

Comparison of Curved Surface Areas and Total Surface Areas of Two Right Circular Cylinders

Objective

To compare the curved surface areas and total surface areas of two right circular cylinders which are formed from rectangular sheets of paper with same dimensions.

Prerequisite Knowledge

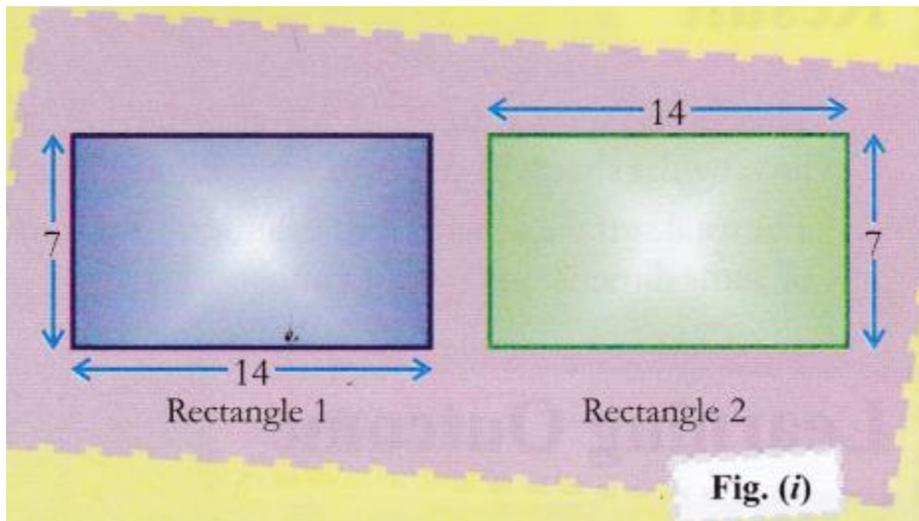
1. Construction of a cylinder from rectangular sheet by paper folding.
2. Area of rectangle = length X breadth
3. Circumference and area of a circle.
 $C=2\pi r$, $A = \pi r^2$

Materials Required

Coloured glazed paper, sketch pens, a pair of scissors, fevicol, cellotape, geometry box.

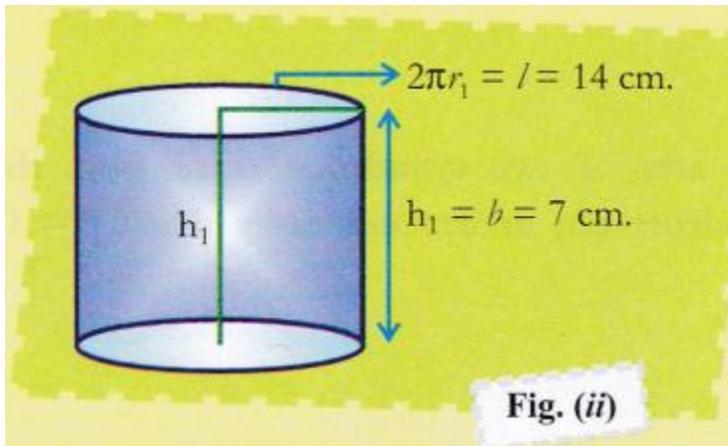
Procedure

1. Take two rectangular sheets of paper of same dimensions as $l= 14$ cm and $b =7$ cm named as rectangle 1 and rectangle 2 .

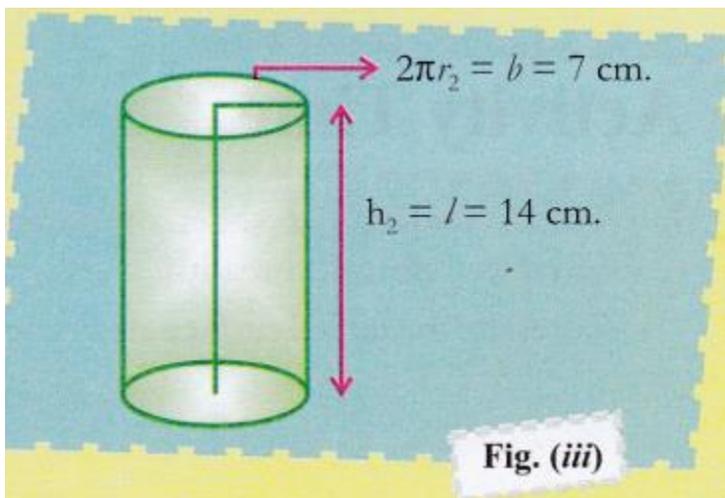


2. Curve the rectangle 1 along its length $l=14$ cm.

3. Join two ends with cellotape to get a cylinder.



4. Similarly curve the rectangle 2 along its breadth $b = 7 \text{ cm}$ to get another cylinder as shown in figure.



Observation

For rectangle 1:

length of the rectangle = circumference of the circular base of the cylinder

$$l = 2\pi r_1 = 14 \text{ cm.}$$

$$r_1 = \frac{14}{2\pi} = \frac{7}{\pi}$$

breadth of the rectangle = height of the cylinder

$$b = h = 7 \text{ cm.}$$

$$\text{curved surface area } C_1 = 2\pi r_2 h_2 =$$

$$2\pi \times \frac{7}{2\pi} \times 14 = 98 \text{ cm}^2$$

Total surface area

For rectangle 2:

breadth of the rectangle = circumference of circular base of the cylinder

$$b = 2\pi r_2 = 7 \text{ cm}$$

$$r_2 = \frac{7}{2\pi}$$

length of the rectangle = height of the cylinder

$$l = h_2 = 14 \text{ cm.}$$

curved surface area

$$\text{Total surface area } T_2 = 2\pi r_2^2 + C_2$$

=

Result

1. The curved surface areas (or lateral surface areas) of two cylinders of different height and radius formed from the two rectangular sheets of paper of same dimensions are same.
2. The total surface areas of two cylinders of different height and radius formed from the two rectangular sheets of paper of same dimensions are not same.

Learning Outcome

Concept of comparison of curved surface area and total surface area of two cylinders formed from the two rectangular sheets of paper of same dimension is more clear.

Students can understand easily that

$$C_1 = C_2 \text{ but } T_1 \neq T_2$$

Activity Time

1. Take a rectangular sheet of paper of size 22 cm x 10 cm. Form two cylinders
 - (i) curved along its length
 - (ii) curved along its breadth.
 Compare the lateral surface areas and total surface areas of these two cylinders.

Question 1:

Find the height of a right circular cylinder made from a rectangle of length 15 cm and breadth 12 cm. It is curved along its length.

Answer:

12 cm

Question 2:

What is the curved surface area of a cylinder obtained from a square of side 5 cm ?

Answer:

25 cm²

Question 3:

Radius of the base of a paper cylinder is 7 cm and it is cut along its height. Find the length of the paper obtained.

Answer:

$$l = \text{circumference of base} = 2\pi r = 2 \times \frac{22}{7} \times 7 = 44 \text{ cm}$$

Multiple Choice Questions

Question 1:

If the circumference of a circular base of a cylinder of height 2 cm is 132 cm, then the radius of the base is

- (a) 21 cm
- (b) 42 cm
- (c) $\frac{21}{2}$ cm
- (d) none of these

Question 2:

A rectangular sheet of paper 44 cm X 18 cm is rolled along its length and a cylinder is formed. What will be the height of the cylinder ?

- (a) 44 cm
- (b) 18 cm
- (c) 22 cm
- (d) 9 cm

Question 3:

The area of a rectangular paper is 88 cm . Find its length if we obtain a circular cylinder of height 14 cm from it. [Hint : $27\pi rh = \text{area of rectangle}$]

- (a) 44 cm
- (b) 88 cm
- (c) $\frac{44}{8}$
- (d) none of these

Question 4:

The diameter of a roller is 1.4 m and it is 2 m long. How much area will it cover in 2 revolutions ?

- (a) 17.6 cm²
- (b) 16.7 m²
- (c) 61.7 m²
- (d) none of these

Question 5:

The area of a circular base of a cylinder is π cm² and its height is 5 cm. Find the lateral surface area and .total surface area of the cylinder.

- (a) 8π cm², 10π cm²
- (b) 10π cm², 12π cm²

- (c) $10\pi \text{ cm}^2$, $10\pi \text{ cm}^2$
- (d) none of these

Answers

- 1. (a)
- 2. (b)
- 3. (c)
- 4. (a)
- 5. (b)