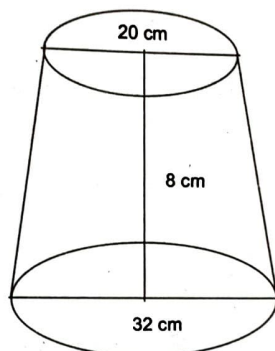


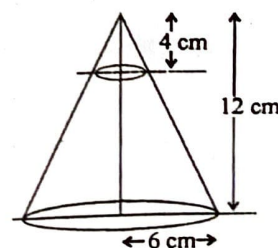
SURFACES AREAS AND VOLUMES

1. The radius of the base and the height of a solid right circular cylinder are in the ratio 2 : 3 and its volume is 1617 cm^3 . Find the total surface area of the cylinder. **(CBSE 2005-06, 4 marks)**
2. The rain water from a roof $22 \text{ m} \times 20 \text{ m}$ drains into a cylindrical vessel having diameter of base 2 m and height 3.5 m . If the vessel is just full, find the rainfall in cm . **(CBSE 2005-06, 6 marks)**
3. A bucket made up of a metal sheet is in the form of a frustum of a cone of height 16 cm with radii of its lower and upper ends as 8 cm and 20 cm respectively. Find the cost of the bucket if the cost of metal sheet used is Rs. 15 per 100 cm^2 . (Use $\pi = 3.14$) **(CBSE 2005-06, 6 marks)**
4. The diameter of a solid copper sphere is 18 cm . It is melted and drawn into a wire of uniform cross-section. If the length of the wire is 108 m , find its diameter. **(CBSE 2006-07, 3 marks)**
5. A hollow copper sphere of external and internal diameter 8 cm respectively is melted into a solid cone of base diameter 8 cm . Find the height of the cone. **(CBSE 2006-07, 5 marks)**
6. If the radii of the circular ends of a bucket 45 cm high, are 28 cm and 7 cm , find the capacity and surface area of the bucket (Use $\pi = \frac{22}{7}$) **(CBSE 2006-07, 5 marks)**
7. The surface area of a sphere is 616 cm^2 . Find its radius. **(CBSE 2007-08, 1 mark)**
8. If the radii of the circular ends of a conical bucket, which is 16 cm high, are 20 cm and 8 cm . Find the capacity and total surface area of the bucket. (Use $\pi = \frac{22}{7}$) **(CBSE 2007-08, 6 marks)**
9. From a solid cylinder whose height is 8 cm and radius 6 cm , a conical cavity of height 8 cm and of base radius 6 cm , is hollowed out. Find the volume of the remaining solid correct to two places of decimals. Also find the total surface area of the remaining solid. (take $\pi = 3.1416$) **(CBSE 2008-09, 6 marks)**
10. A cylinder and a cone are of same base radius and of same height. Find the ratio of the volume of cylinder to that of the cone. **(CBSE 2008-09, 1 mark)**
11. If the area of three adjacent faces of a cuboid are X , Y and Z respectively, then the volume of cuboid is:
 (A) XYZ (B) $3XYZ$
 (C) $\sqrt{XYZ}$ (D) $\sqrt{3XYZ}$ **(CBSE 2011-12, 1 mark)**
12. The perimeter of a semicircular garden is 108 cm . Find the diameter of the garden. **(CBSE 2011-12, 2 marks)**
13. A sphere of maximum volume is cut out from a solid hemisphere of radius 6 cm . What is the volume of the cut out sphere? **(CBSE 2011-12, 2 marks)**
14. From a solid cylinder of height 12 cm and diameter 10 cm , a conical cavity of same height and same diameter is hollowed out. Find the total surface area of remaining solid. **(CBSE 2011-12, 3 marks)**

15. A solid cylinder of diameter 12 cm and height 15 cm is melted and recast into toys with the shape of a right circular cone mounted on a hemisphere of radius 3 cm. If the height of toy is 12 cm. Find the number of toys so formed. (CBSE 2011-12, 3 marks)
16. A right circular cylinder container of base radius 6 cm and height 20 cm is full of ice cream. The ice cream is to be filled in cones of height 10 cm and base radius 3 cm, having a semispherical top. Find the number of cones needed to empty the container. (CBSE 2011-12, 4 marks)
17. Water is flowing at the rate of 15 km/hr through a pipe of diameter 14 cm into a cuboidal pond which is 50 m long and 44 m wide. In what time the level of water in pond rise by 21 cm? (CBSE 2011-12, 4 marks)
18. A friction clutch in the form of a frustum of a cone as shown in figure. The diameter of top and bottom base are 20 cm and 32 cm. Its height is 8 cm. Find its lateral surface and volume. (CBSE 2011-12, 4 marks)



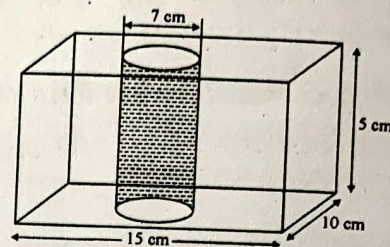
19. A vessel is in the form of a hemispherical bowl surmounted by a hollow cylinder of same diameter. The diameter of the hemispherical bowl is 14 cm and the total height of the vessel is 13 cm. Find the total surface area of the vessel. [Use $\pi = \frac{22}{7}$] (CBSE 2012-13, 3 marks)
20. A wooden toy was made by scooping out a hemisphere of same radius from each end of a solid cylinder. If the height of the cylinder is 10 cm. and its base is of radius 3.5 cm, find the volume of wood in the toy. [Use $\pi = \frac{22}{7}$] (CBSE 2012-13, 3 marks)
21. Water is flowing through a cylindrical pipe, of internal diameter 2 cm, into a cylindrical tank of base radius 40 cm, at the rate of 0.4 m/s. Determine the rise in level of water in the tank in half an hour. (CBSE 2012-13, 4 marks)
22. A bucket open at the top and made up of a metal sheet is in the form of a frustum of a cone. The depth of the bucket is 24 cm and the diameter of its upper and lower circular ends are 30 cm and 10 cm respectively. Find the cost of metal sheet used in it at the rate of Rs. 10 per 100 cm². [Use $\pi = 3.14$] (CBSE 2012-13, 4 marks)
23. The sum of the areas of two squares is 400 cm². If the difference of there perimeters is 16 cm, find the sides of the two squares. (CBSE 2012-13, 4 marks)
24. In 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 the base. Find the total surface area of the remaining solid. (Use $\pi = \frac{22}{7}$ and $\sqrt{5} = 2.236$)



(CBSE 2014-15, 3 marks)

25. A solid wooden toy is in the form of a hemisphere surmounted by a cone of same radius. The radius of hemisphere is 3.5 cm and the total wood used in the making of toy is $166\frac{5}{6}\text{ cm}^3$. Find the height of the toy. Also, find the cost of painting the hemispherical part of the toy at the rate of Rs. 10 per cm^2 . [Use $\pi = \frac{22}{7}$] (CBSE 2014-15, 3 marks)

26. In figure, from a cuboidal solid metallic block, of dimensions 15 cm x 10 cm x 5 cm, a cylindrical hole of diameter 7 cm is drilled out. Find the surface area of the remaining block. [Use $\pi = \frac{22}{7}$]



(CBSE 2014-15, 3 marks)

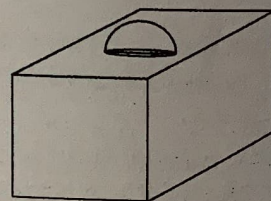
27. Water is flowing at the rate of 2.52 km/h through a cylindrical pipe into a cylindrical tank, the radius of whose base is 40 cm. If the increase in the level of water in the tank, in half an hour is 3.15 m, find the internal diameter of the pipe. (CBSE 2014-15, 4 marks)

28. A well of diameter 4 m is dug 14 m deep. The earth taken out is spread evenly all round the well to form a 40 cm high embankment. Find the width of the embankment. (CBSE 2014-15, 4 marks)

29. A 21 m deep well with diameter 6 m is dug and the earth from digging is evenly spread to form a platform 27 m x 11 m. Find the height of the platform. [Use $\pi = \frac{22}{7}$]. (CBSE 2014-15, 4 marks)

30. A well of diameter 4 m is dug 21 m deep. The earth taken out of it has been spread evenly all around it in the shape of a circular ring of width 3 m to form an embankment. Find the height of the embankment. (CBSE 2015-16, 3 marks)

31. In figure, is a decorative block, made up of two solids – a cube and a hemisphere. The base of the block is a cube of side 6 cm and the hemisphere fixed on the top has a diameter of 3.5 cm. Find the total surface area of the block. (Use $\pi = \frac{22}{7}$).



(CBSE 2015-16, 3 marks)

32. The sum of the radius of base and height of a solid right circular cylinder is 37 m. If the total surface area of the solid cylinder is 1628 sq. cm, find the volume of the cylinder. (use $\pi = \frac{22}{7}$)

(CBSE 2015-16, 3 marks)

33. A right circular cone of radius 3 cm, has a curved surface area of 47.1 cm^2 . Find the volume of the cone. (use $\pi = 3.14$) (CBSE 2015-16, 3 marks)

34. A toy is in the form of a cone of base radius 3.5 cm mounted on a hemisphere of base diameter 7 cm. If the total height of the toy is 15.5 cm, find the total surface area of the toy. (Use $\pi = \frac{22}{7}$)

(CBSE 2015-16, 3 marks)

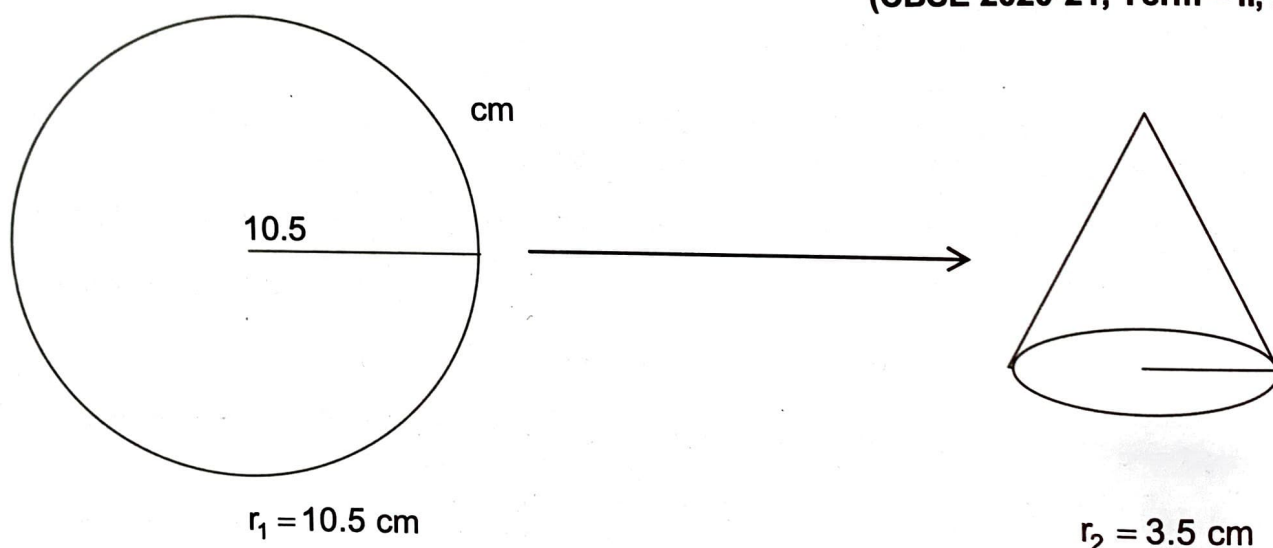
35. A bucket open at the top is in the form of a frustum of a cone with a capacity of 12308.8 cm^3 . The radii of the top and bottom circular ends are 20 cm and 12 cm respectively. Find the height of the bucket and the area of metal sheet used in making the bucket. (Use $\pi = 3.14$)
(CBSE 2015-16, 4 marks)
36. Volume and surface area of a solid hemisphere are numerically equal. What is the diameter of the hemisphere.
(CBSE 2016-17, 1 mark)
37. A solid metallic sphere of diameter 16 cm is melted and recasted into smaller solid cones, each of radius 4 cm and height 8 cm. Find the number of cones so formed. (CBSE 2016-17, 3 marks)
38. The $\frac{3}{4}$ th part of a conical vessel of internal radius 5 cm and height 24 cm is full of water. The water is emptied into a cylindrical vessel with internal radius 10 cm. Find the height of water in cylindrical vessel.
(CBSE 2016-17, 3 marks)
39. A metallic solid sphere of radius 10.5 cm is melted and recasted into smaller solid cones, each of radius 3.5 cm and height 3 cm. How many cones will be made?
(CBSE 2016-17, 3 marks)
40. In a hospital used water is collected in a cylindrical tank of diameter 2 m and height 5 m. After recycling, this water is used to irrigate a park of hospital whose length is 25 m and breadth is 20 m. If tank is filled completely then what will be the height of standing water used for irrigating the park. Write your views on recycling of water.
(CBSE 2016-17, 4 marks)
41. The height of a cone is 10 cm. The cone is divided into two parts using a plane parallel to its base at the middle of its height. Find the ratio of the volumes of the two parts.
(CBSE 2016-17, 4 marks)
42. A cone of radius 10 cm is divided into two parts by a plane parallel to its base through the mid-point of its height. Compare the volumes of the two parts.
(CBSE 2016-17, 4 marks)
43. The height of a cone is 30 cm. From its topside a small cone is cut by a plane parallel to its base. If volume of smaller cone is $\frac{1}{27}$ of the given cone, then at what height it is cut from its base?
(CBSE 2016-17, 4 marks)
44. A wooden article was made by scooping out a hemisphere from each end of a solid cylinder, as shown in figure 3. If the height of the cylinder is 10 cm and its base is of radius 3.5 cm. Find the total surface area of the article.



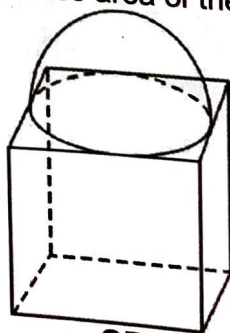
OR

- A heap of rice is in the form of a cone of base diameter 24 m and height 3.5 m. Find the volume of the rice. How much canvas cloth is required to just cover the heap? (CBSE 2017-18, 3 marks)
45. The diameters of the lower and upper ends of a bucket in the form of a frustum of a cone are 10 cm and 30 cm respectively. If its height is 24 cm, find:
(i) The area of the metal sheet used to make the bucket. [Use $\pi = 3.14$]
(ii) Why we should avoid the bucket made by ordinary plastic?
(CBSE 2017-18, 4 marks)
46. Water in a canal, 6 m wide and 1.5 m deep, flowing with a speed of 10 km/hour. How much area will it irrigate in 30 minutes; if 8 cm standing water is needed?
(CBSE 2018-19, 3 marks)

47. A bucket open at the top is in the form of a frustum of a cone with a capacity of 12308.8 cm^3 . The radii of the top and bottom of circular ends of the bucket are 20 cm and 12 cm respectively. Find the height of the bucket and also the area of the metal sheet used in making it. (Use $\pi = 3.14$)
(CBSE 2018-19, 4 marks)
48. Two cones have their heights in the ratio 1 : 3 and radii in the ratio 3:1, What is the ratio of their volumes?
(CBSE 2019-20, 1 mark)
49. A cone of base radius 4 cm is divided into two parts by drawing a plane through the mid – point of its height and parallel to its base. Compare the volume of the two parts.
(CBSE 2019-20, 3 marks)
50. A bucket in the form of a frustum of a cone of height 30 cm with radii of its lower and upper ends as 10 cm and 20 cm respectively. Find the capacity of the bucket. Also find the total cost of milk that can completely fill the bucket at the rate of Rs. 40 per litre. (Use $\pi = \frac{22}{7}$)
(CBSE 2019-20, 4 marks)
51. A solid metallic sphere of radius 10.5 cm is melted and recast into a number of smaller cones, each of radius 3.5 cm and height 3 cm. Find the number of cones so formed.
(CBSE 2020-21, Term – II, 2 mark)

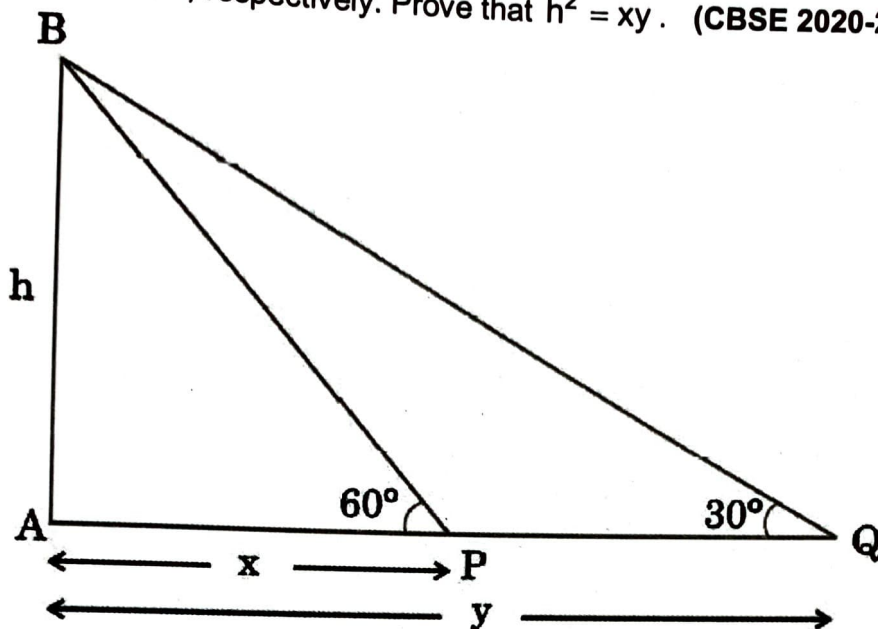


52. A solid metallic sphere of radius 3 cm is melted and recast into the shape of a solid cylinder of radius 2 cm. Find the height of the cylinder.
(CBSE 2020-21, Term – II, 2 mark)
53. 3 cubes each of 8 cm edge are joined end to end. Find the total surface area of the cuboid so formed.
(CBSE 2020-21, Term – II, 2 mark)
54. (a) A cubical block of side 7 cm is surmounted by a hemisphere of largest possible diameter as shown in Figure. Find the total surface area of the solid.



- OR
- (b) How many solid cones of height 3 cm and radius 2 cm can be formed by melting a solid sphere of radius 3 cm?
(CBSE 2020-21, Term – II, 2 mark)

55. In Figure, the angle of elevation of the top of a tower AB of height 'h' m, from two points P and Q at a distance of x m and y from the base of the tower respectively and in the same straight line with it, are 60° and 30° , respectively. Prove that $h^2 = xy$. (CBSE 2020-21, Term – II, 3 mark)



56. (a) From a solid cylinder of height 30 cm and radius 7 cm, a conical cavity of height 24 cm and same radius is hollowed out. Find the total surface area of the remaining solid.

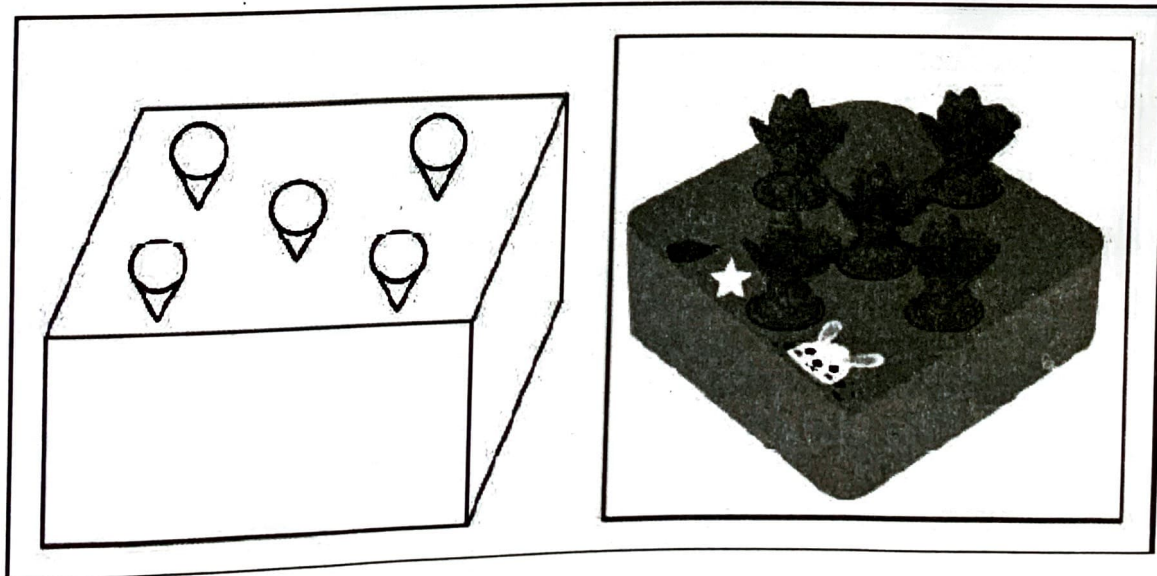
OR

- (b) Water in a canal, 8 m wide and 6 m deep, is flowing with a speed of 12 km/hr. How much area will it irrigate in one hour, if 0.05 m of standing water is required?

(CBSE 2020-21, Term – II, 4 mark)

Case Study 2

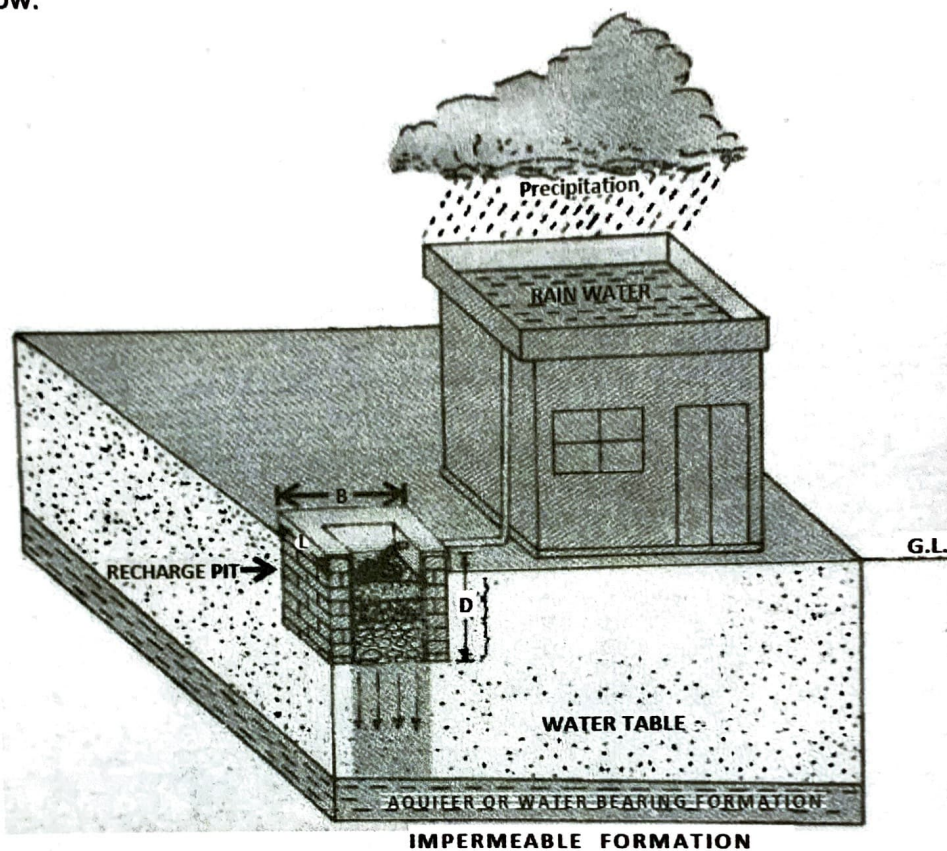
A solid cuboidal toy is made of wood. It has five cone shaped cavities to hold toy carrots. The dimensions of the toy are cuboid – 10 cm $\times$ 10 cm $\times$ 8 cm. Each cone carved out – Radius = 2.1 cm and Height = 6 cm.



57. (i) Find the volume of wood carved out to make five conical cavities.
(ii) Find the volume of the wood in the final product. (CBSE 2020-21, Term – II, 4 mark)

Case Study 2

The technique of Rainwater harvesting through Recharge pit is very useful. Rainwater is collected on the roof and then flowing through the Recharge pit it goes to the ground. Observe the picture given below:



B (BREADTH) = 3 m
D (DEPTH) = 2 m
L (LENGTH) = 3 m

The surface area of the roof floor is 100 m^2 . The cuboidal pit measures $3 \text{ m} \times 3 \text{ m} \times 2 \text{ m}$.

58. (a) Water standing on the roof is released into the cuboidal pit. If the cuboidal pit is filled completely by the roof water, then find the height of standing water on the roof.
(b) Instead of a cuboidal pit, if a cylindrical pit with diameter 3 m and height 2 m had been built, then which tank would hold more water?
(CBSE 2020-21, Term – II, 4 mark)

59. (a) A spherical glass vessel has a cylindrical neck 8 cm long and 1 cm in radius. The radius of the spherical part is 9 cm. Find the amount of water (in litres) it can hold, when filled completely.

OR

- (b) From a solid cylinder, whose height is 2.4 cm and diameter 1.4 cm, a conical cavity of the same height and same diameter is hollowed out. Find the total surface area of the remaining solid.
(CBSE 2020-21, Term – II, 4 mark)

60. (a) Find the curved surface area of a right circular cone whose height is 15 cm and base radius is 8 cm. [Use $\pi = \frac{22}{7}$].

- (b) The surface area of a sphere is 616 sq cm. Find its radius. [Use $\pi = \frac{22}{7}$].

(CBSE 2021-22 TERM-II, 2 mark)

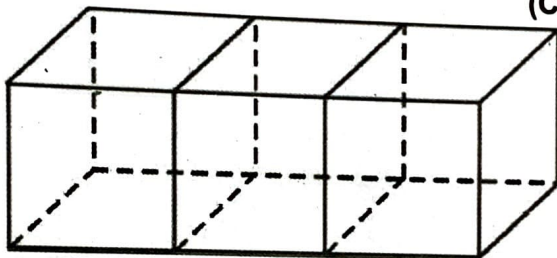
61. (a) The curved surface area of a right circular cylinder is 176 sq cm and its volume is 1232 cu cm. What is the height of the cylinder?
- OR
- (b) The largest sphere is carved out of a solid cube of side 21 cm. Find the volume of the sphere.
(CBSE 2021-22, TERM-II, 2 mark)
62. A solid piece of metal in the form of a cuboid of dimensions 11 cm $\times$ 7 cm $\times$ 7 cm is melted to form 'n' number of solid spheres of radii $\frac{7}{2}$ cm each. Find the value of n.

(CBSE 2021-22 TERM-II, 2 mark)

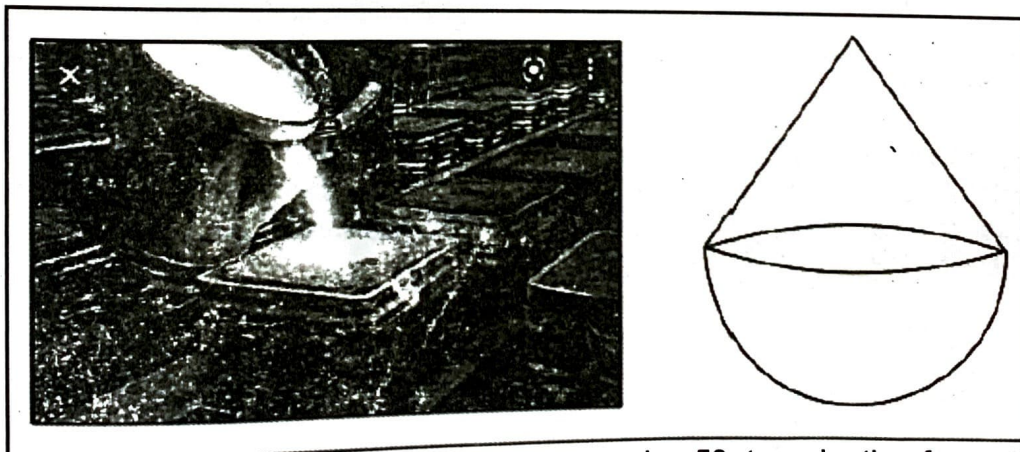
63. (a) 150 spherical marbles, each of diameter 1.4 cm, are dropped in a cylindrical vessel of diameter 7 cm containing some water, and are completely immersed in water. Find the rise in the level of water in the cylindrical vessel.

OR

- (b) Three cubes of side 6 cm each, are joined as shown in figure. Find the total surface area of the resulting cuboid.
(CBSE 2021-22, TERM-II, 2 mark)



64. **Case Study – 2:** A company deals in casting and moulding of metal on orders received from its clients.



In one such order, company is supposed to make 50 toys in the form of a hemisphere surmounted by a right circular cone of the same base radius as that of hemisphere. If the radius of the base of the cone is 21 cm and height is 28 cm,

- (a) find the volume of 50 toys.
(b) find the ratio of the volume of hemisphere to the volume of cone.

(CBSE 2021-22 TERM-II, 4 mark)

65. **Case Study – 2:** A 'circus' is a company of performers who put on shows of acrobats, clowns etc. to entertain people started around 250 years back, in open fields, now generally performed in tents.

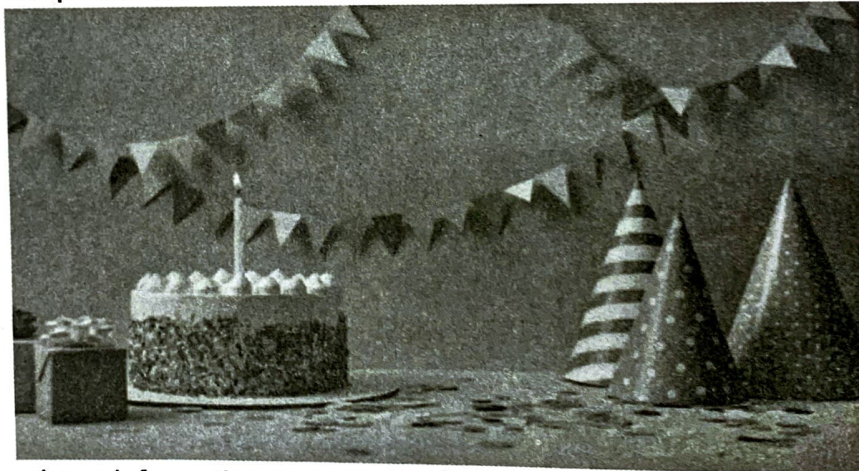
On such 'Circus Tent' is shown below.



The tent is in the shape of a cylinder surmounted by a conical top. If the height and diameter of cylindrical part are 9 m and 30 m respectively and height of conical part is 8 m with same diameter as that of the cylindrical part, then find

- (i) the area of the canvas used in making the tent;
 - (ii) the cost of the canvas bought for the tent at the rate Rs.200 per sq m, if 30 sq m canvas was wasted during stitching.
- (CBSE 2021-22 TERM-II, 4 mark)**

66. **Case Study-2:** John planned a birthday party for his younger sister with his friends. They decided to make some birthday caps by themselves and to buy a cake from a bakery shop. For these two items, they decided the following dimensions:
 Cake: Cylindrical shape with diameter 24 cm and height 14 cm.
 Cap: Conical shape with base circumference 44 cm and height 24 cm.



Based on the above information, answer the following questions:

- (a) How many square cm paper would be used to make 4 such caps?
 - (b) The bakery shop sells cakes by weight (0.5 kg, 1 kg, 1.5 kg, etc.). To have the required dimensions, how much cake should they order, if 650 cm^3 equals 100 g of cake?
- (CBSE 2021-22, TERM-II, 4 mark)**

67. The volume of a right circular cone whose area of the base is 156 cm^2 and the vertical height is 8 cm, is:
 (A) 2496 cm^3
 (B) 1248 cm^3
 (C) 1664 cm^3
 (D) 416 cm^3
- (CBSE 2022-23, 1 mark)**
68. The curved surface area of a cone having height 24 cm and radius 7 cm is _____.
- (A) 528 cm^2
 (B) 1056 cm^2
 (C) 550 cm^2
 (D) 500 cm^2
- (CBSE 2022-23, 1 mark)**

69. Curved surface area of a cylinder of height 5 cm is 94.2 cm^2 . Radius of the cylinder is (Take $\pi = 3.14$)
 (A) 2 cm
 (C) 2.9 cm
 (B) 3 cm
 (D) 6 cm
 (CBSE 2022-23, 1 mark)

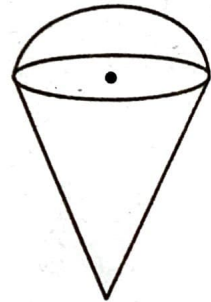
70. The curved surface area of a cone of radius 7 cm is 550 cm^2 . Its slant height is:
 (A) 24 cm
 (C) 14 cm
 (B) 25 cm
 (D) 20 cm
 (CBSE 2022-23, 1 mark)

71. A solid is of the form of a cone of radius ' r ' surmounted on a hemisphere of the same radius. If the height of the cone is the same as the diameter of its base, then the volume of the solid is :
 (CBSE 2022-23, 1 mark)

- (A) πr^3
 (B) $\frac{4}{3} \pi r^3$
 (C) $3\pi r^3$
 (D) $\frac{2}{3} \pi r^3$

72. A room is in the form of cylinder surmounted by a hemi-spherical dome. The base radius of hemisphere is one-half the height of cylindrical part. Find total height of the room if it contains $\left(\frac{1408}{21}\right) \text{ m}^3$ of air. (Take $\pi = \frac{22}{7}$)
 (CBSE 2022-23, 3 marks)

73. An empty cone is of radius 3 cm and height 12 cm. Ice-cream is filled in it so that lower part of the cone which is $\left(\frac{1}{6}\right)^{\text{th}}$ of the volume of the cone is unfilled but hemisphere is formed on the top. Find volume of the ice-cream. (Take $\pi = 3.14$)



(CBSE 2022-23, 3 marks)

74. A solid is in the shape of a right-circular cone surmounted on a hemisphere, the radius of each of them being 7 cm and the height of the cone is equal to its diameter. Find the volume of the solid.
 (CBSE 2022-23, 5 marks)

75. A student was asked to make a model shaped like a cylinder with two cones attached to its ends by using a thin aluminum sheet. The diameter of the model is 3 cm and its total length is 12 cm. If each cone has a height of 2 cm, find the volume of air contained in the model.
 (CBSE 2022-23, 5 marks)

76. A wooden toy is shown in the picture. This is a cuboidal wooden block of dimensions **14 cm × 17 cm × 4 cm**. On its top there are seven cylindrical hollows for bees to fit in. Each cylindrical hollow is of height **3 cm** and radius **2 cm**.

Based on the above, answer the following questions:

(i) Find the volume of wood carved out to make one cylindrical hollow.

(ii) Find the lateral surface area of the cuboid to paint it with green colour.

(iii) (a) Find the volume of wood in the remaining cuboid after carving out seven cylindrical hollows.

OR

(iii) (b) Find the surface area of the top surface of the cuboid to be painted yellow.

(CBSE 2022-23, 4 marks)

77. A solid sphere is cut into two hemispheres. The ratio of the surface areas of sphere to that of two hemispheres taken together is:
 (A) 1 : 1 (B) 1 : 4
 (C) 2 : 3 (D) 3 : 2
 (CBSE 2023-24, 1 Mark)
78. The volume of the largest right circular cone that can be carved out from a solid cube of edge 2 cm is:
 (A) $\frac{4\pi}{3}$ cu cm (B) $\frac{5\pi}{3}$ cu cm
 (C) $\frac{8\pi}{3}$ cu cm (D) $\frac{2\pi}{3}$ cu cm
 (CBSE 2023-24, 1 Mark)
79. The ratio of total surface area of a solid hemisphere to the square of its radius is:
 (A) $2\pi : 1$ (B) $4\pi : 1$
 (C) $3\pi : 1$ (D) $1 : 4\pi$
 (CBSE 2023-24, 1 Mark)

Direction:

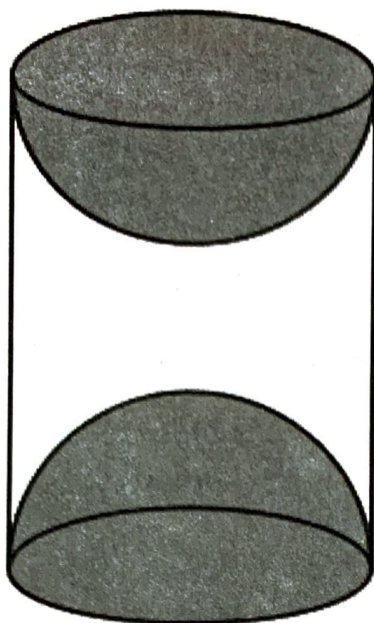
In Q. No 80 is a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option.

- (A) Both, Assertion (A) and Reason (R) are true and Reason (R) is correct explanation of Assertion (A).
 (B) both, Assertion (A) and Reason (R) are true and Reason (R) is not 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.
80. Assertion (A): Two cubes each of edge length 10 cm are joined together.
 The total surface area of newly formed cuboid is 1200 cm^2 .
 Reason (R): Area of each surface of a cube of side 10 cm is 100 cm^2 .
 (CBSE 2023-24, 1 Mark)

Direction:

In Q. No 81 is Assertion and Reason based questions carrying 1 mark each. Two statements are given, one labeled as Assertion (A) and the other is labeled as Reason (R). Select the correct answer to these questions from the codes (A), (B), (C) and (D) as given below:

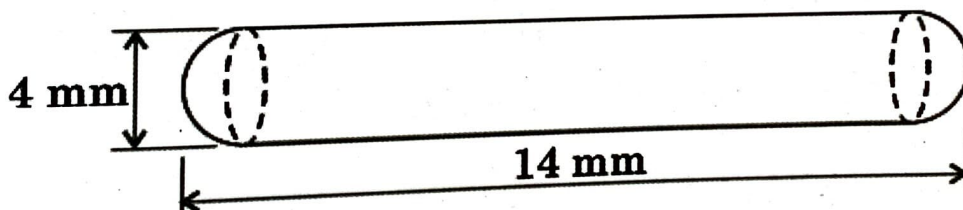
- (A) Both, Assertion (A) and Reason (R) are true and Reason (R) is correct explanation of Assertion (A).
 (B) Both, Assertion (A) and Reason (R) are true and Reason (R) is not correct explanation of Assertion (A).
 (C) Assertion (A) is true but Reason (R) is false.
 (D) Assertion (A) is false but Reason (R) is true.
81. Assertion (A): If the circumference of a circle is 176 cm , then its radius is 28 cm .
 Reason (R): Circumference = $2\pi \times \text{radius of a circle}$
 (CBSE 2023-24, 1 Mark)
82. The difference between the outer and inner radii of a hollow right circular cylinder of length 14 cm is 1 cm . If the volume of the metal used in making the cylinder is 176 cm^3 , find the outer and inner radii of the cylinder.
 (CBSE 2023-24, 3 Marks)
83. A wooden article was made by scooping out a hemisphere from each end of a solid cylinder, as shown in the figure. If the height of the cylinder is 5.8 cm and its base is of radius 2.1 cm , find the total surface area of the article.
 (CBSE 2023-24, 5 Marks)



84. (a) A solid iron pole consists of a solid cylinder of height 200 cm and base diameter 28 cm, which is surmounted by another cylinder of height 50 cm and radius 7 cm. Find the mass of the pole, given that 1 cm^3 of iron has approximately 8 g mass. **(CBSE 2023-24, 5 Marks)**

OR

- (b) A medicine capsule is in the shape of a cylinder with two hemispheres stuck to each of its ends. The length of the entire capsule is 14 mm and the diameter of the capsule is 4 mm, find its surface area. Also, find its volume.



Case Study – 1

85. A rectangular floor area can be completely tiled with 200 square tiles. If the side length of each tile is increased by 1 unit, it would take only 128 tiles to cover the floor.



(CBSE 2023-24, 4 Marks)

- (i) Assuming the original length of each side of a tile be x units, make a quadratic equation from the above information.
 (ii) Write the corresponding quadratic equation in standard form.
 (iii) (a) Find the value of x , the length of side of a tile by factorisation.
 OR
 (b) Solve the quadratic equation for x , using quadratic formula.

Case Study – 2

86. The word 'circus' has the same root as 'circle'. In a closed circular area, various entertainment acts including human skill and animal training are presented before the crowd.

A circus tent is cylindrical upto a height of 8 m and conical above it. The diameter of the base is 28 m and total height of tent is 18.5 m.



(CBSE 2023-24, 4 Marks)

Based on the above, answer the following questions:

- (i) Find slant height of the conical part.
- (ii) Determine the floor area of the tent.
- (iii) (a) Find area of the cloth used for making tent.

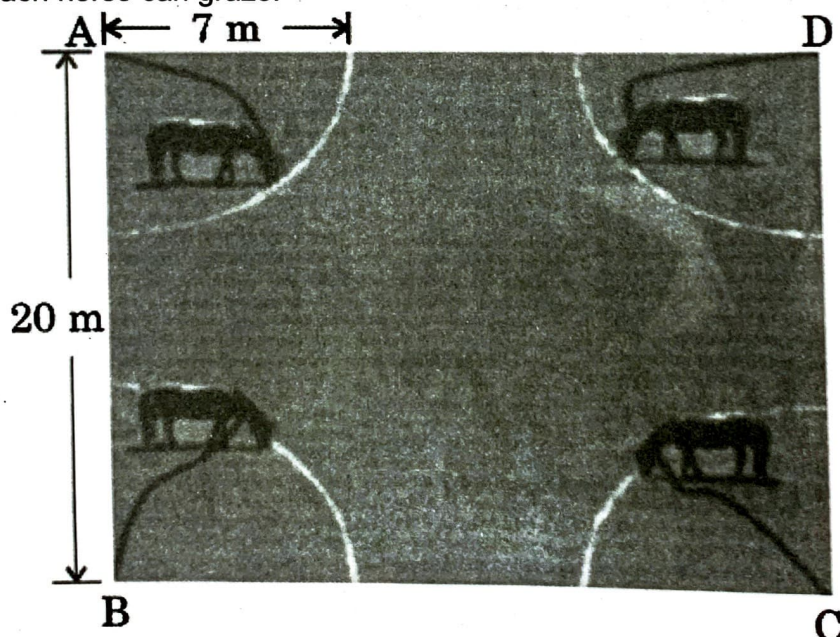
OR

- (b) Find total volume of air inside an empty tent.

Case Study – 3

87. A stable owner has four horses. He usually tie these horses with 7 m long rope to pegs at each corner of a square shaped grass field of 20 m length, to graze in his farm. But tying with rope sometimes results in injuries to his horses, so he decided to build fence around the area so that each horse can graze.

(CBSE 2023-24, 4 Marks)



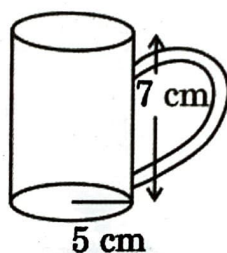
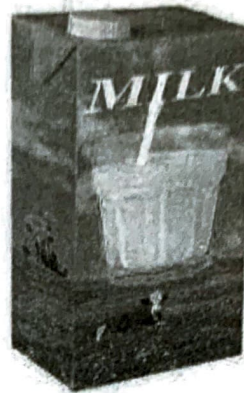
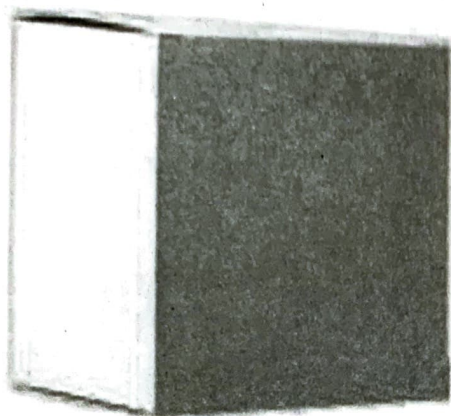
Based on the above, answer the following questions:

- (i) Find the area of the square shaped grass field.
- (ii) (a) Find area of total field in which these horses can graze.

OR

- (b) If the length of the rope of each horse is increased from 7 m to 10 m, find the area grazed by one horse. (Use $\pi = 3.14$)
- (iii) What is area of the field that is left ungrazed, if the length of the rope of each horse is 7 cm?

88. Temper-proof tetra-packed milk guarantees both freshness and security. This milk ensures uncompromised quality, preserving the nutritional values within and making it a reliable choice for health-conscious individuals.
(CBSE 2023-24, 4 Marks)



500 mL milk is packed in a cuboidal container of dimensions $15\text{ cm} \times 8\text{ cm} \times 5\text{ cm}$. These milk packets are then packed in cuboidal cartons of dimensions $30\text{ cm} \times 32\text{ cm} \times 15\text{ cm}$.

Based on the above, answer the following questions:

- (i) Find the volume of the cuboidal carton.
- (ii) (a) Find the total surface area of a milk packet.

OR

- (b) How many milk packets can be filled in a carton?
- (iii) How much milk can the cup (as shown in the figure) hold?