Find a Formula For the Curved Surface Area Of a Cylinder

Objective

To find a formula for the curved surface area of a right circular cylinder, experimentally.

Materials Required

1. Coloured chart paper
2. Adhesive tape
3. Ruler
4. Pencil
5. Scissors

Prerequisite Knowledge

1. Concept of a rectangle and its area.
2. Concept of circle and terms related to it.
3. Concept of a cylinder.

Theory

1. For concept of rectangle and its area refer to Activity 3.
2. For concept of circle and related terms refer to Activity 23.
3. A solid generated by the revolution of a rectangle about one of its sides which is kept fixed is called a right circular cylinder. The fixed side of the rectangle about which it rotates, is called the axis of the cylinder, (see Fig. 29.1)

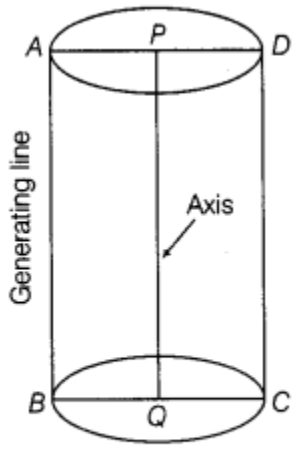

Fig. 29.1 Formation of Right Circular Cylinder

In Fig 29.2, line AB when moving on the circumference of the circle BC generates

a right circular cylinder. Here, the line AB is the generating line and PQ joining the centres of the circular base and top is called the axis. Also, circle BC is the base pf the cylinder.

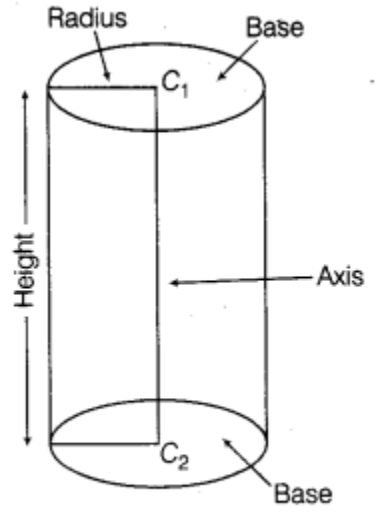

Fig. 29.2 Right Circular Cylinder

Procedure

1. Take a rectangular chart paper having length a units and breadth b units, (see Fig. 29.3)

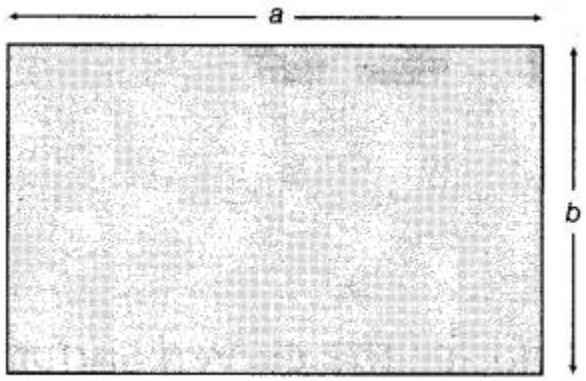

Fig. 29.3

2. Now, folding the chart paper along its breadth, fix both ends by using adhesive tape and obtain a cylinder. (see Fig. 29.4)

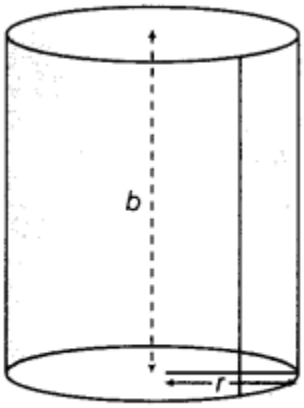

Fig. 29.4

Demonstration

1. On folding the rectangle, the length of rectangle becomes circular base of the cylinder.
   i.e. Circumference of the base of cylinder = Length of rectangular paper = a.
   Let r be the radius of base of cylinder, then circumference of the base of cylinder = $2\pi r$
   $2\pi r = a$ ……(i)
2. Height (h) of the cylinder = Breadth of rectangular paper = b
3. As on folding the rectangle, it becomes cylinder, so curved surface area of cylinder will be equal to area of rectangle.
   Now, curved surface area of cylinder = Area of rectangle
   $= a \times b = (2\pi r)h$ [from Eq. (i)]
   $= 2\pi rh$ sq units

Observation

By actual measurement,
a = ……..
b = …….
$2\pi r = a$ = …….
h = b = ……
Area of the paper = a x b = ……
Hence, curved surface area of the cylinder = $2\pi rh$

Result

We have got the formula for curved surface area of a right circular cylinder, experimentally.

Application

This activity can be used in finding the material used in making cylindrical containers, i.e. powder tins, fuel drums, oil tanks, jars used in industrial units, overhead water/fuel tanks, etc.

Viva-Voce

Question 1.
What is the formula for finding the curved surface area of cylinder having radius r and height h?
Answer:
Curved surface area = $2\pi rh$

Question 2.
What is the total surface area of cylinder having radius r and height h?
Answer:
Total surface area = $2\pi r(h + r)$

Question 3.
While cutting a cylindrical shape, which type of shape we get?
Answer:
Rectangular shape

Question 4.
What is the formula for the circumference of a circle?
Answer:
Circumference of a circle = 2 x π x radius = $2\pi r$ units

Question 5.
Do you know the value of π?
Answer:
Yes, the value of $\pi = \frac{22}{7}$ or 3.14 [approx.).

Question 6.
How can you find the quantity of water that a cylindrical water tank contain?
Answer:
The quantity of water will be equal to the volume of the water tank.

Question 7.
"If we increase the radius and height of a cylinder, then the curved surface area of cylinder will be increased". Is this statement true?
Answer:
Yes

Question 8.
If we fold a rectangular sheet along the length, then a cylinder is formed of radius r. Write the length of the sheet.
Answer:
The length of sheet = Circumference of a circular cylinder = $2\pi r$

Question 9.
Give three real life examples of cylinder.
Answer:
Round glass jar, gas cylinder, circular pillar.

Question 10.
Is it possible that curve surface of a cylinder is equal to the total surface area of the cylinder?
Answer:
No

Suggested Activity

Find the curved surface area of a cylindrical bucket in your home.