

Brief Description (Objective): The student will be able to apply his/her knowledge about the various theorems on circles and cyclic quadrilaterals to solve problems.

Teaching Aids Provided: NA

Notes to the Teacher: The teacher may use these questions and interactively elicit the answers from the students thereby enhancing their problem solving ability.

Q1. Choose the correct answer in each of the following:

1. The radius of a circle is 17 cm and the length of one of its chords is 30 cm. What is the distance of the chord from the centre?
 - a. 8 cm
 - b. 64 cm
 - c. 4 cm
 - d. 16 cm

Answer: a. 8 cm

Method:

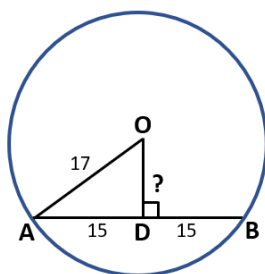


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(Notes to the Teacher: The teacher may ask the students to draw a rough circle with centre O, a chord AB and mark $OD \perp AB$. They may mark the measurements given. They will have to use the theorem that the perpendicular from the centre of a circle to a chord bisects the chord to get the value of AD. Then they have to apply Pythagoras theorem on right $\triangle OAD$ to get the value of OD which is the distance of the chord from the centre)

2. A chord is at a distance of 12 cm from the centre of a circle of radius 13 cm. What is the length of the chord?
 - a. 25 cm
 - b. 50 cm
 - c. 5 cm
 - d. 10 cm

Answer: d. 10 cm (Method is similar to that in previous question)

3. Which of the following figures can be a cyclic quadrilateral?
 - a. A parallelogram ABCD where $\angle A = 45^\circ$.

- b. A square PQRS
- c. A rhombus DEFG where $\angle D = 100^\circ$
- d. None of the above

Answer: b. A square PQRS.

Reason:

A quadrilateral will be cyclic only if the sum of either pair of opposite angles is 180°

In a parallelogram opposite angles are equal. So $\angle A + \angle C = 45^\circ + 45^\circ = 90^\circ$

Similarly, in the rhombus $\angle D + \angle F = 100^\circ + 100^\circ = 200^\circ$

So both ABCD and DEFG cannot be cyclic quadrilaterals

In the case of a square, each angle is 90° . So opposite angles are supplementary. Hence it can be a cyclic quadrilateral.

QII. Answer the following:

- The following figure represents a circular plot of land that is vacant. A, B and C represent the homes of 3 caretakers of the plot. These 3 caretakers live at an equal distance of 420 metres from each other. What is the area of the plot?

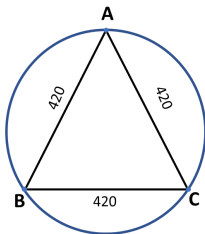


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Given: $AB = BC = CA = 420$

To find: Area of circle.

Solution:

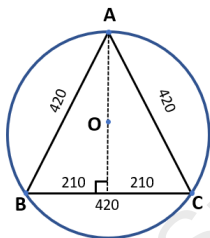


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Let O be the centre of the circle.

$\triangle ABC$ is equilateral and it is inscribed in the circle.

O represents the circumcentre and the centroid of this triangle. (In an equilateral triangle the circumcentre and the centroid coincide).

AD is the median from A to BC and also the perpendicular bisector of BC.

$\therefore \triangle ADB$ is right angled at D.

$$\therefore AB^2 = AD^2 + BD^2$$

$$420^2 = AD^2 + 210^2$$

$$420^2 - 210^2 = AD^2$$

$$210\sqrt{3} = AD$$

AO : OD = 2 : 1 (Centroid divides median in the ratio 2 : 1)

Let AO = 2x

$$\Rightarrow OD = x$$

$$AO + OD = AD$$

$$3x = 210\sqrt{3}$$

$$x = 70\sqrt{3}$$

$$\text{Radius of the circle} = AO = 2x = 140\sqrt{3}$$

$$\begin{aligned} \text{Area of the plot} &= \frac{22}{7} \times (140\sqrt{3})^2 \\ &= \frac{22}{7} \times 140 \times 140 \times 3 \\ &= 184800 \text{ sq. m} \end{aligned}$$

2. In the given figure, PQRS is a cyclic quadrilateral in which PQ $\parallel$ SR. If $\angle SPQ = 110^\circ$, find
(i) $\angle QRS$ (ii) $\angle RSP$ and (iii) $\angle PQR$

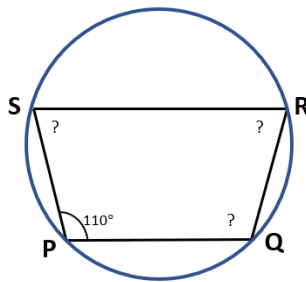


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Solution:

- (i) $\angle SPQ + \angle QRS = 180^\circ$ (Opposite angles of a cyclic quadrilateral are supplementary)

$$110^\circ + \angle QRS = 180^\circ$$

$$\therefore \angle QRS = 70^\circ$$

- (ii) PQ $\parallel$ SR and SP is a transversal.

$$\angle SPQ + \angle RSP = 180^\circ \text{ (Interior angles on the same side of the transversal are supplementary)}$$

$$110^\circ + \angle RSP = 180^\circ$$

$$\therefore \angle RSP = 70^\circ$$

- (iii) $\angle PSR + \angle PQR = 180^\circ$ (Opposite angles of a cyclic quadrilateral are supplementary)

$$70^\circ + \angle PQR = 180^\circ$$

$$\therefore \angle PQR = 110^\circ$$

3. In the following figure, O is the centre of the circle and $\angle DAB = 140^\circ$. Find $\angle BDC$.



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Annexure to Master Lesson Plan

What is the purpose of this Master lesson Plan?	This Master Lesson Plan (MLP) prepared by Sri Sathya Sai Vidya Vahini (SSSVV), covers the entire chapter for the given board. The MLP for the chapter given in the textbook is broken down into smaller modules known as assets. Any chapter can be taught using the 7 asset types in SSSVV methodology. Several different assets together complete the entire chapter. Depending on the requirement, each asset is supported by teaching aids such as animated presentation, audio, video, and learning aids such as worksheets. The MLP is for the teacher's preparation and the teaching aids are for use in the classroom.
How to use it?	You can prepare for your class with this MLP by following 3 simple steps: 1. Read your textbook; 2. Go through the information given in the assets (document & multimedia); 3. Prepare your teaching notes. Great! Now you are ready to transact the chapter.
Duration	Kindly note the duration given for each asset. Due care has been taken in planning the assets, to ensure the chapter is completed within the time specified by the Board. Note: Preparation time is not included in the asset duration. The teaching time depends on the duration of the teaching aids and is not impacted by the length of the MLP.
What is a 'Main Script' (MS) Asset?	The Main Script asset is there for explaining the main concepts of the chapter clearly. The information given in the textbook is simplified, organised and structured to give more clarity. Additionally, you may find a video or mnemonics or a graphic organiser to deepen the understanding of the concept.
How to teach using the MS asset?	Please use the blackboard, slides and interaction to develop the concept.
What is an 'Inquisitive Questions' (IQ) asset?	The Inquisitive Questions asset uses questions to promote higher order thinking like the n th why, what-if, new perspectives, cause-effect, and others, creating curiosity.
How to teach using the IQ asset?	You may use the questions to connect with the students, encourage exploration to engage them in the learning process. You may allow multiple responses and instead of rejecting any of the responses, ask why, before revealing the suggested answer or hints.
What is a 'Day to day Relevance' (DD) Asset?	The Day to Day Relevance asset helps students understand the practical relevance of every topic, making them eager participants in the classroom. If students connect the concepts to their environment, they would learn meaningfully without dislike or simply memorizing for exams.
How to teach using the DD	You may use the asset by asking questions about their experience and use it to establish why they are learning the topic. If necessary you may substitute with a

asset?	recent or local example.
What is an 'Interesting Aside' (IA) asset?	The Interesting Aside asset uses attention grabbing tidbits or anecdotes to bring joy and satisfy the child's hunger to know more. This is a quick/short asset intended to bring attention back to the main concept being taught.
How to teach using the IA asset?	You may use this asset to give a piece of interesting information relevant to the topic, without prolonged explanation/discussion. You may suggest appropriate books for further reading.
What is a 'Suggested Activity' (SA) Asset?	The Suggested Activity asset provides a detailed step by step procedure for the teacher to conduct a hands-on activity. This promotes Activity Based Learning.
How to teach using the SA asset?	You may use this asset to energise your students to learn by doing simple, fun-filled activities based on the topic. The asset includes - preparation, activity, and follow-up. You may engage the students in the preparation and follow-up stages to develop collaboration and responsibility. You could try it once, yourself, before the actual delivery to be more comfortable with it. Note: The duration mentioned in the asset is usually for the activity part only.
What is a 'Value Content' (VC) Asset?	The Value Content asset integrates Universal Human Values (such as empathy, inclusivity, respect for nature that translates into responsible behaviour) seamlessly into the curriculum, as the "End of education is character".
How to teach using the VC asset?	You may use this asset to engage with the students to bring out their innate values and connect with the intrinsic values in the topic/concept. The asset includes pointers on the specific pedagogical technique followed.
What is a 'Questions to Assess' (QA) asset?	The Questions to Assess asset uses an interactive approach to check learning of different types of learners, and provides feedback to the teacher for appropriate action. The questions cater to all the levels of Bloom's Taxonomy. Questions from 'Apply' level and above enable students to reflect on their learning.
How to teach using the QA asset?	You may go through the slides to understand its flow and know when to click for the answer (slides include suggested answers). While presenting in the class, you may display the question and encourage multiple responses, before revealing the answer. In some cases, this asset may include extra questions/worksheet that can be given as homework.