Class 9 Maths Chapter 5: I’m Up and Down, and Round and Round - Notes, Important Questions and MCQs (2026-27)

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These Class 9 Maths Chapter 5 notes cover “I’m Up and Down, and Round and Round” from the new NCERT textbook Ganita Manjari (Part I, 2026-27) – the chapter on circles: definitions, symmetries, circles through given points, chords and the angles they subtend, perpendicular bisectors, distance of chords from the centre, angles subtended by arcs, concyclic points and cyclic quadrilaterals – with theorem tables, solved examples, Q&A, 10 MCQs and a free PDF.

Use the table of contents below to jump to the part you need, or read top to bottom for a complete revision of the chapter.

Table of Contents

- Chapter Overview
- Important Topics and Concepts
- Solved Examples
- Circle Theorems and Converses
- Important Terms and Formulas
- Short Answer Questions
- Long Answer Questions
- MCQs with Answers
- Quick Revision Points
- Chapter Summary
- Exam Tips and PYQ Pattern
- Frequently Asked Questions
- Conclusion

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Chapter Overview

A circle is the set of all points in a plane at a fixed distance (radius) from a fixed point (centre). Circles appear everywhere – ripples on water, wheels, clocks – and they are perfectly symmetric: every diameter is a line of symmetry and the circle looks the same after any rotation about its centre.

This symmetry leads to powerful theorems about chords and arcs: equal chords subtend equal angles and are equidistant from the centre, the perpendicular from the centre bisects a chord, the angle at the centre is double the angle on the circle, and opposite angles of a cyclic quadrilateral add up to 180°.

Important Topics and Concepts

Basic Terms

- Radius: distance from centre to any point on the circle; diameter = 2 × radius.
- Chord: segment joining two points on the circle; the diameter is the longest chord.
- Arc: connected part of the circle; minor and major arcs.
- Segment (region between chord and arc) and sector (region between two radii and an arc).

Symmetry and Circles Through Points

- A circle has reflection symmetry about every diameter and rotational symmetry through any angle about its centre.
- Through one point: infinitely many circles.
- Through two points: infinitely many circles, with centres on the perpendicular bisector of the segment joining them.
- Through three non-collinear points: exactly one circle – the circumcircle; its centre (circumcentre) is where the perpendicular bisectors meet.

Chords and Angles at the Centre

- Equal chords subtend equal angles at the centre.
- Conversely, chords subtending equal angles at the centre are equal.
- Both are proved using congruent triangles (SSS and SAS) formed by radii.

Perpendicular Bisectors and Distance of Chords

- The line from the centre to the midpoint of a chord is perpendicular to the chord.
- Conversely, the perpendicular from the centre to a chord bisects it.
- Equal chords are equidistant from the centre; chords equidistant from the centre are equal.
- Of two unequal chords, the longer one is closer to the centre.
- Useful relation: $(\text{half chord})^2 + (\text{distance from centre})^2 = r^2$.

Angles Subtended by Arcs

- The angle subtended by an arc at the centre is twice the angle it subtends at any point on the remaining part of the circle.
- Angles in the same segment are equal.
- The angle in a semicircle (subtended by a diameter) is 90°.

Concyclic Points and Cyclic Quadrilaterals

- Points lying on one circle are concyclic.
- If a segment subtends equal angles at two points on the same side, the four points are concyclic.
- A quadrilateral whose vertices lie on a circle is cyclic.
- In a cyclic quadrilateral, opposite angles add up to 180°; conversely, if opposite angles are supplementary, the quadrilateral is cyclic.

Solved Examples

Board-pattern practice.

- A chord is 8 cm from the centre of a circle of radius 10 cm. Find its length. Half chord = $\sqrt{(10^2 - 8^2)} = 6 \rightarrow$ chord = 12 cm.
- Chord of 24 cm in a circle of radius 13 cm. Distance from centre? $\sqrt{(13^2 - 12^2)} = 5$ cm.
- An arc subtends 70° at the centre. Angle at a point on the remaining circle? 35°.
- In cyclic quadrilateral ABCD, ∠A = 105°. Find ∠C. 180° – 105° = 75°.
- AB is a diameter; P is on the circle. Find ∠APB. 90° (angle in a semicircle).

Circle Theorems and Converses

Theorem	Converse
Equal chords subtend equal angles at centre	Chords with equal central angles are equal
Line from centre to midpoint of chord chord	Perpendicular from centre bisects the chord
Equal chords are equidistant from centre	Chords equidistant from centre are equal
Angle at centre = 2 × angle on circle	—
Opposite angles of cyclic quadrilateral sum to 180°	If opposite angles sum to 180°, quadrilateral is cyclic
Angle in semicircle = 90°	—

Important Terms and Formulas

Term	Meaning
Circle	Points at a fixed distance (radius) from a centre
Chord	Segment joining two points of a circle
Diameter	Longest chord, through the centre; d = 2r
Arc	Part of a circle between two points
Circumcircle	Circle through three vertices of a triangle
Circumcentre	Meeting point of perpendicular bisectors
Concyclic points	Points on the same circle
Cyclic quadrilateral	Quadrilateral with all vertices on a circle
Chord distance	$(c/2)^2 + d^2 = r^2$
Angle in semicircle	90°

Short Answer Questions

Q1. How many circles pass through three non-collinear points?

Exactly one.

Q2. Where do the centres of circles through two points lie?

On the perpendicular bisector of the segment joining the two points.

Q3. What can you say about equal chords of a circle?

They subtend equal angles at the centre and are equidistant from the centre.

Q4. Which of two unequal chords is nearer the centre?

Q5. State the arc–angle theorem.

The angle at the centre is twice the angle subtended at any point on the remaining part of the circle.

Q6. What is the angle in a semicircle?

90°.

Q7. If ∠B of a cyclic quadrilateral ABCD is 80°, find ∠D.

100°.

Q8. Find the length of a chord 5 cm from the centre of a circle of radius 13 cm.

2 × √(169 – 25) = 2 × 12 = 24 cm.

Long Answer Questions

Q1. Prove that the perpendicular from the centre of a circle to a chord bisects the chord.

Let O be the centre and OM AB at M.

Join OA and OB; OA = OB (radii).

OM is common and ∠OMA = ∠OMB = 90°.

So △OMA ≅ △OMB (RHS).

Hence AM = BM – the perpendicular bisects the chord.

Q2. Prove that equal chords subtend equal angles at the centre.

Let AB = CD be chords of a circle with centre O.

OA = OC and OB = OD (radii).

AB = CD (given).

So △AOB ≅ △COD (SSS).

Hence ∠AOB = ∠COD.

Q3. Show that the opposite angles of a cyclic quadrilateral are supplementary.

Let ABCD be cyclic with centre O.

Arc BCD subtends ∠BOD (reflex side) = 2∠A.

Arc BAD subtends the other angle at O = 2∠C.

The two angles at O add up to 360°, so 2∠A + 2∠C = 360°.

∠A + ∠C = 180°; similarly ∠B + ∠D = 180°.

MCQs with Answers

1. Longest chord of a circle is the(a) radius (b) arc (c) diameter (d) tangentAnswer: (c) diameter

2. Circles through two given points are(a) one (b) two (c) infinitely many (d) noneAnswer: (c) infinitely many

4. Angle in a semicircle is(a) 45° (b) 60° (c) 90° (d) 180°Answer: (c) 90°

5. Arc subtends 100° at centre; at a point on circle(a) 50° (b) 100° (c) 200° (d) 80°Answer: (a) 50°

6. Opposite angles of a cyclic quadrilateral sum to(a) 90° (b) 180° (c) 270° (d) 360°Answer: (b) 180°

7. Radius 5 cm, chord 8 cm; distance from centre(a) 3 cm (b) 4 cm (c) 5 cm (d) 6 cmAnswer: (a) 3 cm

8. Circumcentre is the meeting point of(a) medians (b) angle bisectors (c) perpendicular bisectors (d) altitudesAnswer: (c) perpendicular bisectors

9. Equal chords are(a) equidistant from centre (b) parallel (c) perpendicular (d) diametersAnswer: (a) equidistant from centre

10. A circle has reflection symmetry about(a) one line (b) two lines (c) every diameter (d) no lineAnswer: (c) every diameter

Quick Revision Points

- Circle, radius, diameter, chord, arc, segment, sector.
- Symmetry: every diameter; any rotation.
- 1 point/2 points → infinite circles; 3 points → unique circumcircle.
- Chord theorems and converses.
- Centre angle = 2 × circle angle; semicircle 90°.
- Cyclic quadrilateral: opposite angles 180°.

Chapter Summary

A circle consists of all points at a fixed distance from its centre and is perfectly symmetric. Infinitely many circles pass through one or two points, but exactly one passes through three non-collinear points.

Equal chords subtend equal angles at the centre and are equidistant from it; the perpendicular from the centre bisects a chord, and longer chords lie closer to the centre. The angle subtended by an arc at the centre is twice that at the circle, the angle in a semicircle is 90°, and opposite angles of a cyclic quadrilateral are supplementary.

Exam Tips and PYQ Pattern

- Learn each theorem with its converse.
- Draw neat labelled figures for proofs.
- Use $(c/2)^2 + d^2 = r^2$ for chord numericals.
- Quote the theorem name in each step.
- Practise angle-chasing in cyclic quadrilaterals.

Frequently Asked Questions

Is this chapter in the 2026-27 CBSE syllabus?

Yes. It is part of the new NCERT Class 9 Maths textbook “Ganita Manjari” (Part I), prescribed for the 2026-27 session.

Can I download these notes as a PDF?

Yes. Use the free PDF link at the top of this page – no signup needed.

Which topic is “I’m Up and Down, and Round and Round” about?

It is the Class 9 Ganita Manjari chapter on circles – chords, arcs, angles and cyclic quadrilaterals.

What is the property of a cyclic quadrilateral?

Its opposite angles add up to 180°.

Conclusion

This circles chapter rewards neat diagrams and clear reasoning. Learn the theorem table, practise the solved examples here and save the free PDF for revision.

More Notes: Class 9 Maths Chapter 4: Exploring Algebraic Identities notes | Class 9 Maths Chapter 6: Measuring Space: Perimeter and Area notes | All Class 9 Maths notes

Author Bio: Written and reviewed by the Nextoper Editorial Team, a group of CBSE mathematics educators who build chapter notes directly from the NCERT textbook and past board paper patterns.

Freshness Note: These notes follow the NCERT Class 9 Maths textbook, Ganita Manjari (Parts I and II, first edition 2026, NCF-SE 2023), and the CBSE syllabus for the 2026-27 session. Last checked on 24 November 2026.