Surface Area and volume of A Right Circular cone – 20.1

1.

Sol:

Given that

Radius of its base is 21cm

Slant height $= 60cm$

WKT, Curved surface area of a cone $= \pi rl$

$\therefore$ Curved surface area $= \frac{22}{7} \times 21 \times 60$

$= 3960cm^2$

2.

Sol:

Given,

Radius of a cone $= 12cm = h$

Height of a cone $= 12cm = h$

Slant height of the cone $= \sqrt{r^2 + h^2}$

$= \sqrt{5^2 + 12^2} = 13cm$

$\therefore$ Curved surface Area $= \pi rl$

$= \frac{22}{7} \times 5 \times 12$

$= 204 \cdot 28cm^2$

3.

Sol:

Given

Radius of a cone $(r) = 7cm.$

Let $'l'$ be the slant height of a cone

$\therefore$ Curved surface area $= \pi rl.$

$\Rightarrow 176 = \pi \times 7 \times l$

$\Rightarrow l = \frac{176}{7\pi} = \frac{176 \times 7}{7 \times 22} = 8cm.$

4.

Sol:

Given that

Slant height 'l' $= 28m.$

Height of cone $(h) = 21cm$

$\therefore$ Radius of cone $(r) = \sqrt{25^2 - 21^2}$ [by Pythagoras theorem]

$= 7\sqrt{7}cm$

$\therefore$ Area of base $= \pi r^2$

$= \frac{22}{7} \times \left(7\sqrt{7}\right)^2$

$= \frac{22}{7} \times 7 \times 7 \times 7 = 1078cm^2.$

5.

Sol:

WKT, Total surface area $= \pi rl + \pi r^2$

Now $l = \sqrt{h^2 + r^2}$ [by Pythagoras theorem]

Here, given

Radius $= 6cm$ and height $= 8cm$

$\Rightarrow$ length $= \sqrt{6^2 + 8^2}$

$= 10cm$

$\therefore$ Total surface area $= \pi rl + \pi r^2$

$= \left(\frac{22}{7} \times 6 \times 10\right) + \left(\frac{22}{7} \times 6 \times 6\right)$

$= \left(\frac{1320}{7}\right) + \frac{792}{7} = 301 \cdot 71cm^2$

6.

Sol:

Given that,

Radius of a base of a cone $= 5 \cdot 25cm$

Slant height of cone $= 10cm$

Curved surface area of cone $= \pi rl$

$= \frac{22}{7} \times 5 \cdot 25 \times 10 cm^2$

$= (22 \times 0 \cdot 75 \times 10) cm^2$

$= 165 cm^2$

Thus, the curved surface area of a cone is

$165 cm^2$

7.

Sol:

Given that,

Radius of base of cone $= \left(\frac{24}{2}\right) = 12m$

Slant height of cone $= 21m.$

Total surface area of cone $= \pi r^2 + \pi rl$

$= \pi r (r + l)$

$= \frac{22}{7} \times 12 \times (12 + 21)$

$= \frac{22}{7} \times 12 \times 33 m^2$

$= 1244 \cdot 57 m^2.$

8.

Sol:

Given that

Curved surface area of cone $= 60\pi cm^2$

$\therefore$ Slant height of cone $(l) = 8cm.$

i.e., $\pi rl = 60\pi$

$\Rightarrow \pi \times r \times 8 = 60\pi$

$\Rightarrow r = \frac{60}{8} = 7 \cdot 5$

$\therefore$ Radius of cone $= 7 \cdot 5 cm.$

9.

Sol:

Given diameter $= 70cm$

$\Rightarrow 2r = 70cm$

$\Rightarrow r = 35cm$

Now, curved surface area $= 4070 cm^2$

$\Rightarrow \pi rl = 4070$

Where $r =$ radius of the cone

$l =$ slant height of the cone

$\therefore \pi rl = 4070$

$\Rightarrow \frac{22}{7} \times 35 \times l = 4070$

$\Rightarrow l = \frac{4070 \times 7}{22 \times 35} = 37 cm$

$\therefore$ Slant height of the cone $= 37 cm.$

10.

Sol:

Given that,

Curved surface area $= \pi rl = 792.$

Let the radius $(r) = 4x$

Height $(h) = 7x$

Now, CSA $= 792$

$\frac{22}{7} \times 4x \times 7x = 792$

$\Rightarrow 88x^2 = 792$

$\Rightarrow x^2 = \frac{792}{88} = 9.$

$\Rightarrow x = 3.$

$\therefore$ Radius $= 4x = 4 \times 3 = 12 cm.$

11.

Sol:

Given that,

Radius of conical cap $(r) = 7 cm.$

Height of conical cap $(h) = 24 cm.$

Slant height (I) of conical cap $= \sqrt{r^2 + h^2}$

$= \sqrt{(7)^2 + (24)^2} cm$

$= 25 cm$

CSA of 1 conical cap $= \pi rl = \frac{22}{7} \times 7 \times 25 cm^2 = 550 cm^2$

Curved surface area of 0 such 10 conical caps $= 5500 cm^2$

$[\because 550 \times 10]$

Thus, $5500 cm^2$ sheet will be req for making of 10 caps.

12.

Sol:

Given that,

Diameter of two cones area equal

$\therefore$ Their radius are equal

Let $r_1 = r_2 = r$

Let ratio be x

$\therefore$ Slant height l_1 of 1^{st} cone $= 4x$

Similarly slant height l_2 of 2^{nd} cone $= 3x$.

$$\therefore \frac{C \cdot S\ A_1}{C \cdot S\ A_2} = \frac{\pi r_1 l_1}{\pi r_2 l_2} = \frac{\pi \times r \times 4x}{\pi \times r \times 3x} = \frac{4}{3}.$$

13.

Sol:

Let curved surface area off 1^{st} cone $= 2x$

CSA of 2^{nd} cone = x

and slant height of 1^{st} cone = h

and slant height of 2^{nd} cone = 2h

$$\therefore \frac{CSA\ of\ 1^{st}\ cone}{CSA\ of\ 2^{nd}\ cone} = \frac{2x}{x} = \frac{2}{1}.$$

$$\Rightarrow \frac{\pi r_1 l_1}{\pi r_2 l_2} = \frac{2}{1}$$

$$\Rightarrow \frac{r_1 h}{r_2 h} = \frac{2}{1} \Rightarrow \frac{r_1}{r_2} = \frac{4}{1}.$$

i.e., ratio of r_1 *and* r_2 is $(4:1)$

14.

Sol:

Given that,

Diameters of two cones are equal

$\therefore$ Their radius are also equal i.e., $r_1 = r_2$

Let the ratio of slant height be x

$\therefore l_1 = 5x \ and \ l_2 = 4x$

$\therefore$ Ratio of curved surface area $= \dfrac{C_1}{C_2}$

$$\therefore \frac{C_1}{C_2} = \frac{\pi r_1 l_1}{\pi r_2 l_2} = \frac{\pi r_1 Sx}{\pi r_2 (4x)} = \frac{5}{4}$$

$\therefore$ Ratio of curved surface area $= 5:4$

15.

Sol:

(i) Given that,

Slant height of cone $= 14cm$

Let radius of circular end of cone = r.

Curved surface area of cone $= \pi rh$

$$308cm^2 = \left(\frac{22}{7} \times r \times 14\right) cm \qquad \left[\because CSA = 308cm^2\right)$$

$$\Rightarrow r = \frac{308}{44} cm = 7cm$$

Thus, radius of circular end of cone $= 7cm$

(ii) Given that CSA $= 308cm^2$

WKT, total surface area of cone

= curved surface area of cone + area of base

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

$= \left[308 + \frac{22}{7}(7)^2\right] cm^2$

$= 308 + 154cm^2$

$= 462cm^2$

Thus, the total SA of the cone is $462cm^2$.

16.

Sol:

Given that,

Slant height of conical tomb (l) =25m

Base radius (r) of tomb $= \frac{14}{2} m = 7m.$

CSA of conical length tomb $= \pi rl$

$= \left(\frac{22}{7} \times 7 \times 25\right) m^2$

$= 550 m^2$

Cost of white – washing $100m^2$ area = Rs 210

Cost of white – washing $550m^2$ area = $Rs\left(\frac{210 \times 550}{100}\right)$

$= Rs\ 1155.$

17.

Sol:

(i) Given that

Height of conical tent $(h) = 10m$

Radius of conical tent $(r) = 24m.$

Let slant height of conical tent be l

$l^2 = h^2 + r^2 = (100m)^2 + (24m)^2 = (100 + 576) m^2$

$= 676 m^2$

$l = 26m.$

Thus, the slant height of the conical tent is $26m.$

(ii) Given that

Radius $(r) = 24$

Slant height $(l) = 26$

CSA of tent $= \pi r l = \frac{22}{7} \times 24 \times 26 = \frac{1378}{7} m^2$

Cost of $1m^2$ canva $S = Rs\,70.$

Cost of $\frac{137}{7}28\ m^2$ canvas $= \frac{13728}{7} \times 10$

$= Rs\,1,37,280.$

Thus, the cost of canvas required to make the tent is Rs 137280.

18.

Sol:

Given that,

Diameter of cylinder $= 24m$

$\therefore$ Radius $= \frac{diameter}{2} = \frac{24cm}{2} = 12cm$

Also Radius of cone $= 12m.$

Height of cylinder $=11m$

Height of cone $=16-11=5m$

Slant height of cone $=\sqrt{h^2+r^2}$

$=\sqrt{6^2+12^2}=13m$

$\left[\because l=\sqrt{r^2+h^2}\right]$

$\therefore$ area of canvas required for the

tent $=\pi rl+2\pi rh$

$=\frac{22}{7}[12\times13+2\times12\times11]$

$=490\cdot285+829\cdot714$

$=1320m^2.$

19.

Sol:

Given diameter $=105m$

Radius $=\frac{105}{2}m=52\cdot5m.$

$\therefore$ Curved surface area of circus tent $=\pi rl+2\pi rh$

$=\frac{22}{7}\times52\cdot5\times53+2\times52\cdot5\times3\times\frac{22}{7}$

$=8745+990$

$=9735m^2$

$\therefore$ Length of the canvas equation for tent $=\frac{Area\ of\ canvas}{width\ of\ canvas}$

$=\frac{9735}{5}=1947m$

20.

Sol:

WKT, CSA of cone = πrl

Given circumference $=2\pi r$

$\Rightarrow 2\times\frac{22}{7}\times r=44\Rightarrow\frac{r}{7}=1\Rightarrow r=7m$

$\therefore L=\sqrt{r^2+h^2}=\sqrt{7^2+10^2}=\sqrt{149}m$

$\therefore CSA$ of tent $=\pi rl=\frac{22}{7}\times7\times\sqrt{149}=22\sqrt{149}.$

$\therefore$ The length of can vas used in making tent

$= \frac{Area\ of\ \ canvas}{width\ of\ \ canvas}$

$= \frac{22\sqrt{149}}{2} = 11\sqrt{149}$

$= 134 \cdot 2m.$

21.

Sol:

Given that,

Height of conical tent $(h) = 8m.$

Radius of base of tent $(r) = 6m.$

Slant height $(l) = \sqrt{r^2 + h^2} = \sqrt{8^2 + 6^2} = \sqrt{100} = 10m$

CSA of conicalten $t = \pi rl = (3 \cdot 14 \times 6 \times 10)m^2$

$= 188 \cdot 4m^2$

Let the length of tarpaulin sheet require be L

As 200m will be wasted, So effective length will be $(L - 0 \cdot 2m)$

Breadth of tarpaulin $= 3m$

Area of sheet $=$ CSA o sheet

$(L \times 0 \cdot 2m \times 3)m = 188 \cdot 40m^2$

$\Rightarrow L - 0 \cdot 2m = 62 \cdot 8m$

$\Rightarrow L = 63m$

Thus, the length of the tarpaulin sheet will be $= 163m.$

22.

Sol:

Radius of cone $(r) = \frac{40}{2} = 20m = 0 \cdot 2m.$

Height of cone $= 1m.$

Slant height of cone $(l) = \sqrt{h^2 + r^2}$

$= \sqrt{1^2 + (0 \cdot 2)^2 m}$

$= \sqrt{1 \cdot 04}m = 1 \cdot 02m$

Curved surface area of each one

$= \pi rl = (3 \cdot 14 \times 0 \cdot 2 \times 1 \cdot 02)m^2$

$= 0 \cdot 64056 m^2$

CSA of so such cone $= 50 \times 0 \cdot 64056 m^2 = 32 \cdot 028 m^2$

Cost of painting $1 m^2$ area = Rs 12.

Cost of painting $32 \cdot 028 m^2$ area $= Rs\left(32 \cdot 028 \times 12\right)$

$= Rs\ 384 \cdot 326\ PS.$

Thus, it will cost Rs 38434 (Approx) in painting the so hollow cones.

23.

Sol:

Let us assume radius of cone $= r$.

Also, radius of cylinder $= r$.

Height of cone $= h$

And, height of cylinder $= h$.

Let C, be the curved surface area of cone

$\therefore C_1 = \pi r \sqrt{r^2 + h^2}$

Similarly, C_2 be the curved surface area of cone cylinder.

$\therefore c_2 = 2\pi r h$

According to question $\frac{C_2}{C_1} = \frac{8}{5}$.

$\Rightarrow \frac{2\pi r h}{\pi r \sqrt{r^2 + h^2}} = \frac{8}{5}$

$\Rightarrow 10h = 8\sqrt{r^2 + h^2}$

$\Rightarrow 100h^2 = 64r^2 + 64h^2$

$\Rightarrow 36h^2 = 64r^2$

$\Rightarrow \left(\frac{h}{r}\right)^2 = \frac{64}{36}$

$\Rightarrow \frac{b}{r} = \sqrt{\frac{64}{30}} = \frac{8}{6} = \frac{4}{3}$

$\therefore \frac{r}{h} = \frac{3}{4}$.