Solution

S1. Ans.(b)

Sol. Let increase in level by h cm

Water rained = $1000 \times 1000 \times \frac{2}{100} = 20000\ m^2$

Rain drops collected is pool = $20000 \times \frac{50}{100} = 10000\ m^2$

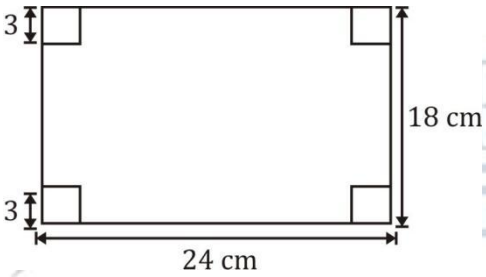
Volume of water collected is swimming pool = $100 \times 10 \times h$

$1000\ h = 10000$

$h = 10\ m$

S2. Ans.(b)

Sol.



Length of box = $24 - 2 \times 3 = 18$ cm

Breadth of box = $18 - 2 \times 3 = 12$ cm

Height of the box = 3 cm

Surface Area of the box = $2(l + b) \times h + l \times b$

$= 2(18 + 12) \times 3 + 18 \times 12$

$= 396\ cm^2$

S3. Ans.(d)

Sol. No. of Balls made = $\frac{\text{volume of cone}}{\text{volume of sphere}}$

$= \frac{\frac{1}{3}\pi r^2, h}{\frac{4}{3}\pi r_2^3}$

$= \frac{(20)^2 \times 10}{4 \times (2)^3}$

$= 125$

S4. Ans.(b)

Sol. Volume of cone = volume of cylinder

$\frac{1}{3}\pi R_1^2 H_1 = \pi R_2^2 H_2$

$\frac{1}{3}\pi(15)^2 \times H_1 = \pi(R_2)^2 \times 9$

$R_2^2 = 900$

$R_2 + 30$

Diameter of base = 2 × 30 = 60 cm

S5. Ans.(c)

Sol. Radius = D/2

= 9.6 m

Height = 2.8 m

Slant height, l = $\sqrt{R^2 + h^2}$

$= \sqrt{(9.6)^2 + (2.8)^2}$

$= \sqrt{100}$ = 10 m

Area of canvas = πrl

$= \frac{22}{7} \times 9.6 \times 10 = 301.7\ m^2$

S6. Ans.(c)

Sol. Volume of Displaced water = volume of sphere

$\pi R_1^2 H_1 = \frac{4}{3}\pi(R_1)^3$

$4 \times 4 \times H_1 = \frac{4}{3} \times 8$

$H_1 = \frac{2}{3}$cm

The water level is the cylinder will rise By = $\frac{2}{3}$cm

Q7. Ans.(a)

Sol. Volume of cone = Volume of sphere

$\frac{1}{3}\pi(R_1)^2 H_1 = \frac{4}{3}\pi(R_2)^3$

$8 \times 8 \times H_1 = 4 \times 8 \times 8 \times 8$

H_1 = 32 cm

Slant height of cone, l = $\sqrt{R_1^2 + H_1^2}$

$= \sqrt{64 + 1024}$

$= 8\sqrt{17}$cm

Q8. Ans.(b)

Sol. Volume of sphere = Volume of Cylinder

$\frac{4}{3}\pi(R_1)^3 = \pi(R_2)^2 \times h$

$\frac{4}{3}\times 7\times 7\times 7 = (R_2)^2 \times 7/3$

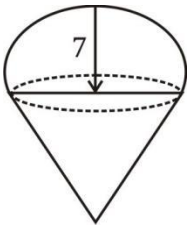
$R_2 = 7 \times 2 = 14$ cm

Diameter of base = 14 × 2

Of cylinder = 28 cm

Q9. Ans.(a)

Sol.



Height of Hemispherical part = Radius of Hemispherical part

Radius of Hemisphere = 7 cm

Height of cone = Radius of Hemisphere = 7 cm

Volume of Ice-cream = $\frac{1}{3}\pi(R_1)^2 H_1 + \frac{2}{3}\pi(R_2)^3$

$= \frac{1}{3}\times\frac{227}{7}\times(7)^3 + \frac{2}{3}\pi(7)^3 = 1078\,cm^3$

Q10. Ans.(d)

Sol. Number of bottle = $\frac{\text{Volume of Hemispherical Bowl}}{\text{Volume of cylinderical Bottle}}$

$= \frac{\frac{2}{3}\times\pi\times 15\times 15\times 15}{\pi\times\frac{5}{2}\times\frac{5}{2}\times 6} = 60$

Q11. Ans.(d)

Sol. Volume of cone = Lateral surface Area

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

$\frac{rh}{3} = \sqrt{h^2 + r^2}$

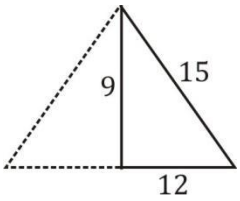
Squaring Both sides

$\frac{1}{9} = \frac{h^2 r^2}{r^2 h^2}$

$\frac{1}{r^2} + \frac{1}{h^2} = \frac{1}{9}.$

Q12. Ans.(a)

Sol.



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

$=\frac{1}{3}\times\pi\times12\times12\times9$

$=432\pi$

Q13. Ans.(d)

Sol. Required Quantity = $\frac{3\times40\times2000}{60}$

= $4000m^3$

Q14. Ans.(d)

Sol. 8.4 gm = $1cm^3$

4725gm = $\frac{4725}{8.4}$ cm^3

Volume = x × x × 0.1

$x^2 \times 0.1 = \frac{4725}{8.4}$

x = 75 cm

Q15. Ans.(a)

Sol. Perimeter of right triangle = 5 + 12 + 13 = 30

Total surface Area = Lateral surface + 2 × area of base

= Perimeter of base × Height + 2 × Area of base

= 30 × H + 2 × $\frac{1}{2}\times5\times12$

= 30 H + 60

30 H + 60 = 360

30H = 300

H = 10

Q16. Ans.(b)

Sol. Volume of cylindrical shell = $\frac{1}{4}\times$ Volume of solid cylinder

$\pi(R^2-r^2)\times1000=\frac{1}{4}\pi R^2\times1000$

$R^2 - r^2 = R^2/4$

$\frac{3R^2}{4}=r^2$

$3R^2 = 4r^2$

$R^2 = \frac{3}{4}R^2$

$r^2 = \frac{3}{4} \times 10^2$

$r = 5\sqrt{3}$

Thickness of cylindrical shell

= Radius of solid cylinder – Inner Radius of cylinder.

$= 10 - 5\sqrt{3} = 5(2 - \sqrt{3})$ cm

Q17. Ans.(b)

Sol. Curved surface area = $2\pi rh$

Curved surface area of 50 pillars

$= 50 \times 50 \times 2\pi rh$

$= 50 \times 2 \times \frac{22}{7} \times \frac{50}{2 \times 100} \times 4$

$= 314\ m^2$

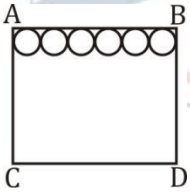
Labour charges for getting these pillars cleared

= 314 × 0.5

= Rs. 157.

Q18. Ans.(c)

Sol.



Diameter of each circle = 2 cm

AB = 2 × 4 = 8 cm

BD = 8 cm

Area of Bottom = AB × BD = 8 × 8 = 64.

Q19. Ans.(a)

Sol. Circumference of Hemispherical bowl = 176

$2\pi r = 176$

r = 28 cm

When bowl is half full = $\frac{2}{3}\pi r^3 \times \frac{1}{2} = \frac{1}{3}\pi(28)^3$

Volume of hemispherical glass = $\frac{2}{3}\pi(2)^2$

No. Of persons may be served = $\frac{\frac{1}{3}\pi(28)^3}{\frac{2}{3}\pi(2)^3} = 1372$

Q20. Ans.(b)

Sol. Area of regular Hexagon = $\frac{3\sqrt{3}\,a^2}{2}$

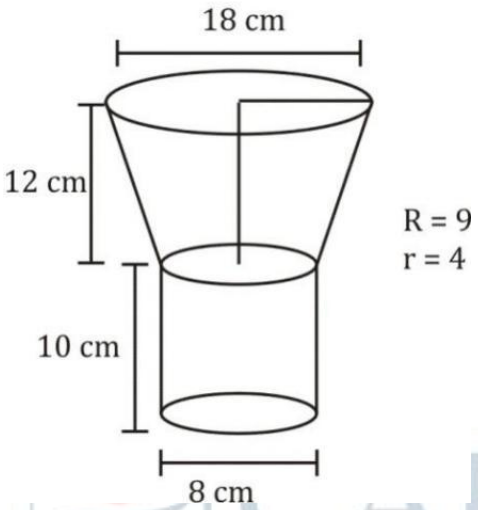
A = side of Hexagon

Volume of prism = area of base × height

$= \frac{3\sqrt{3}}{2} m^3$

S21. Ans.(b)

Sol.



Slant height of frustum

$= \sqrt{h^2 + (R - r)^2}$

$= \sqrt{144 + (9 - 4)^2}$

$= \sqrt{144 + 25}$

= 13

Area of tin Sheet Required to make the funnel

= 2πrh + π (R + r) ℓ

= π [2 × 4 ×10 + [9 + 4] × 13]

= π [80 + 169]

$= 249 \times \frac{22}{7} = 782.57\ cm^3$

S22. Ans. (d)

Sol.

Area of base = 6 × 10 = 60 m^3

Volume of tent = 30 × 10 = 300 m^2

Radius = r, Height = h, slant height = ℓ

$\pi r^2 = 60$ ...(i)

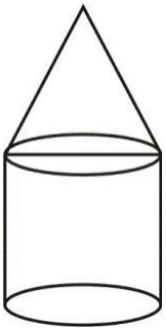
$\frac{1}{3}\pi r^2 h = 300$ ...(ii)

From (i) and (ii)

$\frac{1}{3} \times 60 \times h = 300$

h = 15 m

S23. Ans.(c)
Sol.



Radius = $\frac{105}{2}$ = 52.5 cm

Area of the canvas
= Area of cylindrical portion + Area of conical part
= $2\pi rh + \pi r\ell$
= $\pi r (2h + \ell)$
= $3.14 \times 52.5 [2\sqrt{(53)^2 - (52.5)^2} + 53]$
Area of canvas = $6 \times \ell$
$6 \times \ell = 3.14 \times 52.5 [2\sqrt{(53)^2 - (52.5)^2} + 53]$
ℓ = 1947 m

S24. Ans.(c)
Sol.
Let the internal radius of cylinder = r
Volume of sphere = volume of cylinder

$\frac{4}{3}\pi(6)^3 = \pi h(5^2 - r^2)$

$\frac{864}{3}\pi = 32\pi(25 - r^2)$

$288\pi = 32\pi (25 - r^2)$
$9 = 25 - r^2$
$r^2 = 16$
r = 4 cm
thickness = 5 – 4 cm = 1 cm

S25. Ans.(b)
Sol.
Radius of cylinder = Radius of hemisphere
= $\frac{7}{2}$ = 3.5 cm
Height of cylinder = 19 – (3.5 × 2) = 12 cm
Total surface area of solid
= $2\pi rh + 4\pi r^2$
= $2 \times 3.14 \times 3.5 \times 12 + 4 \times 3.14 \times (3.5)^2$
= 418 cm^2

S27. Ans.(c)

Sol.

Each edge of smaller cube = 1cm

Each edge of bigger cube = 2 cm

Surface area of smaller cube = $6 \times (1)^2 = 6\ cm^2$

Surface area of larger cube = $6 \times (2)^2$

$= 6 \times 4$

$= 24\ cm^2$

% increase in the area of cube

$= \frac{24-6}{6} \times 100 = 300\%$

S28. Ans.(c)

Sol.

Volume of rectangular Block = $14 \times 10.5 \times 11\ cm^3$

Radius of cylindrical cistern = 10.5 cm

Volume of cylinder = $\pi r^2 h$

$\frac{22}{7} \times \frac{21}{2} \times \frac{21}{2} \times h = 14 \times 10.5 \times 11$

$h = \frac{14}{3} = 4\frac{2}{3} cm$

S29. Ans.(c)

Sol.

Height of Pyramid = h

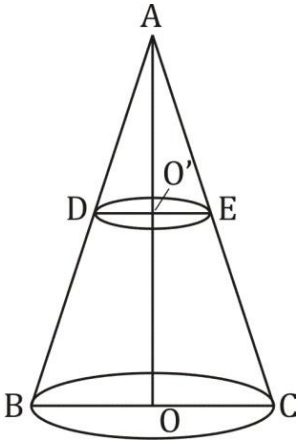
Slant Edge = ℓ

$\ell^2 = \left(\frac{a}{\sqrt{3}}\right)^2 + h^2$

$\ell = \sqrt{\frac{a^2}{3} + h^2}$

S30. Ans.(b)

Sol.



DO' = r cm, OO' = h cm

From similar triangles property in ΔADO' & ABO

$$\frac{AO'}{AO} = \frac{DO'}{BO}$$

$$\frac{9-h}{9} = \frac{r}{3}$$

h = 9 – 3r

Volume of Frustum

$$= \frac{1}{3}\pi h(r_1^2 + r_1 r_2 + r^2)$$

$$44 = \frac{1}{3} \times \frac{22}{7}(9-3r)(9+r^2+3r)$$

$r^3 = 13$, $r = \sqrt[3]{13}$ cm