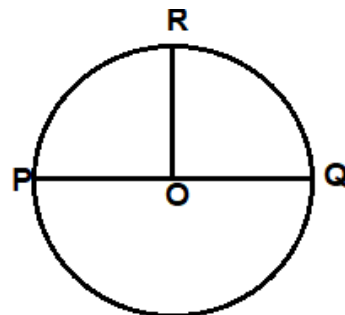


Circles**Circle:**

A circular path equidistant from a fixed point (Centre) is called circle.

Diameter:

A diameter is a line segment from one point to another point on circumference which passes through the centre of the circle. In the given circle PQ is diameter

**Radius:**

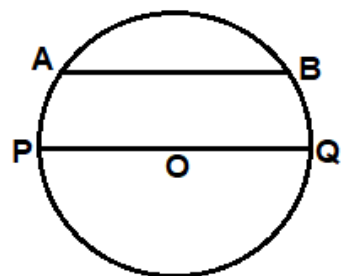
Radius is a line segment from centre to any point of the boundary of the circle. Radius is half of the diameter. In the given circle, OR is the radius.

Circumference:

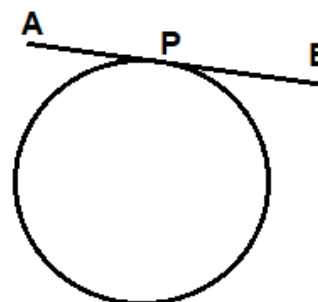
The length of the boundary of the circle is called circumference of circle. It is calculated by using the formula $2\pi r$ or πd , where ' r ' is the radius and ' d ' the diameter of circle.

Chord:

A chord in a circle is a line segment which has the end points on the boundary of the circle. In the given circle, both AB and PQ are the chords. PQ is also the diameter and the chord.

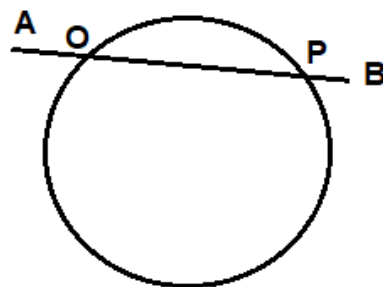
**Tangent:**

A tangent is a line segment which touches the circle only at one point. In the given figure, AE is a tangent which touches the circle at point P



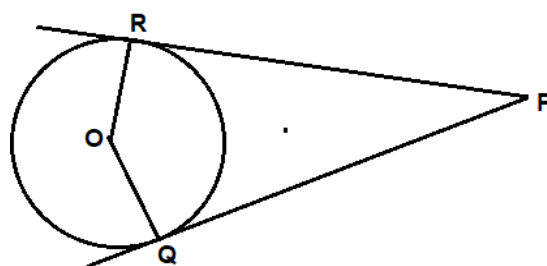
Secant:

A secant is a line segment which touches the circle at two different points. In the given circle, AB is a secant which touches the circle at point O and B



Pair of tangents:

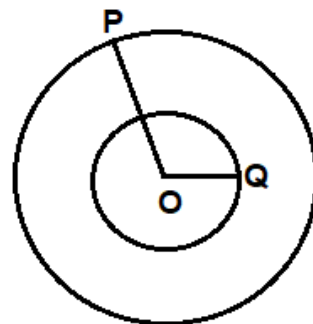
From an external point, two tangents are drawn to a circle. In this figure, from external point P , two tangents PR and PQ are drawn. These tangents touch the circle at R and Q respectively. Also, $PR = PQ$.



At any point on the circumference of the circle, we can draw only one tangent. In this way we can draw as many tangents to a circle.

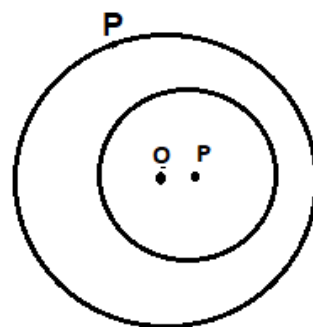
Concentric Circles with same centre:

Two or more circles are said to be concentric with common centre if they have common centre and of different radii. (See given figure) In this figure, there are two concentric circles with same centre O and having radii as OQ and OP



Concentric Circles with different centres:

Two or more circles are said to be concentric with different centres if they lie in one another and their centres are different. (See given figure) In this figure, there are two concentric circles centre O and P . The bigger circle has the centre O and the smaller circle P



Questions for Practice

Objective type

Q.No.1. A line segment which touches the circle at two different points and passes out from the circle is called:

- a) Chord
- b) Secant
- c) Tangent
- d) Radius

Q.No.2. A line segment which touches the circle only at one point is called:

- a) Chord
- b) Secant
- c) Tangent
- d) Diameter

Q.No.3. How many tangents can be drawn from an external point to a circle?

- a) 1
- b) 2
- c) Infinite
- c) 0

Q.No.4. How many tangents can be drawn from a point on the boundary of a circle?

- a) only 1
- b) Infinitely many
- c) More than one
- d) 0

Q.No.5. $ABCD$ is a cyclic quadrilateral with $\angle A = 80^\circ$ and $\angle B = 90^\circ$. The measure of $\angle C$ and $\angle D$ is respectively;

- a) $90^\circ, 90^\circ$
- b) $100^\circ, 80^\circ$
- c) $100^\circ, 90^\circ$
- d) $90^\circ, 100^\circ$

Q.No.6. If two circles touch each other at one point only, the number of common tangents to the circles are;

- | | |
|-------------|---------|
| a) 2 | b) 1 |
| c) Infinite | d) None |

Q.No.7. A circle can have parallel tangents.

- | | |
|------|-------------|
| a) 2 | b) 4 |
| c) 0 | d) Infinite |

Q.No.8. Two circles which do not touch each other will have tangents in common.

- | | |
|------|-------------|
| a) 0 | b) 1 |
| c) 4 | d) Infinite |

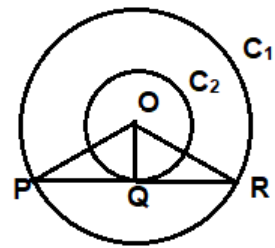
Q.No.9. A tangent touches the circle at points

- | | |
|--------------------|------|
| a) 1 | b) 2 |
| c) Infinite points | d) 4 |

Q.No.10. How many tangents can be drawn from a point which is inside the circle?

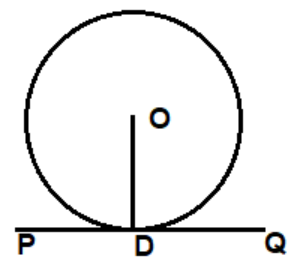
- | | |
|---------------|------------------|
| a) Infinite | b) Only one |
| c) No tangent | d) More than one |

- Q.No.11. In the given figure, C_1 and C_2 are concentric circles with common centre O . If PQ the chord of circle C_1 is tangent to circle C_2 , which one of the following may not be true?



- a) $OP = OR$
- b) $PQ = QR$
- c) $OR = QR$
- d) $\triangle OPQ$ is right angled triangle

- Q.No.12. In the given circle, PQ is a tangent and OD the radius. The measure of $\angle PDO$ is equal to.....



- a) 180°
- b) 90°
- c) 360°
- d) 100°

- Q.No.13. Tangent and the radius which meets the circle at the contact point of tangent are to each other.

- a) Perpendicular
- b) parallel
- c) Coincident
- d) All of these

- Q.No.14. Two tangents to a circle are parallel to each other. The line segment joining the point of contacts of the tangents is as

- a) radius
- b) Diameter
- c) Any chord
- d) Secant

- Q.No.15. The longest chord in the circle is

- Q.No.16. A chord which passed through the centre of the circle is called

- Q.No.17. The line joining the point of contacts of two parallel tangents of a circle must pass through

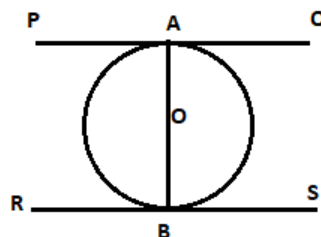
- Q.No.18. We can have only three concentric circles (true/False)

Very Short Answer Type Questions

Q.No.1 Draw a rough sketch of a circle and a pair of tangents to it from any external point.

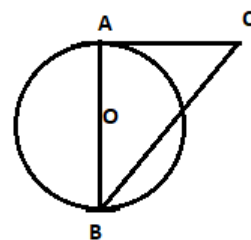
Q.No.2. Draw a circle with centre P . Draw any two tangents which are parallel to each other.

Q.No.3. In the given figure, PQ and RS are two tangents parallel to each other. Show that AB is diameter

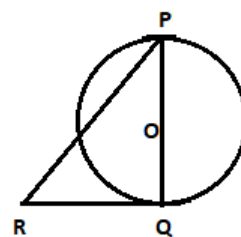


Q.No.4. Draw a rough sketch of any four parallel pairs of tangents.

Q.No.5. In the given figure, AQ is a tangent and AB the diameter of the circle with centre O . Show that ABQ is a right-angled triangle.



Q.No.6. In the given figure, $PQ = RQ$. If diameter $PQ = 12\text{cm}$, Find PR .



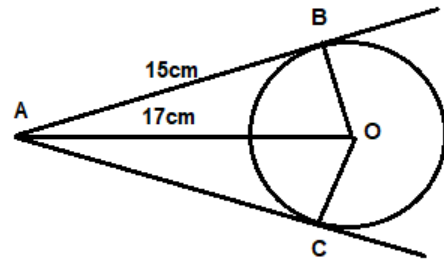
Q.No.7. Draw two concentric circles with common centre. Draw a line segment which is tangent to one circle and chord to another circle.

Q.No.8. Draw three concentric circles. Draw a line segment which chord in one circle, secant in another circle and tangent in third circle.

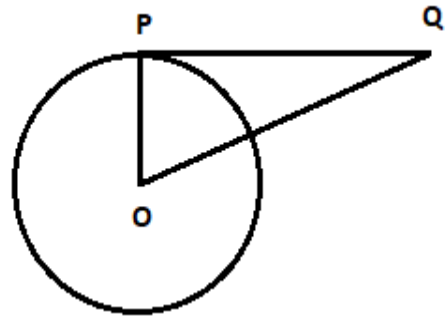
Q.No.9. Is it possible to have two circles with two points in common? If yes, draw at least one.

Short Answer Type Questions

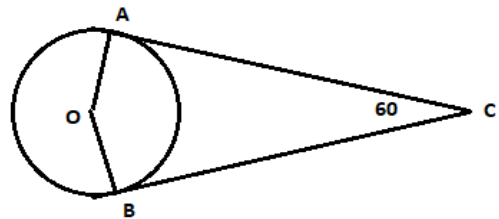
- Q.No.1. AB and AC are two tangents which meet the circle at B and C respectively. If $OA = 17\text{cm}$ and $AB = 15\text{cm}$, find the radius of the circle.



- Q.No.2. In the given figure, PQ is the tangent to the circle with centre O . If $OP = PQ$, show that $OQ = \sqrt{2}OP$



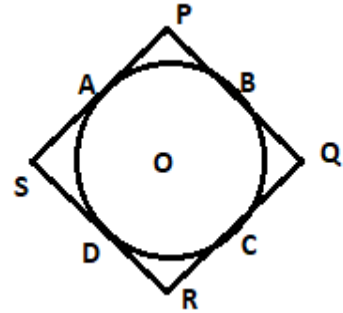
- Q.No.3. In the given figure, AC and BC touches the circle at two points A and B respectively. If $\angle ABC = 60$ and $\angle AOB = 120$, prove that AC and BC are two tangents.



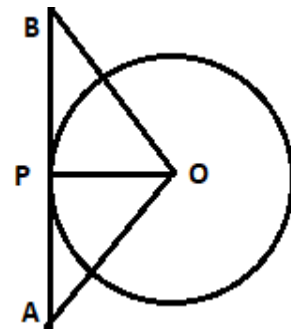
- Q.No.4. Draw a circle with centre P . Draw two tangents to it from the external point D which meet the circle at points B and C . If the radius of the circle is 7cm and the distance between the external point D to the centre of the circle is 10cm , find the length of each tangent

Q.No.5. A tangent from P is 16cm to the circle with radius 12cm . Find the distance between the centre of the circle and the point P .

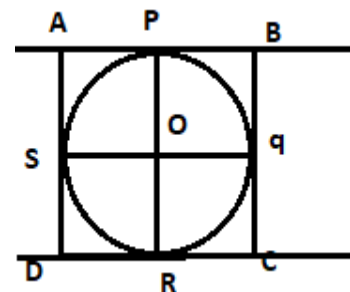
Q.No.6. In the given figure, PS, SR, RQ and QP are the tangents to the circle. If $PQRS$ is a parallelogram and $AP = BQ = SD$, prove that $PQRS$ is a rhombus.



Q.No.7. In the given figure, AB is the tangent to the circle with centre O . If $BP = AP$, show that $BO = OA$.



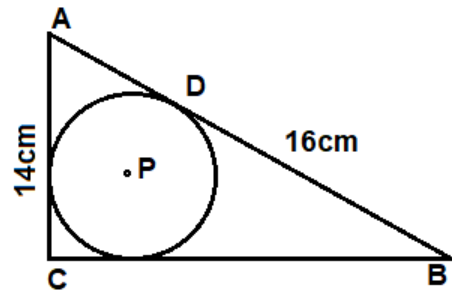
Q.No.8. In the given figure, AB and DC are two tangents which meet the opposite ends of the diameter PR . If $PB = RC$, prove that $PBCR$ is a rectangle.



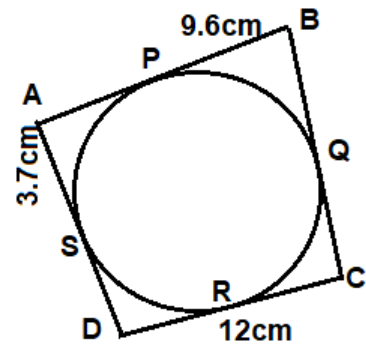
Q.No.9. Prove that the tangents drawn from external point to the circle are equal.

Long Answer Type Questions

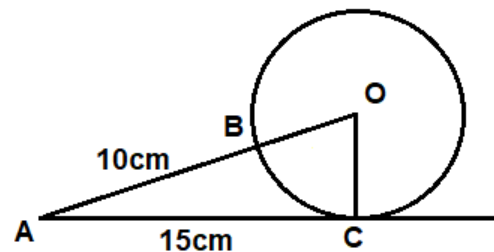
- Q.No.1. AB, BC and AC are the tangents to the circle with centre P . If $AC = 14\text{cm}$, $DB = 16$ and $AB = 22\text{cm}$, find the perimeter of $\triangle ABC$



- Q.No.2. AB, BC, CD and DA are the tangents to the circle which touches the circle at P, Q, R and S respectively. If $PB = 9.6\text{cm}$, $DC = 12\text{cm}$ and $AS = 3.7\text{cm}$, find the perimeter of quadrilateral $ABCD$

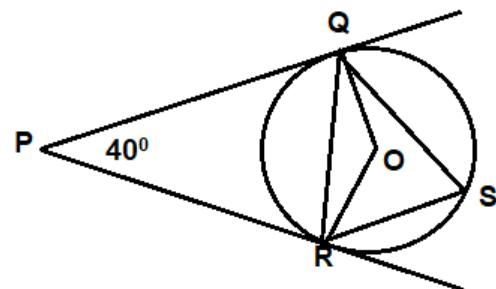


- Q.No.3. In the given figure, $AC = 15\text{cm}$ is a tangent to circle which meets the circle at C . If $AB = 10\text{cm}$, find the radius of circle.

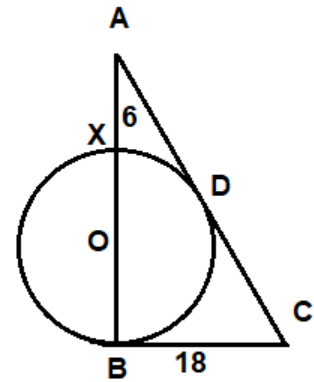


- Q.No.4. In the given figure, PQ and PR are two tangents to the circle with centre O . If $\angle QPR = 40^\circ$, find;

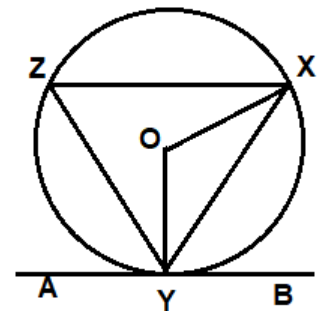
- a) $\angle ROQ$ b) $\angle ORP$
c) $\angle OQR$ d) $\angle RSQ$



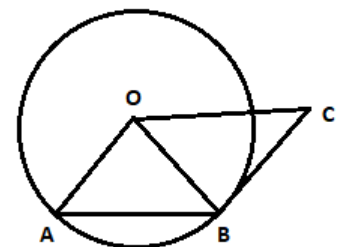
- Q.No.5. BC and AC are two tangents which touches the circle at B and D respectively. If $AX = 6$, $AD = 12\text{cm}$ and $BC = 18$, find the radius of the circle.



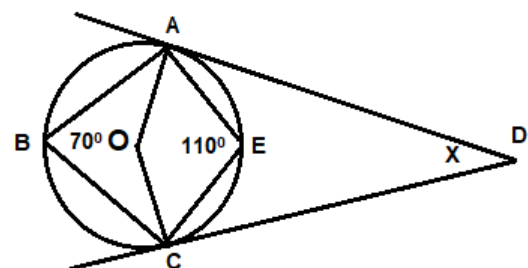
- Q.No.6. A tangent AB touches the circle at Y . If XY is a chord such that $\angle XYB = 65^\circ$. Find $\angle XOY$



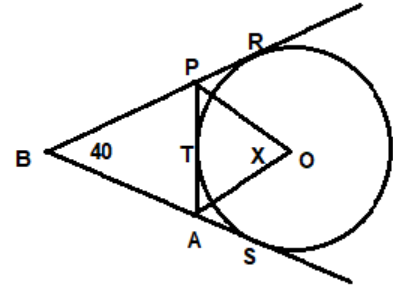
- Q.No.7. In the given circle of radius 6cm , Chord AB is equal to its radius. Tangent BC is equal to the chord AB . Find the length of OC



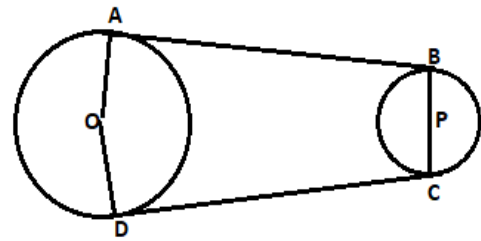
- Q.No.8. AD and DC are two tangents from external point D which meets the circle at point A and C respectively. If $\angle ABC = 70^\circ$, $\angle AEC = 110^\circ$, find $\angle ADC$ and Obtuse $\angle AOC$.



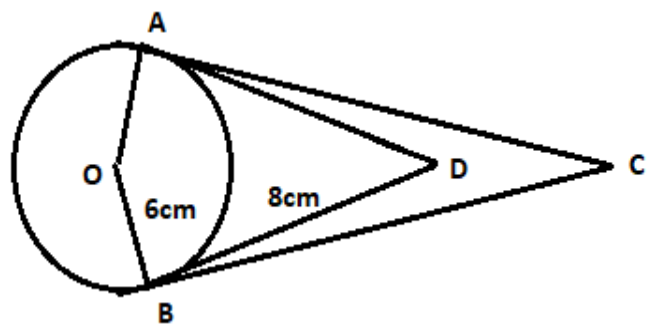
- Q.No.9. In the given figure, BR and BS are two tangents which meet the circle at points R and S respectively. If $\angle PBA = 40^\circ$, $PO = AO$ and PA the tangent which meets the circle at point T , find $\angle POA$



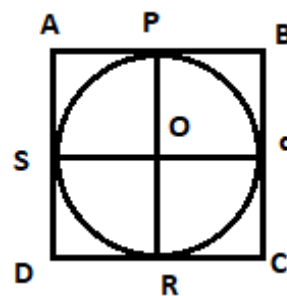
- Q.No.10. In the given figure, AB and OD are the radii of circle with centre O and PB & PC are the radii of circle with centre P . If $AO = 7\text{cm}$, $PB = 3.5\text{cm}$ and $AB = 12\text{cm}$, find the area of polygon $AODCPB$



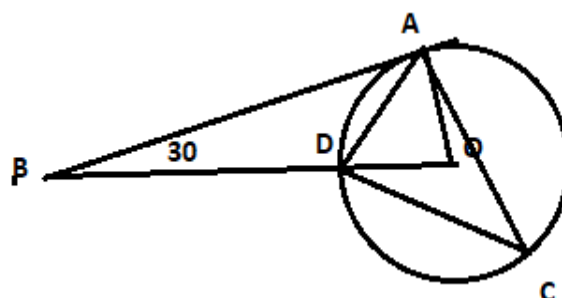
- Q.No.11. In the given figure, AC and BC are two tangents from the point C . Also, AD and BD are two tangents from the point D . If the radius of the circle is 6 cm , $BD = 8\text{ cm}$ and $DC = 5\text{ cm}$, find the length of OC and BC



- Q.No.12. In the given figure, AB, BC, CD, DA are the tangents to the circle. If $AB \parallel SQ \parallel DC$ and $AD \parallel PR \parallel BC$, show that $ABCD$ is a square.



- Q.No.13. In the given figure, AB is a tangent to the circle. If $\angle ABD = 30^\circ$, find $\angle DCA$. Also show that $\angle ABO = 90^\circ - 2\angle ACD$



Answers

Q1, b	Q2, c	Q3, b	Q4, a	Q5, c	Q6, b
Q7, d	Q8, a	Q9,a	Q10, c	Q11, c	Q12, b
Q13, a	Q14, b	Q15, Diameter		Q16, Diameter	
Q17, Centre		Q18, False			

Very Short Answer Type

Q6	$12\sqrt{2}\text{cm}$	Q9, Yes
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Short Answer Type

Q1, 8cm	Q5, $\sqrt{51}$	Q5, 20cm
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Long Answer type

Q1, 60cm	Q2, 50.6cm	Q3, $\frac{25}{4}\text{cm}$
Q4, $\angle ROQ = 140^\circ$, $\angle ORP = 90^\circ$, $\angle OQR = 20^\circ$, $\angle RSQ = 70^\circ$		
Q5, 9cm	Q6, 130,	Q7, 10cm
Q8, $\angle ADC = 40^\circ$, $\angle AOC = 140^\circ$		Q9, 170
Q10, 136 cm^2 ,	Q11, $OC = 15\text{cm}$, $BC = \sqrt{189}$	