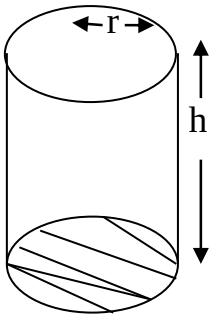
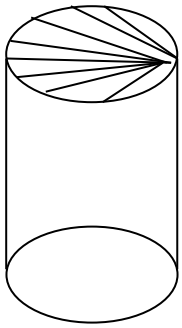
CHAPTER TWO
Cylinders and Cones

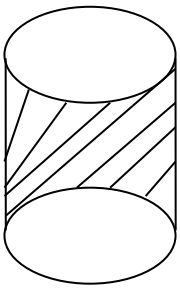
The area of the Cylinder:

1. 

- The diagram shows a cylinder whose height is h and whose radius is r.
- The shaded portion is known as the bottom circular surface area of the cylinder
- The bottom circular surface area = πr^2.

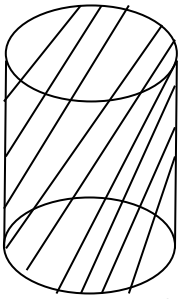
2. 

- The shaded portion is known as the top circular surface area of the cylinder.
- The top surface circular area = πr^2.

3. 

- The shaded portion is known as the curved surface area of the cylinder.
- The curved surface area = $2\pi rh$

4.



- The shaded portion is referred to as the area of the cylinder, or the total surface area of the cylinder.
- **The area of a cylinder:**
- The total surface area of a cylinder is therefore had by adding together all these three surface areas ,
- i.e
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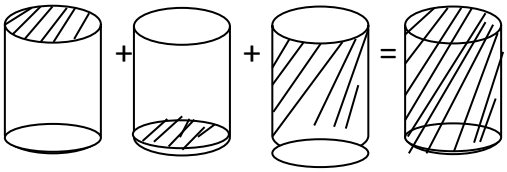

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- $\pi r^2 + \pi r^2 + 2\pi rh = 2\pi r^2 + 2\pi rh = 2\pi r(r + h)$.

- The total surface area of a cylinder = the bottom circular surface area + the top circular surface area + the curved surface area.
- The total surface area of the cylinder is therefore = $\pi r^2 + \pi r^2 + 2\pi rh = 2\pi r^2 + 2\pi rh = 2\pi r(r + h)$

Q1. The radius of a cylinder is 9cm. If it is 70cm long, calculate.

a. the curved surface area.
b. the bottom circular surface area.
c. the top circular surface area.
d. the total surface area.

Soln.

r = 9cm and h = 70cm.

a. The curved surface area = $2\pi rh = 2 \times 3.14 \times 9 \times 70 = 3956cm^2$.

b. The bottom circular surface area = $\pi r^2 = 3.14 \times 9^2 = 3.14 \times 81 = 254cm^2$.
c. The top circular surface area = $\pi r^2 = 3.14 \times 9^2 = 3.14 \times 81 = 254cm^2$.
d. The total surface area =$2\pi r(r + h) = 2 \times 3.14 \times 9(9 + 70) = 2 \times 3.14 \times 9 \times 79 = 4465cm^2$.

N/B: The total surface area is also = top surface area + bottom surface area + curved surface area = 254 + 254 + 3956 = 4465cm^2.

Q2. A milk tin is to be constructed using copper. It is to have a diameter of 120mm and a height of 300mm. Calculate the amount of copper which will be needed to construct

a. the curved surface area.
b. the whole milk tin.

Soln.

D = 120mm $=> r = \frac{120}{2} = 60mm \; and \; h = 300mm$.

a. The amount of copper needed to construct the curved surface area = $2\pi rh = 2 \times 3.14 \times 60 \times 300 = 113040mm^2$.
b. The amount of copper needed to construct the whole milk tin = the total surface area = $2\pi r(r + h) = 2 \times 3.14 \times 60(60 + 300) = 2 \times 3.14 \times 60 \times 360 = 135648mm^2$

Q3. A cylinder has a diameter of 14cm and a height of 49cm. Calculate

a. its curved surface area.
b. its total surface area.[Take $\pi = \frac{22}{7}$].

Soln.

D = 14cm $=> r = 7cm, \; h = 49cm$.

a. Curved surface area =$2\pi rh = 2 \times \frac{22}{7} \times 7 \times 49 = 2156cm^2$.

The total surface area = $2\pi r(r + h) = 2 \times \frac{22}{7} \times 7 \times (7 + 49) = 2 \times \frac{22}{7} \times 7 \times 56 = 2464cm^2$.