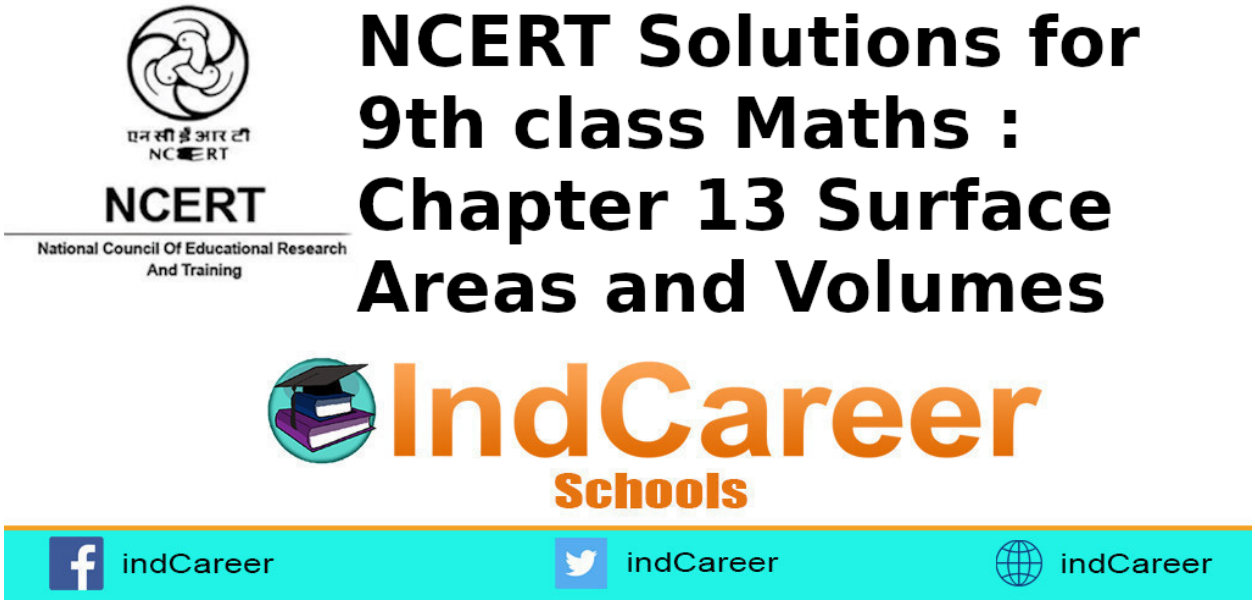

NCERT Solutions for 9th class Maths : Chapter 13 Surface Areas and Volumes

Class 9: Maths Chapter 13 solutions. Complete Class 9 Maths Chapter 13 Notes.

NCERT Solutions for 9th class Maths : Chapter 13 Surface Areas and Volumes

NCERT 9th Maths Chapter 13, class 9 Maths Chapter 13 solutions

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Exercise 13.1

https://www.indcareer.com/schools/ncert-solutions-for-9th-class-maths-chapter-13-surface-areas-and-volumes/

1. A plastic box 1.5 m long, 1.25 m wide and 65 cm deep is to be made. It is opened at the top. Ignoring the thickness of the plastic sheet, determine:

(i) The area of the sheet required for making the box.

(ii) The cost of sheet for it, if a sheet measuring $1m^2$ costs Rs 20.

Answer

Length of plastic box (l) = 1.5 m

Width of plastic box (b) = 1.25 m

Depth of plastic box (h) = 0.65 m

(i) The area of sheet required to make the box is equal to the surface area of the box excluding the top.

Surface area of the box = Lateral surface area + Area of the base

$= 2(l+b)\times h + (l\times b)$

$= 2[(1.5 + 1.25)\times 0.65] + (1.5 \times 1.25)\ m^2$

$= (3.575 + 1.875)\ m^2$

$= 5.45m^2$

The sheet required required to make the box is $5.45\ m^2$

(ii) Cost of $1\ m^2$ of sheet= Rs 20

$\therefore$ Cost of $5.45m^2$ of sheet = Rs (20×5.45) = Rs 109

2. The length, breadth and height of a room are 5m, 4m and 3m respectively. Find the cost of white washing the walls of the room and the ceiling at the rate of ₹7.50 per m^2.

Answer

length of the room = 5m

breadth of the room = 4m

height of the room = 3m

Area of four walls including the ceiling = $2(l+b)\times h + (l\times b)$

$= 2(5+4)\times 3 + (5\times 4)\ m^2$

$= (54 + 20)\ m^2$

$= 74m^2$ Cost of white washing = ₹7.50 per m^2

Total cost = ₹(74×7.50) = ₹ 555

3. The floor of a rectangular hall has a perimeter 250 m. If the cost of painting the four walls at the rate of ₹10 per m^2 is ₹15000, find the height of the hall.

[Hint : Area of the four walls = Lateral surface area.]

Answer

Perimeter of rectangular hall = $2(l + b) = 250$ m

Total cost of painting = ₹15000

Rate per m^2 =₹10

Area of four walls = $2(l + b)\ h\ m^2 = (250\times h)\ m^2$

A/q,

(250×h)×10 = ₹15000

⇒ 2500×h = ₹15000

⇒ h = 15000/2500 m

⇒ h = 6 m

Thus the height of the hall is 6 m.

NCERT 9th Maths Chapter 13, class 9 Maths Chapter 13 solutions

4. The paint in a certain container is sufficient to paint an area equal to 9.375 m^2. How many bricks of dimensions 22.5 cm×10 cm×7.5 cm can be painted out of this container?

Answer

Volume of paint = 9.375 m^2 =93750 cm^2

Dimension of brick = 22.5 cm×10 cm×7.5 cm

Total surface area of a brick = 2(lb + bh + lh) cm^2

= 2(22.5×10 + 10×7.5 + 22.5×7.5) cm^2

= 2(225 + 75 + 168.75) cm^2

= 2×468.75 cm^2 = 937.5cm^2

Number of bricks can be painted = 93750/937.5 = 100

5. A cubical box has each edge 10 cm and another cuboidal box is 12.5 cm long, 10 cm wide and 8 cm high.

(i) Which box has the greater lateral surface area and by how much?

(ii) Which box has the smaller total surface area and by how much?

Answer

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(i) Lateral surface area of cubical box of edge 10cm = 4×10^2 cm^2 = 400 cm^2

Lateral surface area of cuboid box = 2(l+b)×h

= 2×(12.5+10)×8 cm^2

= 2×22.5×8 cm^2 = 360 cm^2

Thus, lateral surface area of the cubical box is greater by (400 – 360) cm^2 = 40 cm^2

(ii) Total surface area of cubical box of edge 10 cm =6×102cm2=600cm2

Total surface area of cuboidal box = 2(lb + bh + lh)

= 2(12.5×10 + 10×8 + 8×12.5) cm^2

= 2(125+80+100) cm^2

= (2×305) cm^2 = 610 cm^2

Thus, total surface area of cubical box is smaller by 10 cm^2

6. A small indoor greenhouse (herbarium) is made entirely of glass panes (including base) held together with tape. It is 30 cm long, 25 cm wide and 25 cm high.

(i) What is the area of the glass?

(ii) How much of tape is needed for all the 12 edges?

Answer

(i) Dimensions of greenhouse:

l = 30 cm, b = 25 cm, h = 25 cm

Total surface area of green house = 2(lb + bh + lh)

= 2(30×25 + 25×25 + 25×30) cm^2

= 2(750 + 625 + 750) cm^2

= 4250 cm^2

(ii) Length of the tape needed = 4(l + b + h)

= 4(30 + 25 + 25) cm

= 4×80 cm = 320 cm

7. Shanti Sweets Stall was placing an order for making cardboard boxes for packing their sweets. Two sizes of boxes were required. The bigger of dimensions 25 cm × 20 cm × 5 cm and the smaller of dimensions 15 cm × 12 cm × 5 cm. For all the overlaps, 5% of the total surface area is required extra. If the cost of the cardboard is ₹4 for 1000 cm^2 , find the cost of cardboard required for supplying 250 boxes of each kind.

Answer

Dimension of bigger box = 25 cm × 20 cm × 5 cm

Total surface area of bigger box = 2(lb + bh + lh)

= 2(25×20 + 20×5 + 25×5) cm^2

= 2(500 + 100 + 125) cm^2

= 1450 cm^2

Dimension of smaller box = 15 cm × 12 cm × 5 cm

Total surface area of smaller box = 2(lb + bh + lh)

= 2(15×12 + 12×5 + 15×5) cm^2

= 2(180 + 60 + 75) cm^2

= 630 cm^2

Total surface area of 250 boxes of each type = 250(1450 + 630) cm^2

= 250×2080 cm^2 = 520000cm^2

Extra area required = 5/100(1450 + 630) × 250 cm^2 = 26000cm^2

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Total Cardboard required = 520000 + 26000 cm^2 = 546000cm^2

Total cost of cardboard sheet = ₹ (546000 × 4)/1000 = ₹ 2184

NCERT 9th Maths Chapter 13, class 9 Maths Chapter 13 solutions

8. Parveen wanted to make a temporary shelter for her car, by making a box-like structure with tarpaulin that covers all the four sides and the top of the car (with the front face as a flap which can be rolled up). Assuming that the stitching margins are very small, and therefore negligible, how much tarpaulin would be required to make the shelter of height 2.5 m, with base dimensions 4m × 3m?

Answer

Dimensions of the box- like structure = 4m × 3m × 2.5

Tarpaulin only required for all the four sides and top.

Thus, Tarpaulin required = 2(l+b)×h + lb = [2(4+3)×2.5 + 4×3] m^2

= (35+12) m^2

= 47 m^2

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Exercise 13.2

NCERT 9th Maths Chapter 13, class 9 Maths Chapter 13 solutions

1. The curved surface area of a right circular cylinder of height 14 cm is 88 cm^2. Find the diameter of the base of the cylinder.

Answer

Let r be the radius of the base and h = 14 cm be the height of the cylinder.

Curved surface area of cylinder = 2πrh = 88 cm^2

⇒ 2 × 22/7 × r × 14 = 88

⇒ r = 88/ (2 × 22/7 × 14)

⇒ r = 1 cm

Thus, the diameter of the base = 2r = 2×1 = 2cm

2. It is required to make a closed cylindrical tank of height 1 m and base diameter 140 cm from a metal sheet. How many square metres of the sheet are required for the same?

Answer

Let r be the radius of the base and h be the height of the cylinder.

Base diameter = 140 cm and Height (h) = 1m

Radius of base (r) = 140/2 = 70 cm = 0.7 m

Metal sheet required to make a closed cylindrical tank = $2\pi r(h + r)$

= $(2 \times 22/7 \times 0.7) (1 + 0.7)$ m^2

= $(2 \times 22 \times 0.1 \times 1.7)$ m^2

=7.48 m^2

3. A metal pipe is 77 cm long. The inner diameter of a cross section is 4 cm, the outer diameter being 4.4 cm (see Fig. 13.11). Find its

(i) inner curved surface area,

(ii) outer curved surface area,

(iii) total surface area.

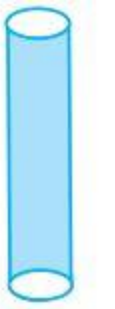

Fig. 13.11

Answer

Let R be external radius and r be the internal radius h be the length of the pipe.

R = 4.4/2 cm = 2.2 cm

r = 4/2 cm = 2 cm

h = 77 cm

(i) Inner curved surface = $2\pi rh$ cm^2

= $2 \times 22/7 \times 2 \times 77 cm^2$

= 968 cm^2

(ii) Outer curved surface = $2\pi Rh$ cm^2

= $2 \times 22/7 \times 2.2 \times 77$ cm^2

= 1064.8 cm^2

(iii) Total surface area of a pipe = Inner curved surface area + outer curved surface area + areas of two bases

= $2\pi rh + 2\pi Rh + 2\pi(R^2 - r^2)$

= $[968 + 1064.8 + (2 \times 22/7)(4.84 - 4)] cm^2$

= $(2032.8 + 44/7 \times 0.84) cm^2$

= (2032.8 + 5.28) cm^2 = 2038.08 cm^2

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NCERT 9th Maths Chapter 13, class 9 Maths Chapter 13 solutions

4. The diameter of a roller is 84 cm and its length is 120 cm. It takes 500 complete revolutions to move once over to level a playground. Find the area of the playground in m^2.

Answer

Length of the roller (h) = 120 cm = 1.2 m

Radius of the cylinder = 84/2 cm = 42 cm = 0.42 m

Total no. of revolutions = 500

Distance covered by roller in one revolution = Curved surface area = 2πrh

= (2 × 22/7 × 0.42 × 1.2) m^2 = 3.168 m^2

Area of the playground = (500 × 3.168) m^2 = 1584 m^2

5. A cylindrical pillar is 50 cm in diameter and 3.5 m in height. Find the cost of painting the curved surface of the pillar at the rate of ₹12.50 per m^2.

Answer

Radius of the pillar (r) = 50/2 cm = 25 cm = 0.25 m

Height of the pillar (h) = 3.5 m.

Rate of painting = ₹12.50 per m^2

Curved surface = 2πrh

= (2 × 22/7 × 0.25 × 3.5) m^2

=5.5 m^2

Total cost of painting = (5.5 × 12.5) = ₹68.75

6. Curved surface area of a right circular cylinder is 4.4 m^2. If the radius of the base of the cylinder is 0.7 m, find its height.

Answer

Let r be the radius of the base and h be the height of the cylinder.

Curved surface area = $2\pi rh = 4.4\ m^2$

$\Rightarrow 2 \times 22/7 \times 0.7 \times h = 4.4$

$\Rightarrow h = 4.4/(2 \times 22/7 \times 0.7) = 1m$

$\Rightarrow h = 1m$

7. The inner diameter of a circular well is 3.5 m. It is 10 m deep. Find

(i) its inner curved surface area,

(ii) the cost of plastering this curved surface at the rate of ₹40 per m^2.

Answer

Radius of circular well (r) = 3.5/2 m = 1.75 m

Depth of the well (h) = 10 m

Rate of plastering = ₹40 per m^2

(i) Curved surface = $2\pi rh$

$= (2 \times 22/7 \times 1.75 \times 10)\ m^2$

$= 110\ m^2$

(ii) Cost of plastering = ₹(110×40) = ₹4400

8. In a hot water heating system, there is a cylindrical pipe of length 28 m and diameter 5 cm. Find the total radiating surface in the system.

Answer

Radius of the pipe (r) = 5/2 cm = 2.5 cm = 0.025 m

Length of the pipe (h) = 28/2 m = 14 m

Total radiating surface = Curved surface area of the pipe = 2πrh

= (2 × 22/7 × 0.025 × 28) m^2 = 4.4 m^2

9. Find

(i) the lateral or curved surface area of a closed cylindrical petrol storage tank that is 4.2 m in diameter and 4.5 m high.

(ii) how much steel was actually used, if 1/12 of the steel actually used was wasted in making the tank.

Answer

(i) Radius of the tank (r) = 4.2/2 m = 2.1 m

Height of the tank (h) = 4.5 m

Curved surface area = 2πrh m^2

= (2 × 22/7 × 2.1 × 4.5) m^2

= 59.4 m^2

(ii) Total surface area of the tank = 2πr(r + h) m^2

= [2 × 22/7 × 2.1 (2.1 + 4.5)] m^2

= 87.12 m^2

Let x be the actual steel used in making tank.

∴ (1 - 1/12) × x = 87.12

⇒ x = 87.12 × 12/11

⇒ x = 95.04 m^2

NCERT 9th Maths Chapter 13, class 9 Maths Chapter 13 solutions

10. In Fig. 13.12, you see the frame of a lampshade. It is to be covered with a decorative cloth. The frame has a base diameter of 20 cm and height of 30 cm. A margin of 2.5 cm is to be given for folding it over the top and bottom of the frame. Find how much cloth is required for covering the lampshade.

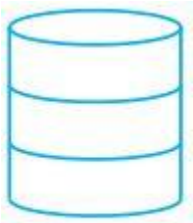

Fig. 13.12

Answer

Radius of the frame (r) = 20/2 cm = 10 cm

Height of the frame (h) = 30 cm + 2×2.5 cm = 35 cm

2.5 cm of margin will be added both side in the height.

Cloth required for covering the lampshade = curved surface area = 2πrh

= (2 × 22/7 × 10 × 35)cm^2

= 2200 cm^2

11. The students of a Vidyalaya were asked to participate in a competition for making and decorating penholders in the shape of a cylinder with a base, using cardboard. Each penholder was to be of radius 3 cm and height 10.5 cm. The Vidyalaya was to supply the competitors with cardboard. If there were 35 competitors, how much cardboard was required to be bought for the competition?

Answer

Radius of the penholder (r) = 3cm

Height of the penholder (h) = 10.5cm

Cardboard required by 1 competitor = CSA of one penholder + area of the base

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

= $[(2 \times 22/7 \times 3 \times 10.5) + 22/7 \times 3^2]$ cm^2

= $(198 + 198/7)$ cm^2

= $1584/7$ cm^2

Cardboard required for 35 competitors = $(35 \times 1584/7)$ cm^2

= 7920 cm^2

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NCERT 9th Maths Chapter 13, class 9 Maths Chapter 13 solutions

1. Diameter of the base of a cone is 10.5 cm and its slant height is 10 cm. Find its curved surface area.

Answer

Radius (r) = 10.5/2 cm = 5.25 cm

Slant height (l) = 10 cm

Curved surface area of the cone = (πrl) cm^2

= $(22/7 \times 5.25 \times 10)$ cm^2

=165 cm^2

2. Find the total surface area of a cone, if its slant height is 21 m and diameter of its base is 24 m.

Answer

Radius (r) = 24/2 m = 12 m

Slant height (l) = 21 m

Total surface area of the cone = $\pi r (l + r)$ m^2

= $22/7 \times 12 \times (21 + 12)$ m^2

= $(22/7 \times 12 \times 33)$ m^2

= 1244.57 m^2

3. Curved surface area of a cone is 308 cm^2 and its slant height is 14 cm. Find

(i) radius of the base and (ii) total surface area of the cone.

Answer

(i) Curved surface of a cone = 308 cm^2

Slant height (l) = 14cm

Let r be the radius of the base

$\therefore \pi r \ell = 308$

$\Rightarrow 22/7 \times r \times 14 = 308$

$\Rightarrow r = 308/(22/7 \times 14) = 7$ cm

(ii) TSA of the cone = $\pi r(l + r)$ cm^2

= $22/7 \times 7 \times (14 + 7)$ cm^2

= (22×21) cm^2

= 462 cm^2

4. A conical tent is 10 m high and the radius of its base is 24 m. Find

(i) slant height of the tent.

(ii) cost of the canvas required to make the tent, if the cost of 1 m^2 canvas is ₹70.

Answer

Radius of the base (r) = 24 m

Height of the conical tent (h) = 10 m

Let l be the slant height of the cone.

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

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

$\Rightarrow l = \sqrt{10^2 + 24^2}$

$\Rightarrow l = \sqrt{100 + 576}$

$\Rightarrow l = 26$ m

(ii) Canvas required to make the conical tent = Curved surface of the cone

Cost of 1 m^2 canvas = ₹70

$\therefore \pi rl = (22/7 \times 24 \times 26)\ m^2 = 13728/7\ m^2$

$\therefore$ Cost of canvas = ₹ $13728/7 \times 70$ = ₹137280

5. What length of tarpaulin 3m wide will be required to make conical tent of height 8m and base radius 6m? Assume that the extra length of material that will be required for stitching margins and wastage in cutting is approximately 20cm (Use π = 3.14).

Answer

Radius of the base (r) = 6 m

Height of the conical tent (h) = 8 m

Let l be the slant height of the cone.

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

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

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⇒ l = √100

⇒ l = 10 m

CSA of conical tent = πrl

= (3.14 × 6 × 10) m^2 = 188.4 m^2

Breadth of tarpaulin = 3 m

Let length of tarpaulin sheet required be x.

20 cm will be wasted in cutting.

So, the length will be (x - 0.2 m)

Breadth of tarpaulin = 3 m

Area of sheet = CSA of tent

[(x - 0.2 m) × 3] m = 188.4 m^2

⇒ x - 0.2 m = 62.8 m

⇒ x = 63 m

NCERT 9th Maths Chapter 13, class 9 Maths Chapter 13 solutions

6. The slant height and base diameter of a conical tomb are 25 m and 14 m respectively. Find the cost of white-washing its curved surface at the rate of ₹210 per 100 m^2.

Answer

Radius (r) = 14/2 m = 7 m

Slant height tomb (l) = 25 m

Curved surface area = πrl m^2

=(227×25×7) m^2

=550 m^2

Rate of white- washing = ₹210 per 100 m^2

Total cost of white-washing the tomb = ₹(550 × 210/100) = ₹1155

7. A joker's cap is in the form of a right circular cone of base radius 7 cm and height 24 cm. Find the area of the sheet required to make 10 such caps.

Answer

Radius of the cone (r) = 7 cm

Height of the cone (h) = 24 cm

Let l be the slant height

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

$\Rightarrow l = \sqrt{24^2 + 7^2}$

$\Rightarrow l = \sqrt{625}$

$\Rightarrow l = 25$ m

Sheet required for one cap = Curved surface of the cone

$= \pi rl \text{ cm}^2$

$= (22/7 \times 7 \times 25) \text{ cm}^2$

$= 550 \text{ cm}^2$

Sheet required for 10 caps = 550 × 10 cm^2 = 5500 cm^2

8. A bus stop is barricaded from the remaining part of the road, by using 50 hollow cones made of recycled cardboard. Each cone has a base diameter of 40 cm and height 1 m. If the outer side of each of the cones is to be painted and the cost of painting is ₹12 per m^2 , what will be the cost of painting all these cones? (Use π = 3.14 and take √1.04 = 1.02)

Answer

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Radius of the cone (r) = 40/2 cm = 20 cm = 0.2 m

Height of the cone (h) = 1 m

Let l be the slant height of a cone.

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

$\Rightarrow l = \sqrt{1^2 + 0.2^2}$

$\Rightarrow l = \sqrt{1.04}$

$\Rightarrow l = 1.02$ m

Rate of painting = ₹12 per m^2

Curved surface of 1 cone = πrl m^2

$= (3.14 \times 0.2 \times 1.02)\ m^2$

$= 0.64056\ m^2$

Curved surface of such 50 cones = $(50 \times 0.64056)\ m^2 = 32.028\ m^2$

Cost of painting all these cones = ₹(32.028 × 12) = ₹384.34

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NCERT 9th Maths Chapter 13, class 9 Maths Chapter 13 solutions

Exercise 13.4

1. Find the surface area of a sphere of radius:

(i) 10.5 cm

(ii) 5.6 cm

(iii) 14 cm

Answer

(i) Radius of the sphere (r) = 10.5 cm

Surface area = $4\pi r^2$

= $(4 \times 22/7 \times 10.5 \times 10.5)\ cm^2$

= $1386\ cm^2$

(ii) Radius of the sphere (r) = 5.6 cm

Surface area = $4\pi r^2$

= $(4 \times 22/7 \times 5.6 \times 5.6)\ cm^2$

= $394.24\ cm^2$

(iii) Radius of the sphere (r) = 14 cm

Surface area = $4\pi r^2$

= $(4 \times 22/7 \times 14 \times 14)\ cm^2$

= $2464\ cm^2$

2. Find the surface area of a sphere of diameter:

(i) 14 cm

(ii) 21 cm

(iii) 3.5 m

Answer

(i) r = 14/2 cm = 7cm

Surface area = $4\pi r^2$

= $(4 \times 22/7 \times 7 \times 7)cm^2$

=$616cm^2$

(ii) r = 21/2 cm = 10.5 cm

Surface area = $4\pi r^2$

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= (4 × 22/7 × 10.5 × 10.5) cm^2

= 1386 cm^2

(iii) r = 3.5/2 m = 1.75 m

Surface area = $4\pi r^2$

= (4 × 22/7 × 1.75 × 1.75) m^2

= 38.5 m^2

3. Find the total surface area of a hemisphere of radius 10 cm. (Use π = 3.14)

Answer

r = 10 cm

Total surface area of hemisphere = $3\pi r^2$

= (3 × 3.14 × 10 ×10) cm^2

= 942 cm^2

4. The radius of a spherical balloon increases from 7cm to 14cm as air is being pumped into it. Find the ratio of surface areas of the balloon in the two cases.

Answer

Let r be the initial radius and R be the increased radius of balloons.

r = 7cm and R = 14cm

Ratio of the surface area =$4\pi r^2/4\pi R^2$

= r^2/R^2

= (7×7)/(14×14) = 1/4

Thus, the ratio of surface areas = 1 : 4

NCERT Solutions for 9th class Maths Chapter 13

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5. A hemispherical bowl made of brass has inner diameter 10.5 cm. Find the cost of tin-plating it on the inside at the rate of ₹16 per 100 cm^2.

Answer

Radius of the bowl (r) = 10.5/2 cm = 5.25 cm

Curved surface area of the hemispherical bowl = $2\pi r^2$

= $(2 \times 22/7 \times 5.25 \times 5.25)$ cm^2

= 173.25 cm^2

Rate of tin - plating is = ₹16 per 100 cm^2

Therefor, cost of 1 cm^2 =₹16/100

Total cost of tin-plating the hemisphere bowl = $173.25 \times 16/100$

= ₹27.72

6. Find the radius of a sphere whose surface area is 154 cm^2.

Answer

Let r be the radius of the sphere.

Surface area = 154 cm^2

$\Rightarrow 4\pi r^2 = 154$

$\Rightarrow 4 \times 22/7 \times r^2 = 154$

$\Rightarrow r^2 = 154/(4 \times 22/7)$

$\Rightarrow r^2 = 49/4$

$\Rightarrow r = 7/2 = 3.5$ cm

7. The diameter of the moon is approximately one fourth of the diameter of the earth. Find the ratio of their surface areas.

Answer

Let the diameter of earth be r and that of the moon will be r/4

Radius of the earth = r/2

Radius of the moon = r/8

Ratio of their surface area = $4\pi(r/8)^2/4\pi(r/2)^2$

= (1/64)/(1/4)

= 4/64 = 1/16

Thus, the ratio of their surface areas is 1:16

8. A hemispherical bowl is made of steel, 0.25 cm thick. The inner radius of the bowl is 5 cm. Find the outer curved surface area of the bowl.

Answer

Inner radius of the bowl (r) = 5 cm

Thickness of the steel = 0.25 cm

∴ outer radius (R) = (r + 0.25) cm

= (5 + 0.25) cm = 5.25 cm

Outer curved surface = $2\pi R^2$

= $(2 \times 22/7 \times 5.25 \times 5.25)$ cm^2

= 173.25 cm^2

9. A right circular cylinder just encloses a sphere of radius r (see Fig. 13.22). Find

(i) surface area of the sphere,

(ii) curved surface area of the cylinder,

(iii) ratio of the areas obtained in (i) and (ii).

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Fig. 13.22

Answer

(i) The surface area of the sphere with raius r = $4\pi r^2$

(ii) The right circular cylinder just encloses a sphere of radius r.

∴ the radius of the cylinder = r and its height = 2r

∴ Curved surface of cylinder =$2\pi rh$

= $2\pi \times r \times 2r$

= $4\pi r^2$

(iii) Ratio of the areas = $4\pi r^2 : 4\pi r^2$ = 1:1

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NCERT 9th Maths Chapter 13, class 9 Maths Chapter 13 solutions

Exercise 13.5

1. A matchbox measures 4cm × 2.5cm × 1.5cm. What will be the volume of a packet containing 12 such boxes?

Answer

Dimension of matchbox = 4cm × 2.5cm × 1.5cm

l = 4 cm, b = 2.5 cm and h = 1.5 cm

Volume of one matchbox = (l × b × h)

= $(4 \times 2.5 \times 1.5)\ cm^3 = 15\ cm^3$

Volume of a packet containing 12 such boxes = (12 × 15) cm^3 = 180 cm^3

2. A cuboidal water tank is 6 m long, 5 m wide and 4.5 m deep. How many litres of water can it hold? ($1m^3$ = 1000 l)

Answer

Dimensions of water tank = 6m × 5m × 4.5m

l = 6m , b = 5m and h = 4.5m

Therefore Volume of the tank =ℓbh m^3

=(6×5×4.5)m3=135 m^3

Therefore , the tank can hold = 135 × 1000 litres **[Since $1m^3$=1000litres]**

= 135000 litres of water.

3. A cuboidal vessel is 10 m long and 8 m wide. How high must it be made to hold 380 cubic metres of a liquid?

Answer

Length = 10 m , Breadth = 8 m and Volume = 380 m^3

Volume of cuboid = Length × Breadth × Height

⇒ Height = Volume of cuboid/(Length × Breadth)

= 380/(10×8) m

= 4.75m

4. Find the cost of digging a cuboidal pit 8 m long, 6 m broad and 3 m deep at the rate of ₹30 per m^3.

Answer

l = 8 m, b = 6 m and h = 3 m

Volume of the pit = lbh m^3

= (8×6×3) m^3

= 144 m^3

Rate of digging = ₹30 per m^3

Total cost of digging the pit = ₹(144 × 30) = ₹4320

5. The capacity of a cuboidal tank is 50000 litres of water. Find the breadth of the tank, if its length and depth are respectively 2.5 m and 10 m.

Answer

length = 2.5 m, depth = 10 m and volume = 50000 litres

1m^3 = 1000 litres

∴ 50000 litres = 50000/1000 m^3 = 50 m^3

Breadth = Volume of cuboid/(Length×Depth)

= 50/(2.5×10) m

= 2 m

6. A village, having a population of 4000, requires 150 litres of water per head per day. It has a tank measuring 20m × 15m × 6m. For how many days will the water of this tank last?

Answer

Dimension of tank = 20m × 15m × 6m

l = 20 m , b = 15 m and h = 6 m

Capacity of the tank = lbh m^3

= (20×15×6) m^3

= 1800 m^3

Water requirement per person per day =150 litres

Water required for 4000 person per day = (4000×150) l

= (4000×150)/1000

= 600 m^3

Number of days the water will last = Capacity of tank Total water required per day

=(1800/600) = 3

The water will last for 3 days.

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7. A godown measures 40m × 25m × 15m. Find the maximum number of wooden crates each measuring 1.5m × 1.25m × 0.5m that can be stored in the godown.

Answer

Dimension of godown = 40 m × 25 m × 15 m

Volume of the godown = (40 × 25 × 15) m^3 = 10000 m^3

Dimension of crates = 1.5m × 1.25m × 0.5m

Volume of 1 crates = (1.5 × 1.25 × 0.5) m^3 = 0.9375 m^3

Number of crates that can be stored =Volume of the godown/Volume of 1 crate

= 10000/0.9375 = 10666.66 = 10666

8. A solid cube of side 12 cm is cut into eight cubes of equal volume. What will be the side of the new cube? Also, find the ratio between their surface areas.

Answer

Edge of the cube = 12 cm.

Volume of the cube = $(edge)^3$ cm^3

= (12 × 12 × 12) cm^3

= 1728 cm^3

Number of smaller cube = 8

Volume of the 1 smaller cube =1728/8 cm^3 = 216 cm^3

Side of the smaller cube = a

a^3 = 216

⇒ a = 6 cm

Surface area of the cube = 6 $(side)^2$

Ratio of their surface area = (6 × 12 × 12)/(6 × 6 × 6)

= 4/1 = 4:1

9. A river 3 m deep and 40 m wide is flowing at the rate of 2 km per hour. How much water will fall into the sea in a minute?

Answer

Depth of river (h) = 3 m

Width of river (b) = 40 m

Rate of flow of water (l) = 2 km per hour = (2000/60) m per minute

= 100/3 m per minute

Volume of water flowing into the sea in a minute = lbh m^3

= (100/3 × 40 × 3) m^3

= 4000 m^3

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Exercise 13.6

https://www.indcareer.com/schools/ncert-solutions-for-9th-class-maths-chapter-13-surface-areas-and-volumes/

1. The circumference of the base of a cylindrical vessel is 132 cm and its height is 25 cm. How many litres of water can it hold? (1000 cm 3 = 1l)

Answer

Let the base radius of the cylindrical vessel be 'r' cm.

∴ Circumference = 2πr

⇒ 2πr = 132 **[∵ Circumference = 132 cm]**

⇒ 2× 22/7 × r = 132 cm

R=(132×7)/(2×22) cm = 21 cm

∵ Height of the vessel = 25 cm

∴ Volume = πr^2 x h **[∵ Volume of a cylinder = $\pi r^2 h$]**

= (22/7) $(21)^2$ × 25 cm^3

= (22/7) × 21 × 21 × 25 cm^3

= 22 × 3 × 21 × 25 cm^3

= 34650 cm^3

∵ Capacity of the vessel = Volume of the vessel

∴ Capacity of cylindrical vessel = 34650 cm^3

Since 1000 cm^3 = 1 litre

⇒ 34650 cm^3 = (34650/1000) litres = 34.65 l

2. The inner diameter of a cylindrical wooden pipe is 24 cm and its outer diameter is 28 cm. The length of the pipe is 35 cm. Find the mass of the pipe, if 1 cm^3 of wood has a mass of 0.6 g.

Answer

Here, Inner diameter of the cylindrical pipe = 24 cm

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⇒ Inner radius of the pipe (r) = (24/2) cm = 12 cm

Outer diameter of the pipe = 28 cm

⇒ Outer radius of the pipe (R) = (28/2)cm = 14 cm

Length of the pipe (h) = 35 cm

∵ Inner volume of the pipe = $\pi r^2 h$

Outer volume of the pipe = $\pi r^2 h$

∴ Amount of wood (volume) in the pipe = Outer volume – Inner volume

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

= $\pi h(R^2-r^2)$

= $\pi h(R+r)(R-r)$ **[∵ $a^2 - b^2 = (a+b)(a-b)$]**

= 22/7 x 35 x (14+12) x (14-12) cm^3

= 22 x 5 x 26 x 2 cm^3

Mass of the wood in the pipe = [Mass of wood in 1 m^3 of wood] x [Volume of wood in the pipe]

= [0.6g] x [22 x 5 x 26 x 2] cm^3

= (6/10)x 22 x 10 x 26 g = 6 x 22 x 26 g

= 3432 g = (3432/1000)= 3.432 kg **[∵ 1000 g = 1 kg]**

Thus, the required mass of the pipe is 3.432 kg.

3. A soft drink is available in two packs (i) a tin can with a rectangular base of length 5 cm and width 4 cm, having a height of 15 cm and (ii) a plastic cylinder with circular base of diameter 7 cm and height 10 cm. Which container has greater capacity and by how much?

Answer

For rectangular pack: Length (l) = 5 cm

Breadth (b) = 4 cm Height (h) = 15 cm

∴ Volume = l x b x h = 5 x 4 x 15 cm^3

= 300 cm^3

⇒ Capacity of the rectangular pack = 300 cm^3 **...(1)**

For cylindrical pack: Base diameter = 7 cm

⇒ Radius of the base (r) = (7/2)cm

Height (h) = 10 cm

∴ Volume = $\pi r^2 h$ = (22/7) x $(7/2)^2$ x 10 cm^3

= (22/7) x (7/2) x (7/2) x 10 cm^3

= 11 x 7 x 5 cm^3 = 385 cm^3

⇒ Volume of the cylindrical pack = 385 cm^3 **...(2)**

From (1) and (2),

we have 385 cm^3 – 300 cm^3 = 85 cm^3

⇒ The cylindrical pack has the greater capacity by 85 cm^3.

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4. If the lateral surface of a cylinder is 94.2 cm^2 and its height is 5 cm, then find: (i) radius of its base (ii) its volume. (Use π = 3.14)

Answer

(i) Since lateral surface of the cylinder = 2 πrh

But lateral surface of the cylinder = 94.2 cm^2

2πrh = 94.2

$2\times3.14\times r\times5 = 942/10$

$\Rightarrow \{(10\times314)/100\} \times r = 942/10$

$\Rightarrow r = (942/10)\times\{100/(10\times314)\}$ cm

$\Rightarrow r = 471/157$ cm

Thus, the radius of the cylinder = 3 cm

(ii) Volume of a cylinder = $\pi r^2 h$

$\Rightarrow$ Volume of the given cylinder = $3.14 \times (3)^2 \times 5$ cm^3

$=314\times100\times3\times3\times5$cm^3

$=(157\times3\times3)/10$

$= 1413/10 = 141.3$ cm^3

Thus, the required volume = 141.3 cm^3

5. It costs ₹ 2200 to paint the inner curved surface of cylindrical vessel 10 m deep. If the cost of painting is at the rate of ₹ 20 per m^2; find:

(i) inner curved surface of the vessel

(ii) radius of the base

(iii) capacity of the vessel.

Answer

(i) To find inner curved surface

Total cost of painting = ₹ 2200

Rate of painting = ₹ 20 per m^2

$\therefore$ Area =cost/rate = $2200/20 = 110$ m^2

$\Rightarrow$ Inner curved surface of the vessel = 110 m^2

(ii) To find radius of the base Let the base radius of the cylindrical vessel.

∵ Curved surface of a cylinder = 2 πrh

∴ 2πrh = 110

⇒ 2× 22/7 ×r×10 = 110 **[∵Height=10 m]**

⇒ r= (110×7)/(2×22×10)m = 7/4 m

= 1.75 m

⇒ The required radius of the base = 1.75 m

(iii) To find the capacity of the vessel

Since, volume of a cylinder = $\pi r^2 h$

∴ Volume (capacity) of the vessel =22/7 × $(7/2)^2$ × 10 m^3

= 22/7 × 7/4 × 7/4 × 10 m^3

= (11×7×5)/4 m^3 = 385/4 m3 = 96.25 m^3

Since, 1 m^3 = 1000000 cm^3 = 1000 l = 1 kl

∴ 96.5 m^3 = 96.5 kl

Thus, the required volume = 96.25 kl

NCERT Solutions for 9th class Maths Chapter 13

6. The capacity of closed cylindrical vessel of height 1 m is 15.4 litres. How many square metres of metal sheet would be needed to make it?

Answer

Capacity of the cylindrical vessel = 15.4 l

= 15.4×1000 cm^3

$= \frac{15.4\times1000}{1000000}\ m^3 = \frac{15.4}{1000}\ m^3 \quad [\because 1000000\ cm^3 = 1m^3]$

⇒ Volume of the vessel = (15.4/1000)m^3

Height of the vessel = 1m Let ‘r’ metres be the radius of the base of the vessel

∴ Volume = $\pi r^2 h$

⇒ $\pi r^2 h$= 15.4/1000

$\Rightarrow \frac{22}{7}\times r^2\times1 = \frac{154}{10000} \Rightarrow r^2 = \frac{154}{10000}\times\frac{7}{22} = \frac{49}{10000}$

$\Rightarrow r^2 = \left(\frac{7}{100}\right)^2$

$\Rightarrow r = \frac{7}{100}\ m$

Now, total surface area of the cylindrical vessel

$= 2\pi r(h+r)$

$=2\times\frac{22}{7}\times\frac{7}{100}\left[1+\frac{7}{100}\right]\ sq.m$

$= \frac{44}{100}\times\left[1+\frac{7}{100}\right]$ sq.m

$=\frac{44}{100}\times\frac{107}{100}\ m^2$

$= \frac{4708}{10000}\ m^2 = 0.4708\ m^2$

Thus, the required sheet = 0.4708 m^2

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7. A lead pencil consists of a cylinder of wood with a solid cylinder of graphite filled in the interior. The diameter of the pencil is 7 mm and the diameter of graphite is 1 mm. If the length of the pencil is 14 cm, find the volume of the wood and that of the graphite.

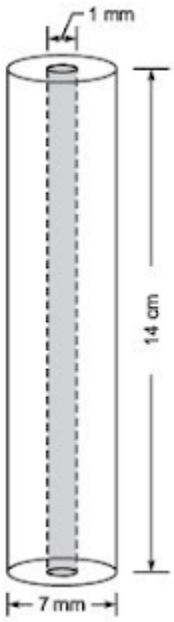
Answer

Since, 10 mm = 1cm

IndCareer

∴ 1 mm = (1/10) cm

For graphite cylinder



Diameter = 1mm = $\frac{1}{10}$ cm

Radius(r) = $\frac{1}{10} \times \frac{1}{2}$ cm = $\frac{1}{20}$cm

Length (h)=14cm

Volume = $\pi r^2 h$

$= \frac{22}{7} \times \frac{1}{20} \times \frac{1}{20} \times 14\ cm^3$

$= \frac{11 \times 1}{100}\ cm^3 = \frac{11}{100}\ cm^3 = 0.11\ cm^3$

Thus, the required volume of the graphite = 0.11 cm^3

For the pencil Diameter of the pencil = 7 mm = (7/10)cm

∴ Radius of the pencil (R) = (7/20) cm

Height of the pencil (h) = 14 cm

Volume of the pencil = $\pi r^2 h$

$$= \frac{22}{7} \times \left(\frac{7}{20}\right)^2 \times 14\ cm^3$$

$$= \frac{22}{7} \times \frac{7}{20} \times \frac{7}{20} \times 14\ cm^3$$

$$= \frac{11 \times 7 \times 7}{100}\ cm^3 = 5.39 cm^3$$

Volume of the wood Volume of the wood = [Volume of the pencil] – [Volume of the graphite]

= 5.39 cm^3 – 0.11 cm^3 = 5.28 cm^3

Thus, the required volume of the wood is 5.28 cm^3.

8. A patient in a hospital is given soup daily in a cylindrical bowl of diameter 7 cm. If the bowl is filled with soup to a height of 4 cm, how much soup the hospital has to prepare daily to serve 250 patients?

Answer

The bowl is cylindrical.

Diameter of the base = 7 cm

⇒ Radius of the base (r) = (7/3) cm

Height (h) = 4 cm

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

$= \frac{22}{7} \times \left(\frac{7}{2}\right)^2 \times 4\ cm^3$

$= \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} \times 4\ cm^3$

$= 11 \times 7 \times 2\ cm^3$

$= 154\ cm^3$

i.e. Volume of soup in a bowl = 154 cm^3

⇒ Volume of soup in 250 bowls = 250 x 154 cm^3

$= 38500\ cm^3 \left[\because \mathbf{1cm^3} = \frac{1}{1000} l\right]$

= 38500 / 100 liters

Thus, the hospital needs to prepare 38.5 litres of soup daily for 250 patients.

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NCERT Solutions for 9th class Maths Chapter 13

Exercise 13.7

1. Find the volume of the right circular cone with

(i) radius 6 cm, height 7 cm **(ii)** radius 3.5 cm, height 12 cm

Answer

(i) Radius (r) = 6 cm

Height (h) = 7 cm

Volume of the cone = $1/3\ \pi r^2 h$

$= (1/3 \times 22/7 \times 6 \times 6 \times 7)\ cm^3$

$= 264\ cm^3$

(ii) Radius (r) = 3.5 cm

Height (h) = 12 cm

Volume of the cone = $1/3\ \pi r^2 h$

$= (1/3 \times 22/7 \times 3.5 \times 3.5 \times 12)\ cm^3$

$= 154\ cm^3$

2. Find the capacity in litres of a conical vessel with

(i) radius 7 cm, slant height 25 cm **(ii)** height 12 cm, slant height 13 cm

Answer

(i) Radius (r) = 7 cm

Slant height (l) = 25 cm

Let h be the height of the conical vessel.

$\therefore h = \sqrt{l^2 - r^2}$

IndCareer

$\Rightarrow h = \sqrt{25^2 - 7^2}$

$\Rightarrow h = \sqrt{576}$

$\Rightarrow h = 24$ cm

Volume of the cone = $1/3\ \pi r^2 h$

$= (1/3 \times 22/7 \times 7 \times 7 \times 24)\ cm^3$

$= 1232\ cm^3$

Capacity of the vessel = (1232/1000) l = 1.232 l

(i) Height (h) = 12 cm

Slant height (l) = 13 cm

Let r be the radius of the conical vessel.

$\therefore r = \sqrt{l^2 - h^2}$

$\Rightarrow r = \sqrt{13^2 - 12^2}$

$\Rightarrow r = \sqrt{25}$

$\Rightarrow r = 5$ cm

Volume of the cone = $1/3\ \pi r^2 h$

$= (1/3 \times 22/7 \times 5 \times 5 \times 12)\ cm^3$

$= (2200/7)\ cm^3$

Capacity of the vessel = (2200/7000) l = 11/35 l

3. The height of a cone is 15 cm. If its volume is 1570 cm^3, find the radius of the base. (Use $\pi = 3.14$)

Answer

Height (h) = 15 cm

Volume = 1570 cm^3

Let the radius of the base of cone be r cm

∴ Volume = 1570 cm^3

⇒ 1/3 $\pi r^2 h$ = 1570

⇒ 13 × 3.14 × r^2 × 15 = 1570

⇒ r^2 = 1570/(3.14×5) = 100

⇒ r = 10

4. If the volume of a right circular cone of height 9 cm is 48π cm^3, find the diameter of its base.

Answer

Height (h) = 9 cm

Volume = 48π cm^3

Let the radius of the base of the cone be r cm

∴ Volume = 48π cm^3

⇒ 1/3 $\pi r^2 h$ = 48π

⇒ 13 × r^2 × 9 = 48

⇒ 3r^2 = 48

⇒ r^2 = 48/3 = 16

⇒ r = 4

5. A conical pit of top diameter 3.5 m is 12 m deep. What is its capacity in kilolitres?

Answer

Diameter of the top of the conical pit = 3.5 m

Radius (r) = (3.5/2) m = 1.75 m

Depth of the pit (h) = 12 m

Volume = 1/3 $\pi r^2 h$

= (13 × 22/7 × 1.75 × 1.75 × 12) m^3

= 38.5 m^3

1 m^3 = 1 kilolitre

Capacity of pit = 38.5 kilolitres.

6. The volume of a right circular cone is 9856 cm^3. If the diameter of the base is 28 cm, find

(i) height of the cone (ii) slant height of the cone

(iii) curved surface area of the cone

Answer

(i) Diameter of the base of the cone = 28 cm

Radius (r) = 28/2 cm = 14 cm

Let the height of the cone be h cm

Volume of the cone = 13$\pi r^2 h$ = 9856 cm^3

⇒ 1/3 $\pi r^2 h$ = 9856

⇒ 1/3 × 22/7 × 14 × 14 × h = 9856

⇒ h = (9856×3)/(22/7 × 14 × 14)

⇒ h = 48 cm

(ii) Radius (r) = 14 m

Height (h) = 48 cm

Let l be the slant height of the cone

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

$\Rightarrow l^2 = 48^2 + 14^2$

$\Rightarrow l^2 = 2304+196$

$\Rightarrow l^2 = 2500$

$\Rightarrow \ell = \sqrt{2500} = 50$ cm

(iii) Radius (r) = 14 m

Slant height (l) = 50 cm

Curved surface area = πrl

$= (22/7 \times 14 \times 50)\ cm^2$

$= 2200\ cm^2$

7. A right triangle ABC with sides 5 cm, 12 cm and 13 cm is revolved about the side 12 cm. Find the volume of the solid so obtained.

Answer

On revolving the△ ABC along the side 12 cm, a right circular cone of height(h) 12 cm, radius(r) 5 cm and slant height(l) 13 cm will be formed.

Volume of solid so obtained = $1/3\ \pi r^2 h$

$= (1/3 \times \pi \times 5 \times 5 \times 12)\ cm^3$

$= 100\pi\ cm^3$

8. If the triangle ABC in the Question 7 above is revolved about the side 5 cm, then find the volume of the solid so obtained. Find also the ratio of the volumes of the two solids obtained in Questions 7 and 8.

Answer

On revolving the△ ABC along the side 12 cm, a cone of radius(r) 12 cm, height(h) 5 cm, and slant height(l) 13 cm will be formed.

Volume of solid so obtained =1/3 $\pi r^2 h$

$$= (1/3 \times \pi \times 12 \times 12 \times 5)\ cm^3$$

$$= 240\pi\ cm^3$$

Ratio of the volumes = 100π/240π = 5/12 = 5:12

9. A heap of wheat is in the form of a cone whose diameter is 10.5 m and height is 3 m. Find its volume. The heap is to be covered by canvas to protect it from rain. Find the area of the canvas required.

Answer

Diameter of the base of the cone = 10.5 m

Radius (r) = 10.5/2 m = 5.25 m

Height of the cone = 3 m

Volume of the heap = 1/3 $\pi r^2 h$

$$= (1/3 \times 22/7 \times 5.25 \times 5.25 \times 3)\ m^3$$

$$= 86.625\ m^3$$

Also,

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

$\Rightarrow l^2 = 3^2 + (5.25)^2$

$\Rightarrow l^2 = 9 + 27.5625$

$\Rightarrow l^2 = 36.5625$

$\Rightarrow l = \sqrt{36.5625} = 6.05$ m

Area of canvas = Curve surface area

= πrl = (22/7 × 5.25 × 6.05) m^2

= 99.825 m^2 (approx)

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Exercise 13.8

1. Find the volume of a sphere whose radius is

(i) 7 cm **(ii)** 0.63 m

Answer

(i) Radius of the sphere(r) = 7 cm

Therefore, Volume of the sphere = 4/3 πr^3

= (4/3 × 22/7 × 7 × 7 × 7) cm^3

= 4312/3 cm^3

(ii) Radius of the sphere(r) = 0.63 m

Volume of the sphere = 4/3 πr^3

= (4/3 × 22/7 × 0.63 × 0.63 × 0.63) m^3

= 1.05 m^3

2. Find the amount of water displaced by a solid spherical ball of diameter.

(i) 28 cm **(ii)** 0.21 m

Answer

(i) Diameter of the spherical ball = 28 cm

Radius = 28/2 cm = 14 cm

Amount of water displaced by the spherical ball = Volume

$= 4/3\ \pi r^3$

$= (4/3 \times 22/7 \times 14 \times 14 \times 14)\ cm^3$

$= 34496/3\ cm^3$

(ii) Diameter of the spherical ball = 0.21 m

Radius (r) = 0.21/2 m = 0.105 m

Amount of water displaced by the spherical ball = Volume

$= 4/3\ \pi r^3$

$= (43 \times 227 \times 0.105 \times 0.105 \times 0.105)\ m^3$

$= 0.004851\ m^3$

3. The diameter of a metallic ball is 4.2 cm. What is the mass of the ball, if the density of the metal is 8.9 g per cm^3?

Answer

Diameter of the ball = 4.2 cm

Radius = (4.2/2) cm = 2.1 cm

Volume of the ball = $4/3\ \pi r^3$

$= (4/3 \times 22/7 \times 2.1 \times 2.1 \times 2.1)\ cm^3$

$= 38.808\ cm^3$

Density of the metal is 8.9g per cm3

Mass of the ball = (38.808 × 8.9) g = 345.3912 g

4. The diameter of the moon is approximately one-fourth of the diameter of the earth.What fraction of the volume of the earth is the volume of the moon?

Answer

Let the diameter of the moon be r

Radius of the moon = r/2

A/q,

Diameter of the earth = 4r

Radius(r) = 4r/2 = 2r

Volume of the moon = v = $4/3\ \pi(r/2)^3$

$= 4/3\ \pi r^3 \times 1/8$

$\Rightarrow 8v = 4/3\ \pi r^3$ --- (i)

Volume of the earth = $r^3 = 4/3\ \pi(2r)^3$

$= 4/3\ \pi r^3 \times 8$

$\Rightarrow V/8 = 4/3\ \pi r^3$ --- (ii)

From (i) and (ii), we have

8v = V/8

$\Rightarrow v = 1/64\ V$

Thus, the volume of the moon is 1/64 of the volume of the earth.

5. How many litres of milk can a hemispherical bowl of diameter 10.5 cm hold?

Answer

Diameter of a hemispherical bowl = 10.5 cm

Radius(r) = (10.5/2) cm = 5.25cm

Volume of the bowl = $2/3\ \pi r^3$

$= (2/3 \times 22/7 \times 5.25 \times 5.25 \times 5.25)\ cm^3$

$= 303.1875\ cm^3$

Litres of milk bowl can hold = (303.1875/1000) litres

= 0.3031875 litres (approx.)

6. A hemispherical tank is made up of an iron sheet 1 cm thick. If the inner radius is 1 m, then find the volume of the iron used to make the tank.

Answer

Internal radius = r = 1m

External radius = R = (1 + 0.1) cm = 1.01 cm

Volume of iron used = External volume – Internal volume

$= 2/3\ \pi R^3 - 2/3\ \pi r^3$

$= 2/3\ \pi(R^3 - r^3)$

$= 2/3 \times 22/7 \times [(1.01)^3 - (1)^3]\ m^3$

$= 44/21 \times (1.030301 - 1)\ m^3$

$= (44/21 \times 0.030301)\ m^3$

$= 0.06348\ m^3$(approx)

7. Find the volume of a sphere whose surface area is 154 cm^2.

Answer

Let r cm be the radius of the sphere

So, surface area = $154cm^2$

$\Rightarrow 4\pi r^2 = 154$

$\Rightarrow 4 \times 22/7 \times r^2 = 154$

$\Rightarrow r^2 = (154 \times 7)/(4 \times 22) = 12.25$

$\Rightarrow r = 3.5$ cm

Volume = $4/3\ \pi r^3$

$= (4/3 \times 22/7 \times 3.5 \times 3.5 \times 3.5)\ cm^3$

$= 539/3\ cm^3$

8. A dome of a building is in the form of a hemisphere. From inside, it was white-washed at the cost of ₹498.96. If the cost of white-washing is ₹2.00 per square metre, find the

(i) inside surface area of the dome, **(ii)** volume of the air inside the dome.

Answer

(i) Inside surface area of the dome =Total cost of white washing/Rate of white washing

$= (498.96/2.00)\ m^2 = 249.48\ m^2$

(ii) Let r be the radius of the dome.

Surface area = $2\pi r^2$

$\Rightarrow 2 \times 22/7 \times r^2 = 249.48$

$\Rightarrow r^2 = (249.48 \times 7)/(2 \times 22) = 39.69$

$\Rightarrow r^2 = 39.69$

$\Rightarrow r = 6.3m$

Volume of the air inside the dome = Volume of the dome

$= 2/3\ \pi r^3$

$= (2/3 \times 22/7 \times 6.3 \times 6.3 \times 6.3)\ m^3$

$= 523.9\ m^3$ (approx.)

9. Twenty seven solid iron spheres, each of radius r and surface area S are melted to form a sphere with surface area S′. Find the

(i) radius r′ of the new sphere, **(ii)** ratio of S and S′.

Answer

(i) Volume of 27 solid sphere of radius r = 27 × 4/3 πr^3 --- (i)

Volume of the new sphere of radius r′ = 4/3 $\pi r'^3$ --- (ii)

A/q,

4/3 $\pi r'^3$= 27 × 4/3 πr^3

⇒ $r'^3 = 27r^3$

⇒ $r'^3 = (3r)^3$

⇒ r′ = 3r

(ii) Required ratio = S/S′ = 4 $\pi r^2/4\pi r'^2 = r^2/(3r)^2$

$= r^2/9r^2 = 1/9 = 1:9$

10. A capsule of medicine is in the shape of a sphere of diameter 3.5 mm. How much medicine (in mm^3) is needed to fill this capsule?

Answer

Diameter of the spherical capsule = 3.5 mm

Radius(r) = 3.52mm

= 1.75mm

Medicine needed for its filling = Volume of spherical capsule

$= 4/3\ \pi r^3$

$= (4/3 \times 22/7 \times 1.75 \times 1.75 \times 1.75)\ mm^3$

$= 22.46\ mm^3$ (approx.)

Chapter 13 NCERT Solutions available here is useful in preparing for the exams. We will learn to find the surface areas and volumes of cuboids and cylinders in details and extend this study to some other solids such as cones and spheres.

https://www.indcareer.com/schools/ncert-solutions-for-9th-class-maths-chapter-13-surface-areas-and-volumes/

• Surface Area of a Cuboid and a Cube: Surface Area of a Cuboid = 2(lb + bh + hl) and Surface Area of a Cube = $6a^2$

• Surface Area of a Right Circular Cylinder: Curved Surface Area of a Cylinder = $2\pi rh$ and Total Surface Area of a Cylinder = $2\pi r(r + h)$.

• Surface Area of a Right Circular Cone: Curved Surface Area of a Cone = $1/2 \times l \times 2\pi r = \pi rl$ and Total Surface Area of a Cone = $\pi rl + \pi r^2 = \pi r(l + r)$.

• Surface Area of a Sphere: A sphere is like the surface of a ball. The word solid sphere is used for the

solid whose surface is a sphere. Surface Area of a Sphere = $4\ \pi r^2$, Curved Surface Area of a Hemisphere = $2\pi r^2$ and Total Surface Area of a Hemisphere = $3\pi r^2$.

• Volume of a Cuboid: The measure of this occupied space is called the Volume of the object. Volume of a Cuboid = base area × height = length × breadth × height and Volume of a Cube = edge × edge × edge = a^3.

• Volume of a Cylinder: The volume of a cylinder can be obtained as : base area × height = area of circular base × height = πr^2h So, Volume of a Cylinder = πr^2h.

• Volume of a Right Circular Cone: Volume of a Cone = $1/3\ \pi r^2h$ where r is the base radius and h is the height of the cone.

• Volume of a Sphere: Volume of a Sphere = $4/3\pi r^3$ where r is the radius of the sphere.

• Volume of a Hemisphere = $2/3\pi r^3$ where r is the radius of the hemisphere.

Surface Areas and Volumes contains total nine exercises in which the last one is optional not important for examinations. Below, we have provided exercisewise Chapter 13 NCERT Solutions which you can check.

Indcareer Schools experts have prepared these **NCERT Solutions for Class 9 Maths** in which every question's answers are detailed step by step that will be give in depth study of concepts.

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These Chapter 13 NCERT Solutions provided here will make you equipped with variety of concepts and help you in learning the concepts embedded in the question. Through these NCERT Solutions, one can easily complete their homework.

What is total surface area of a cone?

Total Surface Area of a Cone = $\pi rl + r^2 = \pi r(l + r)$.

What do you mean by Solids?

The bodies occupying space are called solids, such as a cuboid, a cube, a cylinder, a cone, a sphere, etc. These solids have plane or curved surfaces.

The floor area of a room is 100 m^2 and its height is 8 m. Find its volume.

∵ Volume of a cuboid = [Base area] × Height

∴ Volume of the room = [Area of the floor] × height = 100 m^2 × 8 m = 800 m^3

Thus, the volume of the room = 800 m^3.

NCERT 9th Maths Chapter 13, class 9 Maths Chapter 13 solutions

Chapterwise NCERT Solutions for Class 9 Maths :

- Chapter 1 Number System
- Chapter 2 Polynomials
- Chapter 3 Coordinate Geometry
- Chapter 4 Linear Equations in Two Variables
- Chapter 5 Introduction to Euclid's Geometry
- Chapter 6 Lines and Angles
- Chapter 7 Triangles
- Chapter 8 Quadrilaterals
- Chapter 9 Areas of Parallelograms and Triangles
- Chapter 10 Circles
- Chapter 11 Constructions
- Chapter 12 Heron’s Formula
- Chapter 13 Surface Areas and Volumes
- Chapter 14 Statistics
- Chapter 15 Probability

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