MATHS BASE MAKER

Class 9 CBSE Mathematics | Ganita Manjari

Chapter 5: Circles & Cyclic Quadrilaterals

STUDENT PRACTICE WORKSHEET (concept + questions)

PART 1: MASTER THEOREMS & CIRCLE PROPERTIES AT A GLANCE

Definition & Locus	• Circle: Set/locus of all points in a plane equidistant from a fixed centre point. • Perpendicular Bisector: Locus of points equidistant from two fixed endpoints.
Circles Through Points	• Through 1 point: Infinitely many circles. • Through 2 points: Infinitely many circles (centres lie on the perpendicular bisector). • Through 3 collinear points: Zero circles. • Theorem 1: Exactly ONE unique circle passes through 3 non-collinear points.
Circumcentre Location	• Acute-angled triangle: Circumcentre lies INSIDE the triangle. • Right-angled triangle: Circumcentre lies on the MIDPOINT of the hypotenuse. • Obtuse-angled triangle: Circumcentre lies OUTSIDE the triangle.
Theorems 2 & 3 (Chords & Angles)	• Theorem 2: Equal chords subtend equal angles at the centre. • Theorem 3 (Converse): Chords subtending equal angles at the centre are equal in length.
Theorems 4 & 5 (Chord Bisector)	• Theorem 4: The line joining centre to chord midpoint is perpendicular to the chord. • Theorem 5: The perpendicular from centre to a chord bisects the chord.
Theorems 6 & 7 (Distance from Centre)	• Theorem 6: Chords of equal length are equidistant from the centre. • Theorem 7 (Converse): Chords equidistant from

	the centre are equal in length.
Arc Angle & Inscribed Angle	• Angle of minor arc AB = ∠AOB (x); Angle of major arc = 360° – x. • Theorem 9: Angle subtended by an arc at the centre is double the angle subtended by it at any point on the remaining circumference (∠AOB = 2∠APB).
Semicircle Corollary	• The angle subtended by a diameter at any point on the circle is a right angle (90°).
Theorem 10 (Angles in Same Segment)	• Angles subtended by the same chord/segment in the same circular region are equal. • If segment AB subtends equal angles at C and D on same side, A, B, C, D are concyclic.
Theorems 11 & 12 (Cyclic Quadrilaterals)	• Theorem 11: The opposite angles of a cyclic quadrilateral sum to 180° (supplementary). • Theorem 12 (Converse): If opposite angles sum to 180°, the quadrilateral is cyclic (concyclic).
Pythagoras in Chords	In a circle of radius R with chord length 2L at perpendicular distance d from centre: $R^2 = d^2 + L^2 \Rightarrow L = \sqrt{(R^2 - d^2)}$

PART 2: PRACTICE QUESTIONS (WITH FINAL ANSWERS)

Watch the Complete Chapter 5 Video Solutions on YouTube

https://youtu.be/h975o3BAOqA

contd...watch part 2 , 3 on YouTube

Question 1: Circles Through Two Points (Fill in the Blanks)

Fill in the blanks:

"_____ circles can pass through two given points, and the centres of all these circles lie on the _____ of the line segment joining those two points."

Final Answer: **Infinitely many; Perpendicular bisector**

Question 2: Circumcentre Position in Acute Triangle

Draw triangle ABC with AB = 7 cm, ∠A = 55°, and ∠B = 65°. Draw the circumcircle. Is the circumcentre located inside or outside the triangle?

Final Answer: **Inside the triangle (since ∠C = 180° – 55° – 65° = 60°, all angles < 90°).**

Question 3: Circumcentre Position in Obtuse Triangle

Draw triangle ABC with AB = 6 cm, ∠A = 110°, and AC = 5 cm. Draw the circumcircle. Is the circumcentre located inside or outside the triangle?

Final Answer: **Outside the triangle (since ∠A = 110° > 90°).**

Question 4: Lengths of Two Chords from Given Distances

In a circle of radius 13 cm, chord PQ is at a perpendicular distance of 5 cm from the centre, and chord RS is at a distance of 12 cm from the centre. Find the lengths of chords PQ and RS.

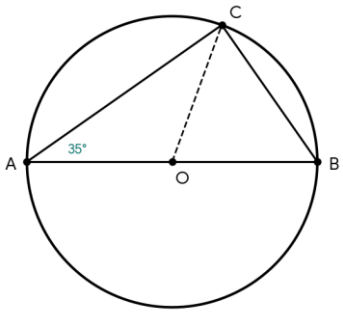
Final Answer: **Length of PQ = 24 cm; Length of RS = 10 cm**

Question 5: Distance Between Parallel Chords on Same Side

Two parallel chords AB and CD of a circle with centre O lie on the same side of the centre. If radius = 17 cm, AB = 16 cm, and CD = 30 cm, find the distance between the two chords.

Final Answer: **Distance between chords = 7 cm**

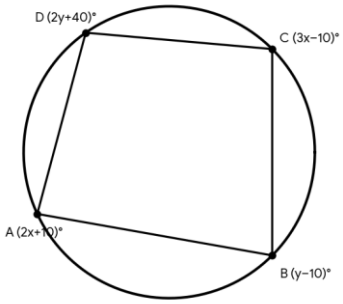
Question 6: Angles Subtended by Diameter and Radii



In the given figure, AB is a diameter of the circle with centre O. Point C lies on the circle such that ∠CAB = 35°. Find the measure of ∠ABC and central angle ∠AOC.

Final Answer: **∠ABC = 55°; ∠AOC = 110°**

Question 7: Angles of a Cyclic Quadrilateral



In the given figure, ABCD is a cyclic quadrilateral with angles:
∠A = (2x + 10)°, ∠B = (y – 10)°,
∠C = (3x – 10)°, ∠D = (2y + 40)°.
Find the degree measure of all four angles.

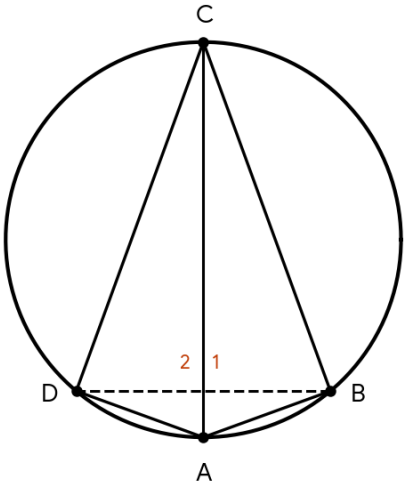
Final Answer: **∠A = 82°, ∠B = 40°, ∠C = 98°, ∠D = 140°**

Question 8: Isosceles Triangle Proof from Cyclic Quadrilateral

In the given figure, ABCD is a cyclic quadrilateral.

Diagonal AC bisects ∠BAD (∠1 = ∠2). Diagonal BD is joined. Prove that triangle BCD is an isosceles triangle.

Final Answer: Proved (CD = CB, hence ΔBCD is isosceles).



https://youtu.be/h975o3BAOqA (video solution on YouTube)

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