1. ARITHMETIC PROGRESSION

The ***n*th** term a_n of the AP with first term a and common difference $\boldsymbol{d}$ is given by

$$a_n = a + (n-1)d$$

2. NTH TERM FROM THE END OF AN AP

Let the last term of an AP be ' l ' and the common difference of an AP is ' d ' then the nth term from the end of an AP is given by

$$I_n = I - (n-1)d$$

3. SUM OF FIRST TERMS OF AN AP

The sum of the first n terms of an AP is given by

$$S_n = \frac{n}{2}[2a + (n-1)d]$$

Where:
a = first term,
d = common difference and
n = number of terms.
Also, it can be written as

$$S_n = \frac{n}{2}[a + a_n]$$

where a_n = nth terms
or

$$S_n = \frac{n}{2}[a + l]$$

where l = last term
Sum of first $\boldsymbol{n}$ positive integers is given by $S_n = \frac{n(n+1)}{2}$

4. ARITHMETIC MEAN

If **a**, **b** and **c** are in AP, then ' b ' is known as arithmetic mean between ' a ' and ' c ' $b = \frac{a+c}{2}$ i.e. AM between ' a ' and ' c ' is $\frac{a+c}{2}$.

5. POINTS TO REMEMBER

The distance of a point from the y-axis is called its $\boldsymbol{x}$-coordinate, or abscissa.
The distance of a point from the x-axis is called its y-coordinate, or ordinate.
The coordinates of a point on the x-axis are of the form $(x, 0)$.
The coordinates of a point on the y-axis are of the form $(0, y)$.

6. DISTANCE FORMULA

The distance between any two points $\mathrm{A}(\mathrm{x}_1, \mathrm{y}_1)$ and $\mathrm{B}(\mathrm{x}_2, \mathrm{y}_2)$ is given by

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$\text{or } AB = \sqrt{(\text{ difference of abscissae })^2 + (\text{ difference of ordinates })^2}$$

5. DISTANCE OF A POINT FROM ORIGIN

The distance of a point P(x, y) from origin O is given by $\mathrm{OP} = \sqrt{x^2 + y^2}$

6. SECTION FORMULA

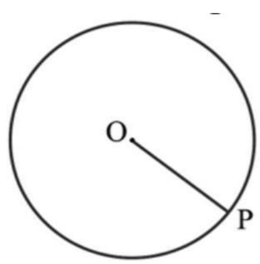
The coordinates of the point $\mathrm{P}(x, y)$ which divides the line segment joining the points $\mathrm{A}(x_1, y_1)$ and $\mathrm{B}(x_2, y_2)$, internally, in the ratio $m_1 : m_2$ are $\left(\frac{m_1 X_2 + m_2 X_1}{m_1 + m_2}, \frac{m_1 y_2 + m_2 y_1}{m_1 + m_2}\right)$ This is known as the section formula.

7. MID-POINT FORMULA

The coordinates of the point $\mathrm{P}(x, y)$ which is the midpoint of the line segment joining the points $\mathrm{A}(x_1, y_1)$ and $\mathrm{B}(x_2, y_2)$, are $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

8. CIRCLE

a) The collection of all the points in a plane, which are at a fixed distance from a fixed point in the plane, is called a circle.
b) The fixed point is called the centre of the circle and the fixed distance is called the radius of the circle. In the below figure, O is the centre and the length OP is the radius of the circle.



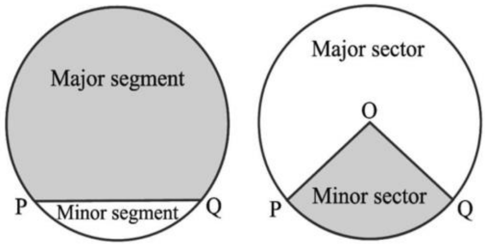
c) The line segment joining the centre and any point on the circle is also called a radius of the circle.

d) A circle divides the plane on which it lies into three parts. They are: (i) inside the circle, which is also called the interior of the circle; (ii) the circle and (iii) outside the circle, which is also called the exterior of the circle. The circle and its interior make up the circular region.

c) The chord is the line segment having its two end points lying on the circumference of the circle.

d) The chord, which passes through the centre of the circle, is called a diameter of the circle.
A diameter is the longest chord and all diameters have the same length, which is equal to two times the radius.
A diameter is the longest chord and all diameters have the same length, which is equal to two times the radius.
> A piece of a circle between two points is called an arc.
The longer one is called the major arc PQ and the shorter one is called the minor arcPQ.
> The length of the complete circle is called its circumference.
> The region between a chord and either of its arcs is called a segment of the circular region or simply a segment of the circle. There are two types of segments also, which are the major segment and the minor segment.
> The region between an arc and the two radii, joining the centre to the end points of the arc is called a sector. The minor arc corresponds to the minor sector and the major arc corresponds to the major sector.
> In the below figure, the region OPQ is the minor sector and remaining part of the circular region is the major sector. When two arcs are equal, that is, each is a semicircle, then both segments and both sectors become the

same and each is known as a semicircular region.



9. POINTS TO REMEMBER:

> A circle is a collection of all the points in a plane, which are equidistant from a fixed point in the plane.
> Equal chords of a circle (or of congruent circles) subtend equal angles at the centre.
> If the angles subtended by two chords of a circle (or of congruent circles) at the centre (corresponding centre) are equal, the chords are equal.
> The perpendicular from the centre of a circle to a chord bisects the chord.
> The line drawn through the centre of a circle to bisect a chord is perpendicular to the chord.
> There is one and only one circle passing through three non-collinear points.
> Equal chords of a circle (or of congruent circles) are equidistant from the centre (or corresponding centres).
> Chords equidistant from the centre (or corresponding centres) of a circle (or of congruent circles) are equal.
> If two arcs of a circle are congruent, then their corresponding chords are equal and conversely, if two chords of a circle are equal, then their corresponding arcs (minor, major) are congruent.
> Congruent arcs of a circle subtend equal angles at the centre.

The angle subtended by an arc at the centre is double the angle subtended by it at any point on the remaining part of the circle.

Angles in the same segment of a circle are equal.

Angle in a semicircle is a right angle.

If a line segment joining two points subtends equal angles at two other points lying on the same side of the line containing the line segment, the four points lie on a circle.

The sum of either pair of opposite angles of a cyclic quadrilateral is 180°.

If the sum of a pair of opposite angles of a quadrilateral is 180°, then the quadrilateral is cyclic.

10. SECANT TO A CIRCLE

A secant to a circle is a line that intersects the circle at exactly two points.

11. TANGENT TO A CIRCLE

A tangent to a circle is a line that intersects the circle at only one point.

The tangent to a circle is perpendicular to the radius through the point of contact.

The lengths of tangents drawn from an external point to a circle are equal.

The centre lies on the bisector of the angle between the two tangents.
"If a line in the plane of a circle is perpendicular to the radius at its endpoint on the circle, then the line is tangent to the circle".

12. PERIMETER AND AREA OF A CIRCLE

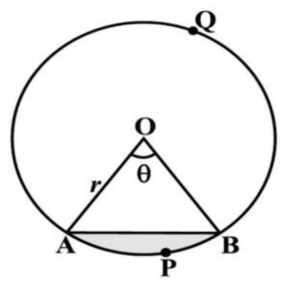
Perimeter/circumference of a circle

$$P = \pi \times \text{ diameter}$$
$$P = \pi \times 2r \text{ (where } r \text{ is the radius of the circle)}$$
$$p = 2\pi r$$

Area of a circle $= \pi r^2$, where $\pi = \frac{22}{7}$

13. AREAS OF SECTOR AND SEGMENT OF A CIRCLE

Area of the sector of angle $\theta = \frac{\theta}{360°} \times \pi r^2$, where r is the radius of the circle and θ the angle of the sector in degrees
length of an arc of a sector of angle $\theta = \frac{\theta}{360°} \times 2\pi r$, where r is the radius of the circle and θ the angle of the sector in degrees

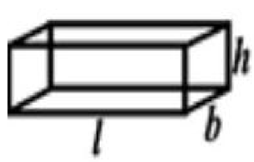


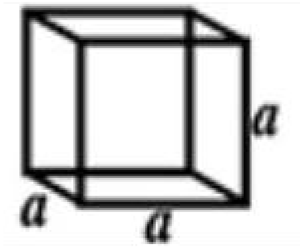
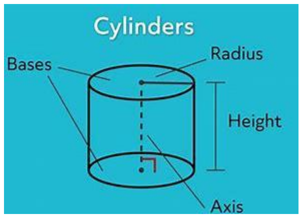
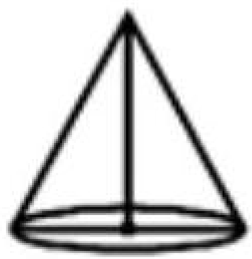
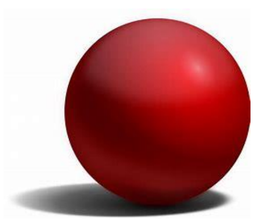
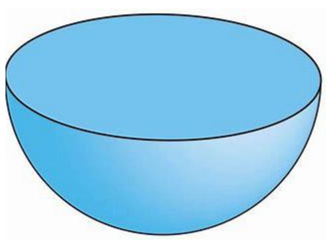
Area of the segment APB = Area of the sector OAPB − Area of △ OAB

$$= \frac{\theta}{360^0} \times \pi r^2 - \text{ area of } \Delta\text{OAB}$$

Area of the major sector OAQB $= \pi r^2 -$ Area of the minor sector OAPB
Area of major segment AQB $= \pi r^2 -$ Area of the minor segment APB

Area of segment of a circle = Area of the corresponding sector - Area of the corresponding triangle

S. No.	Name of the solid	Figure	Lateral/Curved surface area	Total surface area	Volume
1.	Cuboid		$2h(l + b)$	$2(lb + bh + hl)$	lbh

2.	Cube		$4a^2$	$6a^2$	a^3
4.	Regular circular Cylinder		$2\pi rh$	$2\pi r(r+h)$	$\pi r^2 h$
6.	Right circular cone		πrl	$\pi r(l+r)$	$\frac{1}{3}\pi r^2 h$
7.	Sphere		$4\pi r^2$	$4\pi r^2$	$\frac{4}{3}\pi r^3$
8.	Hemisphere		$2\pi r^2$	$3\pi r^2$	$\frac{2}{3}\pi r^3$