

CLASS X

SAMPLE PAPER

MATHS

1. Given H.C.F (306, 657) = 9, find L.C.M (306, 657)

2. Prove that $3 + 2\sqrt{5}$ is irrational.

3. For which value of 'P' does the pair of equations have unique solutions.

$$4x + Py + 8 = 0$$

$$2x + 2y + 2 = 0$$

4. Find the length of the arc of a circle with radius 6cm if the angle of sector is 60° .

5. Find the co-ordinates of the centre of a circle whose end points of the diameter are

(3, -10) and (1, 4).

6. If $\tan 2A = \cot (A - 18^{\circ})$, where $2A$ is an acute angle, find the value of A

6. Use Euclid's algorithm to find the H.C.F of 135 and 225.

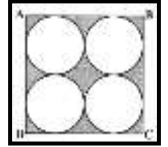
7. Show that any positive integer is of the form $6q + 1$, or $6q + 3$, or $6q + 5$, where q is some integer?

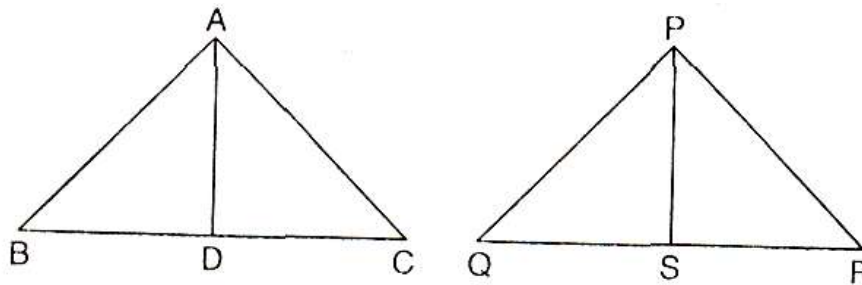
8. Draw the graphs of the equation $x - y + 1 = 0$ and $3x + 2y - 2 = 0$.

9. Determine the coordinates of the vertices of the triangle formed by these lines and the x - axis, and shade the triangular region.

10. A train travels 360 km at a uniform speed. If the speed had been m/hr more, it Would have taken 1 hour less for the same journey. Find the speed of the train.
11. A motorboat whose speed is 18km/hr in still water takes 1 hour more to go 24km upstream than to return downstream to the same spot. Find the speed of the stream.
12. Find the area of the triangle formed by joining the mid-points of the sides of the triangle whose vertices are (0, -1), (2, 1) and (0, 3).
13. In fig. AB and CD are two diameters of a circle (with centre O)perpendicular to each Other and OD is the diameter of the smaller circle. If $OA = 7\text{cm}$, find the area of the
14. Shaded region. In a triangle, if the square of one side is equal to the sum of squares of the remaining Two sides, prove that the angle opposite to the first side is a right angle. Using the above, do the following: ABC is an isosceles triangle with $AB = BC$. If $AB^2 = 2AC^2$, prove that ABC is a right Triangle.
15. As observed from the top of a 75m high lighthouse from the sea-level, the angles of Depression of two ships is 30° and 45° . If one ship is exactly behind the other on the Same side of the lighthouse find the distance between the two ships.
16. A triangle ABC is drawn to circumscribe a circle of radius 4cm such that the segments BD And DC into which the point of contact D is of lengths 8cm and 6cm divides BC Respectively. Find the sides AB and AC.
17. The radii of the ends of a frustum of a cone 45cm high are 28cm and 7cm. Find its volume And total surface area.
18. Water in a canal, 6m wide and 1.5m deep, is flowing with a speed of 10km/hr. how much Area will it irrigate in 30 minutes, if 8cm-tanding water is needed?

19. If m times the m th term of an A.P. is equal to n times its n th term, prove that the $(m+n)$ th term of the A.P. is zero.
20. In a flight of 600 Km, an aircraft was slowed down due to bad weather. The average speed for the trip was decreased by 200 Km/hr. and the time of flight increased by 30 minutes. Find the duration of the flight.
21. Solve the quadratic equation $6x^2 + x - 15 = 0$
22. A chord of a circle of radius 12 cm subtends an angle of 120° at the centre. Find the area of the corresponding segment of the circle.
23. A bag contains 3 red and 2 blue marbles. A marble is drawn at random. If A and B are $(1,4)$ and $(5,2)$ respectively, find the coordinate of P when $AP/PB=3/4$.
24. Find the area of the shaded region in figure, ABCD is a square of side 4 cm.
25. If the surface area of a sphere is 616cm^2 , find its volume.
26. Find the angle of elevation of the sun (Sun's altitude) when the length of shadow of a vertical pole is equal to its height.
27. What is the probability that an ordinary year has 53 Sundays?
28. Prove that the ratio of the areas of two similar triangles is equal to the ratio of the squares of any two corresponding sides. Using this theorem, find the area of ΔABC if $AB = 10$ cm and area of $\Delta PQR = 12\text{ cm}^2$, $PQ = 11$ cm.





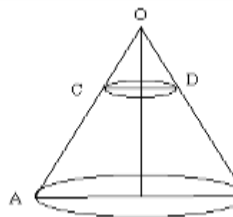
Q28. A solid cone, with height and base radius of 28 cm each, is cut along a plane parallel to its base so that the bottom and top radii of the remaining part are in the ratio 1 : 4. Find its volume. Also find the cost of painting its outer surface @ Re 0.70 per sq.cm.

Q29. A wooden toy is conical at the top, cylindrical in the middle and hemispherical at the bottom (see figure). If the height and radius of the cylindrical portion are both equal to 21 cm and the total height of the toy is 70 cm, find the cost of painting it @ Re 0.70 per sq.cm and the amount of wood used to make it.

Q30. The diagonals of a cyclic quadrilateral are at right angles. Prove that the perpendicular from the point of their intersection on any side when produced backward bisects the opposite side.

Q31. Prove that any line parallel to parallel sides of a trapezium divides the non-parallel sides proportionally (i.e. in the same ratio)

Q32. At the foot of a mountain, the elevation of its summit is 45° . After ascending 1000m towards the mountain up a slope of 30° inclination, the elevation is found to be 60° . Find the height of the mountain.



Q33. The following table gives weekly wages in rupees of workers in a certain commercial organization. The frequency of class 49-52 is missing. It is known that the mean frequency distribution is 47.2. Find the missing frequency.

Weekly Wages (Rs.)	40-43	43-46	46-49	49-52	52-55
Number of workers	31	58	60	?	27

Q34. The area of an equilateral triangle is 17300 cm^2 . With each vertex of the triangle as centre, a circle is drawn with a radius equal to half the length of the side of the triangle. Find the area of the triangle not included in the circles.

($\pi = 3.14$ and $\sqrt{3} = 1.73$)

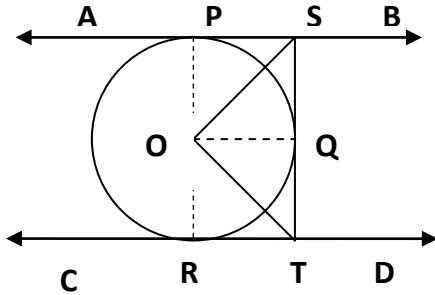
Q35. A solid composed of a cylinder with hemi spherical ends . The whole height of the solid is 19cm and the radius of the cylinder is 3.5cm. Find the weight of the solid if 1 cm^3 of the metal weighs 4.5g.

Q36. Water is flowing at the rate of 15 km per hour through a pipe of diameter 14 cm into a rectangular tank which is 50 m long and 44 m wide. Find the time in which the level will rise by 21cm.

37. A right circular cone is divided into two portions by a plane parallel to the base and passing through a point, which is $\frac{1}{3}$ of the height from the top. Find the ratio of the smaller cone to that of the remaining frustum of the cone.

38. Find the zeroes of the polynomial $g(y) = 4y^2 + 8y$ and verify the relationship between zeroes and coefficients.

39. For what value of c does the following system of equations represent parallel lines?
 $cx + 3y = 3$
 $12x + cy = 6$
40. Using Fundamental theorem of arithmetic, find the LCM of 2231 and 2813(3)
41. Show that $\sqrt{6}$ is irrational
42. Find a quadratic polynomial whose sum and product of the zeros are $\sqrt{2}$ and $\frac{1}{3}$ respectively
43. If each side of an equilateral triangle is '2a' units, what is the length of its altitude?
44. A solid cylinder of radius 'r' cm and height 'h' cm is melted and changed into a right circular cone of radius '4r' cm. Find the height of the cone.
45. Find the value of 'k' for which the quadratic equation $(k+1)x^2 + (k+4)x + 1 = 0$ has equal Roots.
46. Find the value of p for which the points (-1, 3), (2, p) and (5, -1) are collinear.
47. If the point P(x, y) is equidistant from the points A (5,1) and B(-1, 5), prove that $3x = 2y$.
48. **How many terms of the AP $-6, -\frac{11}{2}, -5, \dots$ will give the sum zero**
49. Prove that the intercept of a tangent between two parallel tangents to a circle subtends a right angle at the centre.



50. Prove the following identity:

$$\frac{\cot\theta + \operatorname{cosec}\theta - 1}{\cot\theta - \operatorname{cosec}\theta + 1} = \frac{1 + \cos\theta}{\sin\theta}$$

51. If $3 \tan A = 4$, find the value of $\frac{5 \sin A - 3 \cos A}{5 \sin A + 2 \cos A}$

51. If the sum of first n terms of an A.P. is given by $S_n = 4n^2 - 3n$, find the n^{th} term of the A.P.

52. Obtain all the zeroes of the polynomial $3x^4 + 6x^3 - 2x^3 - 10x + 5$, if two of its zeroes are $\sqrt{5} / \sqrt{3}$ and $-\sqrt{5} / \sqrt{3}$

53. One letter is selected at random from the word 'UNNECESSARY'. Find the probability of selecting an E

54. Three cubes each of sides 5 cm are joined end to end. Find the surface area of the resulting solid.

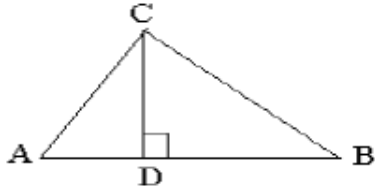
55. The lengths of two cylinders are in the ratio 3:1 and their diameters are in the ratio 1:2. Calculate the ratio of their volumes.

56. Tickets numbered from 1 to 20 are mixed up together and then a ticket is drawn at random. What is the probability that the ticket has a number which is a number of 3 or 7?

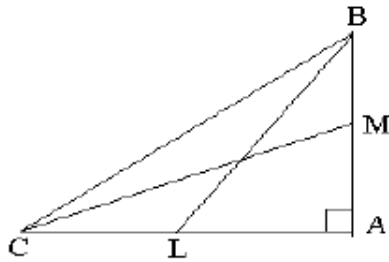
a. AP

- Q.1 Find the sum of integers from 1 to 100 that are divisible by 2 or 5. (3050)
- Q.2 Show that the sum of $(m + n)^{\text{th}}$ and $(m - n)^{\text{th}}$ terms of an A.P. is equal to twice the n^{th} term.
- Q.3 If the sum of three numbers in A.P. be 24 and their product is 440, find the numbers.
(5,8,11 or 11, 8,5)
- Q.4 Let the sum of n , $2n$, $3n$ terms of an A.P. be S_1 , S_2 and S_3 respectively, show that $S_3 = 3(S_2 - S_1)$.
- Q.5 Find the sum of all numbers between 200 and 400 which are divisible by 7. (8729)
- Q.6 Find the sum of integers from 1 to 100 that are divisible by 2 or 5. (3050)
- Q.7 Find the sum of all two digit numbers which when divided by 4, yield 1 as remainder. (1210)
- Q.8 The sum of first four terms of an A.P. is 56. The sum of the last four terms is 112. If its first term is 11, then find the number of terms. (11)
- Q.9 150 workers were engaged to finish a job in a certain number of days. 4 works dropped out on the second day, 4 more workers dropped out on the third day and so on. It took 8 more days to finish the work.. Find the number of days in which the work was completed. (25 days).
- Q.10 Find the sum of all natural numbers between 50 and 500 which are divisible by 3 and 5. (8325)
- Q.11 Find the A.P. whose n th term is
- (a) $9 - 5n$ (4, -1, -6, -11,...)
- (b) $6 - n$ (5, 4, 3, 2.....)

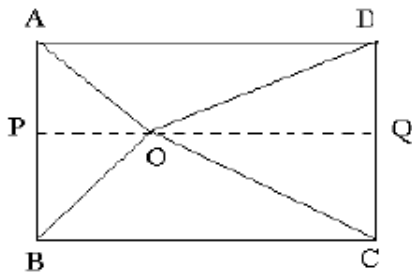
Q. 1. $\angle ABC = 90^\circ$ and $CD \perp AB$. Prove that $\frac{BC^2}{AC^2} = \frac{BD}{AD}$



Q. 2. BL and CM are medians of a triangle ABC right angled at A. Prove that $4(BL^2 + CM^2) = BC^2$.



Q.3. O is any point inside a rectangle ABCD. Prove that $OB^2 + OD^2 = OA^2 + OC^2$.



Q. 4. ABC is an isosceles triangle right angled at C. Prove that $AB^2 = 2AC^2$.

- Express each number as a product of its prime factors:
(i) 140 (ii) 156 (iii) 3825 (iv) 5005 (v) 7429
- Find the LCM and HCF of the following pairs of integers and verify that $\text{LCM} \times \text{HCF} = \text{product}$ of the two numbers.
(i) 26 and 91 (ii) 510 and 92 (iii) 336 and 54
- Find the LCM and HCF of the following integers by applying the prime factorization method.
(i) 12, 15 and 21 (ii) 17, 23 and 29 (iii) 8, 9 and 25
- Given that $\text{HCF}(306, 657) = 9$, find $\text{LCM}(306, 657)$.
- Check whether 6^n can end with the digit 0 for any natural number n .
- Explain why $7 \times 11 \times 13 + 13$ and $7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 + 5$ are composite numbers.
- There is a circular path around a sports field. Sonia takes 18 minutes to drive one round of the field, while Ravi takes 12 minutes for the same. Suppose they both start at the same point and at the same time, and go in the same direction. After how many minutes will they meet again at the starting point?
- Prove that $\sqrt{3}$ is irrational.
- Show that $5 - \sqrt{3}$ is irrational.
- Show that $3\sqrt{2}$ is irrational.

- Q.1 In what ratio does the point $(-4, 6)$ divide the line segment joining the points A $(-6, 10)$ and B $(3, -8)$?
- Q.2 Find the coordinates of the points of trisection (i.e., points dividing in three equal parts) of the line segment joining the point A $(2, -2)$ and B $(-7, 4)$
- Q.3 The length of a line segment is 10. If one end is at $(2, -3)$ and the abscissa of the second end is 10, show that its ordinate is either 3 or -9.
- Q.4 If the points A $(6, 1)$, B $(8, 2)$, C $(9, 4)$ and $(p, 3)$ are the vertices of a parallelogram, taken in order, find the value of p.
- Q.5 If the distances of P (x, y) from A $(5, 1)$ and B $(-1, 5)$ are equal, prove that $3x = 2y$
- Q.6 Find the ratio in which the line segment joining A $(1, -5)$ and $(-4, 5)$ is divided by the x-axis. Also find coordinates of the point of division.
- Q.7 Find the coordinates of a point A, where AB is the diameter of a circle whose center is $(2, -3)$ and B is $(1, 4)$
- Q.8 Find the area of a rhombus if its vertices are $(3, 0)$, $(4, 5)$, $(-1, 4)$, and $(-2, -1)$ taken in order.
- Q.9 Find k for which the points are collinear. $(8, 1)$, $(k, -4)$, $(2, -5)$
- Q.10 Find the area of quadrilateral whose vertices, taken in order, are $(-4, -2)$, $(-3, -5)$, $(3, -2)$ and $(2, 3)$
- Q.11 Determine the ratio in which the line $2x + y - 4 = 0$ divides the line segment joining the points A $(2, -2)$ and B $(3, 7)$.
- Q.12 ABCD is a rectangle formed by the points A $(-1, -1)$, B $(-1, 4)$, C $(5, 4)$ and D $(5, -1)$ P, Q, R and S are the mid points of AB, BC, CD and DA respectively. Is the quadrilateral PQRS a square? a rectangle? Or a rhombus? Justify your answer.

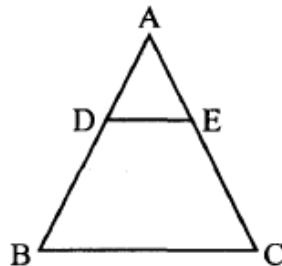
- Q1. Tickets numbered from 1 to 20 are mixed up together and then a ticket is drawn at random. What is the probability that the ticket has a number which is a multiple of 3 or 7.
- Q2. It is known that a box of 600 electric bulbs contains 12 defective bulbs. One bulb is taken out at random from this box. What is the probability that it is a non-defective bulb?
- Q3. 17 cards numbered 1,2,3,...,17 are put in a box and mixed thoroughly. One person draws a card from the box. Find the probability that the number on the card is:
 (i) odd (ii) a prime
 (iii) divisible by 3 (iv) divisible by 3 and 2 both
- Q4. A bag contains 5 red balls, 8 white balls, 4 green balls and 7 black balls. If one ball is drawn at random, find the probability that it is:
 (i) black (ii) red (iii) not green.
- Q5. A game consists of tossing a one rupee coin 3 times and noting its outcome each time. Hanif wins if all the tosses give the same result i.e. three heads or three tails, and loses otherwise. Calculate the probability that Hanif will lose the game.
- Q6. If a number x is chosen at random from the numbers $-2,-1,0,1,2$. What is the probability that $x^2 < 2$?
- Q7. A jar contains 24 marbles some are green others are blue. If a marble is drawn at random from the jar, the probability that it is green is $2/3$. Find the number of blue marbles in the jar.
- Q8. A card is drawn at random from a pack of 52 cards. Find the probability that the card drawn is
 (i) black king (x) a ten
 (ii) either a black card or a king (xi) a spade
 (iii) black and a king (xii) a black card
 (iv) a jack, queen or a king (xiii) the seven of clubs
 (v) neither a heart nor a king (xiv) jack
 (vi) spade or an ace (xv) the ace of spades
 (vii) neither an ace nor a king (xvi) a queen
 (viii) neither a red card nor a queen (xvii) a heart
 (ix) other than an ace (xviii) a red card
- Q9. In a lottery of 50 tickets numbered 1 to 50, one ticket is drawn. Find the probability that the drawn ticket bears a prime number.
- Q10. In a lottery there are 10 prizes and 25 blanks. What is the probability of getting a prize?
- Q11. What is the probability that a number selected at random from the number 1,2,2,3,3,3,4,4,4,4 will be their average?
- Q12. A bag contains 5 red, 8 white and 7 black balls. A ball is drawn at random from the bag. Find the probability that the drawn ball is (i) red or white (ii) not black (iii) neither white nor black.

1. Find the least number of coins of diameter 2.5 cm and height 3 mm which are to be melted to form a solid cylinder of radius 3 cm and height 5 cm.

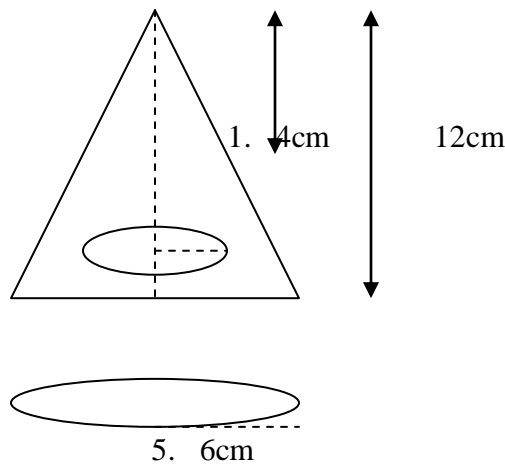
2. The radii of two cylinders are in the ratio 2:3 and their heights are in 5:3. Calculate the ratio of their volume.
3. The volume of two spheres are in the ratio 64 : 27. Find their radii if the sum of their radii is 21cm
4. the height of a cylinder is 15 cm. the curved surface area is 660 cm². find the radius .
5. The circumference of the edge of a hemispherical bowl is 132 cm. find the capacity of the bowl.
6. An electric pole is 10 m high. If its shadow is $10\sqrt{3}$ m in length. Find the elevation of the sun.
7. The lengths of two cylinders are in the ratio 3:1 and their diameters are in the ratio 1:2 .Calculate the ratio of their volumes
8. The largest cube is carved out of a cube of radius 7 cm. find the volume of the sphere.
9. A solid cylinder of radius 'r' cm and height 'h' cm is melted and changed into a right circular cone of radius '4r; cm. Find the height of the cone.

10. 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.
11. A solid iron cylinder of radius 2.5 cm and height 133 cm is melted and recast into a sphere. Find the radius of the sphere.
1. Prove that the ratio of the areas of similar triangles is equal to the ratio of the squares on the corresponding sides. Using the above result, prove that “ if the areas of two similar triangles are equal , they are congruent”.

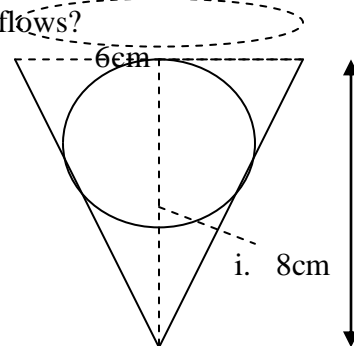
2. **If a line is drawn parallel to one side of a triangle, prove that the other two sides are divided in the same ratio. Using the above result, find AB when in $\triangle ABC$, $DE \parallel BC$ so that $AD = 2.4$ cm, $AE = 3.2$ cm and $EC = 4.8$ cm.**
3. In a triangle, if square of one side is equal to the sum of the squares of other two sides, then angle opposite the first side is a right angle.using the converse of above theorem determines the length of an altitude of an equilateral triangle of side $2a$.
4. The ratio of areas of similar triangles is equal to the ratio of the squares on the corresponding sides. Prove.Using the above theorem, prove that the area of the equilateral triangle described on the side of a square is half the area of the equilateral triangle described on the diagonal.
5. Prove that the ratio of the areas of two similar triangles is equal to the ratio of the squares of their corresponding sides.
Use the above for the following :
If the areas of two similar triangles are equal, prove that they are congruent.
6. If a line is drawn parallel to one side of a triangle, to intersect the other two sides in distinct points, prove that the other two sides are divided in the same ratio.
Using the above, prove the following :
In Fig. 3, $DE \parallel BC$ and $BD = CE$. Prove that ABC is an isosceles triangle.



1. If the radii of the ends of a bucket 45cm high are 28cm and 7cm. Find its capacity and surface area
2. A bucket is in the form of a frustum of a cone and holds 28.490 litres of water. The radii of the top and bottom are 28cm and 21cm respectively. Find the height of the bucket
3. A spherical cannon ball, 28cm in diameter is melted and cast into a right circular conical mould, the base of which is 35cm in diameter. Find the height of the cone.
4. A solid cone of height 12 cm and base radius 6 cm has top 4 cm removed as shown in the fig. Find the whole surface area of the remaining solid cone



6. A conical vessel of radius 6 cm and height 8 cm is completely filled with water. A sphere is lowered into the water and its size is such that when it touches the sides, it is just immersed. What fraction of water overflows?



8. A toy is in the form of a cone mounted on a hemisphere of radius 7cm. The total height of the toy is 19.5cm. Find the total surface area and the volume of the toy.
9. A spherical shell of lead, whose external diameter is 18cm, is melted and recast into a right circular cylinder, whose height is 8cm and diameter 12cm. Determine the internal diameter of the shell.
10. A metallic right circular cone 20cm height and whose vertical angle are 60° is cut into two part at the middle of its height by a plane parallel to its base. if the frustum so obtained is drawn into a wire of diameter $\frac{1}{16}$ cm, find the length of the wire.
- 11.
12. A cylinder container is filled with ice cream, whose radius is 6 cm and height is 15 cm. The whole ice cream is distributed to 10 children in equal cones having hemispherical tops. If the height of the conical portion is four times the radius of its base, find the radius of the base of the ice-cream cone.
Water in a canal, 30 dm wide and 12 dm deep is flowing with a velocity of 10 km/h. How much area will it irrigate in 30 minutes, if 4 cm of standing water is required for irrigation?
13. A solid iron pole consists of cylinder of height 220cm and base diameter 24cm, which is surmounted by another cylinder of height 60cm and radius 8cm. find the mass of the pole, given that 1cm^3 of iron has approximately 8g mass. (Use $\pi=3.14$).
14. If the radii of the ends of a bucket, 45 cm high, are 28 cm and 7 cm, find the capacity and surface area.
A solid right circular cone of diameter 14 cm and height 8 cm is melted to form a hollow sphere. If the external diameter of the sphere is 10 cm, find the internal diameter of the sphere.

15. The height of a cone is 30 cm. A small cone is cut off at the top by a plane parallel to the base. If its volume be $\frac{1}{27}$ of the volume of the given cone, at what height above the base, the section has been made?

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.

Water flows out through a circular pipe whose internal radius is 1 cm, at the rate of 80 cm/second into an empty 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 ?

16.

A hemispherical bowl of internal diameter 36 cm is full of some liquid. This liquid is to be filled in cylindrical bottles of radius 3 cm and height 6 cm. Find the number of bottles needed to empty the bowl.

IMPORTANT QUESTIONS FOR PRACTICES

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