

CLASS: X

SUBJECT: MATHEMATICS

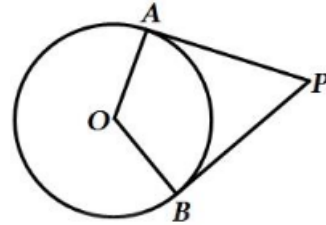
TOPIC	CIRCLES
PREREQUISITE KNOWLEDGE	Basic knowledge of circle, Pythagoras theorem.
OBJECTIVES	Children will be able to : • define various terminologies. • find length of tangents drawn to a circle. • find the radius of a circle. • find the angle formed between two tangents of a circle. • prove theorems related to circles.
THE HISTORY OF CIRCLES	 The word circle derives from the Greek κύκλος/κύκλος (kirkos/kuklos), itself a metathesis of the Homeric Greek κρίκος (krikos), meaning "hoop" or "ring".^[2] The origins of the words circus and circuit are closely related. The circle has been known since before the beginning of recorded history. Natural circles would have been observed, such as the Moon, Sun, and a short plant stalk blowing in the wind on sand, which forms a circle shape in the sand. The circle is the basis for the wheel, which with related inventions such as gears, makes much of modern machinery possible. In Mathematics, the study of the circle has

	helped inspire the development of geometry, astronomy and calculus. Early Science, particularly geometry and astrology and astronomy, was connected to the divine for most medieval scholars, and many believed that there was something intrinsically "divine" or "perfect" that could be found in circles. Some highlights in the history of the circle are: • 1700 BCE – The Rhind papyrus gives a method to find the area of a circular field. The result corresponds to $256/81$ (3.16049...) as an approximate value of π.  Tughrul Tower from inside • 300 BCE – Book 3 of Euclid's <i>Elements</i> deals with the properties of circles. • In Plato's Seventh Letter there is a detailed definition and explanation of the circle. Plato explains the perfect circle, and how it is different from any drawing, words, definition or explanation. • 1880 CE – Lindemann proves that π is transcendental, effectively settling the millennia-old problem of squaring the circle.
SUMMARY OF THE CHAPTER	Circle: A circle is collection of all points in a plane which are at constant distance (called radius) from a certain fixed point (called centre). Tangent: A tangent is a line that intersects the circle in exactly one point. The word tangent owes its origin to the latin word

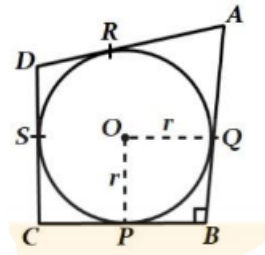
	<i>tangere</i>, which means to touch and it was introduced by Thomas Fineke (1583), a Danish Mathematician. Secant: A secant to a circle is a line which intersects the circle at two distinct points. Chord: a chord is a line segment joining any two points on a circle. Diameter is the longest chord of the circle. Point of contact: The common point of the tangent and the circle is called the point of contact. Length of tangent: The length of the segment of the tangent from the external point and the point of contact with the circle is called the length of the tangent.
TRANSACTION METHODOLOGY	ACTIVITY Children will be told to draw a circle on a paper using a compass and a secant passing through the centre of the circle. Then they will be asked to draw various lines parallel to the secant on both sides of it. OBSERVATION : Children will observe that the length of the chord goes on decreasing continuously as it moves towards the circumference of the circle. Children will also observe that at one juncture the two end points of the chord will meet or coincide with each other and is known as point of contact.
THEOREMS	1) The tangent at any point of a circle is perpendicular to the radius through the point of contact. 2) The length of the tangents drawn from an external point to a circle are equal.
EXPECTED LEARNING OUTCOMES	Children will be able to : • Define various terms used in the topic. • Apply the theorems in the given questions. • Find length of the tangent and the radius
PRACTICE QUESTIONS	1) The length of the tangent from a point A at a distance of 5cm from the centre of the circle is 4cm. What is the radius of the circle? 2) If PT is a tangent drawn from a point P to a circle touching it at T and O is the centre of the circle then find $\angle OPT + \angle POT$. 3) If the angle between two tangents drawn from an external point P to a

circle of radius a and centre O , is 60° , then find the length of OP .

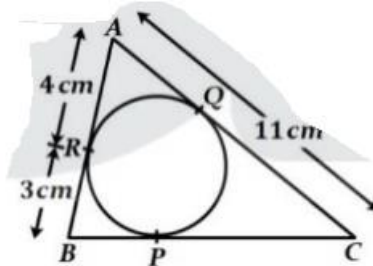
- 4) In the given figure PA and PB are tangents to a circle with centre O . If $\angle APB = (2x + 3)^\circ$ and $\angle AOB = (3x + 7)^\circ$, then find the value of x .



- 5) In the following figure, a circle with centre O is inscribed in a quadrilateral $ABCD$ such that, it touches the sides BC , AB , AD and CD at points P , Q , R and S respectively. If $AB=29$ cm, $AD=23$ cm, $\angle B=90^\circ$ and $DS=5$ cm, find the radius of the circle.



- 6) In the following figure, $\triangle ABC$ is circumscribing a circle. Find the length of BC .



EVALUATION

Class Test, Extra Questions, Lab Manual Activity, Oral Questions.