Surface Area of a Cone

Objective

To find the formula for the lateral surface area and total surface area of a right circular cone experimentally.

Prerequisite Knowledge

1. Area of circle =πr^2
2. Area of parallelogram = b x h (b =base, h = height).
3. Circumference of circle = $2\pi r$

Materials Required

A cone made of chart paper, a pair of scissors, geometry box, fevicol, cello tape.

Procedure

1. Make a cone of pink chart paper having base radius r, slant height 'l' and height h.
2. Cut the cone along slant height as shown in fig (i) as per dotted line and unroll it to get a sector, as shown in fig. (ii). Name this sector OAB.
3. Identify the arc length AB of the sector OAB = circumference of the base of the cone. radius of the sector OAB = slant height of the cone. As shown in the fig. (ii).
4. Cut the sector OAB into 4 small equal sectors, along dotted lines as shown in fig. (ii) and fill red colour in two sectors as shown.
5. Arrange these small sectors to get a parallelogram as shown in fig. (iii).

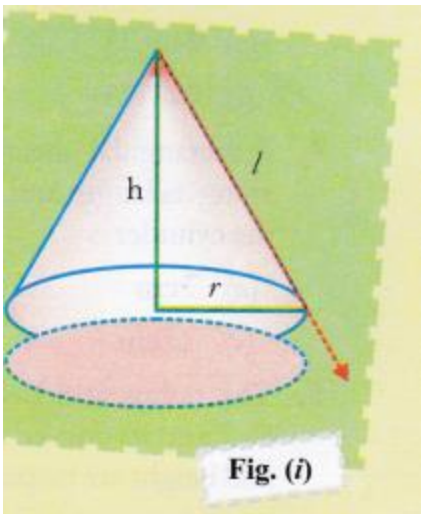

Fig. (*i*)

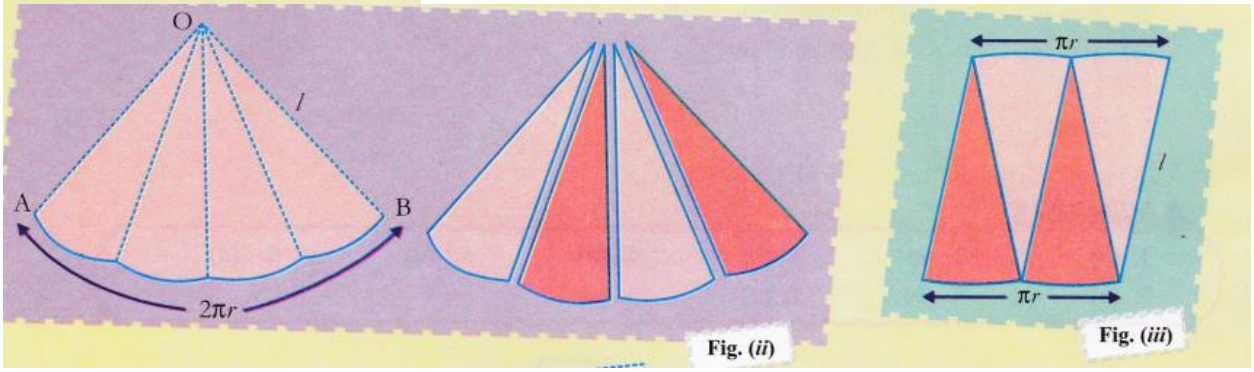

Fig. (*ii*) Fig. (*iii*)

Observation

1. Base of parallelogram =$\frac{1}{2}$x length of sector OAB = $\frac{1}{2}\times 2\pi r = \pi r$
2. Altitude of parallelogram = slant height of cone = l
3. Area of parallelogram =$2\pi r$ x l= Curved surface area of cone.
4. Total surface area of cone =$2\pi rl$ + area of circular base of cone.
   =$2\pi rl$ + πr^2
   = πr(l+r)

Learning Outcome

Students will learn the concept to differentiate between the curved surface area and total surface area of a cone.

Activity Time

1. Find lateral surface area of a cone in figure given.
2. Find total surface area of a cone in figure given.

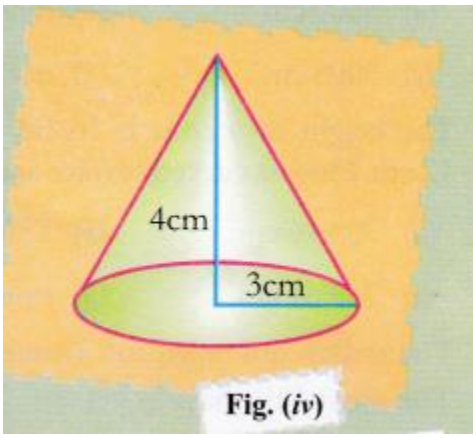

Fig. (*iv*)

Viva Voce

Question 1:
What is the relation between slant height and base radius of a cone ?
Answer:
$l^2 = h^2 + r^2$, l= slant height, r— radius of cone, h = height of cone.

Question 2:
What is the lateral surface area of a cone ?
Answer:
$\pi r l$. l= slant height, r— radius of base.

Question 3:
What is the total surface area of a cone ?
Answer:
\pi r(l+r) . l= slant height, r= radius of base.

Question 4:
How many circular faces are there in a solid cone ?
Answer:
One.

Question 5:
Number of vertex of a cone is
Answer:
One.

Question 6:
Find slant height of a cone of base radius 3 cm and height 4 cm.
Answer:
5 cm.

Question 7:
What is the lateral surface area of a cone if its height is 2 times of the radius ?
Answer:
$\sqrt{5}\pi r^2$

Question 8:
What is the radius of the base of a cone of height 6 cm and slant height 10 cm ?
Answer:
8 cm.

Multiple Choice Questions

Question 1:
Diameter of the base of a cone is 10.5 cm and its slant height is 10 cm. Its curved surface area is
(a) 163 cm^2
(b) 165 cm^2
(c) 156 cm^2
(d) none of these

Question 2:
Curved surface area of a cone is 308 cm^2 and its slant height is 14 cm. Radius of the base is
(a) 7 cm
(b) 14 cm
(c) 22 cm
(d) none of these

Question 3:
A Joker's cap is in the form of a right circular cone of base radius 7 cm and height 24 cm. Find the area of the sheet required to make 10 such caps.
(a) 5500 cm^2
(b) 5050 cm^2
(c) 5005 cm^2
(d) none of these

Question 4:
The height of a cone is 16 cm and its base radius is 12 cm. Find its curved surface area.
(a) 753.16 cm^2
(b) 753.6 cm^2
(c) 753.61 cm^2
(d) none of these

Question 5:
The radius and height of a cone are in the ratio 4 : 3. The area of the base is 154 cm^2. What is the area of its curved surface ?
(a) 129.5 cm^2
(b)195.2 cm^2
(c)192.5 cm^2
(d) none of these

Question 6:
The radius and slant height of a cone are in the ratio 4:7. If its curved surface area is 792 cm^2. Find its radius.
(a) 12 cm
(b) 11cm
(c) 13 cm
(d) 10 cm

Question 7:
Curved surface area of a cone of base radius 7 cm is 308 cm^2, then its slant height is
(a) 7 cm
(b) 14 cm
(c) 21 cm
(d) 28 cm

Question 8:
Total surface area of a cone of base radius 7 cm is 462 cm^2 , then its slant height is
(a) 14 cm
(b) 28 cm
(c) 12 cm
(d) none of these

Question 9:
A conical tent is 10 m high and the radius of its base is 24 m, then its slant height
(a) 24 m
(b) 25 m
(c) 26 m
(d) none of these

Question 10:
Curved surface area of a cone of base radius 7 m and slant height 25 m is
(a) 550 m^2
(b) 505 m^2
(c) 555 m^2
(d) none of these

Answers

1. (b)
2. (a)
3. (a)
4. (b)
5. (c)
6. (a)
7. (b)
8. (a)
9. (c)
10. (a)