

# LESSON PLAN CLASS 9



| Class | Subject | Time Slot       | Lesson  | Topic                                             |
|-------|---------|-----------------|---------|---------------------------------------------------|
| IX    | Maths   | 35 Mins<br>1 Pd | Circles | Equal chords and their distances from the centre. |

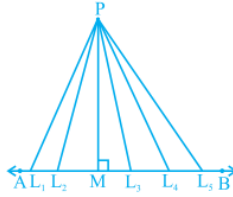
**Expected Learning Outcome :** The learners will be able to :

- Apply the theorem practically that equal chords are equidistant from the centre and vice-versa

**Expected skill development:**

- Logical thinking, Mathematical Skills.
- Computational Skills and Thinking skills while proving different statements.
- Representation skill while drawing the figure as per the requirement of the question.

**FLOW OF LESSON WITH RESPECT TO TIME** (Introduction/warm-up, Content, Think Line, Closure)

| Pedagogy                                                                                                                                                                                                                                                                                                                                                              | Content                                                                                                                                                                                                                                                                                                                                                           |
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| <p><b><u>(5 mins) Warm up</u></b><br/><b><u>Demonstration by Facilitator</u></b></p> <p>Let AB be a line and P be a point outside AB. Since, there are infinite numbers of points on a line, if you join these points to P you will get infinitely many line segments.</p> <p>Thinkline:<br/>Out of these line segments, which line segment will be the shortest?</p> |  <p>Out of these line segments, the perpendicular from P to AB, namely PM will be the shortest. The least length PM is the distance of AB from P. So, we may say that: The length of the perpendicular from a point to a line is the distance of the line from the point.</p> |
| <p><b><u>(20 mins) demonstration by Facilitator on board</u></b></p> <p>Facilitator will give proof of this fact:</p> <p><b>Theorem 10.6 :</b> Equal chords of a circle (or of congruent circles) are equidistant from the centre (or centres).</p> <p><b>Theorem 10.7 :</b> Chords equidistant from the centre of a circle are equal in length.</p>                  | <p>A circle can have infinitely many chords. You may observe by drawing chords of a circle that longer chord is nearer to the centre than the smaller chord.</p>                                                                                                                                                                                                  |

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| <p><b>(10 mins) In class Exercise – Closure</b></p> <p>Students will be reinforced to attempt Ex – 10.4 in the notebook. Facilitator will take round and give personal interventions.</p> | <ol style="list-style-type: none"> <li>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.</li> <li>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.</li> </ol> |
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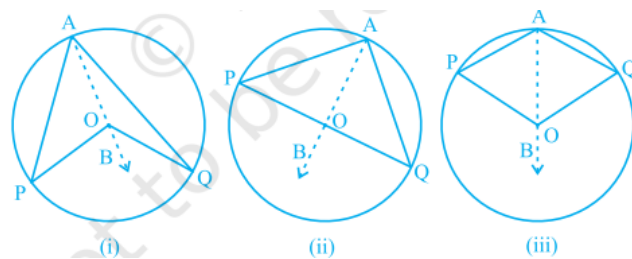
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| <p><b>Proposed Questions (must include the questions asked in the classroom <u>and</u> the ones given as class-work in the notebook)</b></p> <ol style="list-style-type: none"> <li>Two circles of radii 5 cm and 3 cm intersect at two points and the distance between their centres is 4 cm. Find the length of the common chord.</li> </ol> |                                                                                                                                                                                                                                                                                        |
| <p><b>Evaluation/Assessment:</b> Peer discussion will be done. Teacher will assess the children randomly and also through student teacher interaction.</p>                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                        |
| <p><b>Learners on the way</b></p> <p>Draw a circle. Draw two equal chords. Drop perpendiculars from the centre to the two chords. Measure the length of perpendiculars.</p>                                                                                                                                                                    | <p><b>Advanced Learners</b></p> <p>A circular park of radius 20m 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.</p> |
| <p><b>Materials needed/Resources: Chalk, blackboard, duster, NCERT Text Book</b></p>                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                        |
| <p><b>Common Misconceptions:</b></p>                                                                                                                                                                                                                                                                                                           | <p><b>Addressing the Misconceptions:</b></p>                                                                                                                                                                                                                                           |

**Home Assignment:** Attempt Q – 3,4 and 5 of Ex – 10.4 of NCERT Text Book Class 9.

| Class                                                                                                                                                                                                                                                                                                      | Subject | Time Slot       | Lesson  | Topic<br>P4                                                                                                             |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-----------------|---------|-------------------------------------------------------------------------------------------------------------------------|
| IX                                                                                                                                                                                                                                                                                                         | Maths   | 35 Mins<br>1 Pd | Circles | Relation between angle subtended by an arc of a circle at the centre and any point on the remaining part of the circle. |
| <b>Expected Learning Outcome :The learners will be able to :</b> <ul style="list-style-type: none"> <li>Prove that Angle subtended by an arc at the centre is double the angle subtended by it at any point on the remaining part of the circle.</li> </ul>                                                |         |                 |         |                                                                                                                         |
| <b>Expected skill development:</b> <ul style="list-style-type: none"> <li>Logical thinking, Mathematical Skills.</li> <li>Computational Skills and Thinkingskillswhileproving different statements.</li> <li>Representation skill whiledrawing the figureasper the requirement of the question.</li> </ul> |         |                 |         |                                                                                                                         |

**FLOW OF LESSON WITH RESPECT TO TIME (Introduction/warm-up, Content, Think Line, Closure)**

| Pedagogy                                                                                                                                                             | Content                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
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| <b>(5 Mins) Warm Up</b><br><b><u>Demonstration by Facilitator</u></b><br><br>Facilitator will present the following situation                                        | <p><i>If two chords of a circle are equal, then their corresponding arcs are congruent and conversely, if two arcs are congruent, then their corresponding chords are equal.</i></p> <p><i>Congruent arcs (or equal arcs) of a circle subtend equal angles at the centre.</i></p> <p>In fact, they are more than just equal in length. They are congruent in the sense that if one arc is put on the other, without bending or twisting, one superimposes the other completely. If two chords of a circle are equal, then their corresponding arcs are congruent and vice versa.</p> |
| <b><u>(25 mins) demonstration by Facilitator on board</u></b><br>The facilitator tell the proof of the theorem, learners will observe and write in their note books. | <p><b>Theorem 10.8 :</b> <i>The angle subtended by an arc at the centre is double the angle subtended by it at any point on the remaining part of the circle.</i></p> <p><b>Proof :</b> Given an arc PQ of a circle subtending angles POQ at the centre O and PAQ at a point A on the remaining part of the circle. We need to prove that <math>\angle POQ = 2 \angle PAQ</math>.</p>                                                                                                                                                                                                |



Consider the three different cases as given in Fig. 10.28. In (i), arc PQ is minor; in (ii), arc PQ is a semicircle and in (iii), arc PQ is major.

Let us begin by joining AO and extending it to a point B.

In all the cases,

$$\angle BOQ = \angle OAQ + \angle AQO$$

because an exterior angle of a triangle is equal to the sum of the two interior opposite angles.

Also in  $\triangle OAQ$ ,

$$OA = OQ \quad (\text{Radii of a circle})$$

$$\text{Therefore, } \angle OAQ = \angle OQA \quad (\text{Theorem 7.5})$$

$$\text{This gives } \angle BOQ = 2 \angle OAQ \quad (1)$$

$$\text{Similarly, } \angle BOP = 2 \angle OAP \quad (2)$$

$$\text{From (1) and (2), } \angle BOP + \angle BOQ = 2(\angle OAP + \angle OAQ)$$

$$\text{This is the same as } \angle POQ = 2 \angle PAQ \quad (3)$$

For the case (iii), where PQ is the major arc, (3) is replaced by  
reflex angle  $\angle POQ = 2 \angle PAQ$

### **(5 mins) In class Exercise: closure**

Students will be reinforced to prove the given theorem in the notebook. Facilitator will take round and give personal interventions.

**Theorem 10.9 :** *Angles in the same segment of a circle are equal.*

**Proposed Questions (must include the questions asked in the classroom and the ones given as class-work in the notebook)**

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.

**Evaluation/Assessment:** Peer discussion will be done. Teacher will assess the children randomly and also through student teacher interaction.

### Learners on the way

In Fig. 10.38,  $\angle ABC = 69^\circ$ ,  $\angle ACB = 31^\circ$ , find  $\angle BDC$ .

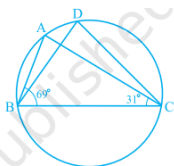


Fig. 10.38

### Advanced Learners

In Fig. 10.39, A, B, C and D are four points on a circle. AC and BD intersect at a point E such that  $\angle BEC = 130^\circ$  and  $\angle ECD = 20^\circ$ . Find  $\angle BAC$ .

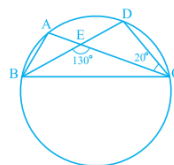


Fig. 10.39

**Materials needed/Resources:** Chalk, blackboard, duster, NCERT Text Book

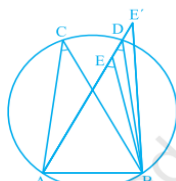
**Common Misconceptions:**

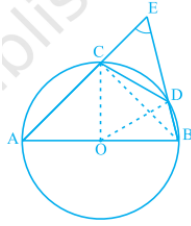
**Addressing the Misconceptions:**

**Home Assignment:** Attempt Q 1, 3 and 4 of Ex – 10.5 of NCERT Text Book Class 9

| Class                                                                                                                                                                                                                                                                                                                         | Subject | Time Slot       | Lesson  | Topic                      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-----------------|---------|----------------------------|
| IX                                                                                                                                                                                                                                                                                                                            | Maths   | 35 Mins<br>1 Pd | Circles | P5<br>Cyclic Quadrilateral |
| <p><b>Expected Learning Outcome :</b> The learners will be able to :</p> <p>Verify “ the sum of opposite angles of a cyclic quadrilateral is supplementary”</p>                                                                                                                                                               |         |                 |         |                            |
| <p><b>Expected skill development:</b></p> <ul style="list-style-type: none"> <li>• Logical thinking, Mathematical Skills.</li> <li>• Computational Skills and Thinking skills while proving different statements.</li> <li>• Representation skill while drawing the figure as per the requirement of the question.</li> </ul> |         |                 |         |                            |

**FLOW OF LESSON WITH RESPECT TO TIME (Introduction/warm-up, Content, Think Line, Closure)**

| Pedagogy                                                                                                                                                                 | Content                                                                                                                                                                                                                                                                                                                                             |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>(5 Mins) Warm Up</b><br/><b>Demonstration by Facilitator</b></p> <p>Facilitator will present the following situation</p>                                           | <p>Which of the following quadrilaterals are cyclic and why?</p>  <p>A Quadrilateral ABCD (join C to D) is called cyclic as all the four vertices of it lie on a circle.</p>                                                                                    |
| <p><b>(25 mins) demonstration by Facilitator on board</b></p> <p>The facilitator tell the proof of the theorem, learners will observe and write in their note books.</p> | <p><b>Theorem 10.11 :</b> The sum of either pair of opposite angles of a cyclic quadrilateral is <math>180^\circ</math>.</p> <p><b>Example :</b> In Fig. 10.32, AB is a diameter of the circle, CD is a chord equal to the radius of the circle. AC and BD when extended intersect at a point E. Prove that <math>\angle AEB = 60^\circ</math>.</p> |

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| <b>(5 mins) In class Exercise: closure</b><br><br>Students will be reinforced to prove the given theorem in the notebook. Facilitator will take round and give personal interventions. | <b>Theorem 10.10 :</b> <i>If a line segment joining two points subtends equal angles at two other points lying on the same side of the line containing the line segment, the four points lie on a circle (i.e. they are concyclic).</i> |

**Proposed Questions (must include the questions asked in the classroom and the ones given as class-work in the notebook)**

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

**Evaluation/Assessment:** Peer discussion will be done. Teacher will assess the children randomly and also through student teacher interaction.

|                                                                                                               |                                                                            |
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| <b>Learners on the way</b><br><br>What is the relation between the opposite angles of a cyclic quadrilateral? | <b>Advanced Learners</b><br>Prove that a Square is a Cyclic Quadrilateral. |
| <b>Materials needed/Resources:</b> Chalk, blackboard, duster, NCERT Text Book                                 |                                                                            |
| <b>Common Misconceptions:</b>                                                                                 | <b>Addressing the Misconceptions:</b>                                      |

**Home Assignment:** Attempt Q 6 and 8 of Ex – 10.5 of NCERT Text Book Class 9

# LESSON PLAN CLASS 9



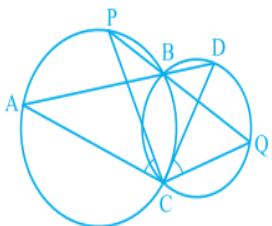
**DLF Public School**

THE LEARNING ACADEMY

Managed By Darbari Lal Foundation

| Class                                                                                                                                                                                                                                                                                                                  | Subject | Time Slot       | Lesson  | Topic     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-----------------|---------|-----------|
| IX                                                                                                                                                                                                                                                                                                                     | Maths   | 35 Mins<br>1 Pd | Circles | Ex – 10.5 |
| <b>Expected Learning Outcome :</b> The learners will be able to :<br>Solve all the problems based on the properties of a cyclic quadrilateral.                                                                                                                                                                         |         |                 |         |           |
| <b>Expected skill development:</b> <ul style="list-style-type: none"> <li>• Logical thinking, Mathematical Skills.</li> <li>• Computational Skills and Thinking skills while proving different statements.</li> <li>• Representation skill while drawing the figure as per the requirement of the question.</li> </ul> |         |                 |         |           |

## FLOW OF LESSON WITH RESPECT TO TIME (Introduction/warm-up, Content, Think Line, Closure)

| Pedagogy                                                                                                                                                                                        | Content                                                                                                                                                                                                                                                                                                                                                                                                                                       |
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| <b>(10 Mins) Warm Up</b><br><b><u>Demonstration by Facilitator</u></b><br><br>Thinkline<br><br>How would you prove that a cyclic parallelogram is a rectangle?                                  | Q1- Prove that the quadrilateral formed by the internal bisectors of any quadrilateral is cyclic.                                                                                                                                                                                                                                                                                                                                             |
| <b><u>(25 mins) demonstration by Facilitator on board</u></b><br>Learners will be reinforced to attempt Ex – 10.5 in the notebook. Facilitator will take round and give personal interventions. | <p>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 Fig. 10.40). Prove that <math>\angle ACP = \angle QCD</math>.</p>  <p>ABC and ADC are two right triangles with common hypotenuse AC. Prove that <math>\angle CAD = \angle CBD</math>.</p> |

**Proposed Questions (must include the questions asked in the classroom and the ones given as class-work in the notebook)**

ABC and ADC are two right triangles with common hypotenuse AC. Prove that  $\angle CAD = \angle CBD$ .

**Evaluation/Assessment:** Peer discussion will be done. Teacher will assess the children randomly and also through student teacher interaction.

**Learners on the way**

**Advanced Learners**

**Materials needed/Resources:** Chalk, blackboard, duster, NCERT Text Book

**Common Misconceptions:**

**Addressing the Misconceptions:**

**Home Assignment:**

10. 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.
12. Prove that a cyclic parallelogram is a rectangle.