Surface Areas and Volumes Class 10 Important Questions

10 questions · 27 marks · no calculator · step-marked answers

Name _____ Date _____ Score / 27

- Original questions in the board paper's question types, from 1-mark MCQs to a case study. Try every question before you look at the answers.
- No calculator: as in the CBSE board exam, everything works by hand.
- Worked answers with step marks for 5 questions start after the questions. The other 5 open free on the chapter page with a free account (no card): the link is next to each one.
- Online, with more practice: cbsemathrevision.com/class-10/surface-areas-and-volumes

Section A · Multiple choice and assertion–reason (1 mark each)

1. **1 mark · Volume of combined solids**

A cylinder and a cone have the same base radius and the same height. The ratio of the volume of the cylinder to the volume of the cone is

(a) $1 : 3$ (b) $2 : 1$

(c) $1 : 1$ (d) $3 : 1$

2. **1 mark · Surface area of combined solids**

A solid hemisphere has radius 14 cm. Taking $\pi = \frac{22}{7}$, its total surface area is

(a) $1848\ \text{cm}^2$ (b) $1232\ \text{cm}^2$

(c) $616\ \text{cm}^2$ (d) $2464\ \text{cm}^2$

3. **1 mark · Surface area of combined solids**

In the following question, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option.

Assertion (A): Two identical cubes of edge a are joined face to face. The total surface area of the cuboid formed is $10a^2$.

Reason (R): When two solids are joined, the surface area of the new solid is the sum of their surface areas.

(a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

(b) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).

(c) Assertion (A) is true but Reason (R) is false.

(d) Assertion (A) is false but Reason (R) is true.

Section B · Short answer (2 marks each)

4. **2 marks · Surface area of combined solids**

A conical cap is 12 cm tall with a circular base of radius 5 cm. How much material, in terms of π, is needed for its curved surface? (Find the slant height first.)

5. **2 marks · Volume of combined solids**

A solid is made of a cylinder of radius 3 cm and height 10 cm with a hemisphere of radius 3 cm fixed to one end. Find its volume in terms of π.

Section C · Short answer (3 marks each)

6. **3 marks · Surface area of combined solids**

A solid is a cylinder of radius 6 cm and height 8 cm with a cone of the same radius and slant height 10 cm on top. Find its total surface area in terms of π.

7. **3 marks · Volume of combined solids**

From a solid cylinder of height 14 cm and base radius 6 cm, a cone of the same height and base radius is hollowed out. Find the volume of the solid left. (Take $\pi = \frac{22}{7}$.)

Section D · Long answer (5 marks each)

8. **5 marks · Volume of combined solids**

A grain silo is a cylinder of radius 3 m and height 8 m with a conical roof of the same radius and height 4 m. Find (a) the slant height of the roof, (b) the volume of the silo, and (c) the area of metal sheet used for the curved wall and the roof. Give (b) and (c) in terms of π.

9. **5 marks · Surface area of combined solids**

A solid metal block is a cuboid 12 cm by 10 cm by 8 cm. A hemispherical hollow of radius 3 cm is scooped out of its top face. Find the volume of metal left and the total surface area of the block now. (Take $\pi = 3.14$.)

Section E · Case study (4 marks)

10. **4 marks · Surface area of combined solids**

Spinning top. A wooden spinning top is a cone of radius 3 cm and height 4 cm, joined at its base to a hemisphere of radius 3 cm.

i. How long is the slant edge of the conical part? *[1 mark]*

ii. What is the area of the conical surface, in terms of π? *[1 mark]*

iii. Find the total surface area of the top to be painted, in terms of π. *[2 marks]*

Answers and worked solutions

Question 1

1 mark

$\pi r^2 h : \frac{1}{3}\pi r^2 h = 3 : 1$ **A1**

Correct option: (d) $3 : 1$

Question 2

1 mark

Worked answer: free with a free account (no card) on the chapter page: cbsemathrevision.com/class-10/surface-areas-and-volumes#iq-2

Question 3

1 mark

Worked answer: free with a free account (no card) on the chapter page: cbsemathrevision.com/class-10/surface-areas-and-volumes#iq-3

Question 4

2 marks

Answer: 13 cm; $65\pi\ \text{cm}^2$

$\ell = \sqrt{5^2 + 12^2} = 13$ cm **A1**

Curved surface area $= \pi r \ell = 65\pi\ \text{cm}^2$ **A1**

Question 5

2 marks

Worked answer: free with a free account (no card) on the chapter page: cbsemathrevision.com/class-10/surface-areas-and-volumes#iq-5

Question 6

3 marks

Answer: $192\pi\ \text{cm}^2$

Curved surface of the cone $= \pi \times 6 \times 10 = 60\pi$ **M1**

Curved surface of the cylinder $= 2\pi \times 6 \times 8 = 96\pi$; base $= \pi \times 36 = 36\pi$ **A1**

Total $= 60\pi + 96\pi + 36\pi = 192\pi\ \text{cm}^2$ (the top of the cylinder is covered by the cone) **A1**

Question 7

3 marks

Worked answer: free with a free account (no card) on the chapter page: cbsemathrevision.com/class-10/surface-areas-and-volumes#iq

Question 8

5 marks

Answer: $5\ m$; $84\pi\ \text{m}^3$; $63\pi\ \text{m}^2$

(a) $\ell = \sqrt{3^2 + 4^2} = 5\ m$ **A1**

(b) Cylinder $= \pi \times 9 \times 8 = 72\pi$; cone $= \frac{1}{3}\pi \times 9 \times 4 = 12\pi$ **M1**

Volume $= 84\pi\ \text{m}^3$ **A1**

(c) Wall $= 2\pi \times 3 \times 8 = 48\pi$; roof $= \pi \times 3 \times 5 = 15\pi$ **M1**

Metal sheet $= 63\pi\ \text{m}^2$ **A1**

Question 9

5 marks

Worked answer: free with a free account (no card) on the chapter page: cbsemathrevision.com/class-10/surface-areas-and-volumes#iq

Question 10

4 marks

i. $\ell = \sqrt{9 + 16} = 5$ cm **A1**

ii. $\pi r \ell = 15\pi\ \text{cm}^2$ **A1**

iii. Hemisphere's curved surface $= 2\pi r^2 = 18\pi$ **M1**

Total $= 15\pi + 18\pi = 33\pi\ \text{cm}^2$ **A1**

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