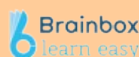


CHAPTER 09

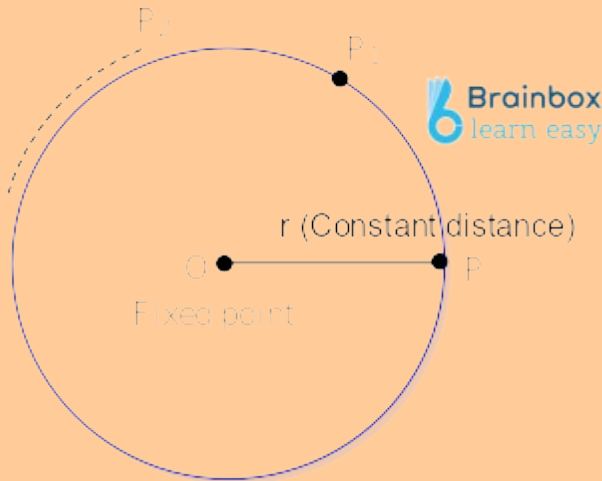
Tangents and Secants to a Circle

Introduction:

We have seen that two lines in a plane may intersect at a point or may not intersect. In some situations, they may coincide with each other.

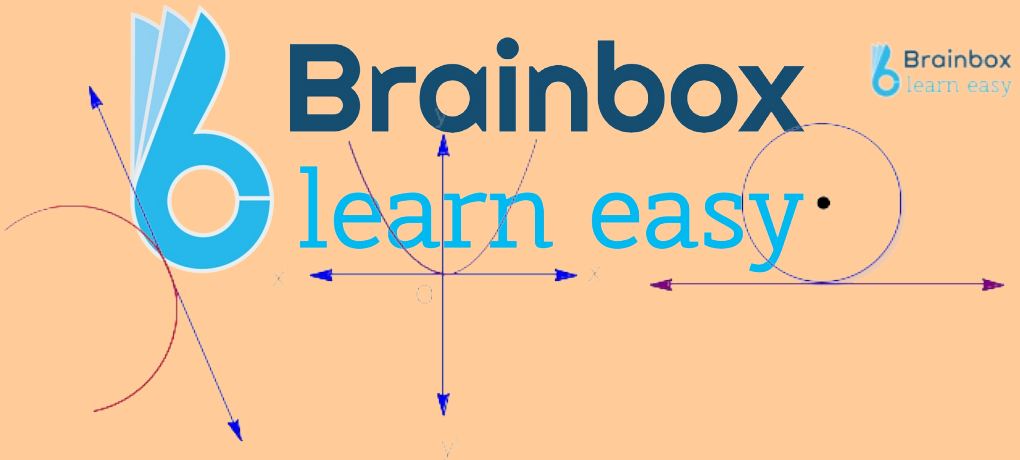


A set of points in a plane. Which are at a constant distance ($r > 0$) from the fixed point (O) is called a 'Circle'. Here constant distance is called radius of the circle. It is denoted by 'r' and the fixed point is called centre of the circle. It is denoted by 'O'.



Similarly, what are the possible relative positions of a curve and a line given in a plane?

A curve may be a parabola as you have seen in polynomials or a simple closed curve like a 'Circle'.

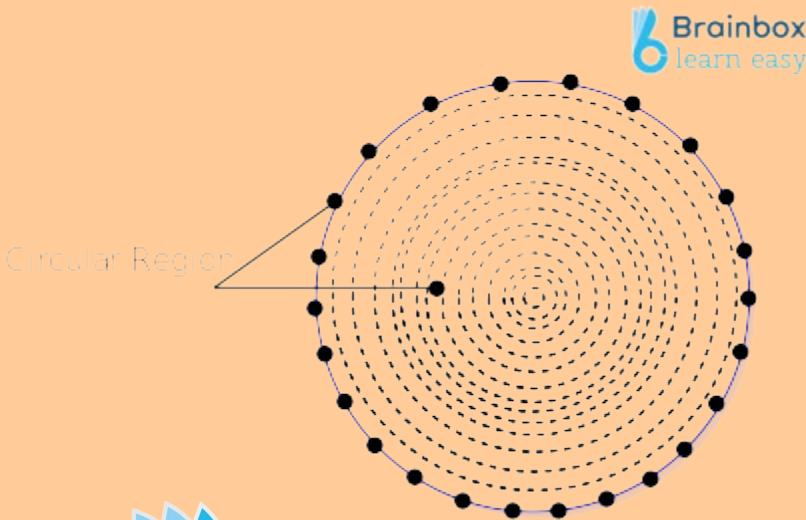


Circular objects rolling on plane creating a path. For example, bicycle wheel on a sandy field, wheels of train on the track etc. In this, we will study about the secant, point of contact, tangent to a circle and length of tangent etc.

Basic terms related to a circle:

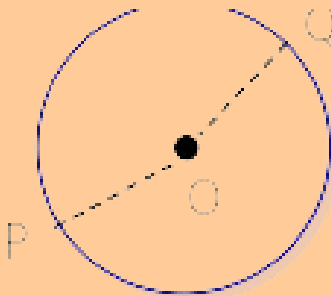
Circular region:

The set of all points of the plane, which lie on the circle and inside the circle form the circular region. This is also known as 'Circular disc'.



Radius: Brainbox learn easy

A line segment joining any point on the circle to its centre is called a 'Radius' of the circle.



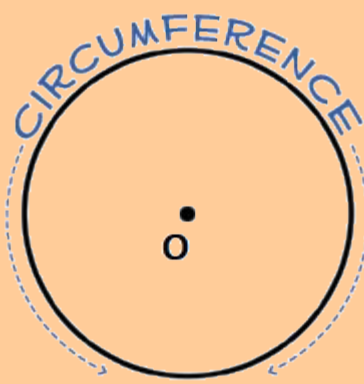
- OP is the radius of the circle
- The plural of radius is radii. The line segment OP and OQ are radii of the circle.
- Clearly, the lengths of all the radii of circle are equal.

Circumference:

The perimeter of a circle is called its 'Circumference'.

(OR)

The length of the complete circle is called its 'Circumference'.



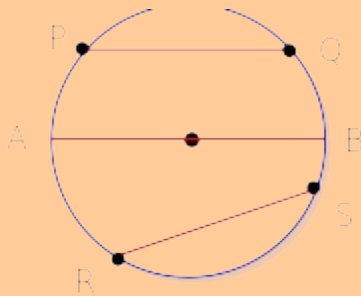
Note: Circumference of the circle = $2\pi r$

Chord:

A line segment joining any two points on the circle is called a 'Chord'. A segment whose end points lie on a circle. In the given figure, PQ, AB, RS and AOB are the chords of a circle with centre 'O'.

Note:

Clearly, an infinite number of chords may be drawn in a circle.



Diameter:

A chord of a circle passing through the centre is called a diameter of the circle. From the above circle, $\overline{AB}$ is the diameter.

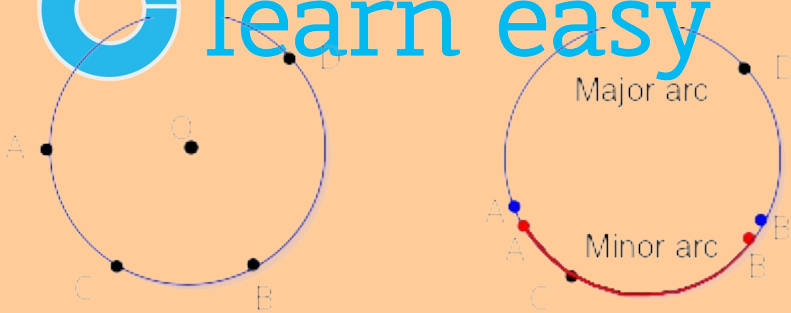
Note:

- Diameter = 2 x radius
- A diameter is the longest chord of a circle.
- Of any two chords of a circle, which is nearer to the centre is longer.

Arc of the circle:

A continuous piece of a circle between two points is called an 'Arc of the circle'.

Let A and B be two points on the circle. We denote the arc from A and B in anti - clockwise direction by $\overset{\frown}{ACB}$ and the arc from A to B in clockwise direction by $\overset{\smile}{ADB}$.



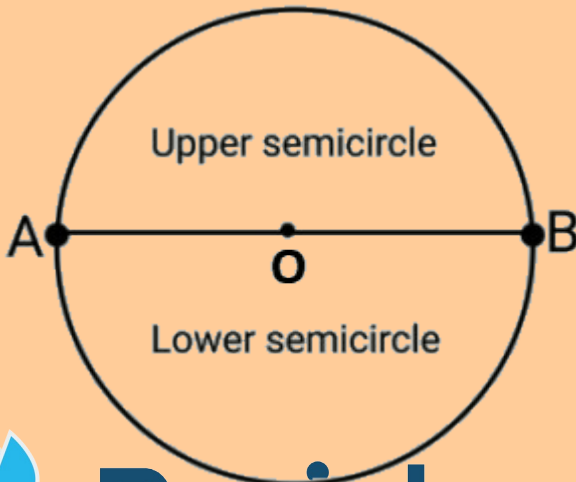
An arc less than one - half of the whole arc of a circle is called a minor arc of the circle. Thus, in the above figure, $\overset{\frown}{ACB}$ is the minor arcs.

Semi - circle:

When A and B are ends of a diameter, then both arcs are equal and each is called a semi - circle.

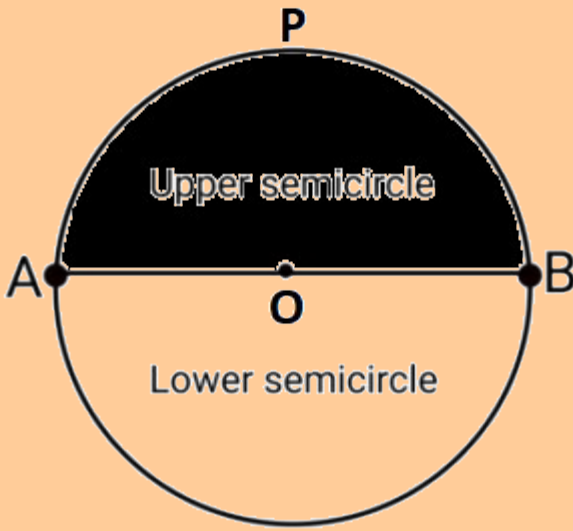
(OR)

One - half of the whole arc of a circle is called a semi - circle.



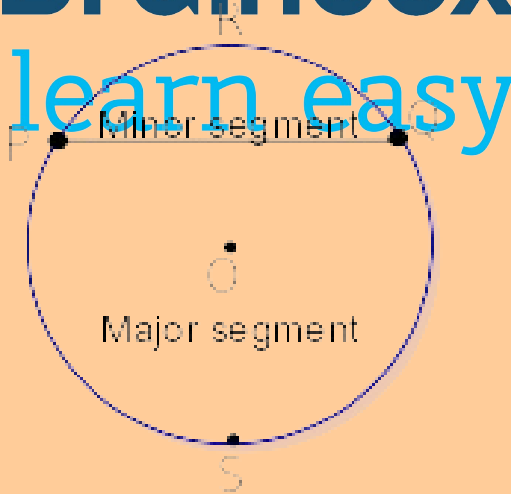
Note:

- Length of minor arc $<$ Length of the semi - circle.
- Length of major arc $>$ Length of the semi - circle.
- The shaded region enclosed by semicircle APB and the diameter AOB together with the semicircle and the diameter is called a semi - circular region.



Segment of a circle:

The part of the circular region enclosed by an arc and the chord joining the end points of the arc together with the arc and the chord is called a 'Segment of the circle'.



- The segment containing the minor arc is called the 'Minor segment'.

In the given figure, PRQP is the minor segment of the circle.

- The segment containing the major arc is called the 'Major segment'.

In the given figure, PSQP is the major segment of the circle.

Note:

The minor and major segments of a circle are called the alternate segments of each other.

Sector of a circle:

The part of the circular region bounded by an arc and the two radii at the ends of the arc together with the arc and the radii is called a 'Sector' of the circle.

- The sector containing the minor arc is called 'Minor sector'.

In the given figure, the region OPQ is the minor sector.

- While the one containing the major arc is called the 'Major sector'.

In the given figure, the remaining part of the circular region is called the 'Major sector'.

