



Attempt questions first; check the separate key afterward. Unless stated otherwise, lengths are in cm. Give exact answers in π ; show units and working.

A. Very short answers - 1 mark each

1. State volume of a cylinder.
2. State curved surface area of a cone.
3. State volume of a sphere.
4. Find volume of cube of side 3 cm.
5. Find total surface area of cube of side 4 cm.
6. State total surface area of a hemisphere.
7. Does doubling every length multiply volume by 8?
8. Find slant height of cone with $r=3$, $h=4$.

B. Short answers / practice - 2 marks each

9. Find cylinder volume for $r=7$, $h=10$, $\pi=22/7$.
10. Find cylinder curved area for $r=3$, $h=8$.
11. Find cone volume for $r=6$, $h=10$.
12. Find sphere surface area for $r=5$.
13. Find hemisphere volume for $r=3$.
14. Find total area of cuboid 2 by 3 by 4.
15. Find sphere radius when volume is 36π .
16. Find height of cylinder of volume 200π and radius 5.
17. A cube of side 6 is melted into cubes of side 2. Find number.
18. A sphere radius 6 is melted into spheres radius 2. Find number.
19. Find total surface area of cone $r=3$, $h=4$.
20. Explain why joined faces are excluded from exposed surface area.

C. Application / reasoning - 3 marks each

21. A cylinder $r=3$, $h=8$ has a hemisphere attached at one end. Find volume.
22. For the preceding solid, find exposed surface area including the other circular end.

23. A cone and cylinder have equal radius and height. Compare volumes.

24. A sphere radius 3 is immersed in a cylinder radius 6. Find water-level rise.

25. A cuboid $12 \times 10 \times 6$ is melted into cubes side 2. Find count.

26. Does melting change volume when density is unchanged and nothing is lost?

27. A cone has radius 5 cm and height 12 cm. Find total surface area.

28. A sphere of radius 3 cm is melted into a cylinder of radius 1 cm. Find height.

29. Find exposed area of a hemisphere of radius 4 cm joined to a cylinder of equal radius and height 10 cm, including its flat base.

30. A cube of side 10 cm is cut into cubes of side 2 cm. Find number and combined surface area.

31. A cylinder and cone have equal volumes and equal base radii. Compare their heights.

D. Extended practice - 5 marks each

32. A toy is a cone $r=3$, $h=4$ on a hemisphere $r=3$. Find volume and exposed area.
33. A cylindrical vessel radius 7 cm, height 20 cm is full. How many cones $r=3.5$ cm, $h=6$ cm can be filled?
34. A hemisphere of radius 7 cm is scooped from a cylinder radius 7, height 10. Find remaining volume.
35. A sphere radius 6 is melted into a wire of radius 0.2. Find wire length.

ANSWER KEY - Numerical / closed questions

- 1) $\pi r^2 h$. 2) $\pi r l$. 3) $4\pi r^3/3$. 4) 27 cm^3 . 5) 96 cm^2 .
6) $3\pi r^2$. 7) Yes. 8) 5. 9) 1540. 10) 48π . 11) 120π . 12) 100π . 13) 18π . 14) 52. 15) 3. 16) 8.
17) 27. 18) 27. 19) 24π . 20) 90π . 21) 75π .
22) 1:3. 23) 1 unit. 24) 90. 25) No. 26) $90\pi \text{ cm}^2$. 27) 36 cm . 28) $128\pi \text{ cm}^2$. 29) $125; 3000 \text{ cm}^2$. 30) Cylinder:cone=1:3. 31) 30π ; 33π . 32) 40. 33) $784\pi/3 \text{ cm}^3$. 34) $7200 \text{ cm}^2 = 72 \text{ m}$ if lengths are in cm.