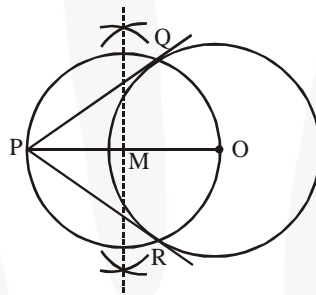


Ex - 11.2

Q1. Draw a circle of radius 6 cm. From a point 10 cm away from its centre, construct the pair of tangents to the circle and measure their lengths.

Sol. Steps of construction :

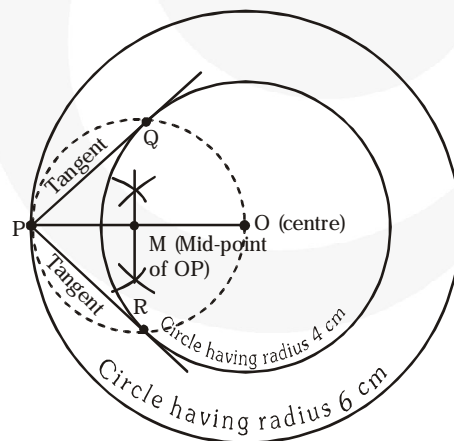
1. Taking any point O of the given plane as centre, draw a circle of 6 cm radius. Locate a point P, 10 cm away from O. Join OP.
2. Bisect OP. Let M be the mid-point of PO.
3. Taking M as centre and MO as radius, draw a circle.
4. Let this circle intersect the previous circle at point Q and R.
5. Join PQ and PR. PQ and PR are the required tangents.



The lengths of tangents PQ and PR are 8 cm each.

Q2. Construct a tangent to a circle of radius 4 cm from a point on the concentric circle of radius 6 cm and measure its length. Also verify the measurement by actual calculation.

Sol. Steps of construction :



1. Draw two concentric circles having radii 4 cm and 6 cm. O is the centre of the circles.
2. Take any point P on the larger circle.
3. Join OP and mark mid-point M of OP.
4. Taking M as centre and radius = MP = MO, draw circle which intersects the smaller circle in two points Q and R.

5. Join PQ and PR.

Now PQ and PR are the required tangents.

By measurement, we have length of the tangents = 4.4 cm (approx.).

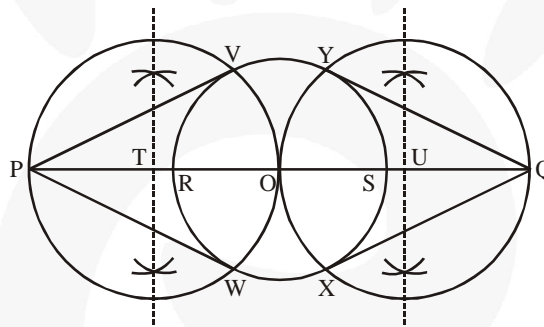
By calculation, we have length of the tangents

$$= \sqrt{OP^2 - OQ^2} = \sqrt{36 - 16} = \sqrt{20} = 2\sqrt{5} \text{ cm}$$

Q3. Draw a circle of radius 3 cm. Take two points P and Q on one of its extended diameter each at a distance of 7 cm from its centre. Draw tangents to the circle from these two points P and Q.

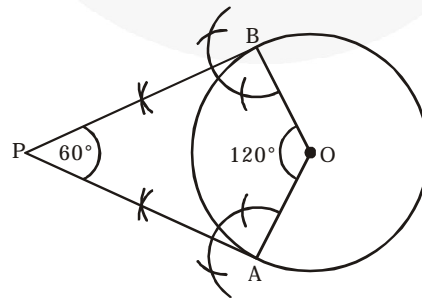
Sol. Steps of construction :

1. Taking any point O on the given plane as centre, draw a circle of 3 cm radius.
2. Take one of its diameters, RS, and extend it on both sides. Locate two points on this diameter such that $OP = OQ = 7 \text{ cm}$
3. Bisect OP and OQ. Let T and U be the mid-points of OP and OQ respectively.
4. Taking T and U as its centre and with TO and UO as radius, draw two circles. These two circles will intersect the circle at point V, W, X, Y respectively. Join PV, PW, QX, and QY. These are the required tangents.



Q4. Draw a pair of tangents to a circle of radius 5 cm which are inclined to each other at an angle of 60° .

Sol. Steps of construction :



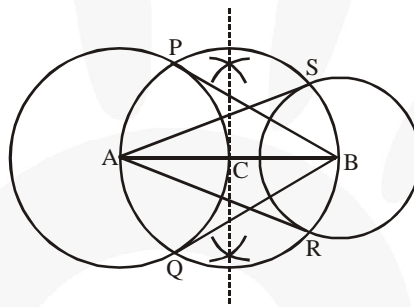
1. Draw circle with centre at O and radius 5 cm.
2. Construct radii OA and OB such that $\angle AOB = 120^\circ$.

3. Draw perpendiculars to OA and OB at A and B respectively and let them intersect at P.
Now, PA and PB is a pair of tangents inclined to each other at an angle of 60° .

Q5. Draw a line segment AB of length 8 cm. Taking A as centre, draw a circle of radius 4 cm and taking B as centre, draw another circle of radius 3 cm. Construct tangents to each circle from the centre of the other circle.

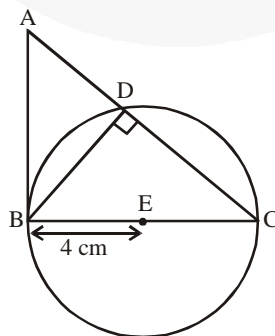
Sol. Steps of construction :

1. Draw a line segment AB of 8 cm. Taking A and B as centre, draw two circles of 4 cm and 3 cm radius.
2. Bisect the line AB. Let the mid-point of AB be C. Taking C as centre, draw a circle of AC radius which will intersect the circles at points P, Q, R, and S. Join BP, BQ, AS, and AR. These are the required tangents.



Q6. Let ABC be a right triangle in which AB = 6 cm, BC = 8 cm and $\angle B = 90^\circ$. BD is the perpendicular from B on AC. The circle through B, C, D is drawn. Construct the tangents from A to this circle.

Sol. Consider the following situation. If a circle is drawn through B, D, and C, BC will be its diameter as $\angle BDC$ is of measure 90° . The centre E of this circle will be the midpoint of BC.

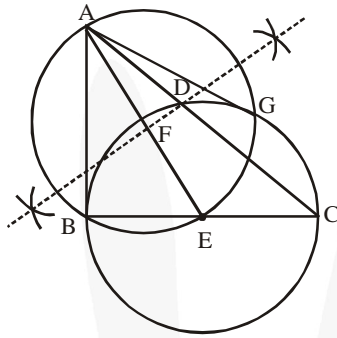


The required tangents can be constructed on the given circle as follows.

Steps of construction :

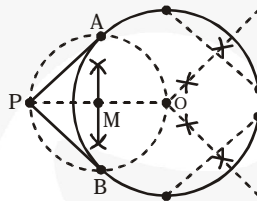
1. Join AE and bisect it. Let F be the mid-point of AE.
2. Taking F as centre and FE as its radius, draw a circle which will intersect the circle at point B and G. Join AG.

AB and AG are the required tangents.



Q7. Draw a circle with the help of a bangle. Take a point outside the circle. Construct the pair of tangents from this point to the circle.

Sol. Steps of construction :



1. Locate the centre O of the circle by drawing right bisectors of two non-parallel chords of the circle. These right bisectors intersect each other at the centre of the circle. (i.e., at O).
2. Take point P outside the circle and join OP.
3. Locate mid-point M of OP.
4. Taking M as centre and radius equal to MP, draw circle. It intersects the given circle at A and B.
5. Joint PA and PB.

Now, PA and PB are the required tangents drawn from P to the circle.