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Class 10 - ICSE MATHEMATICS

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Constructions (Circles)

Revise Notes

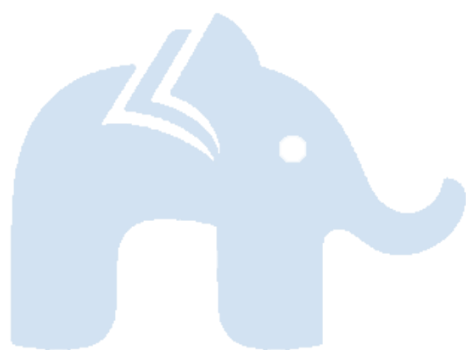


TOPICS in this lesson

Construction of Tangents to a Given Circle

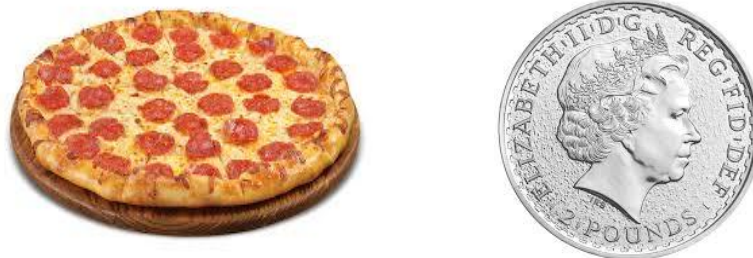
Construction of Circumscribed and Inscribed Circles of a Triangle

Circumscribing and Inscribing a Circle on a Regular Hexagon

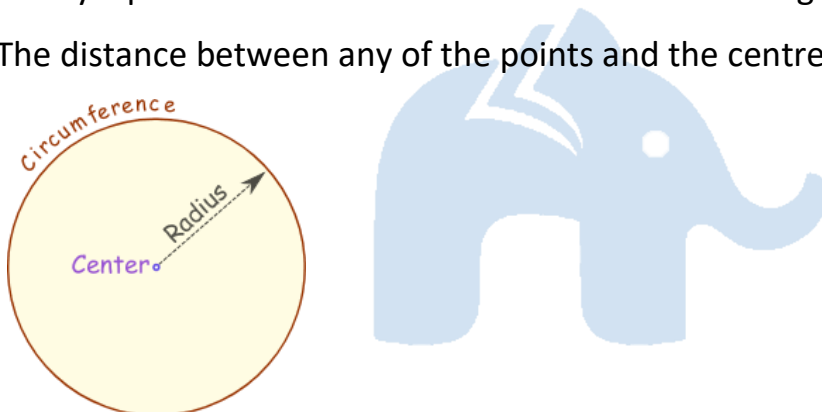


Introduction

Out of all the geometric shapes and figures, the circle is most commonly present around us. May it be a pizza or the coin and yes the ball that you play with are all circular in shape.



A circle is a simple closed shape. It is the set of all points in a plane that are at a given distance from a given point, the centre; equivalently it is the curve traced out by a point that moves so that its distance from a given point is constant. The distance between any of the points and the centre is called the radius.



In this chapter, we shall study constructions of tangents on circle and many other constructions.

Construction of Tangents to a Given Circle

Construction 1:

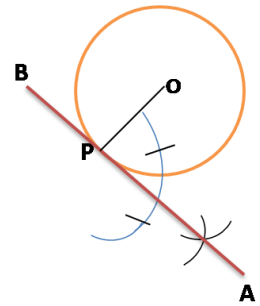
To construct a tangent to a given circle through a point on its circumference.

Let the centre of the given circle be O and P be any point on its circumference.

Steps:

1. Join O and P.

2. Draw line APB making angle of 90° with OP i.e. $\angle OPA = 90^\circ$
Now, APB is the required tangent to the given circle through a point P on its circumference.



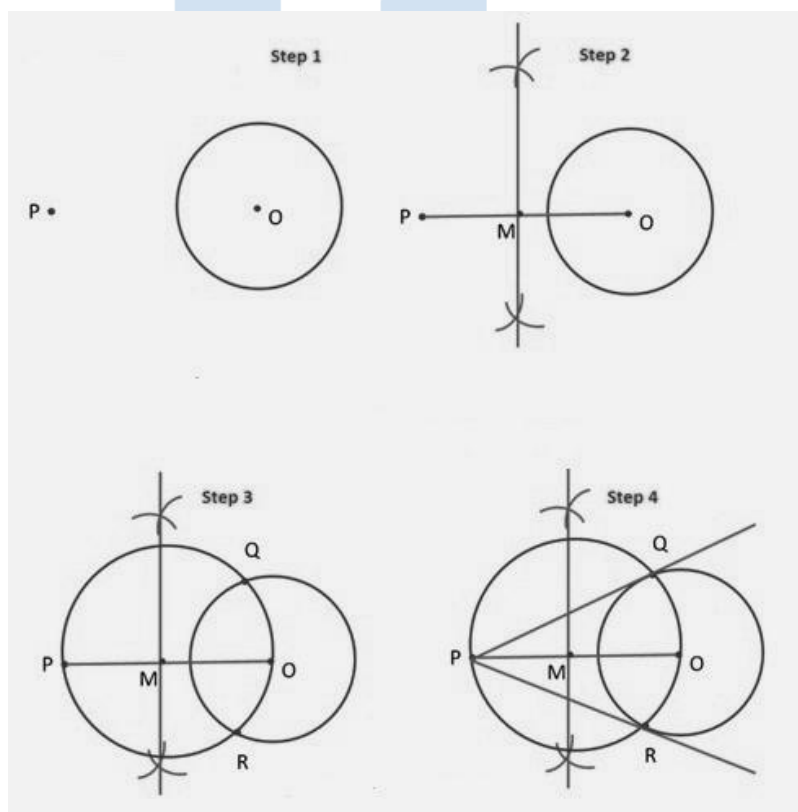
Construction 2:

To construct tangents to a given circle from an external point.

Steps:

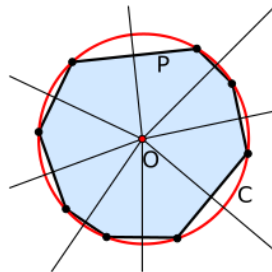
1. Draw a circle with centre O & Take a point P outside circle.
2. Join PO and bisect it. Let M be the midpoint of PO.
3. Taking M as centre & MO as radius, draw circle. Let it intersect the given circle at Q and R.
4. Join PQ and PR.

So, PQ and PR are required tangents to the Given circle from an external point P.

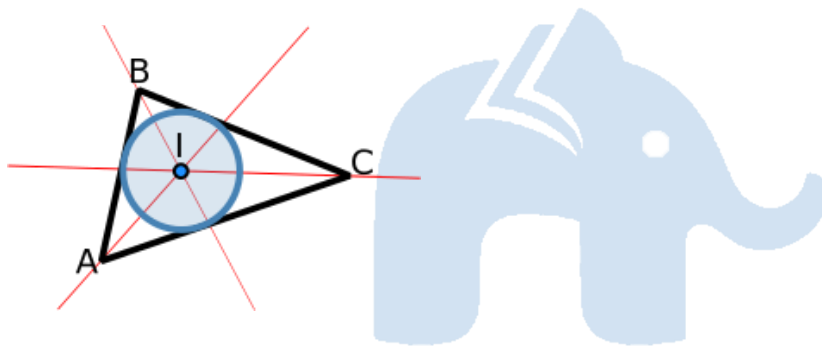


Construction of Circumscribed and Inscribed Circles of a Triangle

In geometry, the circumscribed circle or circumcircle of a polygon is a circle that passes through all the vertices of the polygon. The centre of this circle is called the circumcenter and its radius is called the circumradius.



The incircle or inscribed circle of a triangle is the largest circle contained in the triangle; it touches (is tangent to) the three sides. The centre of the incircle is a triangle centre called the triangle's incenter.

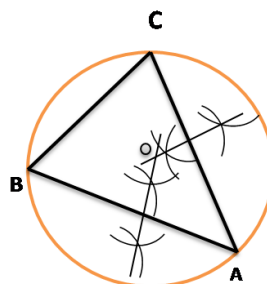


Construction 3:

To construct a circumscribing circle of a triangle.

Let ABC be the given triangle.

Steps:



1. Draw the perpendicular bisectors of any two sides of the triangle.

2. Let the perpendicular bisectors of AB and AC be drawn which meet at point O.
 3. Taking O as the centre and radius equal to OA (or OB or OC), draw a circle.
- Now, the circle so obtained is the required circle.

Construction 4:

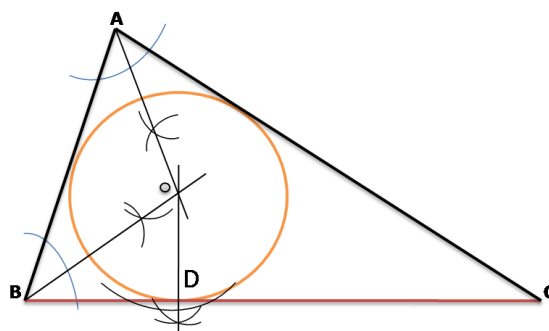
To construct an inscribed circle of a triangle.

Let ABC be the given triangle.

Steps:

1. Draw the bisectors of any two angles of the triangle. Let the bisectors of angles A and B be drawn and they meet at O.
2. From O, drop perpendicular on any side of the triangle. Let OD be the perpendicular drawn from O to side BC.
3. With O as centre and OD as radius, draw a circle which will touch all the three sides of the triangle.

The circle so obtained is the required circle.



Circumscribing and Inscribing a Circle on a Regular Hexagon

If the given hexagon is regular, then it is possible to draw circumscribing or inscribing circle but if the hexagon is not regular, then it is not always possible to draw circumscribing or inscribing circle.

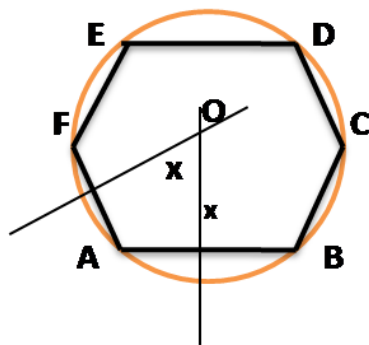
Construction 5:

To construct a circumscribing circle of a given regular hexagon.

Let each side of the given regular hexagon be 4 cm.

Steps:

1. Using the given data, construct the regular hexagon ABCDEF with each side equal to 4 cm.



2. Draw the perpendicular bisectors of sides AB and AF which intersect each other at point O.
3. With O as centre and OA as radius, draw a circle which will pass through all the vertices of the regular hexagon ABCDEF.

The circle so obtained is the required circle circumscribing the given regular hexagon.

Construction 6:

To construct an inscribing circle of a given regular hexagon.

Steps:

1. Draw a circle with centre O. Mark a point A on the circumference.
2. Join OA. OA is the radius of circle.
3. By putting the sharp end of the compass at point A, measure OA.
4. Now, draw an arc intersecting circumference at point B such that $OA = AB$.

Similarly, mark other end points of hexagon.

5. A, B, C, D, E and F are the end points of hexagon.

