MATHEMATICS OF CLASS IX
CHAPTER – 10 CIRCLES

Q.1. Fill in the blanks

(i) The centre of a circle lies in _____ of the circle. (exterior/ interior)

(ii) A point, whose distance from the centre of a circle is greater than its radius lies in _____ of the circle. (exterior/ interior)

(iii) The longest chord of a circle is a _____ of the circle.

(iv) An arc is a _____ when its ends are the ends of a diameter.

(v) Segment of a circle is the region between an arc and _____ of the circle.

(vi) A circle divides the plane, on which it lies, in _____ parts.

Q.2. Write True or False: Give reasons for your answers.

(i) Line segment joining the centre to any point on the circle is a radius of the circle.

(ii) A circle has only finite number of equal chords.

(iii) If a circle is divided into three equal arcs, each is a major arc.

(iv) A chord of a circle, which is twice as long as its radius, is a diameter of the circle.

(v) Sector is the region between the chord and its corresponding arc.

(vi) A circle is a plane figure.

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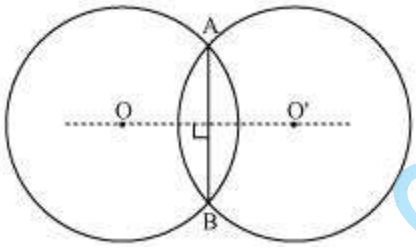
Q.3. Recall that two circles are congruent if they have the same radii. Prove that equal chords of congruent circles subtend equal angles at their centres.

Q.4. Prove that if chords of congruent circles subtend equal angles at their centres, then the chords are equal.

Q.5. Draw different pairs of circles. How many points does each pair have in common? What is the maximum number of common points?

Q.6. Suppose you are given a circle. Give a construction to find its centre.

Q.7. If two circles intersect at two points, then prove that their centres lie on the perpendicular bisector of the common chord.



Q.8. Two circles of radii 5 cm and 3 cm intersect at two points and the distance between their centres is 4 cm. Find the length of the common chord.

Q.9. If two equal chords of a circle intersect within the circle, prove that the segments of one chord are equal to corresponding segments of the other chord.

Q.10. If two equal chords of a circle intersect within the circle, prove that the line joining the point of intersection to the centre makes equal angles with the chords.

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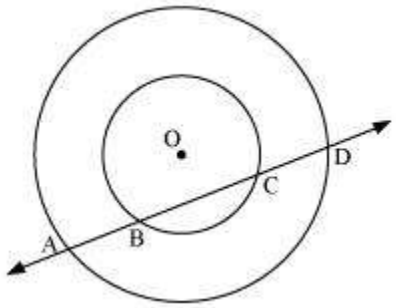
Q.11. If a line intersects two concentric circles (circles with the same centre) with centre O at A, B, C and D, prove that AB = CD (see figure 10.25).



Q.12. Three girls Reshma, Salma and Mandip are playing a game by standing on a circle of radius 5 m drawn in a park. Reshma throws a ball to Salma, Salma to Mandip, Mandip to Reshma. If the distance between Reshma and Salma and between Salma and Mandip is 6 m each, what is the distance between Reshma and Mandip?

Q.13. A circular park of radius 20 m is situated in a colony. Three boys Ankur, Syed and David are sitting at equal distance on its boundary each having a toy telephone in his hands to talk each other. Find the length of the string of each phone.

Q.14. In the given figure, A, B and C are three points on a circle with centre O such that ∠BOC = 30° and ∠AOB = 60°. If D is a point on the circle other than the arc ABC, find ∠ADC.

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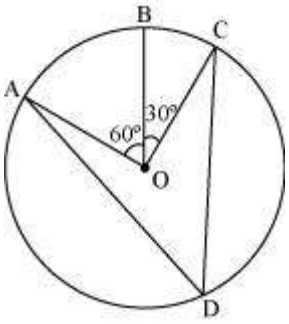
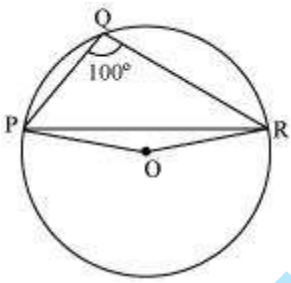
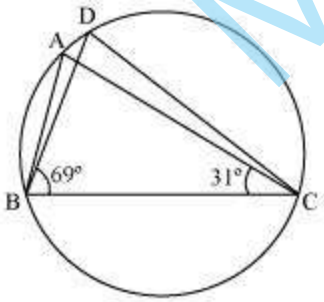


Q.15. A chord of a circle is equal to the radius of the circle. Find the angle subtended by the chord at a point on the minor arc and also at a point on the major arc.

Q.16. In the given figure, ∠PQR = 100°, where P, Q and R are points on a circle with centre O. Find ∠OPR.



Q.17. In the given figure, ∠ABC = 69°, ∠ACB = 31°, find ∠BDC.



Q.18. In the given figure, A, B, C and D are four points on a circle. AC and BD intersect at a point E such that ∠BEC = 130° and ∠ECD = 20°. Find ∠BAC.

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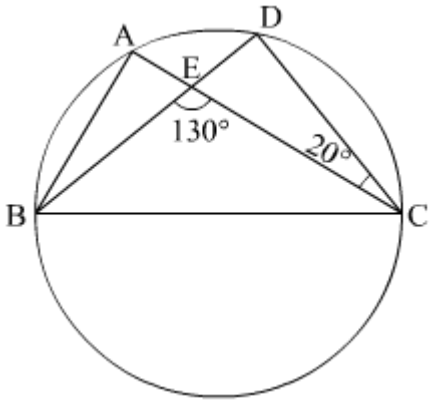
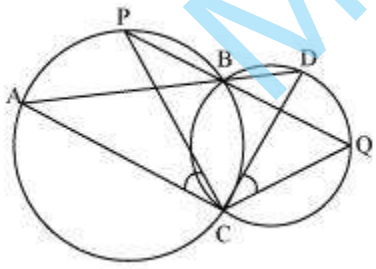


Q.19. ABCD is a cyclic quadrilateral whose diagonals intersect at a point E. If ∠DBC = 70°, ∠BAC is 30°, find ∠BCD. Further, if AB = BC, find ∠ECD.

Q.20. If diagonals of a cyclic quadrilateral are diameters of the circle through the vertices of the quadrilateral, prove that it is a rectangle.

Q.21. If the non-parallel sides of a trapezium are equal, prove that it is cyclic.

Q.22. Two circles intersect at two points B and C. Through B, two line segments ABD and PBQ are drawn to intersect the circles at A, D and P, Q respectively (see the given figure). Prove that ∠ACP = ∠QCD.



Q.23. If circles are drawn taking two sides of a triangle as diameters, prove that the point of intersection of these circles lie on the third side.

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Q.24. ABC and ADC are two right triangles with common hypotenuse AC. Prove that ∠CAD = ∠CBD

Q.25. Prove that a cyclic parallelogram is a rectangle.

Q.26. Prove that line of centres of two intersecting circles subtends equal angles at the two points of intersection.

Q.27. Two chords AB and CD of lengths 5 cm 11cm respectively of a circle are parallel to each other and are on opposite sides of its centre. If the distance between AB and CD is 6 cm, find the radius of the circle.

Q.28. The lengths of two parallel chords of a circle are 6 cm and 8 cm. If the smaller chord is at distance 4 cm from the centre, what is the distance of the other chord from the centre?

Q.29. Let the vertex of an angle ABC be located outside a circle and let the sides of the angle intersect equal chords AD and CE with the circle. Prove that ∠ABC is equal to half the difference of the angles subtended by the chords AC and DE at the centre.

Q.30. Prove that the circle drawn with any side of a rhombus as diameter passes through the point of intersection of its diagonals.

Q.31. ABCD is a parallelogram. The circle through A, B and C intersect CD (produced if necessary) at E. Prove that AE = AD.

Q.32. AC and BD are chords of a circle which bisect each other. Prove that (i) AC and BD are diameters; (ii) ABCD is a rectangle

Question 8:

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Bisectors of angles A, B and C of a triangle ABC intersect its circumcircle at D, E and F respectively. Prove that the angles of the triangle DEF are 90° $-\frac{1}{2}A, 90° - \frac{1}{2}B$ and $90° - \frac{1}{2}C$.

Q.33. Two congruent circles intersect each other at points A and B. Through A any line segment PAQ is drawn so that P, Q lie on the two circles. Prove that BP = BQ.

Q.34.In any triangle ABC, if the angle bisector of ∠A and perpendicular bisector of BC intersect, prove that they intersect on the circum circle of the triangle ABC.

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