

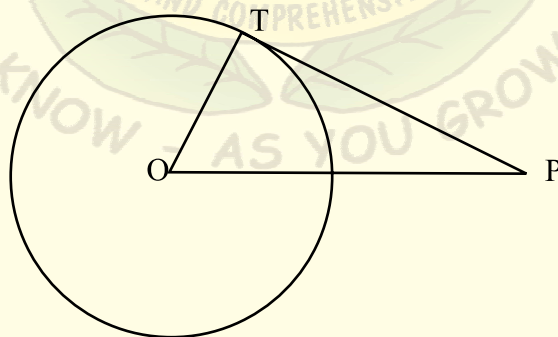
## CHAPTER-10

### Circles

#### Task-1

Topic	Circles
Nature of task	Content
Content Coverage	Tangent to a circle is perpendicular to the radius through the point of contact
Learning Objectives	To apply the knowledge of above theorem in solving questions
Task	Solve
Execution of task	Teacher may ask students to recall the theorem and apply in the given set of questions.
Duration	1 period
Criteria for assessment	It is a diagnostic task. Teacher would come to know the knowledge and understanding of theorem.
Follow up	Teacher may ask the students to learn the basics and try questions once again.

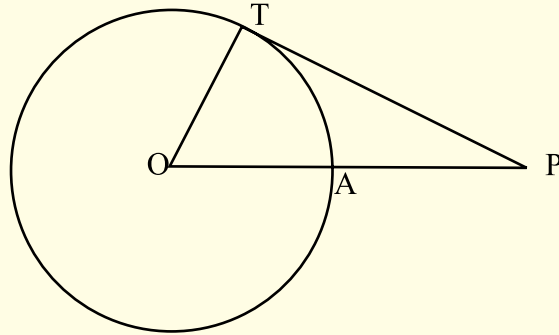
**Q.1.** PT is tangent to a circle with centre O,  $OT = 56\text{cm}$ ,  $TP = 90\text{cm}$ , find OP.



Which theorem have you used?



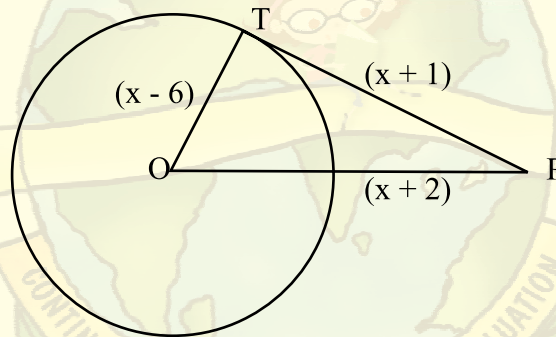
**Q.2.** PT is tangent to a circle with centre O,  $PT = 36\text{cm}$ ,  $AP = 24\text{cm}$ . Find the radius of the circle.



**Q.3.** From a point P, 10cm away from the centre of a circle, a tangent PT of length 8cm is drawn. Find the radius of the circle.

**Q.4.** Draw a circle with centre O. Draw diameter AB. Now, draw tangents at the end points of diameter. Are these parallel or intersecting? Justify your answer.

**Q.5.** Find the actual lengths of sides of  $\triangle OTP$ .



### Follow up Questions for practice

**Q.1.** TP and TQ are the two tangents to a circle with centre O so that angle

$$\angle POQ = 130^\circ. \text{ Find } \angle PTQ.$$

**Q.2.** From a point Q, the length of the tangent to a circle is 40 cm and the distance of Q from the centre is 41cm. Find radius of the circle.

**Q.3.** The common point of a tangent to a circle with the circle is called \_\_\_\_\_.

**Q.4.** The length of a tangent from a point A at a distance 5 cm from the centre is 4 cm. Find the radius of the circle.

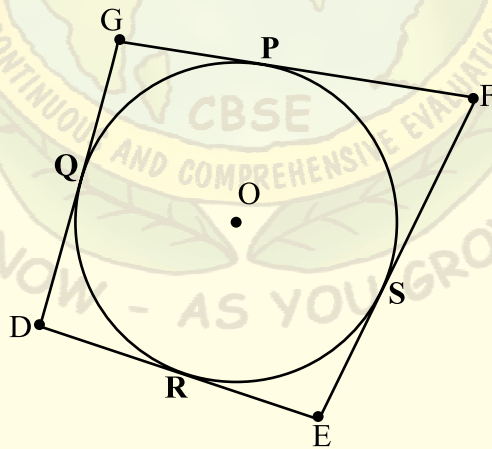


**Task-2: Observe and Answer**

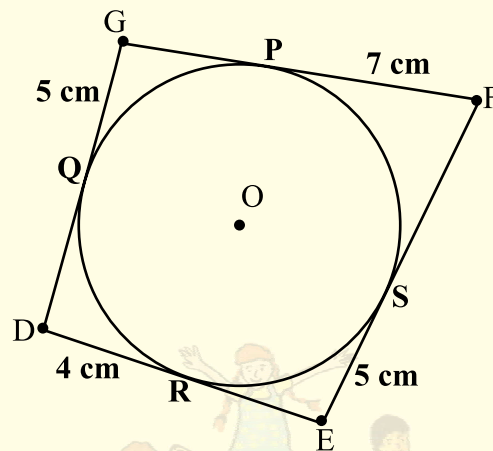
Topic	Circles
Nature of task	Content
Content Coverage	Lengths of tangents from an external point to a circle are equal
Learning Objectives	To apply the knowledge of above theorem in solving questions
Task	Solve
Execution of task	Teacher may ask students to recall the theorem and apply in the given set of questions.
Duration	1 period
Criteria for assessment	It is a diagnostic task. Teacher would come to know the knowledge and understanding of theorem.
Follow up	Teacher may ask the students to learn the basics and try questions once again.

(A) Observe and answer

Observe the given figure and write 4 observations.

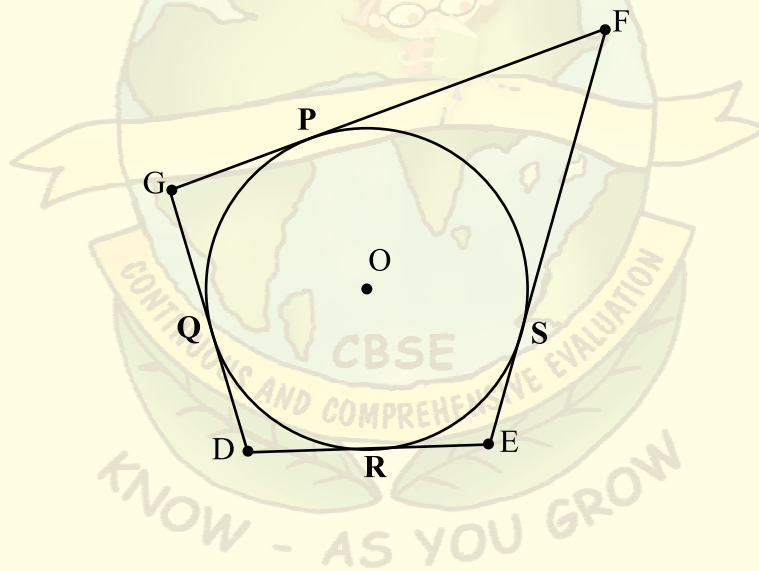


(B) Find the perimeter of DEFG.

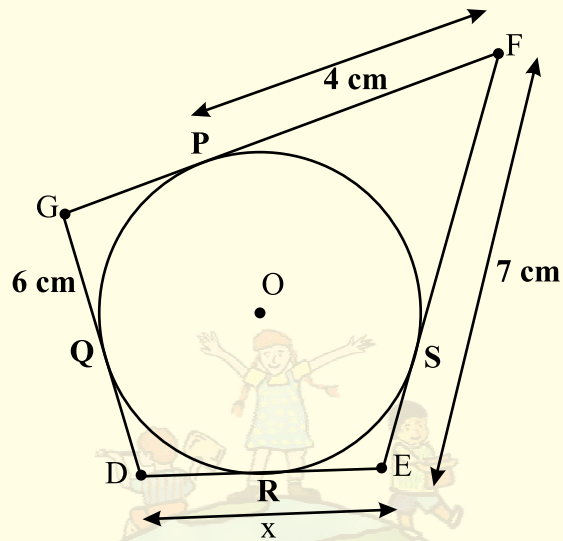


Write the result used.

(C) Observe the given figure and write four observations.



(D) In the given figure, find  $x$ .



### Task-3: Home Assignment

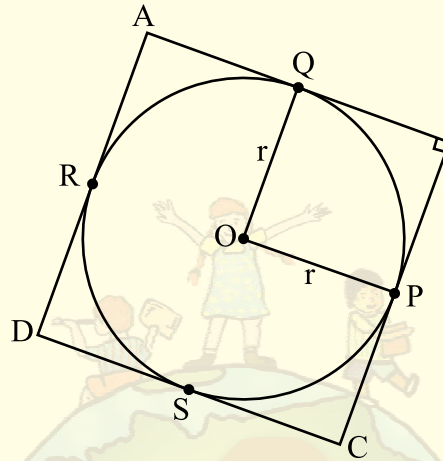
Topic	Circles
Nature of task	Post Content
Content Coverage	Complete chapter
Learning Objectives	To apply the knowledge of theorems and results learnt in the chapter
Task	Solve
Execution of task	Teacher may ask students to do the home assignment.
Duration	2 days
Criteria for assessment	Follow C.W/H.W/Assignment rubric
Follow up	–

### Home Assignment

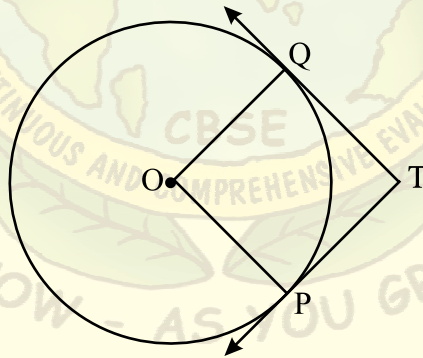
- Q.1.** Prove that in two concentric circles, the chord of the bigger circle, which touches the smaller circle, is bisected at the point of contact.
- Q.2.**  $\triangle PQR$  circumscribes a circle of radius  $r$  such that angle  $Q = 90^\circ$ ,  
 $PQ = 3$  cm and  $QR = 4$  cm. Find  $r$ .
- Q.3.** Prove that the parallelogram circumscribing a circle is a rhombus.



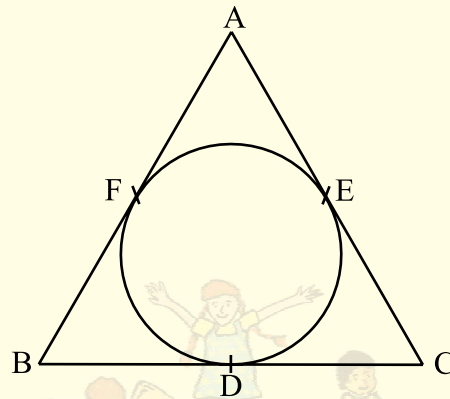
- Q.4.** ABC is an isosceles triangle, in which  $AB = AC$ , circumscribed about a circle. Show that BC is bisected at the point of contact.
- Q.5.** In Fig., a circle is inscribed in a quadrilateral ABCD in which angle  $B = 90^\circ$ . If  $AD = 23$  cm,  $AB = 29$  cm and  $DS = 5$  cm, find the radius ( $r$ ) of the circle.



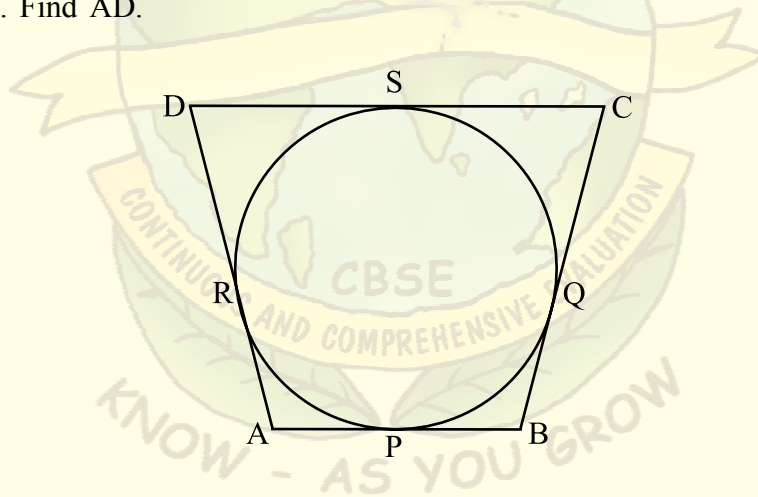
- Q.6.** An isosceles triangle ABC is inscribed in a circle. If  $AB = AC = 13$  cm and  $BC = 10$  cm, find the radius of the circle.
- Q.7.** Two tangents TP and TQ are drawn from external point T to a circle with centre O, as shown in fig. If they are inclined to each other at an angle of  $100^\circ$  then what is the value of angle POQ?



- Q.8.** The incircle of  $\triangle ABC$  touches the sides  $BC$ ,  $CA$  and  $AB$  at  $D$ ,  $E$  and  $F$  respectively. If  $AB = AC$ , prove that  $BD = CD$ .



- Q.9.**  $XP$  and  $XQ$  are tangents from  $X$  to the circle with centre  $O$ .  $R$  is a point on the circle. Prove that,  $XA + AR = XB + BR$ .
- Q.10.** If all the side of a parallelogram touches a circle, show that the parallelogram is a rhombus.
- Q.11.** A circle touches all the 4 sides of a quadrilateral  $ABCD$  with  $AB = 6$  cm,  $BC = 7$  cm &  $CD = 4$  cm. Find  $AD$ .



- Q.12.**  $TP$  and  $TQ$  are tangents to a circle with centre  $O$  at  $P$  and  $Q$  respectively.  $PQ = 8$  cm and radius of circle is 5 cm. Find  $TP$  and  $TQ$ .





# CHAPTER-11

## Constructions

### Learning Objectives :

- To learn to divide a line segment internally in a given ratio.
- To construct a triangle similar to a given triangle as per given scale factor which may be less than 1 or greater than 1.
- To construct the pair of tangents from an external point to a circle.

### Suggested Formative Assessment Tasks

#### Task-1: Class Worksheet / Oral Assessment

Topic	Constructions.
Nature of Task	Pre-Content
Content Coverage	Basic concepts like construction of triangles, scale factor.
Task	Class Worksheet
Execution of task	<ul style="list-style-type: none"><li>● This task may be performed in the classroom in the first 10 minutes of a teaching period. A small worksheet containing short questions may be given. They would be then asked to write the answers to questions.</li><li>● In one period, oral assessment may be done in groups.</li></ul>
Duration	<ul style="list-style-type: none"><li>● 10 minutes for Worksheet.</li><li>● 1 period for oral assessment.</li></ul>
Criteria for assessment	Teacher may ask questions in groups and observe the level of understanding. It is not necessary to give marks for this assessment. It may be used for diagnostic purpose.

#### Class Worksheet / Oral Assessment

1. Is it possible to construct a triangle with sides 3 cm, 4 cm and 8 cm ?
2. What are the instruments to be used in performing constructions?





3. When are two angles equal ? Can you make an angle equal to a given angle with the use of compass & unmarked ruler only ?
4. When do you say a line is the perpendicular bisector of another line ?
5. What is the sum of the angles of a triangle ?
6. The exterior angle of a triangle is equal to sum of the \_\_\_\_\_.
7. What are the adjacent sides and adjacent angles of a triangle ?
8. Out of angles of  $35^\circ$ ,  $40^\circ$ ,  $57^\circ$  and  $75^\circ$ , which can be made with the help of a ruler and compass ?
9. What are the different criteria for construction of a triangle ?
10. What do you understand by similar triangles ?
11. What is a tangent ?
12. What can you say about the length of tangents from an external point to a circle?

### Task-2: Class Worksheet

Topic	Constructions.
Nature of task	Content
Content Coverage	Scale factor, Construction of similar triangles & tangents to a circle.
Learning Objectives	<ul style="list-style-type: none"> <li>● To learn to divide a line segment internally in a given ratio.</li> <li>● To construct a triangle similar to a given triangle as per given scale factor which may be less than 1 or greater than 1.</li> <li>● To construct the pair of tangents from an external point to a circle.</li> </ul>
Task	Class Worksheet
Execution of task	Printed worksheet should be given to each child with appropriate space for making the constructions.
Duration	2 periods
Criteria for assessment	<ul style="list-style-type: none"> <li>● Accuracy &amp; neatness of constructions.</li> <li>● Possession of required geometrical instrument by each child.</li> <li>● Accuracy of Construction</li> </ul>



### Class Worksheet

1. AB is a line segment of length 8 cm. Locate a point C on AB such that  $AC = \frac{1}{3} CB$ .
2. A triangle ABC is given such that  $AB = 15$  cm,  $BC = 27$  cm and  $\angle BAC = 50^\circ$ . Another triangle A'BC' similar to triangle ABC is constructed with sides BA' and BC' equal to 25 cm and 45 cm respectively. Find the scale factor.
3. Draw a pair of tangents to a circle of radius 6 cm which are inclined to each other at an angle of  $60^\circ$ . Also justify the construction. Measure the distance between the centre of the circle and the point of intersection of tangents.
4. Give a method to locate the centre of circle if it is not given to you.
5. Draw a triangle ABC in which  $AB = 5$  cm,  $BC = 6$  cm and  $\angle ABC = 60^\circ$ . Construct a triangle similar to ABC with scale factor  $\frac{3}{8}$ . Justify the construction.
6. Draw a triangle ABC in which  $AB = 4$  cm,  $BC = 6$  cm and  $AC = 9$  cm. Construct a triangle similar to triangle ABC with scale factor  $\frac{2}{5}$ . Justify the construction. Are the two triangles congruent ?

#### Task-3: Practice Sheet-MCQ

Topic	Constructions.
Nature of task	Pre-Content
Content Coverage	Complete Chapter
Task	MCQ
Execution of task	Printed copy of MCQ paper can be given to students.
Duration	10-15 minutes
Criteria for assessment	After a follow up discussion of questions students can do peer evaluation.

### Multiple Choice Questions

Choose the correct answer from the given four options :

1. To divide a line segment AB in the ratio 3:7, first a ray AX is drawn so that  $\angle BAX$  is an acute angle and then at equal distances points are marked on the ray AX such that the minimum number of these points is  
 (A) 3                      (B) 10                      (C) 7                      (D) 12



2. To divide a line segment AB in the ratio 4:5, a ray AX is drawn first such that angle BAX is an acute angle and then points A1, A2, A3, .... are located at equal distances on the ray AX and the point B is joined to
- (A) A4                      (B) A5                      (C) A10                      (D) A9
3. To divide a line segment AB in the ratio 4 : 5, draw a ray AX such that angle BAX is an acute angle, then draw a ray BY parallel to AX and the points A1, A2, A3, ... and B1, B2, B3,... are located at equal distances on ray AX and BY, respectively. Then the points joined are
- (A) A5 and B6    (B) A6 and B5  
(C) A4 and B5    (D) A5 and B4
4. To construct a triangle similar to a given  $\Delta ABC$  with its sides  $\frac{2}{5}$  of the corresponding sides of  $\Delta ABC$ , first draw a ray BX such that angle CBX is an acute angle and X lies on the opposite side of A with respect to BC. Then locate points B1, B2, B3, ... on BX at equal distances and next step is to join
- (A) B7 to C                      (B) B2 to C                      (C) B5 to C                      (D) B4 to C
5. To construct a triangle similar to a given  $\Delta ABC$  with its sides  $\frac{5}{3}$  of the corresponding sides of  $\Delta ABC$  draw a ray BX such that CBX is an acute angle and X is on the opposite side of A with respect to BC. The minimum number of points to be located at equal distances on ray BX is
- (A) 3                      (B) 5                      (C) 8                      (D) 2
6. To draw a pair of tangents to a circle which are inclined to each other at an angle of  $30^\circ$ , it is required to draw tangents at end points of those two radii of the circle, the angle between them should be
- (A)  $150^\circ$                       (B)  $90^\circ$                       (C)  $60^\circ$                       (D)  $120^\circ$



**Task-4: Home Assignment**

Topic	Constructions.
Nature of task	Post Content
Content Coverage	Complete Chapter
Learning Objectives	<ul style="list-style-type: none"> <li>● To learn to divide a line segment internally in a given ratio.</li> <li>● To construct a triangle similar to a given triangle as per given scale factor which may be less than 1 or greater than 1.</li> <li>● To construct the pair of tangents from an external point to a circle.</li> </ul>
Task	Home Assignment.
Execution of task	Printed assignment may be given after completing the chapter.
Duration	1-2 days.
Criteria for assessment	Follow Rubric for H.W/Assignments
Follow up	Reference material in the form of important points to remember can be given as a support material.

**Home Assignment**

1. Draw two tangents to a circle of radius 3.5 cm from a point P at a distance of 5.5 cm from its center.
2. Construct a triangle similar to  $\Delta ABC$  such that each of its sides is  $\frac{2}{3}$ rd of the corresponding sides of  $\Delta ABC$ . It is given that  $AB = 5\text{cm}$ ,  $AC = 6\text{cm}$  and  $BC = 7\text{cm}$ .
3. Draw a line segment AB of length 4.4cm. Taking A as centre, draw a circle of radius 2cm and taking B as centre, draw another circle of radius 2.2cm. Construct tangents to each circle from the centre of the other circle.
4. Draw a pair of tangents to a circle of radius 2cm that are inclined to each other at an angle of  $90^\circ$ .
5. Construct a tangent to a circle of radius 2cm from a point on the concentric circle of radius 2.6cm and measure its length. Also, verify the measurements by actual calculations.
6. Construct an isosceles triangle whose base is 7cm and altitude 4cm and then construct another similar triangle whose sides are  $\frac{3}{2}$  times the corresponding sides of the isosceles triangle.
7. Draw a line segment AB of length 8cm. Taking A as center, draw a circle of radius 4cm and taking B as centre, draw another circle of radius 3cm. Construct tangents to each circle from the center of the other circle.



## CHAPTER-12

### Area Related to Circles

#### Learning Objectives :

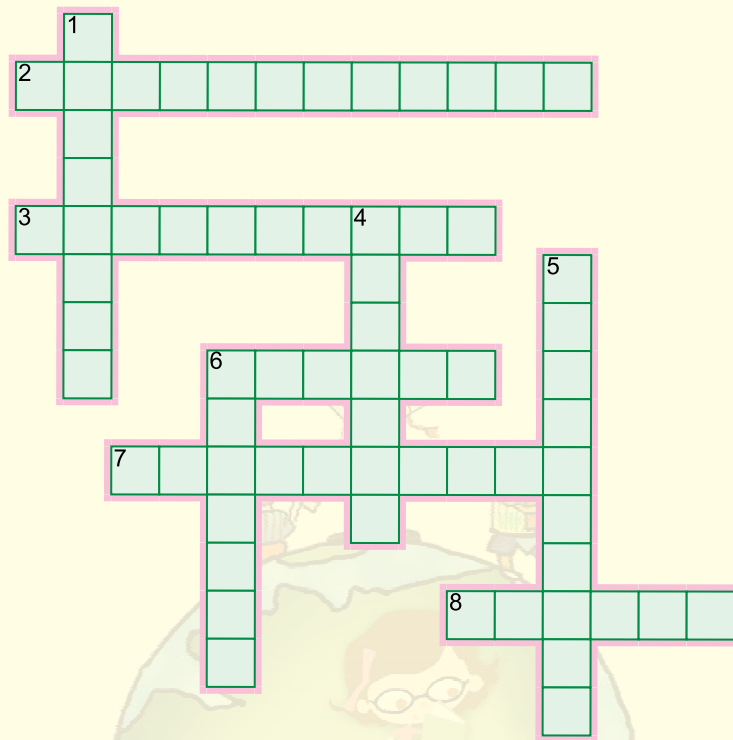
- Recall the concept of circumference of circle and its use in daily life situations.
- Understand the terms- major segment ,minor segment., major sector, minor sector, angle subtended by the sector at the centre, area of the sector of given angle, length of an arc of a sector of given angle and their applications.
- Apply the knowledge of area of plane figures in solving the problems with combination of plane figures.

#### Task-1: Crossword Puzzle

Content Coverage	Perimeter and Area of a Circle Review
Nature of task	Content
Learning Objective	<ol style="list-style-type: none"><li>1. Recall the concept of circumference of circle and its use in daily life situations.</li><li>2. Understand the terms- major segment ,minor segment., major sector, minor sector, angle subtended by the sector at the centre, area of the sector of given angle, length of an arc of a sector of given angle and their applications.</li></ol>
Execution of task	<p>After explaining all concepts crossword puzzle can be given to quickly review the understanding of learner. Sheet of crossword can be distributed to students with instructions to complete it in 15 minutes.</p> <p>Teacher can discuss all the hints and can call the students to explain each hint on blackboard by drawing it .</p>
Duration	1 period
Criteria for Assessment	Objective of assessment will be diagnostic as well as remedial as the follow up discussion will give an opportunity to understand the concepts.



### Crossword Puzzle Sheet



EclipseCrossword.com

**Across**

- 2.  $2\pi r = \dots\dots\dots$  of circle
- 3.  $2\pi r + d =$  perimeter of  $\dots\dots\dots$
- 6. region enclosed between an arc and two radii.
- 7. angle in semi-circle.
- 8.  $\pi r^2 =$  area of  $\dots\dots\dots$

**Down**

- 1.  $\pi$  is the ratio between circumference and  $\dots\dots\dots$  of circle.
- 4. angle formed by two radius at centre is known as  $\dots\dots\dots$
- 5. two circle having same centre.
- 6. region enclosed between chord and arc.





**Task-2: MCQ**

Content Coverage	Perimeter and Area of a Circle Review
Nature of task	content
Learning Objective	1. Recall the concept of circumference of circle and its use in daily life situations.
	2. Understand the terms- major segment ,minor segment., major sector, minor sector, angle subtended by the sector at the centre, area of the sector of given angle, length of an arc of a sector of given angle and their applications.
Execution of task	After giving the practice of questions based on applications of area of sector, length of sector etc. An MCQ can be conducted in the class to assess the skills attained in solving problems.
Duration	1 period
Criteria for Assessment	For correct answer 1 mark and no marks for incorrect answer.

**Multiple Choice Questions**

- The area of the sector of a circle of radius  $r$  and central angle  $\theta$ , is  
 A.  $\frac{1}{2} l.r$       B.  $2\pi r^2\theta/720$       C.  $2\pi r\theta/360$       D.  $\pi r\theta/360$
- An arc of a circle is of length  $5\pi$  cm and the sector it bounds has an area of  $20\pi$  cm<sup>2</sup>. The radius of circle is  
 A. 1 cm      B. 5 cm      C. 8 cm      D. 10 cm
- A sector is cut from a circle of circle of radius 21 cm. The angle of sector is  $150^\circ$ . The area of sector is  
 A.  $577.5$  cm<sup>2</sup>      B.  $288.2$  cm<sup>2</sup>      C.  $152$  cm<sup>2</sup>      D.  $155$  m<sup>2</sup>
- A chord AB of a circle of radius 10 cm makes a right angle at the centre of the circle. The area of major segment is  
 A.  $210$  cm<sup>2</sup>      B.  $235.7$  cm<sup>2</sup>      C.  $185.5$  cm<sup>2</sup>      D.  $258.1$  cm<sup>2</sup>
- A horse is tied to a pole with 56 m long string. The area of the field where the horse can graze is  
 A.  $2560$  m<sup>2</sup>      B.  $2464$  m<sup>2</sup>      C.  $9856$  m<sup>2</sup>      D.  $25600$  m<sup>2</sup>





6. The circumferences of two circles are in the ratio 2:3. The ratio of their areas is  
 A. 4:9                      B. 2:3                      C. 7:9                      D. 4:10
7. Area enclosed between two concentric circles is  $770 \text{ cm}^2$ . If the radius of outer circle is 21 cm, then the radius of inner circle is  
 A. 12 cm                      B. 13 cm                      C. 14 cm                      D. 15 cm
8. The perimeter of a semi-circular protector is 72 cm. Its diameter is  
 A. 28 cm                      B. 14 cm                      C. 36 cm                      D. 24 cm
9. The minute hand of a clock is 21 cm long. The area described by it on the face of clock in 5 minutes is  
 A.  $115.5 \text{ cm}^2$                       B.  $112.5 \text{ cm}^2$                       C.  $211.5 \text{ cm}^2$                       D.  $123.5 \text{ cm}^2$
10. The area of a circle circumscribing a square of area  $64 \text{ cm}^2$  is  
 A.  $50.28 \text{ cm}^2$                       B.  $25.5 \text{ cm}^2$                       C.  $100.57 \text{ cm}^2$                       D.  $75.48 \text{ cm}^2$

**Task-3: Oral Assessment**

Content Coverage	Area of sector and segment of a circle
Nature of task	Post content
Learning Objectives	1. Recall the concept of circumference of circle and its use in daily life situations
	2. Understand the terms- major segment ,minor segment., major sector, minor sector, angle subtended by the sector at the centre, area of the sector of given angle, length of an arc of a sector of given angle and their applications
Execution of task	oral assessment can be conducted individually in the class. Teacher must have the list of questions ready in order to save time. If any student is not able to answer any question he/she should be given another opportunity.
Duration	1 /2periods depending on class strength.
Criteria for Assessment	Objective of assessment will be diagnostic.

**Suggestive Questions for Oral Assessment**

- The length of an arc of a circle of radius, subtending angle  $\theta$  at the centre is \_\_\_\_\_.
- The area of the sector of a circle of radius with central angle  $\theta$  is \_\_\_\_\_.



3. The perimeter of sector of a circle of radius  $r$  and central angle  $\theta$  is \_\_\_\_\_.
4. The areas of two circular fields are in the ratio of 16:49. If the radius of the bigger circle is 14 cm, then the radius of smaller circle is \_\_\_\_\_.
5. The distance travelled by a road roller of radius  $r$  and length  $l$  in 20 rotations is \_\_\_\_\_.
6. Area of a ring of outer radius  $R$  and inner radius  $r$  is \_\_\_\_\_.
7. If a road roller, of radius 7 cm and length 20 cm. performs 20 revolutions in a minute then the distance traveled by it in one minute is \_\_\_\_\_.
8. Perimeter of semi circle \_\_\_\_\_.
9. Perimeter of sector with radius  $r$  and central angle  $\theta$ .
10. Perimeter of segment with radius  $r$  and chord length  $a$  units.

#### Task-4: Home Assignment

Content Coverage	Area of circle and plane combination of figures
Nature of task	Post-content
Learning Objectives	Apply the knowledge of area of plane figures in solving the problems with combination of plane figures.
Execution of task	Once the chapter is complete, home assignment can be given. Assignment may contain variety of questions from simple to complex, from routine problems to non-routine problems.
Duration	3 to 4 Days
Criteria for Assessment	As per Rubric of Home Assignment. Follow up session to discuss the problems of students from assignment is must.

#### Home Assignment : Short & long Questions

1. Find the area of a  $\Delta OAB$  with  $\angle AOB = 120^\circ$  &  $OA = OB = 18$  cm.

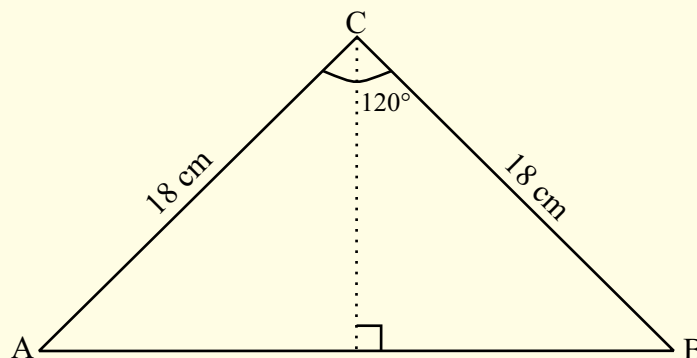


Fig. 1



2. Find the area of sector of angle  $120^\circ$  and radius 18 cm.

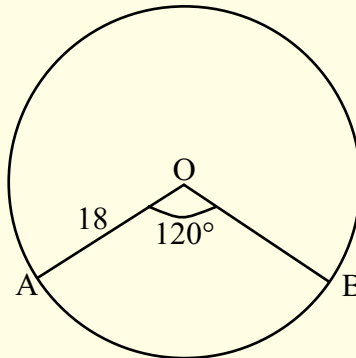


Fig. 2

3. Find the area of the segment AOB of angle  $120^\circ$  and radius 18 cm.

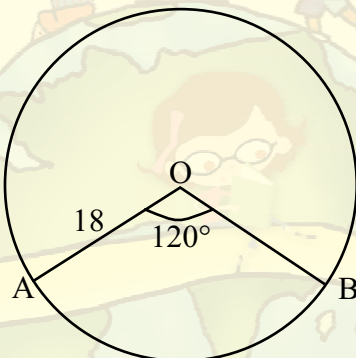
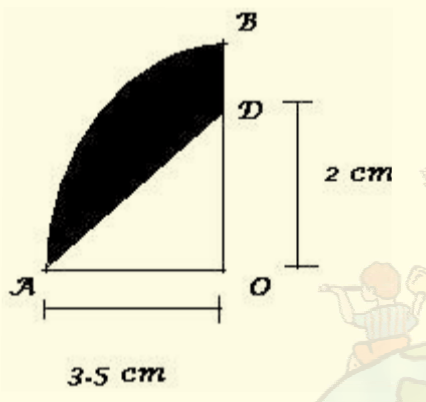
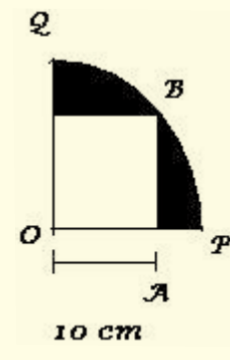
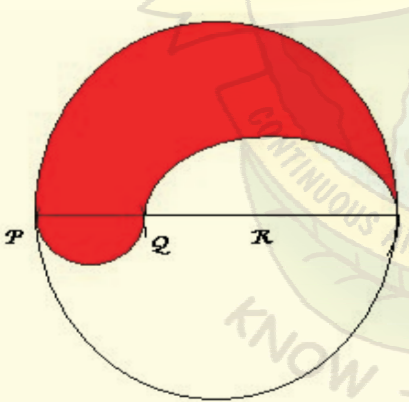
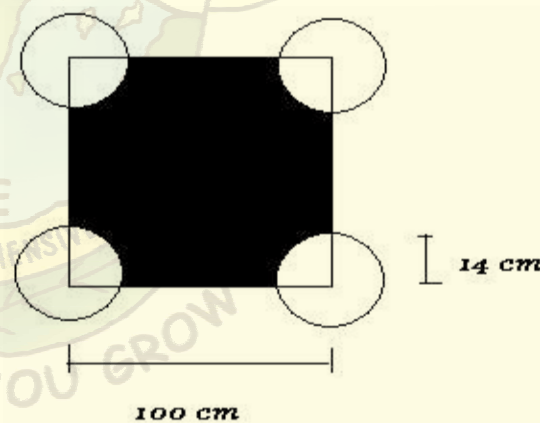


Fig. 3

4. A chord of a circle of radius 10 cm subtends a right angle at the centre. Find the following.
- Area of minor sector
  - Area of minor segment
  - Area of major segment
  - Area of major segment
- (Use  $\pi = 3.14$ )
5. It is proposed to add two circular ends, to a square lawn whose side measures 58 cm, the centre of each circle being the point of intersection of the diagonals of the square. Find the area of the whole lawn.
6. In a circle of radius 21 cm, an arc subtends an angle of  $60^\circ$  at the centre. Find:
- length of the arc
  - area of sector formed by the arc
  - area of segment formed by the corresponding chord of the arc.
7. The length of an arc subtending an angle of  $72^\circ$  at the center is 44 cm. Find the area of the circle.



8. A park is in the form of a rectangle 120 m by 100 m. At the center of the park, there is a circular lawn. The area of the park excluding the lawn is 11384 sq. m. Find the radius of the circular lawn.
9. Find the area of shaded portion in the following figures:

 <p><b>Figure (i):</b> AOB is isosceles triangle.</p>	 <p><b>Figure (ii):</b> AOQ is isosceles triangle</p>
 <p><b>Figure (iii):</b> <math>PQ = QR = RS = 4</math> cm</p>	 <p><b>Figure (iv)</b></p>

10. An athletic track, 14 m wide, consists of two straight sections 120 m long joining semicircular ends whose inner radius is 35 m. Calculate the area of the track.



**Task-5: Project Work**

Topic	Areas Related to Circles.
Nature of task	Post Content
Content Coverage	Whole chapter
Learning Objectives	To apply the knowledge of Areas Related to Circles in real life.
Task	Project work
Execution of task	<p>The class may be divided into groups of 6 to 8 students (Students living in the same neighborhood may be assigned in one group). Each group is supposed to work as a team for the completion of project. Few members can take responsibility of gathering required information for the project; others can work for making a rough draft from the gathered information. All members should discuss the draft &amp; give their inputs. After finalizing few members can writes the report.</p> <p>The project work completes with the submission of report. A small seminar could be conducted where the team leader should present their work to the complete class.</p>
Duration	10 to 15 days
Criteria for assessment	<p>The project work could be assessed according to the following parameters:</p> <ul style="list-style-type: none"> <li>● Team Spirit</li> <li>● Identification of project</li> <li>● Procedure adopted</li> <li>● Preparation of Report</li> <li>● Class presentation of the work</li> </ul>



## Suggested Projects

Prepare architectural layout of a house/ flat. The plan of flat should incorporate all shapes related to circles (circular lawn, semicircular balcony, kitchen in the shape of segment, sectorial washrooms etc)

### Expectations from Project Report :

1. The report should contain the layout diagram of the house with scale.
2. The layout should contain sectors and semi-circles and circular areas (e.g. semi-circular lawns or balconies).
3. Find the area of all the sectors, segments in the layout.
4. Find the cost of flooring each room & other parts of your flat.





## CHAPTER-13

# Surface Area & Volumes

### Learning Objectives :

- To be familiar with the term - combination of solids.
- To relate examples from real life.
- To learn how to find out the volume & surface area of combination of solids.
- To relate & to apply it to daily life situations.
- To learn how a new solid (frustum) can be obtained from a cone.
- To learn how to find out volume & surface area of frustum.

### Suggested Formative Assessment Tasks

#### Task-1: Group Discussion on Designing A Swimming Pool

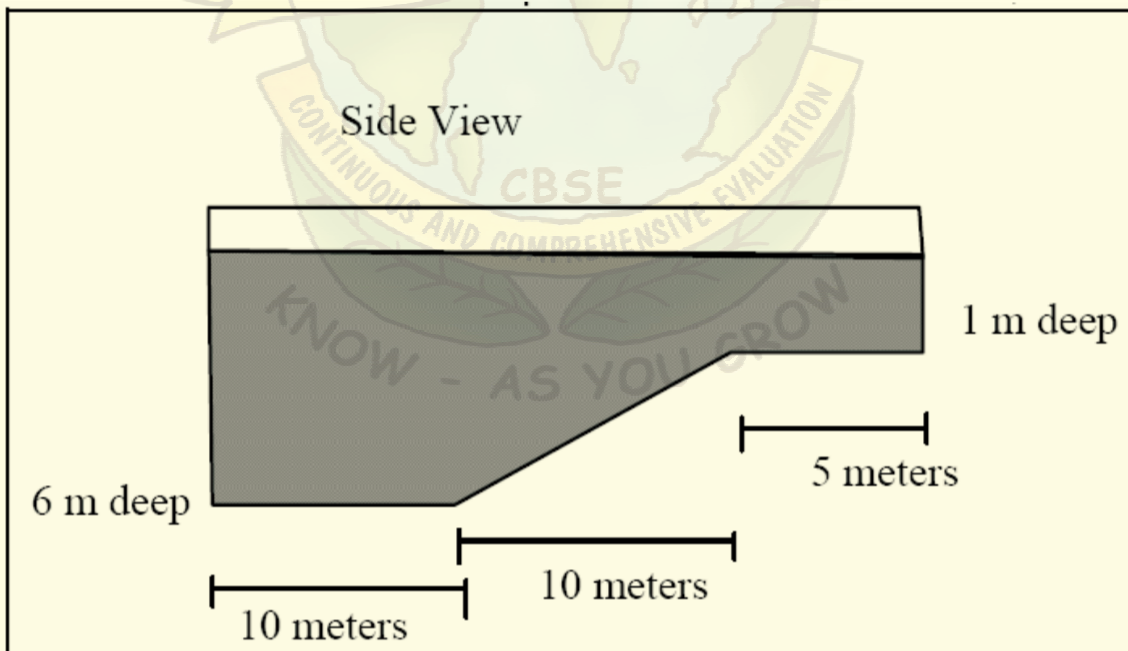
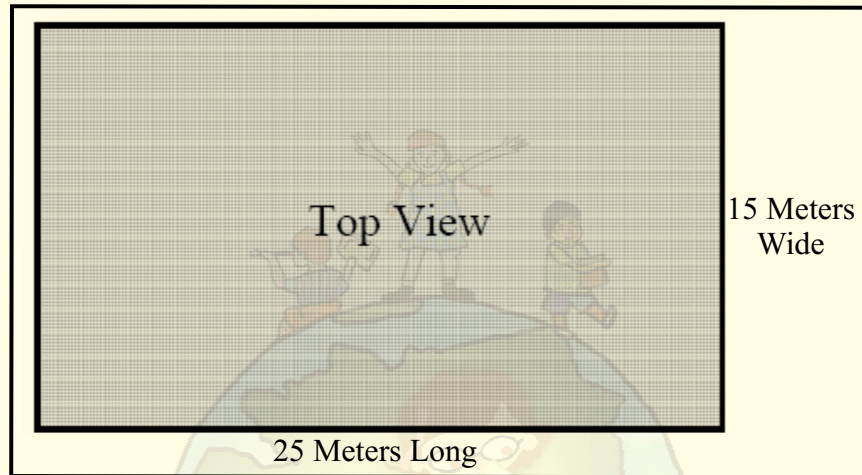
Topic	Surface Area & Volume
Nature of task	Post Content
Content Coverage	Surface area & Volume of combination of cube & cuboids.
Learning Objectives	To apply the knowledge of finding surface area & volume in real life situation.
Task	Group discussion initiated with a practice sheet.
Execution of task	This task may be performed in the classroom. Students can be divided in groups of 4-5. Each group should be given one practice sheet. 20 minutes should be given for group discussion followed by class discussion.
Duration	1 period
Criteria for assessment	Observation Team Spirit Logical Thinking Problem Solving Skills Imaginative Ability from 2D to 3D
Follow up	Teacher should encourage children to visit a swimming pool and make a small report of the layout, material required (in terms of number of units, cost) & calculate the cost of making & maintenance of the pool.
	Let children appreciate what they are learning with their surroundings.





## Designing a Swimming Pool-Practice Sheet

Our school has decided to build a swimming pool in school with dimensions- 25 meters long and 15 meters wide. The teacher in-charge wants to discuss the plans to build the pool, put tiles on the bottom of the pool and other requirements. Can you help him to answer the following questions ?



1. What is the surface area of the pool ?
2. If the in-charge plans to cover the bottom and sides of the pool with square tiles having side 25 cm, how many such tiles will be required ?



3. If each tile costs Rs. 40, how much will be the total cost ?
4. The local digging company Kumar & Sons charges Rs. 150 per cubic meter, how much school has to pay for digging the swimming pool ?
5. How long will it take for the swimming pool to be filled completely, if the hose pipe is pouring water into the pool @ 40 liters per minute ?
6. What is the area of the wall at the shallow end of the swimming pool ?
7. What is the area of the wall at the deep end of the swimming pool ?
8. How much will be the total cost for making the swimming pool operational, considering cost for digging the pool & fixing tiles ?

### Task-2: Practice Sheet

Topic	Surface Area & Volumes
Nature of Task	<ul style="list-style-type: none"> <li>● Objective sheet during the delivery of lesson.</li> <li>● Subjective sheet after post content</li> </ul>
Content Coverage	<ul style="list-style-type: none"> <li>● Formulae to calculate Surface Area &amp; Volume of various solids</li> <li>● Application of above in solving questions</li> </ul>
Learning objectives	<ul style="list-style-type: none"> <li>● To recall formulae of various solids.</li> <li>● To analyze &amp; apply the above the knowledge in solving questions.</li> </ul>
Task	Class Worksheets <ul style="list-style-type: none"> <li>● Objective (Oral Test can also be taken)</li> <li>● Subjective</li> </ul>
Execution of task	<ul style="list-style-type: none"> <li>● Objective worksheet is for a quick follow up of the recall capacity of child. It also test their mental presence in the class. Teacher can distribute printed sheets after the delivery of main concepts.</li> <li>● Subjective worksheet test the understanding of concepts, so it should be done after finishing the chapter.</li> </ul>
Duration	<ul style="list-style-type: none"> <li>● 10-15 minutes for objective test</li> <li>● 1 period for subjective test</li> </ul>
Criteria for assessment	<ul style="list-style-type: none"> <li>● Teacher may prepare a rating scale according to the marks assigned to this task.</li> <li>● Follow Rubrics for assessing subjective worksheet.</li> </ul>
Follow up	A class discussion on the given worksheet.



**Practice Sheet 1: Objective****1. Match the following :**

Surface Area of a sphere	$2\pi rh$
Total S.A. of a cone	$\frac{1}{3}\pi r^2h$
Volume of a cuboid	$2\pi r(r+h)$
Volume of hemisphere	$\frac{1}{3}\pi h(r^2 + R^2 + rR)$
Curved Surface Area of a Cone	$\pi r(r+l)$
Total S.A. of a hemisphere	$l \times b \times h$
Curved S.A. of a cylinder	$\frac{2}{3}\pi r^3$
Volume of a cone	$\pi rl$
Total S.A. of a cylinder	$3\pi r^2$
Volume of a frustum	$4\pi r^2$

**2. Fill in the blanks:**

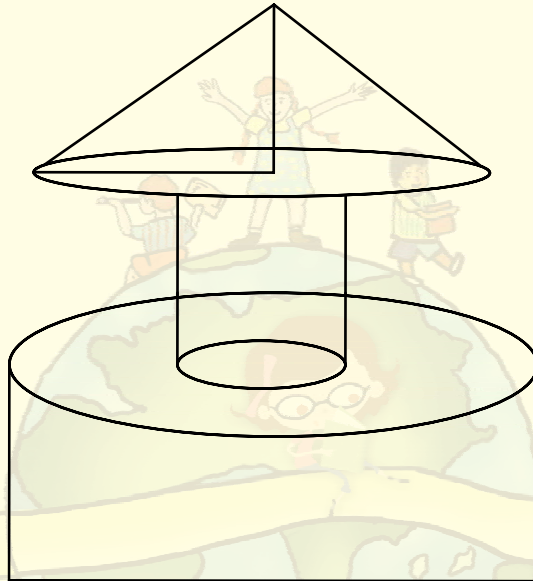
- The total surface area of a cuboid of dimensions  $a \times a \times b$  is \_\_\_\_\_.
- The volume of right circular cylinder of base radius  $r$  and height  $2r$  is \_\_\_\_\_.
- The total surface area of a cylinder of base radius  $r$  and height  $h$  is \_\_\_\_\_.
- The curved surface area of a cone of base radius  $r$  and height  $h$  is \_\_\_\_\_.
- If the height of a cone is equal to diameter of its base, the volume of cone is \_\_\_\_\_.
- The total surface area of a hemisphere is of radius  $r$  is \_\_\_\_\_.
- The lateral surface area of a hollow cylinder of outer radius  $R$  and inner radius  $r$  and height  $h$  is \_\_\_\_\_.
- Volume of a frustum of cone of radii of circular bases as  $R$  and  $r$  and height  $h$  is \_\_\_\_\_.
- If the radius of a sphere is doubled, its volume becomes \_\_\_\_\_ times the volume of original sphere.
- If the radius of a sphere is halved, its volume becomes \_\_\_\_\_ times the volume of original sphere.

**Practice Sheet 2: Short & long Questions**

- A cone of radius 10 cm is divided into two parts by drawing a plane through the midpoint of its axis, parallel to its base. Compare the volume of the two parts.



2. A hollow cone is cut by a plane parallel to the base and the upper portion is removed. If the curved surface of the remainder is  $\frac{8}{9}$  of the curved surface of the whole cone, find the ratio of the line segments into which the cone's altitude is divided by the plane.
3. From a solid cylinder of height 24 cm and diameter 10 cm, two conical cavities of same radius as that of the cylinder are hollowed out. If the height of each conical cavity is half the height of cylinder, find the total surface area of the remaining cylinder.
4. A wooden show piece is as shown in the figure. Find the total surface area of the show piece.



5. A roller pin is made by joining 3 cylindrical pieces of wood as shown in the figure. Find the cost of painting it at the rate of 10 paisa per sq cm.



6. A farmer connects a pipe of internal diameter 20 cm from a canal into a cylindrical tank to her field, which is 10 m in diameter and 2 m deep. If water flows through the pipe at the rate of 3 km/hr, in how much time will the tank be filled?
7. A toy is in the form of a cone on a hemi-sphere of Diameter 7cm. The total height of the top is 14.5 cm. Find the volume and total surface area of the toy.
8. A vessel in the form of hemi-spherical is mounted by a hollow cylinder. The diameter of the bowl is 14 cm and the total height of the vessel is 13 cm. Find the capacity of the vessel.



9. A cylindrical container with radius and height is 4cm and 8cm is filled with Ice-cream and ice-cream is distributed to 10 Children in equal can having hemi-spherical tops. If the height of the conical portion is 4 times the radius of its base, find the radius of the ice-cream Cone.
10. A tent has cylindrical surmounted by a conical roof. The radius of the cylindrical base is 20m. The total height of tent is 6.3 m and height of cylindrical portion is 4.2 m. find the volume and surface area of tent.

**Task-3: MCQ**

Topic	Surface Area & Volumes
Nature of task	Post Content
Content Coverage	Complete Chapter
Task	MCQ
Execution of task	Printed assignment may be given after completing the chapter. After completion of worksheet, teacher can ask children to interchange their sheets & a quick evaluation can be done by class discussion.
Duration	10-15 minutes.
Criteria for assessment	Teacher may prepare a rating scale according to the marks assigned to this task.

**Multiple Choice Questions**

1. The total surface area of a solid hemisphere of radius  $r$  is  
 (A)  $\pi r^2$  (B)  $2\pi r^2$  (C)  $3\pi r^2$  (D)  $4\pi r^2$
2. The volume and the surface area of a sphere are numerically equal, then the radius of sphere is  
 (A) 0 units (B) 1 units (C) 2 units (D) 3 units
3. A cylinder, a cone and a hemisphere are of the same base and of the same height. The ratio of their volumes is  
 (A) 1 : 2 : 3 (B) 2 : 1 : 3 (C) 3 : 1 : 2 (D) 3 : 2 : 1
4. Small spheres, each of radius 2cm, are made by melting a solid iron ball of radius 6 cm, then the total number of small spheres is  
 (A) 9 (B) 6 (C) 27 (D) 81
5. A solid sphere of radius  $r$  cm is melted and recast into the shape of a solid cone of height  $r$ . Then the radius of the base of cone is  
 (A)  $2r$  (B)  $r$  (C)  $4r$  (D)  $3r$





6. Three solid spheres of diameters 6 cm, 8 cm and 10 cm are melted to form a single solid sphere. The diameter of the new sphere is  
 (A) 6 cm (B) 4.5 cm (C) 3 cm (D) 12 cm
7. The radii of the ends of a frustum of a cone 40 cm high are 38 cm and 8 cm. The slant height of the frustum of cone is  
 (A) 50 cm (B)  $10\sqrt{7}$  cm (C) 60.96 cm (D)  $4\sqrt{2}$  cm

#### Task-4: Home Assignment

Topic	Surface Area & Volumes
Nature of task	Post Content
Content Coverage	Complete Chapter
Learning Objectives	<ul style="list-style-type: none"> <li>● To find surface area of combination of solids.</li> <li>● To find volume of combination of solids.</li> <li>● To find surface area &amp; volume of a frustum.</li> <li>● To apply the knowledge in solving questions related to real life.</li> </ul>
Task	Home Assignment (Short/Long questions)
Execution of task	Printed assignment may be given after completing the chapter.
Duration	2 days.
Criteria for assessment	Follow Rubric for H.W/Assignments
Follow up	Reference material in the form of important points to remember can be given as a support material.

#### Home Assignment 2 : Short & Long Questions

1. A vessel is in the form of a hollow hemisphere mounted by a hollow cylinder. The diameter of the hemisphere is 14 cm and the total height of the vessel is 13 cm. Find the inner surface area of the vessel.
2. A conical vessel with internal radius 6 cm and height 8 cm is completely filled with water. A sphere is lowered into the water and its size is such that when it touches the sides, it is just immersed. Find the volume of water overflows.
3. A given amount of wax in cylindrical form is heated in a metal container and then poured into another container. A new candle is formed which is shaped like a fish.



**Fill in the blanks:**

- (a) The volume of the wax \_\_\_\_\_ (is changed/remains same)
- (b) The total surface Area \_\_\_\_\_ (is changed/remains same)
- How many silver coins, 1.75 cm in diameter and of thickness 2 mm, must be melted to form a cuboid of dimensions 5.5 cm  $\times$  10 cm  $\times$  3.5 cm?
  - A wooden article was made by scooping out a hemisphere from each end of a solid cylinder. If the height of the cylinder is 10 cm and its base is of radius 3.5 cm, find the total surface area of the article.
  - A sphere of radius 3 cm is dropped into a cylindrical vessel partly filled with water. The radius of the vessel is 6 cm. If the sphere is submerged completely, by how much will the surface of water be raised ?
  - The radii of the ends of the frustum of a cone are 14 cm and 21 cm and the slant height is 8 cm. Find the area of the curved surface.
  - Find the volume of a frustum of a cone whose face radii are 7 m and 4m and height is 4m.
  - A lamp shade made of a special chart paper is in the form of a frustum of a cone open at both ends. The radii of its ends are 16 cm and 24 cm and its height is 6 cm. Find the cost of paper used if one square m costs Rs 0.70.
  - A solid sphere of radius 6 cm is melted into a hollow cylinder of uniform thickness. If the external radius of the base of the cylinder is 5 cm and its height is 32 cm, find the uniform thickness of the cylinder.

**Task-5: Hands on activity**

Topic	Surface Area & Volumes
Nature of task	During delivery of content
Content Coverage	Volume of a right circular cylinder in terms of its height & base radius.
Learning Objectives	<ul style="list-style-type: none"> <li>To observe &amp; apply the fact that volume remains same by the change in shape of an object.</li> <li>To get the formula for volume of right circular cone.</li> </ul>
Task	Math activity
Execution of task	An activity gives student the scope to experiment. So the teacher should give utmost care in the execution of this task. Children should not be provided with ready reckoner to perform the activity but teacher should throw questions to direct students to do the activity.





	<p>In this activity teacher should make a cylinder with plastic clay &amp; just squeeze it so that its shape changes. Put the question-</p> <p>What remains same after the change in shape?</p> <p>Can we change it in some other shape whose volume we already know?</p> <p>Give children sufficient time to think &amp; experiment with their plastic clay.</p> <p>Likewise facilitate children to complete the activity.</p>
Duration	1 period
Criteria for assessment	<p>This activity will be a part of Math activity , so it will be assessed according to the following parameters:</p> <p>Observation on thinking skills</p> <p>Class Ethics</p> <p>Performance of activity</p> <p>File Record</p> <p>(marks may be allotted by the teacher accordingly)</p>
Follow up	Children should be encouraged to do the same activity in another way.

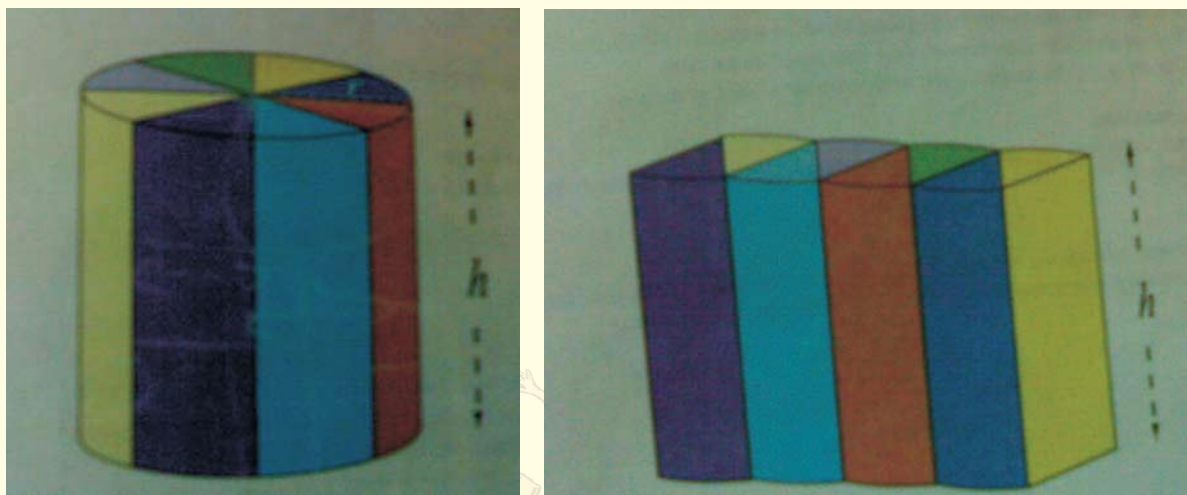
**Note :** Remaining activities can be taken up in similar manner in the math activity period. (Refer to CBSE Math Laboratory Manual).

Write up of the activity:

- Aim/Objective:
- Previous Knowledge
- Procedure
- Observations
- Calculations
- Conclusion



Children should be encouraged to make the supporting drawings.



### Task-6: Remedial Worksheet

Topic	Surface Area & Volumes
Nature of task	Delivery of Content/Post Content
Content Coverage	<ul style="list-style-type: none"> <li>● Surface area &amp; Volume of solids.</li> <li>● SA &amp; Volumes of Combination of solids.</li> </ul>
Learning Objectives	To provide remedial measures on specific topics based on individual needs.
Task	Need based worksheets.
Duration	1 period
Criteria for assessment	<ul style="list-style-type: none"> <li>● Observation of group based remedial teaching.</li> <li>● Rubric for remedial worksheets.</li> </ul>
Follow up	Remedial practice sheets of subtopics & frequent retests.

#### Need Based Remedial Worksheets:

- *Memory Based Remedial Sheet*

#### Match the following:

Surface Area of a sphere	$2\pi rh$
Total S.A. of a cone	$\frac{1}{3}\pi r^2 h$
Volume of a cuboid	$2\pi r(r+h)$
Volume of hemisphere	$\frac{1}{3}\pi h(r^2 + R^2 + rR)$



Curved Surface Area of a Cone	$\pi r(r + l)$
Total S.A. of a hemisphere	$l \times b \times h$
Curved S.A. of a cylinder	$2/3 \pi r^3$
Volume of a cone	$\Pi rl$
Total S.A. of a cylinder	$3 \pi r^2$
Volume of a frustum	$4 \pi r^2$

● **Conceptual Understanding Based Remedial Sheet**

- To make a toy of given shape, we have folded the paper sheets. To find how much sheet was used we should calculate surface Area/volume. (Tick the correct one).
- From a solid right circular cylinder, two hemi spheres are scooped out. To find the volume of remaining part, write the required steps in sequence. (with formulae).
- A given amount of wax in cylindrical form is heated in a metal container and then poured into another container. A new candle is formed which is shaped like a fish. Fill in the blanks
  - The volume of the wax \_\_\_\_\_ (is changed/remains same)
  - The total surface Area \_\_\_\_\_ (is changed/remains same)

● **Application Based Remedial Sheet**

- A vessel is in the form of a hollow hemisphere mounted by a hollow cylinder. The diameter of the hemisphere is 14 cm and the total height of the vessel is 13 cm. Find the inner surface area of the vessel.
- A conical vessel with internal radius 6 cm and height 8 cm is completely filled with water. A sphere is lowered into the water and its size is such that when it touches the sides, it is just immersed. Find the volume of water overflows.

