MATHS

BOOKS - KALYANI MATHS (ASSAMESE ENGLISH)

Surface Area and Volume

Example

1. In a cuboidal solid metallic block of dimension $15cm \times 10cm \times 5cm$, a cylindrical

hole of diameter 7 cm is drilled out. Find the volume and surface area of the remaining block $\left(\pi = \dfrac{22}{7}\right)$.

2. A golf ball has diameter equal to 8 cm. Its surface has 200 dimples each of radius 2 mm. Calculate the volume and surface area of a golf ball. Assuming that dimples are hemispherical.

3. A toy is in the shape of a right circular cylinder with a hemisphere on one end and a cone on the other. The radius and height of the cylindrical part are 5 cm and 13 cm respectively. The radii of the hemispherical and conical parts are the same as that of the cylindrical part. Find the volume and surface area of the toy if the total height of the toy is 30 cm.

4. A 20m deep well with diameter 7m is dug and the earth from digging is evenly spread out to from a platform 22m by 14m.Find the height of the platform.

5. A well of diameter 4 m is dug 14 m deep. The earth taken out is spread evenly all around the well to form a 40 cm high embankment. Find the width of the embankment.

6. A sphere of diameter 12 cm is dropped in the right circular cylindrical vessel partly filled with water. If the sphere is completely submerged in water, the water level in the cylindrical vessel rises by $3\frac{5}{9}cm$. Find the diameter of the cylindrical vessel.

7. A cylindrical container is filled with ice-cream whose radius is 6 cm and height 15 cm. The whole ice-cream is distributed among ten children equally in form of cones having hemispherical tops. If the height of the conical portion is four times the radius of the base, find the radius of the base of the cone.

8. In the figure, from the top of a solid cone of height 12 cm and base radius 6 cm, a cone of height 4 cm is removed by a plane parallel to its base. Find the total surface area of the remaining solid $\left(\pi = \dfrac{22}{7}, \sqrt{5} = 2.236 \right)$.

9. A bucket made up of metal sheet is in the form of a frustum of height 16 cm (closed at the lower end but open at the upper end) with

radii of the lower and upper ends are 8 cm and 20 cm respectively. Find the cost of the bucket if the cost of the metal sheet used is ₹ 15.00 per $100cm(\pi = 3.14)$.

Exercise

1. The ratio of the edges of a cuboid is $1 : 2 : 3$ and its volume is $1,296cm^3$. What is the area of the whole surface?

2. To raise the height of a rectangular low land 48 m long and 31.5 m broad to 6.5 dm, a ditch 27 m long and 18.2 m broad was dug in a side rectangular plot. What will be the depth of the ditch.

3. The height and the diameter of a cylinder are 6 cm and 14 cm respectively. Find the area

of the whole surface.

4. Find the height and volume of cylinder whose area of the curved surface is $4, 400 cm^2$ and perimeter of the base is 110 cm.

5. The amount of cubic units of the volume of a sphere is double the amount of whole

surface area of the same in square unit. Find the radius of the sphere.

6. Three spheres of radius 1 cm, 6 cm and 8 cm are melted and recast into a single solid sphere. Find the radius of new sphere.

7. Find the surface area and volume of a hemisphere whose radius is 10 cm ($\pi = 3.14$)

**8.** Two cubes each of volume $125 cm^3$ are joined end to end. Find the surface area of the resulting cuboid.

9. Three cubes each of volume $216cm^3$ are joined end to end. Find the surface area of the resulting cuboid.

10. A pen stand made of wood is in the shape of a cuboid with four concial depressions to hold pens. The dimensions of the cuboid are 15 cm by 10 cm by 3.5 cm. The radius of each of the depressions is 0.5 cm and the depth is 1.4

cm. Find the volume of wood in the entire stand (see Fig. 13.16).
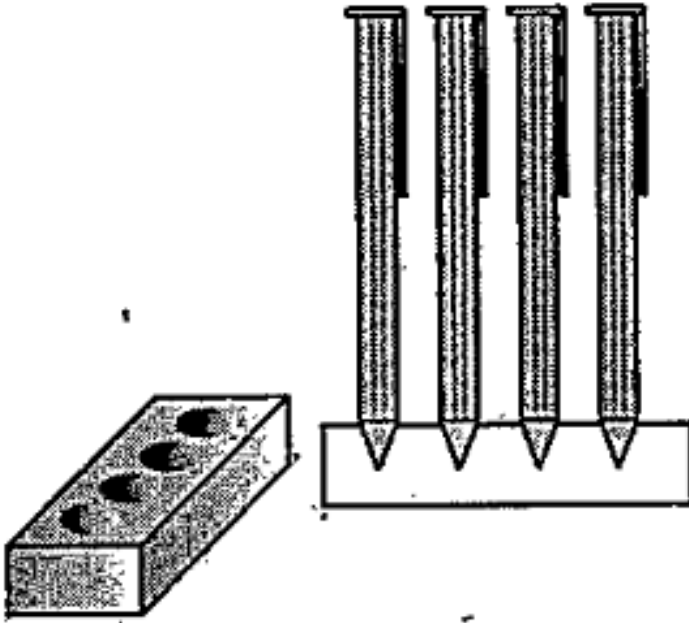
11. A toy is in the form of a cone of radius 3.5 cm mounted on a hemisphere of same radius. The total height of the toy is 15.5 cm. Find total surface area of the toy (Use $\pi = \dfrac{22}{7}$).

12. A toy is in the form of a cone mounted on a hemisphere with same radius. The diameter of the base of the conical portion is 7 cm and the

total height of the toy is 14.5 cm. Find the volume of the toy.

13. A sphere of diameter 12 cm is dropped in a right circular cylindrical vessel, partly filled with water. If the sphere is completely submerged in water the water level in the cylindrical vessel rises by $3\frac{5}{9}cm$. Find the diameter of the cylindrical vessel.

14. A vessel is in the form of a hemispherical bowl mounted by a hollow cylinder. The diameter of the hemisphere is 14 cm and the total height of the vessel is 13 cm. Find the capacity of the vessel. (Use $\pi = \dfrac{22}{7}$)

15. A circus tent is cylindrical height of 3 m and conical above it. If its base radius is 52.5 m and slant height of the conical portion is 53 m, find

the area of the convex required to make a tent.

16. A solid is composed of a cylinder with hemisphere ends. If the whole length of the solid is 104 cm and the radius of each of its hemisphere end is 7 cm, find the cost of polishing its surface at the rate of ₹ 10 per dm^2

17. A cylindrical tub of radius 5 cm and length 9.8 cm is full of water. A solid is in the form of a right circular cone mounted on a hemisphere is immersed into the tub. If the radius of the hemisphere is 3.5 cm and the height of the cone outside the hemisphere is 5 cm, find the volume of water left on the tub. (Use $\pi = \dfrac{22}{7}$)

18. A wooden article was made by scooping out a hemisphere from each end of a solid cylinder. If the height of the cylinder is 20 cm and radius of the base is 3.5 cm, find the total surface area of the article.

19. A tent is in form of a cylinder of diameter 4.2 m and height 4 m surmounted by a cone of equal base and height 2.8 m. Find the capacity

of the tent and the cost of canvas making the tent at ₹ 100 per square meter.

20. A tent is in the shape of a cylinder surmounted by a conical top. If the height and diameter of the cylindrical part are 2.1 m and 4 m respectively and the slant height of the top is 2.8 m, find the area of the convas for making the tent. Find the cost of convas of the tent at the rate of ₹ 500 per square meter.

21. A solid is in the form of a right-circular cone mounted on a hemisphere. The radius of the hemisphere is 2.1 cm and height of the cone is 2 cm. The solid is placed in a cylindrical tub full of water in such a way that the solid is fully submerged in water. If the radius of the cylinder is 5 cm and its height is 9.8 cm, find the volume of the water left in the tub..

22. A cylindrical tub of radius 5 cm and length 9.8 cm is full of water. A solid in the form of a right circular cone mounted on a hemisphere is immersed into the tub. If the radius of the hemisphere is 3.5 cm and height of the cone outside the hemisphere is 5 cm, find the volume of water left in the tub.

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23. How many lead balls each of radius 1 cm each be made from a sphere whose radius is 8

cm?

24. A right circular cone is 3.6 cm high and the radius of its base is 1.6 cm. It is melted and recast into a right cylinder cone with radius of its base as 1.2 cm, find the height.

25. The diameter of sphere is 42 cm. If it is melted and drawn into cylindrical wire of 28 cm diameter, find the length of wire.

26. A solid metallic sphere of diameter 21 cm is melted and recast into a number of smaller cones, each of diameter 3.5 cm and height 3 cm. Find the number of cones so formed.

27. A hemispherical bowl of radius 9 cm is full of liquid. The liquid is to be filled into cylindrical shaped small bottles, each of diameter 3 cm and height 4 cm. How many bottles are needed to empty the bowl.

28. A conical vessel whose radius is 5 cm and height is 24 cm, is full of water. The water is emptied into cylindrical vessel with internal

radius 10 cm. Find the height to which the water rises in the cylindrical vessel.

29. The rain water from a roof $22m \times 20m$ drains into a cylindrical vessel having diameter of base 2 m and height 3.5 m. If the vessel is just full, find the height of the rainfall .

30. A solid cylinder of diameter 12 cm and height 15 cm is melted and recast into 12 toys in the shape of a right circular cone mounted on a hemisphere. Find the radius of the hemisphere and total height of the toy, if the height of the conical part is 3 times its radius.

31. How many silver coins 1.75 cm in diameter and of thickness 2 mm must be melted to form

a cuboid of dimension $5.5cm \times 10cm \times 55cm$

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32. A well whose diameter is 7 m, has been dug 22.5 m deep and the earth dug out is used to form an embankment 10.5 m wide around it. Find the height of the embankment.

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33. A cylindrical bucket 32 m high and 18 cm of radius of base, is filled with sand. The bucket is emptied on the ground and a conical heap of sand is formed. If the height of the conical heap is 24 cm, find the radius and slant height of the heap.

34. The internal and external radii of a hollow sphere are 3 cm and 5 cm respectively. The

sphere is melted to form a solid cylinder of height $2\frac{2}{3}cm$. Find the diameter and the curved surface area of the cylinder.

35. From a solid cylinder whose height 8 cm and radius 6 cm, a conical cavity of height 8 cm and a base radius 6 cm is hollowed out. Find the volume of the remaining solid. Also find the total surface area of the remaining solid.

36. There is an agriculture field in the form of rectangle of length of 20 m and width 14 m. A 10 m deep well of diameter 7 cm is dug in a corner of the field and the earth taken out of the well is spread evenly over the remaining part of the field. Find the rise in its level.

37. Water flows through a circular pipe whose internal diameter is 2 cm at the rate of 0.7 m

per second into a cylindrical tank, the radius of whose base is 40 cm. By how much will the level of water rise in the tank in half an hour.

38. Water is flowing at the rate of $15k\dfrac{m}{h}$ through a pipe of diameter 14 cm into a rectangular tank whose dimension $55m \times 44m$. Find the time in which the level of water in the tank will rise by 21 cm.

39. A farmer connects a pipe of internal diameter 20cm from a canal into a cylindrical tank in her field,which is 10 m in diameter and 2 m deep.If water flows through thr pipe at the rate of 3 km/h,in how much time will the tank be filled?

40. If the radii of the circular ends of a conical bucket of height 45 cm be 28 cm and 7 cm, find

the capacity of the bucket. $\left(\pi = \dfrac{22}{7} \right).$

41. The slant height of a frustum of a cone is 4 cm and the perimeter (circumference) of its circular ends are 18 cm and 16 cm. Find the curved surface area of the frustum.

42. A bucket made up of metal sheet is in the form of a frustum of height 16 cm (closed at the lower end but open at the upper end) with radii of the lower and upper ends are 8 cm and 20 cm respectively. Find the cost of the bucket if the cost of the metal sheet used is ₹ 15.00 per $100cm (\pi = 3.14)$.

43. A bucket is in the form of a frustum of a cone with capacity of $12,308.8cm^3$ of water. The radii of the top and bottom circular ends are $20cm$ and $12cm$ respectively. Find the height of the bucket and the area of the metal sheet used in its making $(\pi = 3.14)$.

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44. A bucket made up of a metal sheet is in the form of a frustum of a cone. Its depth is $24cm$

and the diameters of the top and bottom are $30cm$ and $10cm$ respectively. Find the cost of milk which can completely fill the bucket at the rate of ₹ 20 per litre and the cost of metal used, if its cost ₹ 10 per $100cm^2$ $(\pi = 3.14)$.

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45. A bucket is in the form of frustum of a cone and holds 28.49 liters of milk. The radius of the top and bottom are 28 cm and 21 cm respectively. Find the height of the bucket.

46. A drinking glass is in the shape of a frustum of a cone height 14 cm.The diameters of its two circular ends 4 cm and 2 cm.Find the capacity of the glass.

47. The radii of the circular ends of a solid frustum of a cone are 33 cm and 27 cm and its

slant height is 10 cm. Find the capacity and total surface area.

48. A bucket is in the form of a frustum of a cone. In depth is 15 cm and the diameters of the top and bottom are 56 cm and 42 cm respectively. Find how many litres of water can the bucket hold $\left(\pi = \dfrac{22}{7}\right)$.

49. A cone of radius 10 cm is divided into two parts by drawing a plane through mid-point of its axis parallel to the base. Compare the volume of the two parts.

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50. What is the volume of a solid sphere of radius 2R?

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51. Which two solid figures when considered makes a cylindrical pencil?

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52. A cylinder and a cone are of the same base radius and of some height.Find the ratio of the volume of the cylinder to that of the cone.

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53. The radii of the ends of a frustum of a cone 40 cm height are 20 cm and 11 cm. Find the slant height.

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54. The ratio of the volumes of two sphere is $27 : 8$. What is the ratio of their surface areas?

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55. Fill up the gap.

The curved surface area of a cone is also called the ....

56. Fill up the gap.

The slant height of a frustum is ....

57. Fill up the gap.

Vertical cross-section of a right circular cylinder is always a ....

58. Fill up the gap.

The shape of a glass (tumbler) is usually in the form of .... of a cone.

59. Fill up the gap.

If each side of a cuboid is doubled the volume of the cuboid become .... time.

60. Choose the correct-one.

The number of cubes of side 2 cm which can be cut from a cube of side 6 cm is

   A. 27

   B. 25

C. 54

D. 28

Answer:

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61. Choose the correct-one.

A shuttle cock used for playing badminton has the shape of the combination.

A. a cylinder and a sphere

B. a hemisphere and a frustum cone

C. a cylinder and a hemisphere

D. none of these.

Answer:

62. Choose the correct-one.

The total surface area of a solid hemisphere of

radius 7 cm is

A. $147\pi cm^2$

B. $174\pi cm^2$

C. $235\pi cm^2$

D. $439\pi cm^2$

Answer:

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63. Choose the correct-one.

If the surface area of a sphere is $144\pi cm^2$ then its radius is

A. 6 cm

B. 12cm

C. 15 cm

D. 9 cm

Answer:

64. Choose the correct-one.

The radii of two cylinders are in the ratio $2 : 3$

and their heights are in the ratio $5:3$. The ratio of their volume

A. $20:27$

B. $3:4$

C. $9:4$

D. $27:20$

Answer:

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