RS Aggarwal Solutions for Class 8 Maths Chapter 20 Exercise 20.3: RS Aggarwal's Class 8 Maths Chapter 20, Exercise 20.3 focuses on Volume and Surface Area of Solids. It provides comprehensive solutions and exercises to understand these fundamental concepts in geometry. The chapter covers various types of solids such as cubes, cuboids, cylinders, cones, and spheres, emphasizing both theoretical knowledge and practical applications.

Students learn to calculate volumes and surface areas using appropriate formulas and practice problem-solving skills through structured exercises. This chapter equips learners with the necessary skills to analyze and solve real-world problems involving dimensions and spatial relationships of different solid shapes.

RS Aggarwal Solutions for Class 8 Maths Chapter 20 Exercise 20.3 Volume and Surface Area of Solids Overview

RS Aggarwal Solutions for Class 8 Maths Chapter 20 Exercise 20.3 Volume and Surface Area of Solids is designed to deepen students' understanding of geometric principles through practical applications. The chapter begins by introducing basic concepts such as volume (the amount of space occupied by a solid) and surface area (the total area covered by the surface of a solid). It covers various types of solids including cubes, cuboids, cylinders, cones, and spheres, each with its own unique formulas for calculating volume and surface area.

The RS Aggarwal Solutions for Class 8 Maths Chapter 20 Exercise 20.3 in this chapter are structured to progressively challenge students, starting with straightforward calculations and advancing to more complex problems that require application of multiple formulas and problem-solving strategies. This approach helps students develop their mathematical reasoning and spatial visualization skills.

RS Aggarwal Solutions for Class 8 Maths Chapter 20 Exercise 20.3

Below we have provided RS Aggarwal Solutions for Class 8 Maths Chapter 20 Exercise 20.3 -

Tick (√) the correct answer in each of the following:

(1) The maximum length of a pencil that can be kept in a rectangular box of dimensions 12 cm × 9 cm × 8 cm, is

Ans: (b) 17 cm

Solution: Length of the diagonal of a cuboid $= \sqrt{(12)^2 + (9)^2 + (8)^2}$

$$= \sqrt{144 + 81 + 64} = \sqrt{289} = 17\ cm$$

(2) The total surface area of a cube is 150 cm^2. Its volume is

Ans: (b) 125 cm^3

Solution: Total surface area $= 6a^2 = 150$ cm^2

$$\Rightarrow 6\,a^2 = 150$$

$$\Rightarrow a^2 = \frac{150}{6} = 25$$

$$\Rightarrow a = \sqrt{25} = 5$$

Volume $= a^3 = (5)^3 = 125$ cm^3

(3) The volume of a cube is 343 cm^3. Its total surface area is

Ans: (c) 294 cm^2

Solution: Volume $= a^3 = 343$

$$\Rightarrow a = \sqrt[3]{343} = 7 \text{ cm}$$

$\therefore$ Total surface area $= (6\times7\times7)$ cm^2 $= 294$ cm^2

(4) The cost of painting the whole surface area of a cube at the rate of 10 paise per cm^2 is Rs 264.60. Then, the volume of the cube is

Ans: (b) 9261 cm^3

Solution: Total cost = Rs (264.60 × 10) = Rs 2646

Surface area = 2646 cm^2

Let the surface area of a cube be $6a^2$ cm^2

$$\therefore 6a^2 = 2646$$

$$\Rightarrow a^2 = \frac{2646}{6} = 441$$

$$\Rightarrow a = \sqrt{441} = 21 \text{ cm}$$

(5) How many bricks, each measuring 25 cm × 11.25 cm × 6 cm, will be needed to build a wall 8 m long, 6 m high and 22.5 cm thick?

Ans: (c) 6400

$$\text{Solution: Here, } 8 \text{ m} = 800 \text{ cm; } 6 \text{ m} = 600 \text{ cm}$$

$$\text{Volume of the wall} = (800 \times 600 \times 22.5) \text{ cm}^3 = 10{,}800{,}000 \text{ cm}^3$$

$$\text{Volume of each bricks} = (25 \times 11.25 \times 6) \text{ cm}^3 = 1687.5 \text{ cm}^3$$

$$\therefore \text{Number of the bricks} = \left(\frac{10800000 \times 10}{16875}\right) = 6400$$

(6) How many cubes of 10 cm edge can be put in a cubical box of 1 m edge?

Ans: (c) 1000

Solution: Volume of each small cube = $(10 \text{ cm})^3 = 1000 \text{ cm}^3$

Volume of the box = $(100 \text{ cm})^3 = 1000000 \text{ cm}^3$

$$\therefore \text{Total number of cube} = \frac{1000000}{1000} = 1000$$

(7) The edge of a cuboid are in the ratio 1 : 2 : 3 and its surface area is 88 cm^2. The volume of the cuboid is

Ans: (a) 48 cm^3

Solution: Let the length of the edges a cm, 2a cm and 3a cm.

Surface area = {2(a×2a + 2a× 3a + 3a × a)} cm^2

= 2 ($2a^2$ + $6a^2$ + $3a^2$) cm^2 = (2 × $11a^2$) cm^2 = $22a^2$ cm^2

$$\therefore 22a^2 = 88$$

$$\Rightarrow a^2 = \frac{88}{22} = 4$$

$$\Rightarrow a = \sqrt{4} = 2$$

Volume of the cuboid = {2 ×(2×2) × (3×2)} cm^3

= (2 × 4 × 6) cm^3 = 48 cm^3

(8) Two cubes have their volumes in the ratio 1 : 27. The ratio of their surface areas is

Ans: (b) 1 : 9

$$\text{Solution: given, } \frac{\text{volume of 1st cube}}{\text{volume of 2nd cube}} = \frac{1}{27}$$

$$\text{Let, } \frac{a^3}{b^3} = \frac{1}{27}$$

$$\Rightarrow \frac{a}{b} = \sqrt[3]{\frac{1}{27}} = \frac{1}{3}$$

$$\Rightarrow b = 3a$$

$$\text{Now, } \frac{\text{Surface area of 1st cube}}{\text{Surface area of 2nd cube}} = \frac{6a^2}{6b^2} = \frac{a^2}{(3a)^2} = \frac{a^2}{9a^2} = \frac{1}{9}$$

∴ Ratio of the surface areas = 1 : 9

(9) The surface area of a (10 cm × 4 cm × 3 cm) brick is

Ans: (c) 164 cm^2

Solution: Surface area = {2(10×4) + (4×3) + (3× 10)} cm^2

$= \{2 \times (40 + 12 + 30)\}\ cm^2 = (2 \times 82)\ cm^2 = 164\ cm^2$

(10) An iron beam is 9 m long, 40 cm wide and 20 cm high. If 1 cubic metre of iron weighs 50 kg, what is the weight of the beam?

Ans: (c) 36 kg

Solution: Here 40 cm = 0.4 m; 20 cm = 0.2 m

Volume of the iron beam = $(9 \times 0.4 \times 0.2)\ m^3 = 0.72\ m^3$

Given $1\ m^3 = 50$ kg

Then weight of the beam = (0.72×50) kg = 36 kg

(11) A rectangular water reservoir contains 42000 litres of water. If the length of reservoir is 6 m and its breadth is 3.5 m, the depth of the reservoir is

Ans: (a) 2 m

Solution: Let the depth of the water be x cm.

42000 L = $42\ m^3$ [$\because 1m^3 = 1000$ L]

Then, volume of the reservoir = $(6 \times 3.5 \times x)\ m^3$

$\therefore 6 \times 3.5 \times x = 42$

$\Rightarrow 21x = 42$

$\Rightarrow x = 2$ m

(12) The dimensions of a room are (10 m × 8 m × 3.3 m). How many men can be accommodated in this room if each man requires 3 m³ of space?

Ans: (b) 88

Solution: Volume of the room = $(10 \times 8 \times 3.3)\ m^3 = 264\ m^3$

$$\therefore \text{Total number of men} = \frac{264}{3} = 88$$

(13) A rectangular water tank is 3 m long, 2 m wide and 5 m high. How many litres of water can it hold?

Ans: (a) 30000

Solution: Volume of the tank = $(3 \times 2 \times 5)\ m^3 = 30\ m^3$

We know, $1\ m^3 = 1000$ L

∴ Quantity of water = (30 × 1000) L = 30000 L.

(14) The area of the cardboard needed to make a box of size 25 cm × 15 cm × 8 cm will be

Ans: (b) 1390 cm^2

Solution: Total surface area of cardboard,

$= \{2 \times (25 \times 15 + 15 \times 8 + 8 \times 25)\}\ cm^2$

$= \{2 \times (375 + 120 + 200)\}\ cm^2$

$= 1390\ cm^2$

(15) The diagonal of a cube is 4√3 cm long. Its volume is

Ans: (d) 64 cm^3

Solution: Diagonal of a cube = $a\sqrt{3} = 4\sqrt{3}$

∴ a = 4

Then, volume = $a^3 = (4 \times 4 \times 4)\ cm^3 = 64\ cm^3$

(16) The diagonal of a cube is 9√3 cm long. Its total surface area is

Ans: (b) 486 cm^2

Solution: Diagonal of a cube = $\sqrt{3}\ a = 9\ \sqrt{3}$

∴ a = 9

Then, total surface area = $6a^2 = (6 \times 9 \times 9)\ cm^2 = 486\ cm^2$

(17) If each side of a cube is doubled then its volume

Ans: (d) becomes 8 times

Solution: Let the side of 1^{st} cube be a cm and side of the 2^{nd} cube be 2a cm.

Volume of the 1^{st} cube = a^3

Volume of the 2^{nd} cube = $(2a)^3 = 8a^3$

Then, the volume becomes 8 times the original volume.

(18) If each side of a cube is doubled, its surface area

Ans: (b) Becomes 4 times

Solution: Let the side of 1^{st} cube be a cm and side of the 2^{nd} cube be 2a cm.

(17) If each side of a cube is doubled then its volume

Ans: (d) becomes 8 times

Solution: Let the side of 1^{st} cube be a cm and side of the 2^{nd} cube be 2a cm.

Total surface area of the 1^{st} cube = $6a^2$

Total surface of the 2^{nd} cube = $6(2a)^2 = 24a^2$

Then, the surface area becomes 4 times the original surface area.

(19) Three cubes of iron whose edges are 6 cm, 8 cm and 10 cm respectively are melted and formed into a single cube. The edge of the new cube formed is

Ans: (a) 12 cm

Total volume of three cubes = $\{(6)^3 + (8)^3 + (10)^3\}$ cm^3

= (216 + 512 + 1000) cm^3 = 1728 cm^3

$$\therefore \text{Edge of the new cube} = \sqrt[3]{1728}\ \text{cm} = 12\ \text{cm}$$

(20) Five equal cubes, each of edge 5 cm, are placed adjacent to each other. The volume of the cuboid so formed, is

Ans: (d) 625 cm^3

Solution: Length of the cube = (5+5+5+5+5) = 25 cm

Breadth = 5 cm

Height = 5 cm

∴ Volume of the cuboid = $(25 \times 5 \times 5)$ cm^3 = 625 cm^3

(21) A circular well with a diameter of 2 metres, is dug to a depth of 14 metres. What is the volume of the earth dug out?

Ans: (d) 44 m^3

Solution: Here, Diameter = 2 m

Radius = 1 m

$$\text{Volume of the earth dug} = \left(\frac{22}{7} \times 1 \times 1 \times 14\right) = 44\ \text{m}^3$$

(22) If the capacity of a cylindrical tank is 1848 m^3 and the diameter of its base is 14 m, the depth of the tank is

Ans: (b) 12 m

Solution: Here, Diameter = 14 m

Radius = 7 m

Let the depth be h m.

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

$$\therefore \frac{22}{7} \times 7 \times 7 \times \text{h} = 1848$$

$$\Rightarrow 154\text{h} = 1848$$

$$\Rightarrow \text{h} = \frac{1848}{154} = 12\ \text{m}$$

(23) The ratio of the total surface area to the lateral surface area of a cylinder whose radius is 20 cm and height 60 cm, is

Ans: (c) 4 : 3

$$\text{Solution: } \frac{\text{Total surface area}}{\text{Lateral surface area}} = \frac{2\pi r(h+r)}{2\pi rh} = \frac{h+r}{h}$$

$$= \frac{60+20}{60} = \frac{80}{60} = \frac{4}{3} = 4 : 3$$

(24) The number of coins, each of radius 0.75 cm and thickness 0.2 cm, to be melted to make a right circular cylinder of height 8 cm and base radius 3 cm is

Ans: (d) 640

$$\text{Solution: Total number of coins} = \frac{\text{Volume of the cylinder}}{\text{Vloume of each coin}}$$

$$= \frac{\pi \times 3 \times 3 \times 8}{\pi \times 0.75 \times 0.75 \times 0.2} = 640$$

(25) 66 cm^3 of silver is drawn into a wire 1 mm in diameter. The length of the wire will be

Ans: (b) 84 m

Solution: Here, Diameter = 1 mm, r = 0.05 cm

$$\text{Length of the wire} = \frac{\text{Volume}}{\pi r^2} = \frac{66 \times 7}{22 \times 0.05 \times 0.05 \times h}$$

$$\Rightarrow 22 \times 0.05 \times 0.05 \times h = 66 \times 7$$

$$\Rightarrow 0.055h = 462$$

$$\Rightarrow h = \frac{462 \times 100}{55} = 840 \text{ cm}$$

$$\Rightarrow h = 8.4 \text{ m}$$

(26) The height of a cylinder is 14 cm and its diameter is 10 cm. The volume of the cylinder is

Ans: (a) 1100 cm^3

Solution: here, diameter = 10 cm, radius = 5 cm

$$\therefore \text{Volume of the cylinder} = \left(\frac{22}{7} \times 5 \times 5 \times 14\right) \text{cm}^3 = 1100 \text{ cm}^3$$

(27) The height of a cylinder is 80 cm and the diameter of its base is 7 cm. The whole surface area of the cylinder is

Ans: (a) 1837 cm^2

$$\text{Solution: Here, } r = \frac{7}{2} \text{ cm}$$

$$\therefore \text{Total surface area} = \left\{2 \times \frac{22}{7} \times \frac{7}{2} \times \left(80 + \frac{7}{2}\right)\right\} \text{cm}^2$$

$$= \left(22 \times \frac{167}{2}\right) \text{cm}^2 = 1837 \text{ cm}^2$$

(28) The height of a cylinder is 14 cm and its curved surface area is 264 cm^2. The volume of the cylinder is

Ans: (b) 396 cm^3

Solution: Let the radius of the cylinder be r cm.

$$\therefore 2 \times \frac{22}{7} \times r \times 14 = 264$$

$$\Rightarrow 88r = 264$$

$$\Rightarrow r = \frac{264}{88} = 3 \text{ cm}$$

$$\text{Volume of the cylinder} = \left(\frac{22}{7} \times 3 \times 3 \times 14\right) \text{cm}^3 = 396 \text{ cm}^3$$

(29) The diameter of a cylinder is 14 cm and its curved surface area is 220 cm^2. The volume of the cylinder is

Ans: (a) 770 cm^3

Solution: Here, radius = 7 cm

Let the height be h cm.

∴ Curved surface area = 2 cm^2

$$\therefore \text{Curved surface area} = 2\pi rh = 220 \text{ cm}^2$$

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

$$\Rightarrow 44h = 220$$

$$\Rightarrow h = \frac{220}{44} = 5 \text{ cm}$$

$$\text{Volume of the cylinder} = \left(\frac{22}{7} \times 7 \times 7 \times 5\right) \text{cm}^3 = 770 \text{ cm}^3$$

(30) The ratio of the radii of two cylinders is 2 : 3 and the ratio of their heights is 5 : 3. The ratio of their volumes will be

Ans: (c) 20 : 27

$$\text{Solution: } \frac{r_1}{r_2} = \frac{2}{3}$$

$$\frac{H_1}{h_2} = \frac{5}{3}$$

$$\therefore \frac{v_1}{v_2} = \frac{\pi r_1{}^2 h_1}{\pi r_2{}^2 h_2} = \frac{2\times2\times5}{3\times3\times3}$$

$$\Rightarrow \frac{v_1}{v_2} = \frac{20}{27} = 20 : 27$$

Benefits of RS Aggarwal Solutions for Class 8 Maths Chapter 20 Exercise 20.3

RS Aggarwal Solutions for Class 8 Maths Chapter 20 Exercise 20.3 on Volume and Surface Area of Solids offer several benefits for students:

Concept Clarity: The solutions provide clear explanations and step-by-step methods to solve problems related to volume and surface area of solids. This enhances conceptual understanding and builds a strong foundation in geometry.

Structured Approach: The exercises are structured progressively, starting from basic problems to more advanced ones. This helps students to gradually build their skills and confidence in tackling geometric calculations.

Practice Variety: The chapter covers a variety of solid shapes including cubes, cuboids, cylinders, cones, and spheres. By solving problems related to each type, students gain comprehensive practice and familiarity with different geometric formulas.

Real-World Applications: Problems are designed to include real-world scenarios, making the concepts relevant and applicable outside the classroom. This helps students understand the practical importance of volume and surface area calculations in everyday life.

Self-Assessment: Each exercise comes with solutions that allow students to self-assess their understanding. This enables them to identify areas where they need more practice and review.

Problem-Solving Skills: By engaging with challenging problems, students develop critical thinking and problem-solving skills. They learn to analyze geometric relationships and apply appropriate formulas to find solutions.