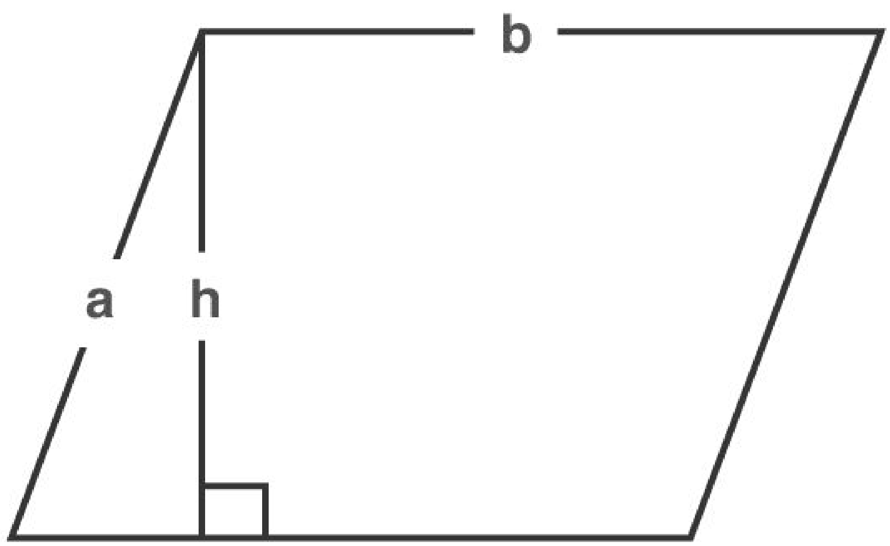
Visualisations

Areas of different plane figures

– Area of a square (side l) $= l^2$

– Area of a rectangle $= l \times b$, where l and b are the length and breadth of the rectangle

– Area of a parallelogram $= b \times h$, where b is the base and h is perpendicular height.



parallelogram

Area of a trapezium $= [(a+b) \times h]/2$,

where

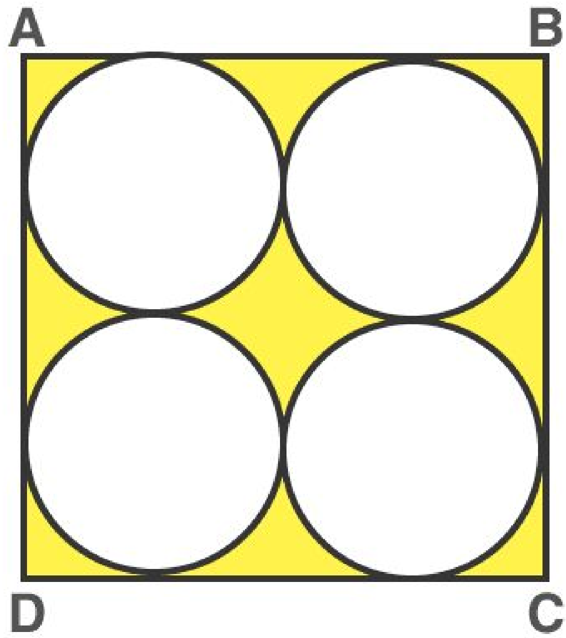
a & b are the parallel sides length

h is the trapezium height

Area of a rhombus $= pq/2$, where p & q are the diagonals

Areas of Combination of Plane figures

For example: Find the area of the shaded part in the following figure: Given the ABCD is a square of side 28cm and has four equal circles enclosed within.



Area of the shaded region

Looking at the figure we can visualise that the required shaded area = A(square ABCD) − 4 ×A(Circle).

Also, the diameter of each circle is 14 cm.

$=(l^2)-4\times(\pi r^2)$

$=(28^2)-[4\times(\pi\times 49)]$

$=784-[4\times\frac{22}{7}\times 49]$

$=784-616$

$=168cm^2$