RS Aggarwal Solutions for Class 8 Maths Chapter 20 Exercise 20.2: The Physics Wallah academic team has produced a comprehensive answer for Chapter 20: Volume and Surface Area of Solids in the RS Aggarwal class 8 textbook. The RS Aggarwal class 8 solution for Chapter 20 Volume and Surface Area of Solids Exercise-20B is uploaded for reference only; do not copy the solutions.

Before going through the solution of Chapter 20 Volume and Surface Area of Solids Exercise-20B, one must have a clear understanding of chapter 20 Volume and Surface Area of Solids. Read the theory of chapter 20 Volume and Surface Area of Solids and then try to solve all numerical of exercise-20B.NCERT solutions were prepared by the Physics Wallah academic staff. Please use the NCERT maths solutions for class 8 to answer all of the questions in the exercise.

RS Aggarwal Solutions for Class 8 Maths Chapter 20 Exercise 20.2 Volume and Surface Area of Solids Overview

Chapter 20, Exercise 20.2 of RS Aggarwal's Class 8 Maths focuses on the volume and surface area of various three-dimensional solids. This exercise challenges students to apply key formulas to solve practical problems involving cubes, cuboids, cylinders, cones, and spheres.

By solving these problems, students reinforce their understanding of three-dimensional geometry and enhance their ability to apply these concepts in various contexts.

RS Aggarwal Solutions for Class 8 Maths Chapter 20 Exercise 20.2

Below we have provided RS Aggarwal Solutions for Class 8 Maths Chapter 20 Exercise 20.2 Volume and Surface Area of Solids -

(1) Find the volume, curved surface area and total surface area of each of the cylinders whose dimensions are:

(i) Radius of the base = 7 cm and height = 50 cm

Solution: Here, r = 7 cm and h = 50 cm

Volume of the cylinder = $(\pi r^2 h)$ cubic units

$$= \left(\frac{22}{7} \times 7 \times 7 \times 50\right) cm^3 = 7700 cm^3$$

Curved surface area of the cylinder = $(2\pi rh)$ sq units

$$= \left(2 \times \frac{22}{7} \times 7 \times 50\right)\ cm^2 = 2200\ cm^2$$

Total surface area of the cylinder = $2\pi r(h + r) sq\ units$

$$= \left\{2 \times \frac{22}{7} \times 7 \times (50 + 7)\right\}\ cm^2 = 2508\ cm^2$$

(ii) Radius of the base = 5.6 m and height = 1.25 m

Solution: Here, $r = 5.6\ \text{cm} = \frac{56}{10}\ \text{cm} = \frac{28}{5}\ \text{cm}$

and $h = 1.25\ \text{cm} = \frac{125}{100}\ \text{cm} = \frac{5}{4}\ \text{cm}$

Volume of the cylinder $= (\pi r^2 h)$ cubic units

$$= \left(\frac{22}{7} \times \frac{28}{5} \times \frac{28}{5} \times \frac{5}{4}\right) cm^3 = \left(\frac{22 \times 28}{5}\right) cm^3 = 123.2\ cm^3$$

Curved surface area of the cylinder $= (2\pi rh)$ sq units

$$= \left(2 \times \frac{22}{7} \times \frac{28}{5} \times \frac{5}{4}\right)\ cm^2 = 44\ cm^2$$

Total surface area of the cylinder $= 2\pi r(h + r) sq\ units$

$$= \left\{2 \times \frac{22}{7} \times \frac{28}{5} \times \left(\frac{5}{4} + \frac{28}{5}\right)\right\}\ cm^2$$

$$= \left\{\frac{176}{5} \times \frac{137}{20}\right\} = 241.12\ cm^2$$

(iii) Radius of the base = 14 dm and height = 15 m

Solution: Here, r = 14 dm = 1.4 m = $\frac{14}{10}$ m = $\frac{7}{5}$ m and h = 15 m

Volume of the cylinder = $(\pi r^2 h)$ cubic units

$$= \left(\frac{22}{7} \times \frac{7}{5} \times \frac{7}{5} \times 15\right) m^3 = 92.4\ m^3$$

Curved surface area of the cylinder = $(2\pi rh)$ sq units

$$= \left(2 \times \frac{22}{7} \times \frac{7}{5} \times 15\right)\ m^2 = 132\ m^2$$

Total surface area of the cylinder = $2\pi r(h + r) sq\ units$

$$= \left\{2 \times \frac{22}{7} \times \frac{7}{5} \times \left(15 + \frac{7}{5}\right)\right\}\ m^2$$

$$= \left\{\frac{44}{5} \times \frac{82}{5}\right\} = 144.32\ m^2$$

(2) A milk tank is in the form of a cylinder whose radius is 1.5 m and height is 10.5 m. Find the quantity of milk in litres that can be stored in the tank.

Solution: Here, r = 1.5 m = $\frac{15}{10}$ m = $\frac{3}{2}$ m

and h = 10.5 m = $\frac{105}{10}$ m = $\frac{21}{2}$ m

Volume of the tank = $\left\{\frac{22}{7} \times \frac{3}{2} \times \frac{3}{2} \times \frac{21}{2}\right\}\ m^3 = 74.25\ m^3$

$\because 1\ m^3 = 1000\ L$

$\therefore (74.25 \times 1000)\ L = 74250\ L.$

Therefore, the quantity of milk is 74250 L.

(3) A wooden cylindrical pole is 7 m high and its base radius is 10 cm, Find its weight if the wood weighs 225 kg per cubic metre.

Solution: Here, $r = 10\text{ cm} = 0.1\text{ m} = \frac{1}{10}\text{ m}$

Volume of the cylindrical pole $= \left\{\frac{22}{7} \times \frac{1}{10} \times \frac{1}{10} \times 7\right\}\ m^3 = 0.22\text{ m}^3$

$\therefore$ Weight of the wooden pole $= (0.22 \times 225)\text{ kg} = 49.5\text{ kg}$

(4) Find the height of the cylinder whose volume is 1.54 m^3 and diameter of the base is 140 cm?

Solution: Let the height of the cylinder be h metres.

Radius of its base $= 140\text{ cm} = 1.4\text{ m} = \frac{14}{10\times2}\text{ m} = \frac{7}{10}\text{ m}$

Volume of the cylinder $= \left(\frac{22}{7} \times \frac{7}{10} \times \frac{7}{10} \times h\right)\ m^3$

$\therefore \frac{22}{7} \times \frac{7}{10} \times \frac{7}{10} \times h = 1.54$

$\Rightarrow \frac{154h}{100} = \frac{154}{100}$

$\Rightarrow h = 1\text{ m}$

Therefore, height of the cylinder is 1 m.

(5) The volume of a circular iron rod of length 1 m is 3850 cm^3. Find its diameter.

Solution: Here, $h = 1\ m = 100\ cm$

$\therefore \frac{22}{7} \times r^2 \times 100 = 3850$

$\Rightarrow 2200r^2 = 26950$

$\Rightarrow r^2 = \frac{26950}{2200} = 12.25$

$\Rightarrow r = \sqrt{12.25} = 3.5$

Therefore, length of the diameter is $(3.5 \times 2)\ cm = 7\ cm.$

(6) A closed cylindrical tank of diameter 14 m and height 5 m is made from a sheet of metal. How much sheet of metal will be required?

Solution: Radius $= 14\ m = 7\ m$

Area of the sheet of metal required = Total surface area of cylinder

$$= \left\{2 \times \frac{22}{7} \times 7 \times (5 + 7)\right\} m^2 = 528\ m^2$$

(7) The circumference of the base of a cylinder is 88 cm and its height is 60 cm. Find the volume of the cylinder and its curved surface area.

Solution:

Circumference of the base of cylinder = 88 cm.

$$\because \text{radius} = \frac{\text{circumference}}{2\pi} = \frac{88 \times 7}{2 \times 22} = 14 \text{ cm}$$

Height (h) = 60 cm.

$$\therefore \text{Volume} = \pi r^2 h = \frac{22}{7} \times 14 \times 14 \times 60 \text{ cm}^3$$

$$= 36960 \text{ cm}^3$$

and curved surface area $= 2\pi rh$

$$= 88 \times 60 = 5280 \text{ cm}^2 \textbf{ Ans.}$$

(8) The lateral surface area of a cylinder of length 14 m is 220 m^2. Find the volume of the cylinder.

Solution:

Lateral surface of cylinder = 220 m^2

Height (h) = 14 m

Let radius of cylinder = r

then $2\pi rh = 220$

$$\Rightarrow 2 \times \frac{22}{7} \times r \times 14 = 220$$

$$\Rightarrow r = \frac{220 \times 7}{2 \times 22 \times 14} = \frac{5}{2} = 2{\cdot}5 \text{ m}$$

$$\therefore \text{Volume} = \pi r^2 h$$

$$= \frac{22}{7} \times (2{\cdot}5)^2 \times 14 \text{ m}^3$$

$$= \frac{22}{7} \times 2{\cdot}5 \times 2{\cdot}5 \times 14 \text{ m}^3$$

$$= 22 \times 6{\cdot}25 \times 2 = 275 \text{ m}^3 \textbf{ Ans.}$$

(9) The volume of a cylinder of height 8 cm is 1232 cm^3. Find its curved surface area and the total surface area.

Let r be the radius, then

$\pi r^2 h = 1232$

$\frac{22}{7} \times r^2 \times 8 = 1232$

$\Rightarrow r^2 = \frac{1232 \times 7}{22 \times 8}$

$\Rightarrow r^2 = 49 = (7)^2$

$\Rightarrow r = 7\text{cm}$

$\therefore$ curved surface area $= 2\pi rh$

$= 2 \times \frac{22}{7} \times 7 \times 8 = 352 \text{ cm}^2$

and total surface area $= 2\pi r (r + h)$

$= 2 \times \frac{22}{7} \times 7 (7 + 8) \text{ cm}^2$

$= 44 \times 15 = 660 \text{ cm}^2$ **Ans.**

(10) The radius and height of a cylinder area in the ratio 7 : 2. If the volume of the cylinder is 8316 cm^3, find the total surface of the cylinder.

$\therefore$ Volume $= \pi r^2 h = \frac{22}{7} \times 7x \times 7x \times 2x$

$= 308\ x^3$

$\therefore$ $308\ x^3 = 8316$

$x^3 = \frac{8316}{308} = 27 = (3)^3$

$\therefore$ $x = 3$

$\therefore$ Radius of cylinder $(r) = 7x = 7 \times 3$
$= 21$ cm

and height $(h) = 2x = 2 \times 3 = 6$ cm

Now, total surface area $= 2\pi r\ (r + h)$

$= 2 \times \frac{22}{7} \times 21\ (21 + 6)\ \text{cm}^2$

$= 132 \times 27\ \text{cm}^2$

$= 3564\ \text{cm}^2$ **Ans.**

(11) The curved surface area of a cylinder is 4400 cm^2 and the circumference of its base is 110 cm. Find the volume of the cylinder.

$\therefore \quad 2\pi r = 110$

$\Rightarrow \quad 2 \times \frac{22}{7} \times r = 110$

$\Rightarrow \quad r = \frac{110 \times 7}{2 \times 22} = \frac{35}{2}$ cm

Now, curved surface area $= 2\pi rh$

$\therefore \quad 2\pi rh = 4400$

$\Rightarrow \quad 2 \times \frac{22}{7} \times \frac{35}{2} \times h = 4400$

$110.h = 4400$

$\Rightarrow \quad h = \frac{4400}{110}$

$\Rightarrow \quad h = 40$ cm

Hence volume of cylinder $= \pi r^2 h$

$= \frac{22}{7} \times \frac{35}{2} \times \frac{35}{2} \times 40 \text{ cm}^3$

$= 38500 \text{ cm}^3$ **Ans.**

(12) A particular brand of talcum powder is available in two packs, a plastic can with a square base of side 5 cm and of height 14 cm, or one with a circular base of radius 3.5 cm and of height 12 cm. Which of them has greater capacity and by how much?

In second case,
Radius of the circular base (r) = 3.5 cm.
Height (h) = 12 cm.
Volume = $\pi r^2 h$
= 22/7 x 3.5 x 3.5 x 12 cm^3
= 462 cm^2
Hence second type of circular plastic can has greater capacity.
Difference = 462 – 350
= 112 cm^3

(13) Find the cost of painting 15 cylinder pillars of a building at Rs 2.50 per square metre if the diameter and height of each pillar are 48 cm and 7 metres respectively.

Height (h) = 7 m

$\therefore$ Lateral surface area of one pillar

$= 2\pi rh = 2 \times \frac{22}{7} \times \frac{24}{100} \times 7 \text{ m}^2$

$= \frac{1056}{100} \text{ m}^2$

Surface area of 15 pillars

$= \frac{1056}{100} \times 15 \text{ m}^2 = \frac{15840}{100} \text{ m}^2$

Rate of painting = Rs. 2·50 per sq. m.

$\therefore$ Total cost = Rs. $2{\cdot}50 \times \frac{15840}{100}$

= Rs. 396 **Ans.**

(14) A rectangular vessel 22 cm by 16 cm by 14 cm is full of water. If the total water is poured into an empty cylindrical vessel of radius 8 cm, find the height of water in the cylindrical vessel.

$\therefore$ Volume of vessel = lbh

$= 22 \times 16 \times 14 \text{ cm}^3 = 4928 \text{ cm}^3$

Volume of water in the cylindrical vessel = 4928 cm^3

Radius (r) = 8 cm.

Let height of water in the vessel = h

$\therefore \pi r^2 h = 4928$

$\Rightarrow \frac{22}{7} \times 8 \times 8 \times h = 4928$

$\Rightarrow h = \frac{4928 \times 7}{22 \times 8 \times 8} \Rightarrow h = 24{\cdot}5.$

Hence height of water = 24·5 cm. **Ans.**

(15) A piece of ductile metal is in the form of a cylinder of a diameter 1 cm and length 11 cm. It is drawn out into a wire of diameter 1 mm. What will be the length of the wire so obtained?

Volume = $\pi r^2 h$

$$= \frac{22}{7} \times \left(\frac{1}{2}\right)^2 \times 11 \text{cm}^3 = \frac{22}{7} \times \frac{1}{4} \times 11$$

$$= \frac{22}{7} \times \frac{11}{4} = \frac{121}{14} \text{cm}^3$$

$\therefore$ Volume of wire $= \frac{121}{14}$ cm^3

Diameter of wire = 1 mm

$\therefore$ Radius $= \frac{1}{2}$ mm $= 0{\cdot}5$mm $= 0{\cdot}05$ cm.

Let length of wire $= h$

then $\pi r^2 h = \frac{22}{7} \times (0.05)^2 \times h$

$$\Rightarrow \frac{22}{7} \times .0025 \times h \ \frac{121}{14}$$

$$\Rightarrow h = \frac{121 \times 7}{14 \times 22 \times .0025}$$

$$= \frac{121 \times 7 \times 10000}{14 \times 22 \times 25} = 1100 \text{ cm}$$

$\therefore$ Length of wire = 11 m. **Ans.**

(16) A solid cube of metal each of whose sides measures 2.2 cm is melted to form a cylindrical wire of radius 1mm. Find the length of the wire so obtained.

Volume of the cube $=a^3=(2.2)^3=10.648$ cm^3

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

Radius = 1 mm = 0.1 cm

As volume of cube = volume of wire, we have:

$h=$volume $/ \pi r^2=10.648\times7 / 22\times0.1\times0.1=338.8$ cm

(17) How many cubic metres of earth must be dug out to sink a well which is 20 m deep and has a diameter of 7 metres? If the earth so dug out is spread over a rectangular plot 28 m by 11 m, what is the height of the platform so formed?

Radius (r) = 7/2 m

Depth (h) = 20 m

$\therefore$ Volume of earth dug out = $\pi r^2 h$

$$= \frac{22}{7} \times \left(\frac{7}{2}\right)^2 \times 20\,\text{m}^3$$

$$= \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} \times 20\ \text{m}^3 = 770\ \text{m}^3$$

Now volume of platform = 770 m^3

Length (l) = 28 m

Breadth (b) = 11 m

Let height = h

$\therefore lbh = 770 \Rightarrow 28 \times 11 \times h = 770$

$$\Rightarrow h = \frac{770}{28 \times 11} = \frac{5}{2} = 2{\cdot}5\ \text{m}$$

$\therefore$ Height of the platform = 2·5 m **Ans.**

(18) A well of inner diameter 14 m is dug to a depth of 12 m. Earth taken out of it has been evenly spread all around it to a width of 7 m to form an embankment. Find the height of the embankment so formed.

Inner diameter of well = 14 m
Inner radius = 14/2= 7 m
Depth (h) = 12 m

$\therefore$ Volume of earth dig out = $\pi r^2 h$

$= \frac{22}{7} \times (7)^2 \times 12 \text{ m}^3$

$= \frac{22}{7} \times 7 \times 7 \times 12 \text{ m}^3 = 1848 \text{ m}^3$

Width of the embankment of the well
= 7 m

$\therefore$ Outer radius (R) = 7 + 7 = 14 m.

Let height of the embankment = h

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

$= \pi h (R^2 - r^2) = \frac{22}{7} h (R^2 - r^2)$

$\therefore \frac{22}{7} h (14^2 - 7^2) = 1848$

$\Rightarrow \frac{22}{7} h (14+7)(14-7) = 1848$

$\Rightarrow \frac{22}{7} h \times 21 \times 7 = 1848$

$\Rightarrow 462\, h = 1848$

$\therefore h = \frac{1848}{462} = 4$

$\therefore$ Height of embankment = 4 m **Ans.**

(19) A road roller takes 750 complete revolutions to move once over to level a road. Find the area of the road if the diameter of the road roller is 84 cm and its length is 1 m.

No. of revolutions = 750
Diameter of road roller = 84 cm
Length (h) = 1 m

$$\text{Radius} = \frac{84}{2} = 42 \text{ cm} = 0.42 \text{ m}$$

$$\therefore \text{Surface area} = 2\pi rh$$

$$= 2 \times \frac{22}{7} \times \frac{42}{100} \times 1 \text{ m}^2$$

$$= \frac{264}{100} \text{ m}^2$$

$$\therefore \text{Area of road} = \frac{264}{100} \times 750 \text{ m}^2$$

$$= 1980 \text{ m}^2$$

(20) A cylinder is open at both ends and is made of 1.5 cm thick metal. Its external diameter is 12 cm and height is 84 cm. What is the volume of metal used in making the cylinder? Also, find the weight of the cylinder if 1 cm^3 of the metal weighs 7.5 g.

External diameter = 12 cm.

$\therefore$ External radius (R) $= \frac{12}{2} = 6$ cm.

and then internal radius (r) = 6 – 1·5

= 4·5 cm.

Height (h) = 84 cm.

$\therefore$ Volume of metal used = $\pi R^2 h - \pi r^2 h$

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

= $\pi h\,(R + r)\,(R - r)$

= $\frac{22}{7} \times 84\,(6 + 4{\cdot}5)\,(6 - 4{\cdot}5)$ cm^2

= 264 (10·5) (1·5) cm^3 = 4158 cm^3

Weight of 1cm^3 = 7·5 g

$\therefore$ Total weight = 7·5 × 4158 g

= 31185 g = 31·185 kg. Ans.

(21) The length of a metallic tube is 1 metre, its thickness is 1 cm and its inner diameter is 12 cm. Find the weight of the tube if the density of the metal is 7.7 grams per cubic centimetre.

Thickness of metal = 1 m.

$\therefore$ Outer radius (R) = 6 + 1 = 7 cm.

Length of the tube (h) = 1 m = 100 cm.

$\therefore$ Volume of metal used = $\pi R^2 h - \pi r^2 h$

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

$= \frac{22}{7} \times 100\,(7+6)\,(7-6)\ \text{cm}^3$

$= \frac{2200}{7} \times 13 \times 1\ \text{cm}^3 = \frac{28600}{7}\ \text{cm}^3$

Weight of 1 cm^3 metal = 7·7 g.

$\therefore$ Total weight

$= \frac{28600}{7} \times 7{\cdot}7\text{g} = 31460\ \text{g}$

= 31·46 kg. **Ans.**

Benefits of RS Aggarwal Solutions for Class 8 Maths Chapter 20 Exercise 20.2

The RS Aggarwal Solutions for Class 8 Maths Chapter 20 Exercise 20.2, which focuses on the volume and surface area of solids, offers several key benefits for students:

Conceptual Clarity: The solutions provide step-by-step explanations for each problem, helping students understand the underlying concepts of calculating volume and surface area for different solids. This clear approach reinforces their comprehension of three-dimensional geometry.

Practice and Application: By working through diverse problems, students get ample practice in applying geometric formulas to real-world scenarios. This enhances their problem-solving skills and prepares them for more advanced mathematical challenges.

Error Correction: Detailed solutions help students identify and correct mistakes in their calculations. This immediate feedback is crucial for learning and mastering the techniques involved.

Confidence Building: Mastery of exercises boosts students' confidence in handling similar problems in exams and other assessments, reducing anxiety and improving performance.

Comprehensive Learning: The exercise covers various shapes such as cubes, cuboids, cylinders, cones, and spheres, ensuring a well-rounded understanding of how to handle different geometric forms.

Preparation for Future Topics: Proficiency in these basic concepts lays a strong foundation for more advanced topics in geometry and calculus, which students will encounter in higher classes.