INTEGRATED+

Class: IX, MATHEMATICS

5. SURFACE AREAS AND VOLUMES

TEACHING TASK (JEE MAINS)

01 For cylinder

$r = \frac{2.1}{2}$ mt, $h = 5$ mt

$T.S.A = 2\pi r(r+h)$

$= 2 \times \frac{22}{7} \times \frac{21}{20}\left(\frac{21}{20} + 5\right)$ mt

Total cost Rs. 10 per 1mt^2

$= 2 \times \frac{22}{7} \times \frac{21}{20} \times \frac{121}{20} \times 10 =$ Rs 399.30 (Approx)

Ans. B

02 $V_1 = lbh$

$V_2 = (2l)(2b)(2h)$

$V_2 = 8\,lbh = 8V_1$

Ans. D

03 For cuboid

sides ratio $= 2:3$

Surface area $= (2)^2 : (3)^2 = 4:9$

Ans: B

04 Area of the hall $= \frac{\text{Total cost of decoration}}{\text{Cost of decoration per sq. mt}}$

$= \frac{4050}{4.50} = 900$ sq. mt

$l:b = 3:2 \Rightarrow l = 3x, b = 2x$

$L.S.A = 2h(l+b)$

$900 = 2 \times 4.5 \times (3x+2x)$

$\Rightarrow x = 20$

$l = 60$ mt, $b = 40$ mt

Ans: C

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05 For cube

$V_1 = a^3$

$V_2 = (2a)^3 = 8a^3 = 8V_1$

Ans. D

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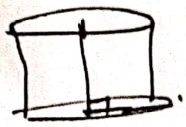
06 For a cylinder



$h = r$

T.S.A $= 2\pi r(r+h)$

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

$= 4\pi h^2 = 616$

$4 \times \frac{22}{7} \times h^2 = 616 \Rightarrow h = 7\text{ cm}$

Ans. B

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07 For a cube

$4a^2 = 96$

$\Rightarrow a^2 = 24$

$\Rightarrow a = 2\sqrt{6}$

Ans. —

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08 For cylinder

$h = 14\text{ cm}, r = 3\text{ cm}$

T.S.A $= 2\pi r(r+h)$

$= 2 \times \frac{22}{7} \times 3(3+14)$

$= 320.6$ sq. units

Ans: —

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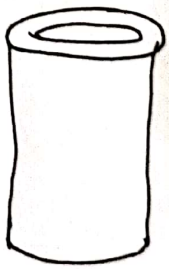
09 $R = 7\text{cm}, r = 5\text{cm}, h = 10\text{ cm}$



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

$= \frac{22}{7}(7^2 - 5^2) \times 10$

$= \frac{5280}{7} = 754.29$ (or) $240\pi\ \text{cm}^3$

Ans: A

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10 $\frac{V_1}{V_2} = \frac{\frac{1}{3}\pi r^2 h}{\frac{1}{2}\pi r^2 h} = \left(\frac{2}{3}\right)^2 = 4:9$

Ans: B

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11. $l = 4cm,\ b = 3cm,\ h = 2cm$

T.S.A = 94

A) $2(lb + bh + hl) = 94$ ✓

B) L.S.A $= 2h(l + b)$

$= 2 \times 2(4 + 3) = 28\ cm^2$ ✗

C) Volume $= lbh = 4 \times 3 \times 2 = 24\ cm^3$ ✓

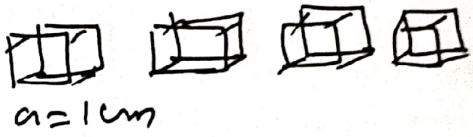
Ans: A, C

12

A) S.A $= 6a^2$

$= 6 \times 4^2$

$= 96\ cm^2$ ✓



B) No. of small cubes = 64 ✓

C) S.A of small cube $= 6a^2 = 6(1)^2 = 6$

$\therefore$ Ratio $= \dfrac{\text{Large cube}}{4 \times \text{Small cubes}} = \dfrac{96}{4 \times 6}$

Ratio $= \dfrac{4 \times \text{Small cubes}}{\text{Large cube}} = \dfrac{4 \times 6}{96} = 1:4$ (False)

D) T.S.A of Small cube $= 6a^2 = 6(1)^2 = 6$ ✓

Ans: A, B, D

13. Statement I: cube

$T.S.A_1 = 6a^2$

$T.S.A_2 = 6(2a)^2 = 24a^2 = 4(6a^2) = 4 \cdot TSA_1$

(True)

Statement II:

$Volume_1 = a^3$

$Volume_2 = (2a)^3 = 8a^3 = 8\ Volume_1$ (True)

Ans. A

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14. Statement I: $h = 25\text{cm}$, $r = 3.5\text{cm}$

$C.S.A = 2\pi rh$

$= 2 \times \frac{22}{7} \times \frac{35}{10} \times 25$

$= 550\ \text{cm}^2$ (True)

Statement II: Conceptual (True)

Ans. A

15 Assertion: Conceptual (True)

Reason: Conceptual (True)

Ans. A

16 Assertion: C.S.A of hemisphere $= 2\pi r^2$

S.A of sphere $= 4\pi r^2$ ~~(False)~~ (True)

Reason: Conceptual (True)

Ans. A

17 For a cube

original edge $= a$

New edge $= a + 50\%$ of $a =$

$= a + \frac{50}{100} \times a = \frac{3a}{2}$

% Increase in its surface area

$= \frac{\text{Final} - \text{original}}{\text{original}} \times 100$

$= \frac{6\left(\frac{3a}{2}\right)^2 - 6a^2}{6a^2} \times 100$

$= 125\%$.

Ans. A

18 $6a^2 = 150 \Rightarrow a = 5$

L. of diagonal $= \sqrt{3}\,a = 5\sqrt{3}$

Ans. B

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19. for a sphere

$r = 7$ cm

Surface area $= 4\pi r^2$

$= 4\pi (7)^2 = 4 \times \frac{22}{7} \times 7 \times 7 = 616 \text{ cm}^2$

Ans. B

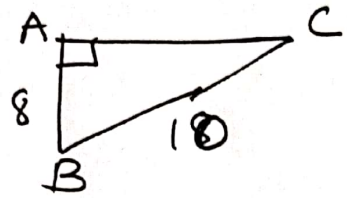
20 Volume of hemisphere $= \frac{2}{3}\pi r^3$

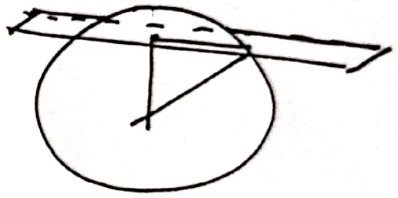
$= \frac{2}{3} \times \frac{22}{7} \times 7 \times 7 \times 7$

$= 718.67 \text{ cm}^3$

Ans. A

21.





$AC^2 + AB^2 = BC^2$

$\Rightarrow AC^2 + 8^2 = 10^2 \Rightarrow AC = 6$ cm

Ans: 6

22 for a cone

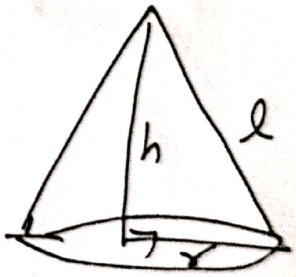
$r = 6$ cm

$l = 10$ cm

C.S.A $= \pi r l$

$= \frac{22}{7} \times 6 \times 10$

$= 188.57$



Integral value $= 188$

Ans: 188

23 a) Conceptual (p) | c) Conceptual (r)

b) " (q) | d) Conceptual (s)

24 a) Volume of hollow cylinder

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

$= \pi(7^2 - 5^2) \times 10$

$= 240\pi \text{ cm}^2$ (q)

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b) L.S.A $= 2\pi(R+r) \times h$

$= 2\pi(7+5) \times 10$

$= 240\pi$ (q)

c) Area $= \pi(R^2 - r^2)$

$= \pi(7^2 - 5^2)$

$= 24\pi \text{ cm}^2$ (r)

d) Thickness $= R - r = 7 - 5 = 2$

Doubled $= 2 \times 2 = 4$

Outer radius $= R = 7$

New inner radius $= 7 - 4 = 3$

height $= h = 10$

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

$= \pi \times (7^2 - 3^2) \times 10$

$= 400\pi$

Ans: q, q, r, —

LEARNERS TASK (CUQ'S)

01	Conceptual	Ans: B
02	T.S.A $= 6a^2 = 6 \cdot 7^2 = 294 \text{ cm}^2$	Ans: B
03	Conceptual	Ans: D
04	Conceptual	Ans: B
05	Conceptual	Ans: B
06	Conceptual	Ans: D
07	Plase discard this question as it has inadquate data (insufficient data).	
08	Conceptual	Ans: D

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09. $V_1 = \frac{4}{3}\pi r^3 h$ (1)

$V_2 = \frac{4}{3}\pi (3r)^3 . h$

$= \frac{4}{3}\pi . 27 r^3 . h = 27 . \frac{4}{3}\pi r^2 h = 27 . V_1$

Ans: D

10. Conceptual Ans: B

JEE MAINS LEVEL

01. $d = 7mt, \quad r = \frac{7}{2} mt$

$S.A = 4\pi r^2 = 4 \times \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} = 154 Sq.mt$ Ans: A

02 $l = 5, \quad b = 8, \quad h = 10$

$T.S.A = 2(lb + bh + hl)$

$= 2(40 + 80 + 50) = 340 cm^2$ Ans: A

03 $2\pi r = 17.6$

$\Rightarrow r = 2.8 mt$

$C.S.A = 2\pi r^2$

$= 2 \times \frac{22}{7} \times (2.8)^2$

$= 49.28 mt^2$

Cost of painting $\rightarrow$ per $100 cm^2 \rightarrow$ Rs 5.

Now, $C.S.A = 49.28 mt^2$

$= 49.28 \times 100 \times 100 \times cm^2$

$= 492800 cm^2$

Cost of painting $= \frac{5}{100} \times 492800$

$=$ Rs. 24,640

Ans: D

04 Volume = Area of the base x height

$240 = 40 \times$ height

$\therefore$ height $= 6cm$ Ans: C

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05 For Cone.

$r = 7$, $h = 24$

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

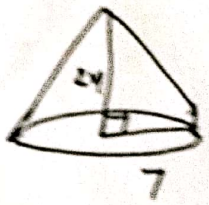
$= 24^2 + 7^2$

$\therefore l = 25$

C.S.A $= \pi r l$

$= \frac{22}{7} \times 7 \times 25$

$= 550 \text{ mt}^2$



Area $= l \times b$

$= l \times 5$

$5l = 550$

$l = 110$ mt

Ans. B

06 $l = 20$m, $b = 16$m, $h = 12$m

Length of the rod $= \sqrt{l^2 + b^2 + h^2}$

$= \sqrt{20^2 + 16^2 + 12^2}$

$= \sqrt{800}$

$= 10\sqrt{8} = 20\sqrt{2}$

$= 20 \times 1.414$

$= 28.28$

Ans. D

07 $a_1 : a_2 = 3 : 4$

$\frac{\text{T.S.A}}{\text{C.S.A}} = \frac{6a_1^2}{6a_2^2} = \left(\frac{3}{4}\right)^2 = 9 : 16$

Ans: B

08 $l = 25$cm, $b = 15$cm, $h = 8$cm

T.S.A $= 2(lb + bh + hl)$

$= 2(25 \times 15 + 15 \times 8 + 8 \times 25)$

$= 1390 \text{ cm}^2$

Ans: C

09. For cylinder $r = 2$ mt, $h = 7$ mt

Volume $= \pi r^2 h = \frac{22}{7} \times 2 \times 2 \times 7 = 88 \text{ mt}^2$

Ans. D

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10. Cylinder

$r = 4$ cm

$h = 10$ cm

Volume $= \pi r^2 h$

$= \pi \times (4)^2 \times 10$

Cube Sphere

$r = 2$ cm

Volume $= \frac{4}{3} \pi r^3$

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

No. of Spheres $= \frac{\pi \times 4^2 \times 10}{\frac{4}{3} \pi \times (2)^3} = 15$

Ans: 15

11. $r = 14$ cm, $d = 7$ cm

$R = r + d = 14 + 7 = 21$ cm

$R = r + d$

T.S.A. of hollow hemisphere

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

$= \pi r^2 + 3\pi R^2$

$= \frac{22}{7} \times 14^2 + 3 \times \frac{22}{7} \times (21)^2$

$= 4774 \text{ cm}^2$

Ans: A

12 $l = 6$ m, $b = 8$ cm, $h = 10$ cm

A) T.S.A $= 2(lb + bh + hl)$

$= 2(48 + 80 + 60) = 376 \text{ m}^2$ ✓

B) L.S.A $= 2h(l + b)$

$= 2 \times 10 (6 + 8) = 280 \text{ cm}^2$ ✓

C) Volume $= lbh = 6 \times 8 \times 10 = 480 \text{ cm}^3$ ✓

d) conceptual (True) ✓

Ans: A, C, D

13.

13. Statement I: $r = 7\text{cm}$, $h = 14\text{cm}$

Volume $= \pi r^2 h$

$= \frac{22}{7} \times 7 \times 7 \times 14 = 2156\ \text{cm}^3$ (True)

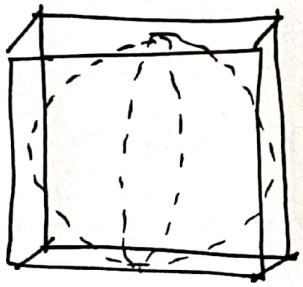
Statement II: C.S.A $= 2\pi r h$

$= 2 \times \frac{22}{7} \times 7 \times 14 = 616\ \text{cm}^2$ (True)

Ans: A

14 Statement I:

$r = 3.5\text{cm} = \frac{7}{2}\text{cm}$



C.S.A of sphere $= 4\pi r^2$

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

C.S.A. of cube $= 6a^2$

$= 6(7)^2$

since $a = 2r$

$= 2 \times \frac{7}{2}$

$= 7$

Diffrence in S.A $= 6 \times 7^2 - 4 \times \frac{22}{7} \times \left(\frac{7}{2}\right)^2$

$= 140\text{cm}^2$ (True)

Statement II: Conceptual (True)

Ans. A

15. Assertion: Conceptual (True)

Reason: Conceptual (True)

Ans. A

16. Assertion: Conceptual (True)

Reason: Conceptual (True)

Ans A

17. Volume $= l\,b\,h = 8 \times 5 \times 10 = 400\text{cm}^2$ Ans: A

18 T.S.A $= 2(lb + bh + hl)$

$= 2(8 \times 5 + 5 \times 10 + 10 \times 8)$

$= 340\text{cm}^2$

Ans B

19.

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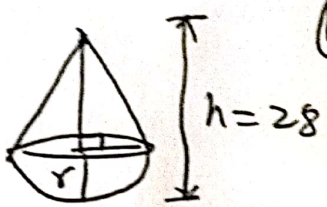
19. Hemisphere

$r = 14$ mt



(1)

For cone

$r = 14$ mt, $h = 28 - 14 = 14$ mt

$l^2 = h^2 + r^2 \quad | \quad l = 14\sqrt{2}$

$= 14^2 + 14^2$

Area of Canvas required = C.S.A of cone

$= \pi r l$

$= \frac{22}{7} \times 14 \times 14\sqrt{2}$

$= 616\sqrt{2}$ mt^2 Ans D

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20 Area of metal sheet required

= C.S.A. of hemisphere

$= 2\pi r^2$

$= 2 \times \frac{22}{7} \times 14^2 = 1232$ mt^2 Ans. D

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21 For cylinder

$r = 7$cm, $h = 10$cm

C.S.A $= 2\pi r h$

$= 2 \times \frac{22}{7} \times 7 \times 10 = 440$ cm^2 Ans: 440

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22 For cylinder

$h = 8$ cm

C.S.A $= 2\pi r h = 704$

$2 \times \frac{22}{7} \times r \times 8 = 704$

$\Rightarrow r = 14$ cm

∴ Sum of the digits $= 1 + 4 = 5$ cm Ans: 5

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23 a) Conceptual (P) | c) Conceptual (r) (12)
b) " (q) | d) " (s)
Ans.. p, q, r, s

24 a) L.S.A = ~~$2\pi rh$~~ $2h(l+b)$
$= 2 \times \frac{22}{7} \times 2 \times 10 \times (5+6)$
$=$

24 a) Volume $= l \times b \times h = 5 \times 6 \times 10 = 300\ cm^3$
b) L.S.A $= 2h(l+b)$
$= 2 \times 3\ (8+7) = 210\ cm^2$
c) T.S.A $= 6a^2 = 6(7)^2 = 294\ cm^2$
d) volume $= a^3 = 6^3 = 216\ cm^2$ Ans:- ~~r~~, s

$\Rightarrow$ THE END $\Leftarrow$

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