LESSON PLAN 9						
CLASS: 9 SUBJECT : MATHEMATICS T	EACHER'S NAME :					
NAME OF THE UNIT	SUB-TOPICS	NO OF PERIODS REQUIRED		Time line for teaching		
	501-101103	Teaching	Practice	TOTAL	From	То
	9.1 ANGLE SUBTENDED BY A CHORD AT A POINT	2	2	4		
CIRCLES	9.2 PERPENDICULAR FROM A CENTRE TO A CHORD	1	2	3		
	9.3 EQUAL CHORDS AND THEIR DISTANCES FROM CENTRE	2	2	4		
	9.4 ANGLE SUBTENDED BY AN ARC OF CIRCLE	2	2	4		
	9.5 CYCLIC QUADRILATERALS	2	2	4		
	TOTAL	9	10	19		
PRE-REQUISITES & & SKILLS BKILLS BKILLS Complementary angles, supplementary angles, perpendicular, parallel etc., # Usage of Mathematical instrument box						

Learning Outcomes

After Completion of this lesson every student will be able to

recognize that equal chords subtend equal angles at the centre and vice versa.

apprehend that perpendicular from the centre of a circle bisects the chord and vice versa & equal chords of a circle are equidistant from centre and vice versa.

understand and utilize the property "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"

utilize the property "Angles in the same segment of a circle are equal" in usual sums wherever necessary.

discriminates the differences between a normal quadrilateral and a cyclic quadrilateral and identifies the special quality which makes a quadrilateral cyclic.

appriciate the beauty of circles and its different properties in geometry and real life sums

Teaching Learning Process INTRODUCTION /INDUCTION Experience & Reflection Teacher introduces the chapter of circles by recalling their previous # Pupils will recollect their knowledge on Circle and its knowledge on circles and its related terminology and parts like radius, diameter, properties and utilize that in exploring and learning new centre, chord, arc etc., by showing some models and pictures concepts of Circles # Students will experience the usage of the different properties of circle and appreciate their usage. Parts of a circle Parts of a Circle Radius Sector Arc Segment Tangeni Segment Chord Arc Diameter Tangent Chord Circumference Diameter Sector Cente Secani Circumference+

EXPLICIT TEACHING/TEACHER MODELLING (I DO)	GROUP WORK (WE DO)	INDEPENDENT WORK (YOU DO)	NOTES
9.1. Angle subtended by a chord at a	Pupils will work in groups and try to recall	Every individual will	Proofs of theorem 9.1 to 9.2 along
point	their previous apprehensions on various	participate in the activiy	with associated examples and
Teacher first explains what does it	properties of a circle and will try to	and learns the way of	exercise 9.1
mean by the angle subtended by a	understand these new properties through	proving	
chord at a point and later explains	discussion	Equal chords of a circle subtend equal angles at the center.	
the thoerem 9.1 : Equal chords of a circle subtend equal angles at the centre along with theorem 9.2 : Its converse.		Equal chords of a circle subtend equal angles at the center. Given: A circle with center O. AB and CD are equal chords of circle i.e. $AB = CD$ To Prove : $\angle AOB = \angle DOC$ Proof : In $\triangle AOB \& \Delta DOC$ AO = OD (Radius) AB = CD (Given) OB = OC (Radius) $\therefore \ \triangle AOB \cong \Delta \ DOC$ (SSS rule) $\therefore \ \angle AOB \cong \angle DOC$ (CPCT) Hence, Proved.	

EXPLICIT TEACHING/TEACHER MODELLING (I DO)	GROUP WORK (WE DO)	INDEPENDENT WORK (YOU DO)	NOTES
9.2 Perpendicular from a centre to a	Pupil groups will participate in the activity	Every individual will	Proofs of theorem 9.3 to 9.4 along
chord	and learn the concept and try to	participate in the activiy	with associated examples and
Teacher gives the proof of the	synchronize it with the proof by discussion	and learns the way of	exercise 9.2
theorem "The perpendicular from		proving	
the centre of a circle to a chord			
bisects the chord" by conducting a	The perpendicular from the center of a circle to a chord bisect the chord.		
simple activity involving pupil			
groups where groups are given	Silven : C is a circle with center at D, AB is a chord such that CX 1 AB To Prove : CX bisect chord AB i.e. AX = 5X 0		
circles with different radii and			
chords and are asked to draw a			
perpendicular from centre to the			
chord in each case. Now Pupils are	Proof ;	ند) د	τ
asked to check the lengths of both	In AOAX & AOE	BX A	h is
line segements formed in the chord	<0%A = 20%	B (Both SOT, area)	
after the perpendicular intersection.	04 = DB	(Both Nachus)	
After having apprehension on the	CX = CX	(Lammaa)	
concept teacher gives the proof	AOAX = ADBX	(RHS Rule)	
along with its converse	AX = BX	(CPC7)	
	Hence, Proved,		

EXPLICIT TEACHING/TEACHER MODELLING (I DO)	GROUP WORK (WE DO)	INDEPENDENT WORK (YOU DO)	NOTES
9.3 Equal chords and their distances from Centre	Pupils groups can easily understand the concept using geoboard and confirm the	Every pupil is focused to learn the concept by	Proofs of theorem 9.5 & 9.6 along with examples and exercise sums
	authenticity of the theorem by proving	indulging them in doing	of 9.2
different theorems 1) Equal chords	themselves through discussion	the acivity	
of a circle (or of congruent circles) are equidistant from the	Now, given that	fords equidistant from th	e centre of a circle are equal in length.
centre (or centres)	$\frac{AB}{2} = \frac{CD}{2}$	<u>Given</u> : C is a circle with ce	nter at 0.
centre of a circle are equal in length	AX = DY (From (1) and (2))(3)	AB and CD are two Chords of the circle where OX is distance from center i.e. OX ⊥ AB	
using Geoboard and later explains the concept literally by proving.	In \triangle AOX and \triangle DOY	& OY is distance from cent	eri.e. OY 1 CD
	$\angle OXA = \angle OYD \qquad (Both 90^\circ, given)$ $OA = OD \qquad (Radius)$ $AX = DY \qquad (From (1))$ $B \qquad C$	<u>To Prove</u> : AB = CD	x b v v
	$\therefore \Delta AOX \cong \Delta DOY \qquad (by R.H.S rule)$	<u>Proof</u> : In $\triangle AOX$ and $\triangle DOY$	вС
	Hence, Proved.	∠OXA = ∠OYD (Both S OA = OD (Radiu OX = OY (Given	90°, given) s))
		$\therefore \Delta AOX \cong \Delta DOY (By R.H. AX = DY (CPCT)$	S rule) (1)

EXPLICIT TEACHING/TEACHER MODELLING (I DO)	GROUP WORK (WE DO)		INDEPENDENT WORK (YOU DO)	NOTES
9.4 Angle subtended by an arc of a circle Teacher gives the proof of 3 different theorems 1) The angle subtended by an arc at the centre is	Pupils groups can easily understand concept using geoboard and conf authenticity of the theorem by p themselves through discussi	and the firm the proving fon	Every pupil is focused to learn the concept by indulging them in doing the acivity	Proofs of theorem 9.7 to 9.9 along with examples and exercise sums of 9.3
double the angle subtended by it at any point on the remaining part of the circle 2) Angles in the same segment of a circle are equal 3) 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) using Geoboard and later explains the concept literally by proving.	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. Given : A circle with center at 0. Arc PQ of this circle subtends angles POQ at centre 0. 8 \pm PAQ at a point A remaining part of circle. To Prove : \pm POQ = \pm 2000 Construction : Join AO and extend it to point B Proof: There are two general cases arc = 1	<u>Proof</u> : Chord PQ subtend From Theorem angle subtended by ∴ ∠ POQ = 2∠PAQ From (1) and (2 2∠PBQ = 2∠ ∠ PBQ = ∠PA Hence, Proved.	∠PBQ s ∠ POQ at the center Angle subtended by an arc at the centre is double the it at any other point on circle (1) ∠POQ = 2∠PBQ(2)) PAQ AQ	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). Given : A, B, C and D are 4 points (no 3 are collinear) AB subtends equal angles at C and D Le. ZACB = ZADB. To Prove : A, B, C and D are concylic Proof : Since A, B, C are non-collinear One circle passes through three collinear points Let us draw a circle C, with centre at O Let us assume D does not lie on C,

EXPLICIT TEACHING/TEACHER MODELLING (I DO)	GROUP WORK (WE DO)	INDEPENDENT WORK (YOU DO)	NOTES
9.5 Cyclic Quadrilaterals Teacher conducts an activity by groupin chilren. Each groups is instructed to draw circles of different radii and are asked to mark 4 different points on each circle and make a quadrilateral in each case. Now pupils are instructed to measure the angles of each quadrilateral and observe the measures of opposite angles in each case .Now teacher gives the proof of 2 different theorems " The sum of either pair of opposite angles of a cyclic quadrilateral is 180°." and its converse	Pupils groups can easily understand the concept usingactivity and confirm the authenticity of the theorem by proving themselves through discussion the sum of a quadrilateral is <u>Given</u> : ABCD is a $\angle BAC + \angle \angle \angle ABD + \angle d$ <u>Prove</u> : ABCD is a cycl <u>Proof</u> : Since A, B, C are One circle passes throug Let us draw a circle C ₁ with	Every pupil is focused to learn the concept by indulging them in doing the acivity pair of opposite angles of a quad cyclic. quadrilateral such that CBDC = 180° DCA = 180° lic quadrilateral e non-collinear th three collinear points h centre at O	Proofs of theorem 9.10 to 9.11 along with examples and exercise sums of 9.3 drilateral is 180°, th
	r us assume D does not li	ie on C ₁	

	CHECK FOR UNDERSTANDING QUESTIONS
	1) Two circles of radii 5 cmand 3 cm intersect at two points and the distance between their
1. Factual	centres is 4 cm. Find the length of the common chord.
	2) Prove that if chords of congruent circles subtend equal angles at their centres, then the
	1) Three girls Reshma, Salma and Mandip are playing a game by standing on a circle of radius 5m 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 6m each, what is the distance between Reshma and
2. Open Ended/Critical Thinking	Mandip?
2. open Endewerntieur Enniking	2) ABCD is a cyclic quadrilateral whose diagonals intersect at a point E. If $LDBC=70^{\circ}$,
	LBAC is 30°, find LBCD. Further, if AB = BC, find LECD
	1. If the non-parallel sides of a trapezium are equal, prove that it is cyclic
3.Student Practice questions & Activities	2.Prove that a cyclic parallelogram is a rectangle
4. Assessment	Exercise sums and worksheet on Circles