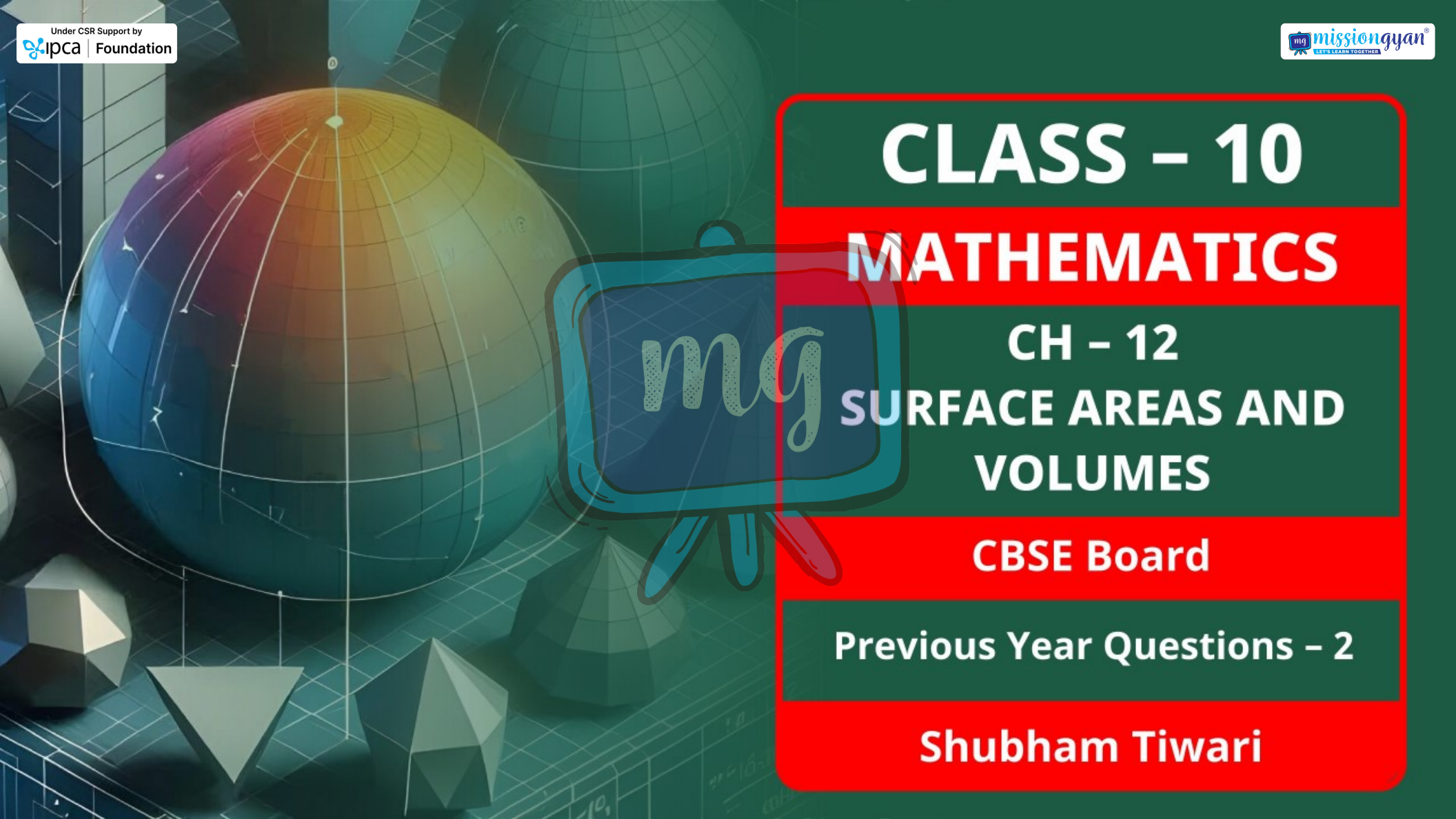


CLASS – 10

MATHEMATICS

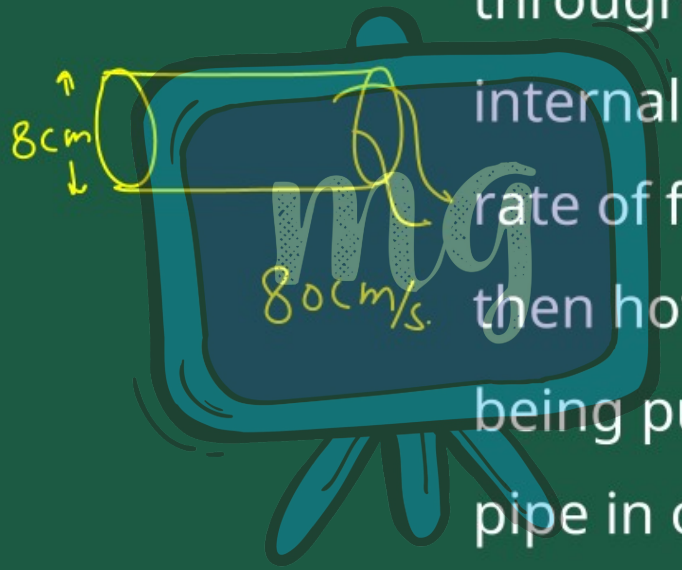
CH – 12
SURFACE AREAS AND VOLUMES

CBSE Board

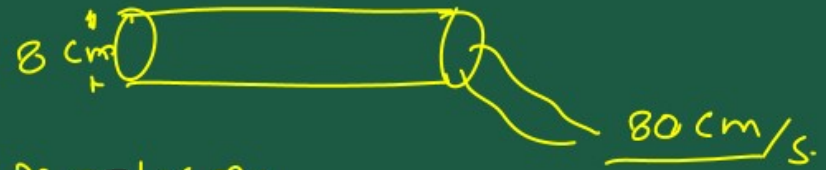
Previous Year Questions – 2

Shubham Tiwari

15. Water is being pumped out through a circular pipe whose internal diameter is 8 cm. If the rate of flow of water is 80 cm/s, then how many litres of water is being pumped out through this pipe in one hour?



(CBSE 2021)



$r = 4\text{cm}.$

Volume of the water in one sec. $= \pi r^2 h$

$= \frac{22}{7} \times (4)^2 \times 80$

$= \frac{22}{7} \times 16 \times 80$

$= \frac{22}{7} \times 1280$

$= \frac{11}{7} \times 2560 = \frac{28160}{7} \times 3600$

256 x 11

3

25 16

2816

1 hour = 3600 sec.

1 ml = 1 cm^3

1 l = 1000 ml

1 l = 1000 cm^3

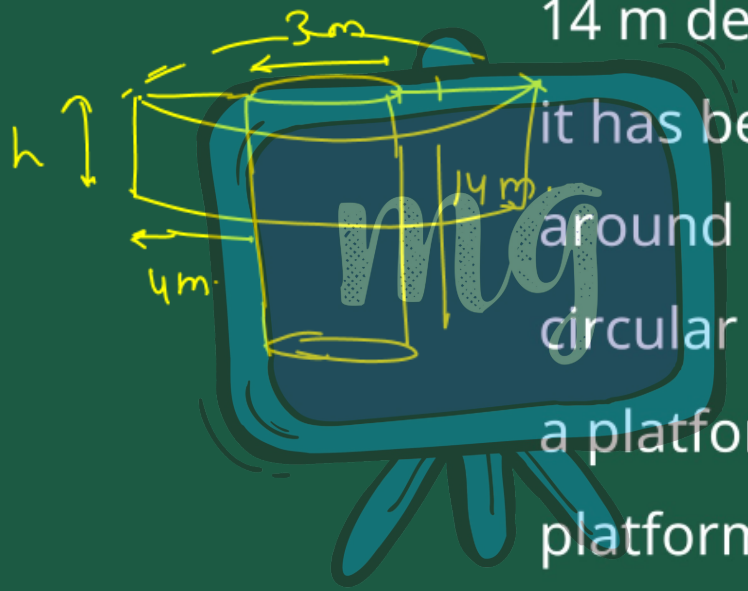
Volume in one hour = 3600 × Volume in one sec

Water in litre = $3600 \times \frac{28160}{7}$

$= 3600 \times \frac{28160}{7} \times \frac{1}{1000}$

$= 36 \times \frac{2816}{7}$

16. A well of diameter 3 m is dug 14 m deep. The earth taken out of it has been spread evenly all around it in the shape of a circular ring of width 4 m to form a platform. Find the height of the platform. $\left(\text{Take } \pi = \frac{22}{7}\right)$



(CBSE 2020)

Volume of the mill = Volume of the platform

$$\pi R^2 H = \pi r^2 h - \pi R^2 h$$

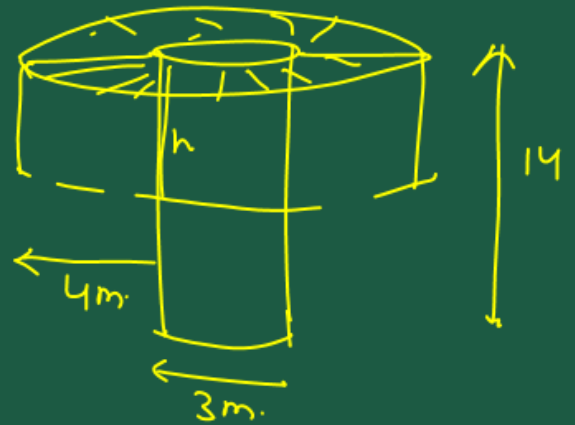
$$\left(\frac{3}{2}\right)^2 14 = \left(\frac{11}{2}\right)^2 h - \left(\frac{3}{2}\right)^2 h$$

$$\left(\frac{3}{2}\right)^2 \times 14 = h\left[\left(\frac{11}{2}\right)^2 - \left(\frac{3}{2}\right)^2\right]$$

$$= h\left[\left(\frac{11}{2} + \frac{3}{2}\right)\left(\frac{11}{2} - \frac{3}{2}\right)\right]$$

$$\left(\frac{3}{2}\right)^2 \times 14 = h\left[7 \times 4\right]$$

$$\frac{9}{4} = h \times 2$$

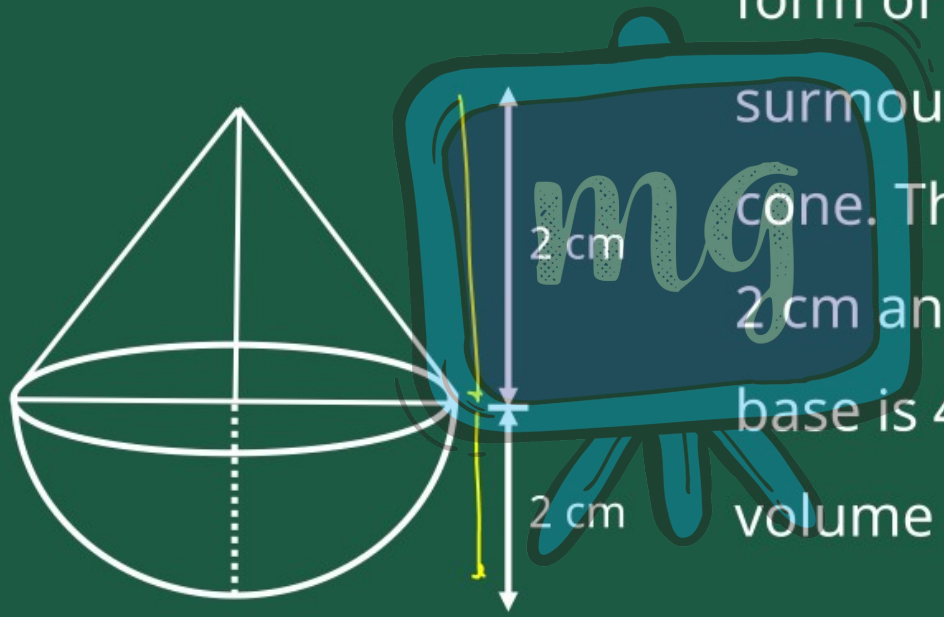


$\frac{3}{2}$

$\frac{3}{2} + 4 = \frac{11}{2}$

17. In Figure, a solid toy is in the form of a hemisphere surmounted by a right circular cone. The height of the cone is 2 cm and the diameter of the base is 4 cm. Determine the volume of the toy. (Take $\pi = 3.14$)

(CBSE 2020)



Volume of the toy :→

= Volume of the cone + Volume of the hemisphere

$= \frac{1}{3}\pi r^2 h + \frac{2}{3}\pi r^3$

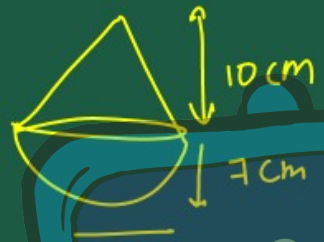
$= \frac{1}{3}\pi r^2 [h + 2r]$

$= \frac{1}{3} \times (3.14)(2)^2 [2 + 2\times 2]$

$\frac{1}{8} \times 3.14 \times 4 \times 8^2$

$3.14 \times 8 = \underline{25.12\ cm^3}$

18. A solid toy is in the form of a hemisphere surmounted by a right circular cone of same radius. The height of the cone is 10 cm and the radius of the base is 7 cm. Determine the volume of the toy. Also find the area of the coloured sheet required to cover the toy. (use $\pi = \frac{22}{7}$ and $\sqrt{149} = 12.2$)

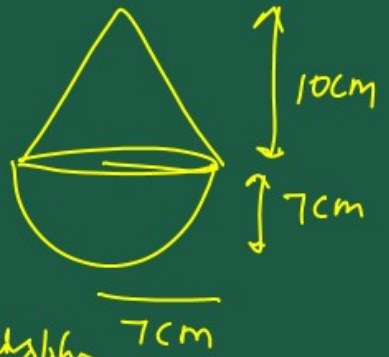


(CBSE 2020)

Sol:

Volume of toy =

Volume of cone + Volume of hemisphere



$= \frac{1}{3}\pi r^2 h + \frac{2}{3}\pi r^3$

$= \frac{1}{3}\pi r^2 \left[h + 2r\right]$

$= \frac{1}{3} \times \frac{22}{7} \times 7 \times 7 \left[10 + 14\right]$

$= \frac{1}{3} \times \frac{22}{7} \times 1 \times 7 \times 24^{8}$

$= 22 \times 56$

$= 11 \times 112$

$= 1232\ cm^3$

112 x 11

11 3 2

1232

SA of the toy :- CSA of Cone + CSA of hemisphere.

$= \pi r l + 2\pi r^2$

$= \pi r [l + 2r]$

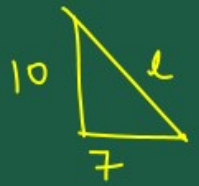
$= \frac{22}{7} \times 7 [12.2 + 2 \times 7]$

$= 22 \times 26.2$

$= 11 \times 2 \times 26.2$

$= 11 \times 52.4$

$= 576.4 \text{ cm}^2$



$l^2 = h^2 + r^2$

$l^2 = 10^2 + 7^2$

$= 100 + 49$

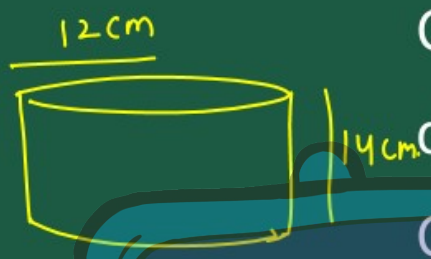
$l^2 = 149$

$l = \sqrt{149}$

$l = 12.2$

19. Case Study : John planned a birthday party for his younger sister with his friends. They decided to make some birthday caps by themselves and to buy a cake from a bakery shop. For these two items they decided the following dimensions :

(CBSE Term II, 2022)



$2\pi r = 44$

$2 \times \frac{22}{7} \times r = 44$

$r = 7$

Cake : Cylindrical shape with diameter 24 cm and height 14 cm.

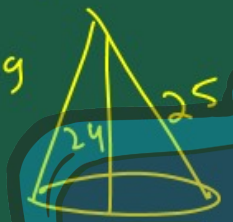
Cap : Conical shape with base circumference 44 cm and height 24 cm.

$l^2 = 24^2 + 7^2$

$= 576 + 49$

$l^2 = 625$

$l = 25$



Based on the above information answer the following questions.

(a) How many square cm paper would be used to make 4 such caps?

Soln:

CSA of cone :- $\pi r l$

$= \frac{22}{7} \times 7 \times 25$

$= 22 \times 25 \times 4$

$= 22 \times 100$

$= 2200 \text{ cm}^2$

(b) The bakery shop sells cakes by weight (0.5 kg, 1 kg, 1.5 kg, etc.,). To have the required dimensions how much cake should they order if 650 cm^3 equals 100g of cake?

Volume of cake :-

$\pi r^2 h = \frac{22}{7} \times 12^2 \times 14$

$= \frac{22 \times 144 \times 14}{7 \times 2}$

$= \frac{288 \times 14 \times 11}{7}$

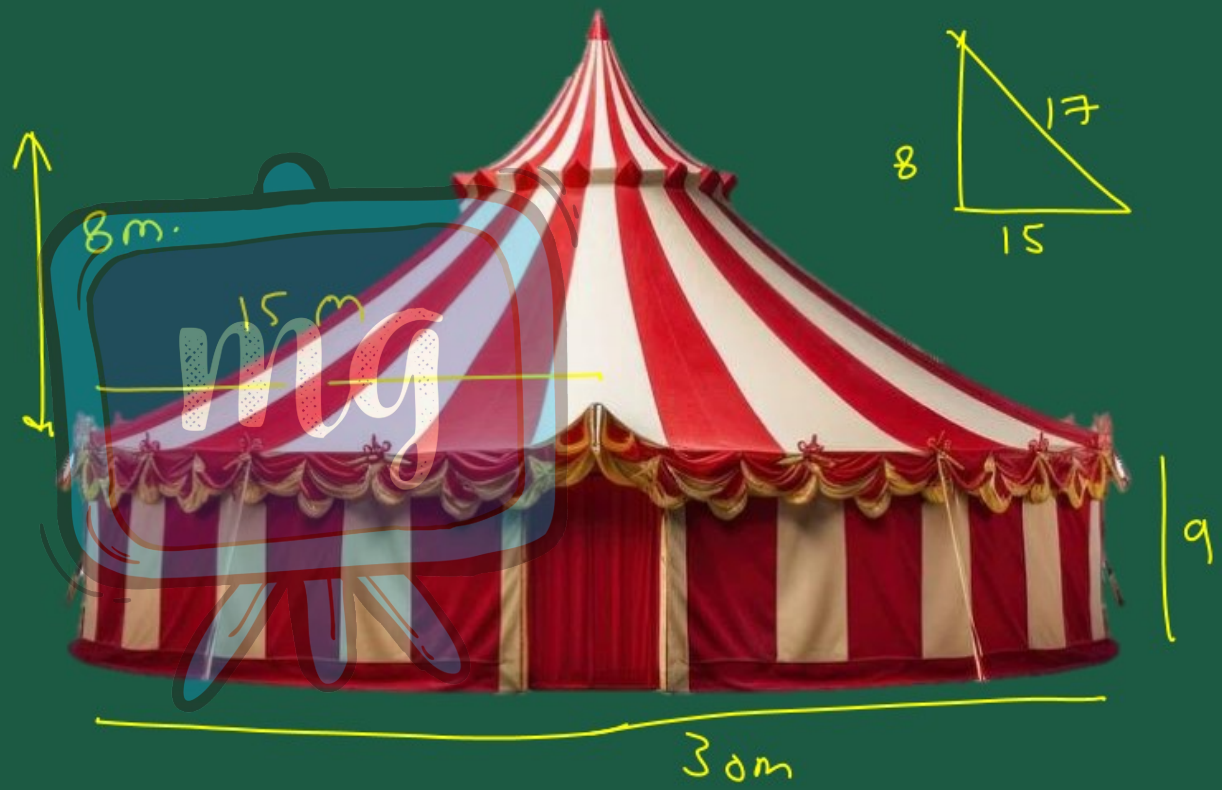
$= 576 \times 11 = 6336\ cm^3$

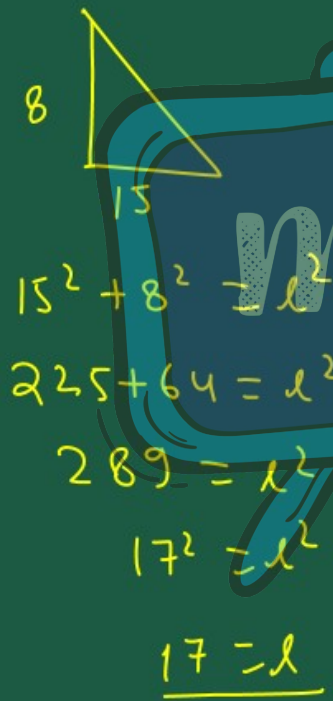
576
6
57 36
6336

650 → 100 g
6500 → 1 kg

20. **Case Study :** A 'circus' is a company of performers who put on shows of acrobats, clowns etc. to entertain people started around 250 years back, in open fields, now generally performed in tents. One such 'Circus Tent' is shown below.

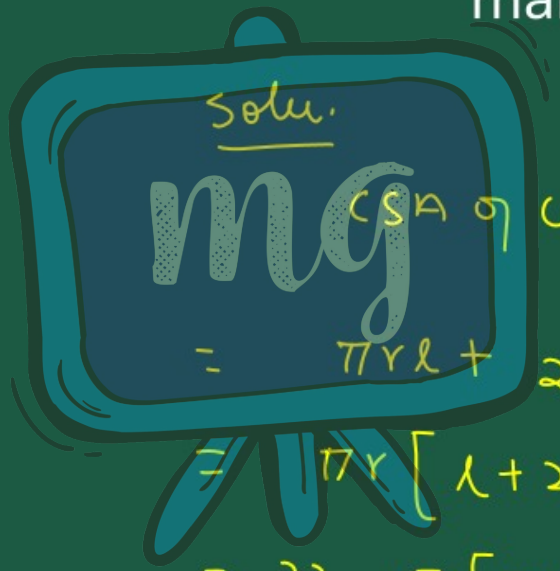
(CBSE Term II, 2022)





The tent is in the shape of a cylinder surmounted by a conical top. If the height and diameter of cylindrical part are 9 m and 30 m respectively and height of conical part is 8 m with same diameter as that of the cylindrical part, then find

(i) area of the canvas used in making the tent.



Solu.

CSA of cone + CSA of cylinder

$= \pi r l + 2\pi r h$

$= \pi r [l + 2h]$

$= \frac{22}{7} \times 15 \left[17 + 2 \times \frac{9}{5}\right]$

$= \frac{22}{7} \times 15 \times 35$

$22 \times 15 \times 5$

$= 11 \times 2 \times 15 \times 5$

$= 11 \times 10 \times 15$

$= 11 \times 150$

$= 1650 \ m^2$

$1650 + 30 = 1680 \ m^2 \times 200$

Cost $=$ 3,36,000 Rs

(ii) the cost of the canvas bought for the tent at the rate 200 per sq. m, if 30 sq. m canvas was wasted during stitching.