CHAPTER 13

Surface Areas and Volumes

1. OBJECTIVE QUESTIONS

1. If the radius of the sphere is increased by 100%, the volume of the corresponding sphere is increased by

(a) 200% (b) 500%
(c) 700% (d) 800%

Ans : (c) 700%

When the radius is increased by 100%, the corresponding volume becomes 800% and thus increase is 700%.

2. A sphere is melted and half of the melted liquid is used to form 11 identical cubes, whereas the remaining half is used to form 7 identical smaller spheres. The ratio of the side of the cube to the radius of the new small sphere is

(a) $\left(\frac{4}{3}\right)^{1/3}$ (b) $\left(\frac{8}{3}\right)^{1/3}$
(c) $(3)^{1/3}$ (d) 2

Ans : (b) $\left(\frac{8}{3}\right)^{1/3}$

As per the given conditions,

$$11a^3 = 7 \times \frac{4}{3} \times \pi \times r^3$$

$$\frac{a}{r} = \left(\frac{8}{3}\right)^{1/3}$$

3. The base radii of a cone and a cylinder are equal. If their curved surface areas are also equal, then the ratio of the slant height of the cone to the height of the cylinder is

(a) 2 : 1 (b) 1 : 2
(c) 1 : 3 (d) 3 : 1

Ans : (a) 2 : 1

$$\pi rl = 2\pi rh$$

$$\frac{l}{h} = \frac{2}{1}$$

4. A slab of ice 8 inches in length, 11 inches in breadth, and 2 inches thick was melted and resolidified in the form of a rod of 8 inches diameter. The length of such a rod, in inches, is nearest to

(a) 3 (b) 3.5
(c) 4 (d) 4.5

Ans : (b) 3.5

$$\text{Volume of the given ice cuboid} = 8 \times 11 \times 2 = 176$$

Let the length of the required rod be l.

$$\pi l \frac{8^2}{4} = 176$$

$$l = 3.5 \text{ inches}$$

5. If the perimeter of one face of a cube is 20 cm, then its surface area is

(a) 120 cm^2 (b) 150 cm^2
(c) 125 cm^2 (d) 400 cm^2

Ans : (b) 150 cm^2

$$\text{Edge of cube} = \frac{20}{4}\text{ cm} = 5\text{ cm}$$

$$\text{Surface area} = 6 \times 5^2\text{ cm}^2 = 150\text{ cm}^2$$

6. Ratio of lateral surface areas of two cylinders with equal height is

(a) 1 : 2 (b) $H:h$
(c) $R:r$ (d) None of these

Ans : (c) $R:r$

$$2\pi Rh : 2\pi rh = R:r$$

7. Ratio of volumes of two cylinders with equal height is

(a) $H:h$ (b) $R:r$
(c) $R^2:r^2$ (d) None of these

Ans : (c) $R^2:r^2$

$$\pi R^2h : \pi r^2 h = R^2:r^2$$

8. Ratio of volumes of two cones with same radii is

(a) $h_1:h_2$ (b) $s_1:s_2$
(c) $r_1:r_2$ (d) None of these

Ans : (a) $h_1:h_2$

$$\frac{1}{3}\pi r_1^2 h_1 : \frac{1}{3}\pi r_2^2 h_2$$

$$\frac{1}{3}\pi r_1^2 h_1 : \frac{1}{3}\pi r_1^2 h_2 \qquad (r_1 = r_2)$$

$$h_1 : h_2$$

9. The diameter of hollow cone is equal to the diameter

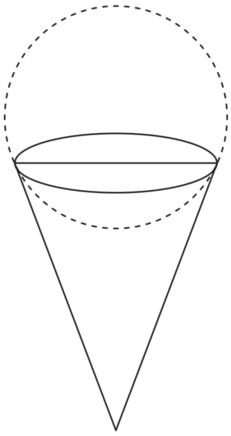
of a spherical ball. If the ball is placed at the base of the cone, what portion of the ball will be outside the cone?

(a) 50% (b) less than 50%

(c) more then 50% (d) 100%

Ans : (c) more then 50%

Though it is given that diameter of the cone is equal to the diameter of the spherical ball. But the ball will not fit into the cone because of its slant shape. Hence more than 50% of the portion of the ball will be outside the cone.



10. If a solid of one shape is converted to another, then the volume of the new solid.

(a) remains same (b) increases

(c) decreases (d) can't say

Ans : (a) remains same

11. If the radii of circular ends of a frustum of height 6 cm are 15 cm and 7 cm, respectively. Then, the volume of the frustum is

(a) 1380.12 cm^3 (b) 2380.12 cm^3

(c) 3380.12 cm^3 (d) 4380.12 cm^3

Ans : (b) 2380.12 cm^3

Given, radii of both circular ends are,

$$r_1 = 15\text{ cm}$$

$$r_2 = 7\text{ cm}$$

and height, $h = 6\text{ cm}$.

Volume of the frustum,

$$(V) = \frac{1}{3}\pi h(r_1^2 + r_2^2 + r_1 r_2)$$

$$= \frac{1}{3} \times \pi \times 6(225 + 49 + 105)$$

$$= 2\pi(379) \qquad [\because \pi = 3.14]$$

$$= 3.14 \times 758 = 2380.12\text{ cm}^3$$

12. Volume of a spherical shell is given by

(a) $4\pi(R^2 - r^2)$ (b) $\pi(R^3 - r^3)$

(c) $4\pi(R^3 - r^3)$ (d) $\frac{4}{3}\pi(R^3 - r^3)$

Ans : (d) $\frac{4}{3}\pi(R^3 - r^3)$

$$\text{Volume of spherical shell} = \frac{4}{3}\pi R^3 - \frac{4}{3}\pi r^3$$

$$= \frac{4}{3}\pi(R^3 - r^3)$$

13. The volume of a largest sphere that can be cut from cylindrical log of wood of base radius 1 m and height 4 m, is

(a) $\frac{16}{3}\pi\text{ m}^3$ (b) $\frac{8}{3}\pi\text{ m}^3$

(c) $\frac{4}{3}\pi\text{ m}^3$ (d) $\frac{10}{3}\pi\text{ m}^3$

Ans : (c) $\frac{4}{3}\pi\text{ m}^3$

$$\text{Volume of sphere} = \frac{4}{3}\pi r^3 = \frac{4}{3}\pi(1)^3$$

14. A cubical ice-cream brick of edge 22 cm is by to be distributed among some children and filling ice-cream cones of radius 2 cm and many height 7 cm upto its brim. How many children will get ice-cream cones?

(a) 163 (b) 263

(c) 363 (d) 463

Ans : (c) 363

Given, Volume of brick $= (22)^3\text{ cm}^3$

$$\text{Volume of 1 cone} = \frac{1}{3} \times \frac{22}{7} \times 2 \times 2 \times 7$$

$$= \frac{22 \times 4}{3}$$

Let number of cones $= n$

$$\text{Then, } n \times 22 \times \frac{4}{3} = 22 \times 22 \times 22$$

$$n = \frac{22 \times 22 \times 3}{4}$$

$$n = 121 \times 3 = 363$$

15. TThree identical cones with base radius r are placed on their bases so that each is touching the other two. The radius of the circle drawn through their vertices is

(a) Smaller than r

(b) equal to r

(c) larger than r

(d) depends on the height of the cones

Ans : (c) larger than r

The centres of the bases of the cones form a triangle of side $2r$. The circumcircle of this triangle will be identical to a circle drawn through the vertices of cones and thus, it will have a radius of $2/\sqrt{3}$ times r, which is greater than r.

16. he diameter of a sphere is 6 cm. It is melted and drawn into a wire of diameter 2 mm. The length of the wire is

(a) 12 m (b) 18 m

(c) 36 m (d) 66 m

Ans : (c) 36 m

We have, diameter of metallic sphere $= 6\text{ cm}$

Radius of metallic sphere $= 3\text{ cm}$

Also, diameter of cross-section of cylindrical wire

$$= 0.2\text{ cm}$$

Radius of cross-sections of cylindrical wire

$$= 0.1\text{ cm}$$

Let the length of the wire be h cm.

Since, metallic sphere is converted into a cylindrical shaped wire of length h cm.

Volume of the metal used in wire

$$= \text{Volume of the sphere,}$$

$$\pi \times \left(\frac{1}{10}\right)^2 \times h = \frac{4}{3} \times \pi \times 27$$

$$\pi \times \frac{1}{100} \times h = 36\pi$$

$$h = \frac{36\pi \times 100}{\pi} = 3600 \text{ cm}$$

$$= 36 \text{ cm}$$

17. A 20 m deep well, with diameter 7 m is dug and the earth from digging is evently spread out to form a platform 22 m by 14 m. The height of the platform is
(a) 2.5 m (b) 3.5 m
(c) 3 m (d) 2 m

Ans : (a) 2.5 m

$$\text{Radius of the well} = \frac{7}{2}\text{m} = 3.5 \text{ m}$$

$$\text{Volume of the earth dug out} = \frac{22}{7} \times (3.5)^2 \times 20$$

$$= \frac{22}{7} \times 3.5 \times 3.5 \times 20$$

$$= 770 \text{ m}^3$$

$$\text{Area of platform} = (22 \times 14)\,\text{m}^2$$

$$= 308 \text{ m}^2$$

$$\text{Height} = \frac{770}{308} = 2.5 \text{ m}$$

18. From a solid circular cylinder with height 10 cm and radius of the base 6 cm, a right circular cone of the same height and same base is removed, then the volume of remaining solid is
(a) $280\,\pi\text{cm}^3$ (b) $330\,\pi\text{cm}^3$
(c) $240\,\pi\text{cm}^3$ (d) $440\,\pi\text{ cm}^3$

Ans : (c) $240\,\pi\text{cm}^3$

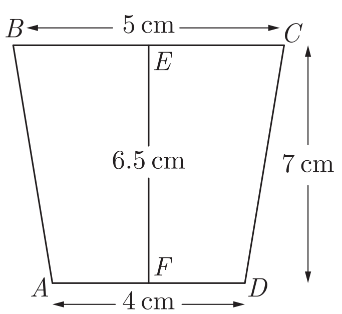
Volume of the remaining solid

$$= \text{Volume of the cylinder} - \text{Volume of the cone}$$

$$= \left\{\pi \times 6^2 \times 10 - \frac{1}{3} \times \pi \times 6^2 \times 10\right\}$$

$$= (360\pi - 120\pi) = 240\pi \text{ cm}^3$$

19. Find the space occupied by the figure, when we rotate the figure about the line CD.



(a) 130.7 cm^3 (b) 103.7 cm^3
(c) 130.72 cm^3 (d) 15.25 cm^3

Ans : (b) 103.7 cm^3

When we rotate a figure along the line CD, we get a frustum of a cone

Now, space occupied by the figure = Volume of frustum of a cone

$$= \frac{1}{3}\pi h(r_1^2 + r_1 r_2 + r_2^2)$$

$$= \frac{1}{3} \times 3.14 \times 6.5\,[2^2 + 2 \times 2.5 + (2.5)^2]$$

$$[\because r_1 = 2 \text{ cm } r_2 = 2.5 \text{ cm and } h = 6.5 \text{ cm}]$$

$$= 6.80\,[4 + 5 + 6.25]$$

$$= 6.80\,[15.25] = 103.7 \text{ cm}^3$$

20. A shuttle cock, used for playing badminton, has the shape of a frustum of a cone mounted on a hemisphere. If the external diameters of the frustum are 5 cm and 2 cm and height of the entire shuttle cock is 7 cm, then its external surface area is
(a) 67.98 cm^2 (b) 74.26 cm^2
(c) 76.89 cm^2 (d) 47.62 cm^3

Ans : (b) 74.26 cm^2

Given, radius of the lower end of the frustum,

$$r_1 = 1 \text{ cm}$$

Radius of the upper end of the frustum,

$$r_2 = 2.5 \text{ cm}$$

Heigh of the frustum,

$$h = 6 \text{ cm}$$

Now, slant height of the frustum,

$$l = \sqrt{h^2 + (r_2 - r_1)^2}$$

$$l = \sqrt{36 + (2.5 - 1)^2} = \sqrt{38.25}$$

$$= 6.18 \text{ cm}$$

External surface area of shuttlecock

$$= \text{Curved surface area of the frustum}$$

$$= \pi(r_1 + r_2)\,l + 2\pi r_1^2$$

$$= \pi(1 + 2.5) \times 6.18 + 2 \times \pi \times 1^2$$

$$= \frac{22}{7} \times 3.5 \times 6.18 + 2 \times \frac{22}{7}$$

$$= 67.98 + 6.28 = 74.26 \text{ cm}^2$$

21. An hexagonal pyramid is 20 m high. Side of the base is 5 m. The volume of the pyramid is
(a) $250\sqrt{3} \text{ m}^3$ (b) 250 m^3
(c) $25\sqrt{3} \text{ m}^3$ (d) 25 m^3

Ans : (a) $250\sqrt{3} \text{ m}^3$

Given, $h = 20 \text{ m}$

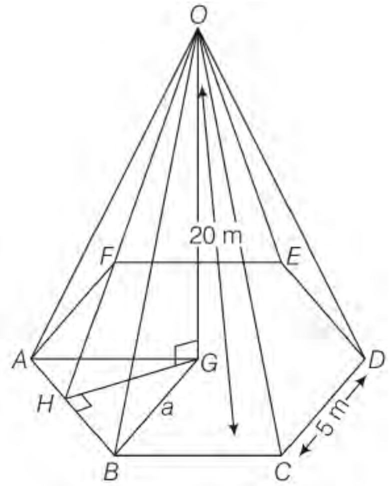
side of base, $a = 5 \text{ m}$

$$\text{Area of base} = \frac{\sqrt{3}}{4} \times a^2 \times 6$$

$$= \frac{\sqrt{3}}{4} \times 5^2 \times 6$$

$$= \frac{3\sqrt{3}}{2} \times 25 \text{ m}^2$$

Now, volume of pyramid $= \frac{1}{3}Ah$



Where A = Area of the base

and h = height

$$= \frac{1}{3} \times \frac{3\sqrt{3}}{2} \times 25 \times 20$$

$$= 250\sqrt{3} \text{ m}^3$$

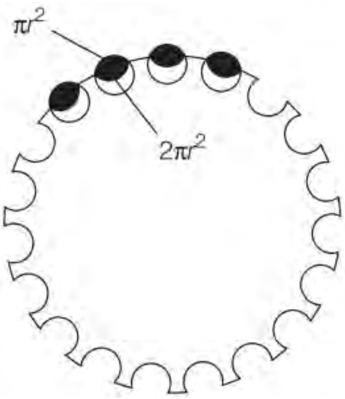
22. A golf ball has diameter equal to 4.1 cm. Its surface has 150 dimples each of radius 2 mm. Calculate total surface area which is exposed to the surroundings, assuming that the dimples are hemispherical.

(a) 22.81 cm^2 (b) 68.71 cm^2

(c) 71.68 cm^2 (d) None of the above

Ans : (c) 71.68 cm^2

Given, diameter of ball, $d = 4.1$ cm



Radius of ball, $r = \frac{d}{2} = \frac{4.1}{2}$ cm

Surface area of the ball $= 4\pi r^2 = 4\pi \times \left(\frac{4.1}{2}\right)^2$

$$= 16.81\,\pi \text{ cm}^2$$

In each dimple,surface area equal to πr^2 (r is the radius of each dimple) is removed from the surface of the ball whereas the surface area of hemisphere, i.e. $2\pi r^2$ is exposed to the surroundings.

Total surface area exposed to the surroundings

$= $ Surface area of the ball $- 150 \times \pi r^2 + 150 \times 2\pi r^2$

$$= 16.81\pi + 150\pi r^2$$

$$= 16.81\pi + 150\pi \times \left(\frac{2}{10}\right)^2$$

$$= 16.81\pi + 6\pi$$

$$= 22.81\pi = 22.81 \times \frac{22}{7}$$

$$= 71.68 \text{ cm}^2$$

2. FILL IN THE BLANK

DIRECTION : Complete the following statements with an appropriate word/term to be filled in the blank space(s).

1. The length of the diagonal of a cube that can be inscribed in a sphere of radius 7.5 cm is ....

Ans : 15 cm

2. The volume of a hemisphere is .... the volume of a cylinder if its height and radius is same as that of the cylinder.

Ans : two-third

3. If the volume and the surface area of a solid sphere are numerically equal, then its radius is ....

Ans : 3 Units

4. A sharpened pencil is a combination of .... and .... shapes.

Ans : cylinder, cone

5. If we cut a cone by a plane parallel to its base, we obtain a .... and ....

Ans : cone, frustum of a cone

6. If the volume of a cube is 64 cm^3, then its surface area is ....

Ans : 96 cm^2

7. Solid figures are .... while plane figures are ....

Ans : 3-dimensional. 2-dimensional or cube, cuboid, etc. circle, square etc.

8. If the radius of a sphere is halved, its volume becomes .... time the volume of original sphere.

Ans : one-eighth

9. Surahi is the combination of .... and ....

Ans : sphere, cylinder

10. The volume of a solid is the measurement of the portion of the .... occupied by it.

Ans : Space

11. If the heights of two cylinders are equal and their radii are in the ratio of 7 : 5, then the ratio of their volumes

is ....
Ans : 49 : 25

12. The volume and surface area of a sphere are numerically equal, then the radius of sphere is .... units.
Ans : 3

13. In a right circular cone, the cross-section made by a plane parallel to the base is a ....
Ans : Circle

14. Volume of the frustum of cone is ....
Ans : $\frac{1}{3}\pi h(r_1^2 + r_2^2 + r_1 r_2)$

15. Total curved surface area of the frustum is ....
Ans : $\pi(r_1 + r_2)l + \pi r_1^2 + \pi r_2^2$

16. The TSA, CSA stand for .... and .... respectively.
Ans : Total surface area, Curved surface area.

17. A shuttle cock used for playing badminton has the shape of the combination of .... of cone and hemisphere.
Ans : Frustum

18. .... is measured in square units.
Ans : Area

19. In the gilli-danda game, the shape of a gilli is a combination of two cones and ....
Ans : Cylinder

20. The volume of a cube with diagonal d is ....
Ans : $\frac{d^3}{3\sqrt{3}}$ cu units.

21. .... is measured in cubic units.
Ans : Volume

22. A cube is a special type of ....
Ans : Cuboid

23. The total surface area of a solid hemisphere having radius r is ....
Ans : $3\pi r^2$

3. TRUE/FALSE

DIRECTION : Read the following statements and write your answer as true or false.

1. Volume of the solid is measured in cubic units.
Ans : True

2. A cube has eight faces.
Ans : False

3. Area is the length of the boundary of a closed figure.
Ans : False

4. Volume of a frustum of cone$= \frac{1}{2}\pi h(r_1^2 + r_2^2 + r_1 r_2)$
Ans : False

5. Area is the total surface covered by a closed figure.
Ans : True

6. A solid cone of radius r and height h is placed over a solid cylinder having same base radius and height as that of a cone. The total surface area of the combined solid is $\pi r[\sqrt{r^2 + h^2} + 3r + 2h]$
Ans : False

7. The volume of sphere of diameter is $\frac{\pi d^3}{6}$.
Ans : True

8. A solid ball is exactly fitted inside the cubical box of side a. The volume of the ball is $\frac{4}{3}\pi a^3$.
Ans : False

9. The total surface area of a solid cylinder of radius r and height h is $2\pi r(h + r)$.
Ans : True

10. A cone having thrice the height of a cylinder and equal base radius have the same volume as that of the cylinder.
Ans : True

11. An open metallic bucket is in the shape of a frustum of a cone, mounted on a hollow cylindrical base made of the same metallic sheet. The surface area of the metallic sheet used is equal to curved surface area of frustum of a cone + area of circular base + curved surface area of cylinder.
Ans : True

12. Two identical solid cubes of side 'a' are joined end to end. Then the total surface area of the resulting cuboid is $12a^2$.
Ans : False

13. If the base area and the volume of a cone are numerically equal, then its height is 3 units.
Ans : True

14. A circle is revolved about any of its diameters, a hollow sphere is generated.
Ans : True

15. If the curved surface of a right circular cylinder is $1760\ \text{cm}^2$ and its radius is 21 cm, then its height is $\frac{80}{3}$ cm.
Ans : False

16. If a right circular cone and a cylinder have equal circles as their base and have equal heights, then the

ratio of their volume is 2 : 3.

Ans : False

17. The curved surface area of a frustum of a cone is $\pi l(r_1 + r_2)$, where $l = \sqrt{h^2 + (r_1 + r_2)^2}$, r_1 and r_2 are the radii of the two ends of the frustum and h is the vertical height.

Ans : False

18. Volume of cone is $\frac{1}{3}\pi r^2 h$.

Ans : True

19. All faces of a cuboid must be rectangular.

Ans : False

20. If the total surface area of a cube is $\frac{50}{3}m^2$, then its side is (5/3) m.

Ans : True

21. The volume of cylinder is $\pi r^3 h$.

Ans : False

22. Surface area of a square pyramid is $S = s^2 + 2sl$.

Ans : True

23. If we double the radius of a hemisphere, its surface area will also be doubled.

Ans : False

4. MATCHING QUESTIONS

DIRECTION : Each question contains statements given in two columns which have to be matched. Statements (A, B, C, D) in Column-I have to be matched with statements (p, q, r, s) in Column-II.

1. For figure shown, match the column

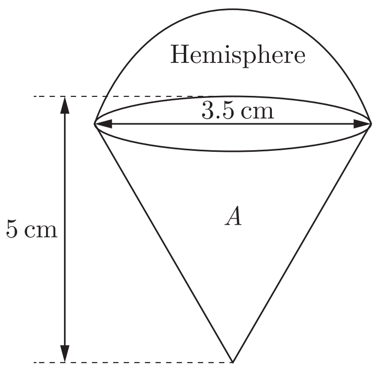
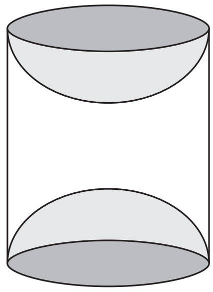


Fig : Top (Lattu)

	Column-I		Column-II
(A)	Curved area of hemi-sphere	(p)	3.25
(B)	Height of cone	(q)	77/4
(C)	Slant height of cone	(r)	3.7
(D)	Surface area of top	(s)	39.6

Ans : (A) – q, (B) – p, (C) – r, (D) – s

2. For a wooden article was made by scooping out a hemisphere from each end of a solid cylinder, as shown in Figure. If the height of the cylinder is 10 cm, and its base is of radius 3.5 cm, match the column.



	Column-I		Column-II
(A)	Volume of cylinder	(p)	616/3
(B)	Volume of scoops	(q)	374
(C)	Total surface area	(r)	122.5 π
(D)	Volume of the article	(s)	171.5/3 π

Ans : (A) – r, (B) – s, (C) – q, (D) – p

3. From a solid cylinder of height 2.4 cm and diameter 1.4 cm, a conical cavity of the same height and some diameter is hollowed out then match the column.

	Column-I		Column-II
(A)	Area of bottom of cylinder	(p)	10.56
(B)	Outer curved surface area	(q)	1.54
(C)	Curved area of conical cavity	(r)	5.5
(D)	Total surface area	(s)	17.6

Ans : (A) – q, (B) – p, (C) – r, (D) – s

4.

Column I		Column II	
(A)	Solid	(p)	a set of points in the space which are at equal distances from a fixed point.
(B)	Area	(q)	a mathematical term used for a rigid three-dimensional shape.
(C)	Volume	(r)	quantitative measure of a plane or curved surface.
(D)	Cube	(s)	a solid whose faces are rectangles.

Column I		Column II	
(E)	Cuboid	(t)	a solid whose faces are all congruent squares.
(F)	Cylinder	(u)	a solid with a circular base tapering to a point.
(G)	Cone	(v)	a solid whose cross-sections are all circles of the same radii.
(H)	Sphere	(w)	a solid which is obtained by removing the upper portion of the cone by a plane parallel to its base.
(I)	Frustum of a cone	(x)	amount of apace occupied by a solid.

Ans : (A) – q, (B) – r, (C) – x, (D) – t, (E) – s,(F) – v, (G) – u, (H) – p, (I) – w.

5.

	Column-I		Column-II
(A)	Solids	(p)	Right circular cone
(B)	Road rollers	(q)	Sphere
(C)	Ice-cream cone	(r)	Cylinder
(D)	Volleyball	(s)	Cuboid
		(t)	Cube

Ans : (A) – (p, q, r, s, t), (B) – r, (C) – p, (D) – q

5. ASSERTION AND REASON

DIRECTION : In the following questions, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:

(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.

1. **Assertion :** Total surface area of the cylinder having radius of the base 14 cm and height 30 cm is 3872 cm^2.
Reason : If r be the radius and h be the height of the cylinder, then total surface area $= (2\pi rh + 2\pi r^2)$.

Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

$$\text{Total surface area} = 2\pi rh + 2\pi r^2$$
$$= 2\pi r(h+r)$$
$$= 2 \times \frac{22}{7} \times 14(30+14) = 88(44)$$
$$= 3872\text{ cm}^2$$

2. **Assertion :** The slant height of the frustum of a cone is 5 cm and the difference between the radii of its two circular ends is 4 cm. Than the height of the frustum is 3 cm.
Reason : Slant height of the frustum of the cone is given by $l = \sqrt{(R-r)^2 + h^2}$.

Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

We have, $l = 5\text{ cm},\ R - r = 4\text{ cm}$

$$5 = \sqrt{(4)^2 + h^2}$$
$$16 + h^2 = 25$$
$$h^2 = 25 - 16 = 9$$
$$h = 3\text{ cm}$$

3. **Assertion :** If the height of a cone is 24 cm and diameter of the base is 14 cm, then the slant height of the cone is 15 cm.
Reason : If r be the radius and h the slant height of the cone, then slant height $= \sqrt{h^2 + r^2}$.

Ans : (d) Assertion (A) is false but reason (R) is true.

$$\text{Slant height} = \sqrt{(14/2)^2 + (24)^2}$$
$$= \sqrt{49 + 576}$$
$$= \sqrt{625} = 25$$

4. **Assertion :** Two identical solid cube of side 5 cm are joined end to end. Then total surface area of the resulting cuboid is 300 cm^2.
Reason : Total surface area of a cuboid is $2(lb + bh + lh)$

Ans : (d) A is false but R is true
When cubes are joined end to end, it will form a cuboid.

$$l = 2 \times 5 = 10\text{ cm},\ b = 5\text{ cm}$$
and $$h = 5\text{ cm}$$
$$\text{Total surface area} = 2(lb + bh + lh)$$
$$= 2(10 \times 5 + 5 \times 5 + 10 \times 5)$$
$$= 2 \times 125 = 250\text{ cm}^2$$

5. **Assertion :** If the radius of a cone is halved and volume is not changed, then height remains same.
Reason : If the radius of a cone is halved and volume is not changed then height must become four times of the original height.

Ans : (d) Assertion (A) is false but reason (R) is true.

$$\frac{V_1}{V_2} = \frac{(1/3)\pi r^2 h_1}{(1/3)\pi (r/2)^2 h_2} = \frac{4h_1}{h_2}$$
As $$V_1 = V_2$$
$$h_2 = 4h_1$$

6. **Assertion :** The radii of two cones are in the ratio $2:3$ and their volumes in the ratio $1:3$. Then the ratio of their heights is $3:2$.
Reason : Volume of the cone $= \frac{1}{3}\pi r^2.h$

Ans : (d) Assertion (A) is false but reason (R) is true.

We have, $$\text{ratio of volume} = \frac{\frac{1}{3}\pi \times (2x)^2 \times h_1}{\frac{1}{3}\pi \times (3x)^2 \times h_2}$$
$$\frac{1}{3} = \frac{4}{9} \times \frac{h_1}{h_2}$$

$$\frac{h_1}{h_2} = \frac{3}{4}$$

$$h_1 : h_2 = 3:4$$

7. **Assertion :** If a ball is in the shape of a sphere has a surface area of 221.76 cm^2, then its diameter is 8.4 cm.
Reason : If the radius of the sphere be r, then surface area, $S = 4\pi r^2$, i.e. $r = \frac{1}{2}\sqrt{\frac{S}{\pi}}$.

Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

8. **Assertion :** The number of coins 1.75 cm in diameter and 2 mm thick is formed from a melted cuboid $10\text{ cm} \times 5.5\text{ cm} \times 3.5\text{ cm}$ is 400.
Reason : Volume of a cylinder $= \pi r^2 h$ cubic units and area of cuboid$=(l \times b \times h)$ cubic units.

Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

$$\text{Number of coins} = \frac{\text{volume of cuboid}}{\text{volume of one coin}}$$

$$= \frac{10 \times 5.5 \times 3.5}{\pi \times \frac{1.75}{2} \times \frac{1.75}{2} \times 0.2}$$

$$\frac{10 \times 5.5 \times 3.5}{\frac{22}{7} \times \frac{1.75}{2} \times \frac{1.75}{2} \times 0.2} = 400$$

9. **Assertion :** No. of spherical balls that can be made out of a solid cube of lead whose edge is 44 cm, each ball being 4 cm. in diameter, is 2541
Reason : Number of balls $= \frac{\text{Volume of one ball}}{\text{volume of lead}}$

Ans : (c) Assertion (A) is true but reason (R) is false.

10. **Assertion :** If the volumes of two spheres are in the ratio $27:8$. Then their surface areas are in the ratio $3:2$.
Reason : Volume of the sphere $= \frac{4}{3}\pi r^3$ and its surface area $= 4\pi r^2$.

Ans : (d) Assertion (A) is false but reason (R) is true.

We have, $$\frac{\frac{4}{3}\pi R^3}{\frac{4}{3}\pi r^3} = \frac{27}{8}$$

$$\frac{R^3}{r^3} = \frac{27}{8}$$

$$\frac{R}{r} = \frac{3}{2}$$

$$\text{Ratio of surface area} = \frac{4\pi R^2}{4\pi r^2} = \frac{R^2}{r^2} = \left(\frac{3}{2}\right)^2 = \frac{9}{4}$$