1. Arithmetic Progressions

I. Four alternatives are given for every question. Choose one appropriate answer :

1. The common difference of the Arithmetic progression -10, -6,-2,2 ..... is
   A)-16 B) -4 C) 4 D) 2
2. The nth term of the Arithmetic progression 11,9,7,5 ..... is
   A) 9-2n B) 9+2n C) 13-2n D) 12+2n
3. The sum of first 'n'odd natural numbers is
   A) 2n-1 B) 2n+1 C) n^2-1 D) n^2
4. If k, 2k-1 and 2k+1 are three consecutive terms of an AP, then the value of 'k' is
   A) -3 B) -2 C) 3 D) 6
5. The fourth term of an AP $\sqrt{7}, \sqrt{28}, \sqrt{63}$ . . . . . is
   A) $\sqrt{70}$ B) $\sqrt{112}$ C) $\sqrt{84}$ D) $\sqrt{97}$

II. One mark questions:

1. What is an Arithmetic progression?
2. Give an example for infinite Arithmetic progression.
3. In an Arithmetic progression, if 'a' is the first term and 'd' is the common difference then write the formula used to find its nth term.
4. If 'a' is the first term 'a' is the common difference and 'n' is the number of terms in an AP, then write the formula used to find its sum to first 'n' terms.
5. Find the common difference of the Arithmetic progression -1, 1, 3, 5.....
6. Write an Arithmetic progression in which first term is 'x' and common difference is 'y'.

III. Two mark questions:

1. The 17th term of an Arithmetic progression exceeds its 10th term by 7. Find common difference.
2. Find the sum of two-digit numbers that are completely divisible by 3.
3. Find the 20th term from the last term of the AP 3,8,13 ..... 253.
4. Find whether 55 is a term of the AP 7,10,13 .....
5. The first term of an Arithmetic Progression is 5 and last term is 45. If the sum of the terms is 125, then find the number of terms.
6. Find the sum of first 1000 positive integers.
7. Find the sum of first 40 positive integers divisible by 6.
8. If 2x, x+10, 3x+2 are in Arithmetic progression, then find the value of 'x'.
9. If the sum of 'n' terms of an Arithmetic progression is $s_n=3n^2+5n$ then find its common difference.
10. If five times the fifth term of an A.P is equal to 8 times its eighth term, show that its 13th term is zero.

IV. 3 marks / 4 marks questions:

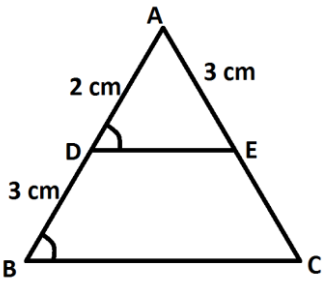
1. In an Arithmetic Progression 4th term and 8th term are in the ratio 1:2. If the 10th term is 30. Find the Arithmetic Progression.
2. The sum of three numbers in an Arithmetic Progression is 12 and their product is 48.Find those numbers.
3. The angles of a quadrilateral in an Arithmetic Progression. If the least angle is 15^0, then find the remaining angles.

4. If ‘m’ times the nth term of an A.P is equal to ‘n’ times its nth term, show that its $(m+n)^{th}$ term is Zero.
5. Find four numbers in AP whose sum is 20 and the sum of whose squares is 120.
6. A man repays a loan of ₹ 3,250 by paying ₹20 in the first month and then increases the payment by ₹15 every month. How long will it take him to clear the loan?
7. If the sum of 3rd and 8th terms of an A.P is 7 and the sum of 7th and 14th terms is -3, find the 10th term.
8. The sum of first seven terms of an Arithmetic Progression is 182. If its 4th and 17th terms are in the ratio 1:5, find the Arithmetic Progression.

V. 5 marks questions:

1. The difference of two consecutive angles of polygon is 5^0. Find the number of sides of a polygon if its smaller angle is 120^0.
2. Ratio of sum of two Arithmetic Progressions contains ‘n’ terms is (3n+6): (5n-13). Find their 11th terms.
3. Sum of first six terms of an Arithmetic Progression is 6, product of second and fifth term is -80. Write the terms of Arithmetic Progression.

2. Triangles



I. Choose the correct alternative in each of the following:

1. In the figure ∠ADE = ∠ABC then CE =

   A) 2 B) 5 C) $\frac{3}{4}$ D) $\frac{9}{2}$

2. The areas of two similar triangles are respectively 9 cm^2 and 16 cm^2. The ratio of their corresponding sides is

   A) 3:4 B) 4:3 C) 2:3 D) 4:5

3. ΔABC ~ ΔPQR such that ar (ΔABC) = 4 ar (ΔPQR) if BC = 12 cm, then QR =

   A) 6 cm B) 8 cm C) 7 cm D) 10 cm

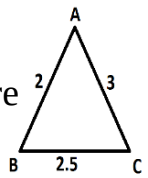
4. XY is drawn parallel to the base BC of a ΔABC cutting AB at X and AC at Y. If AB=4BX and YC=2cm the n AY=

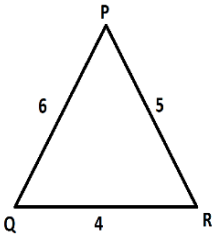
   A) 2 cm B) 4 cm C) 6 cm D) 8 cm

5. A man goes 24 m due west and then 7 m due north. How far is he starting point?

   A) 17 m B) 25 m C) 26 m D) 31 m

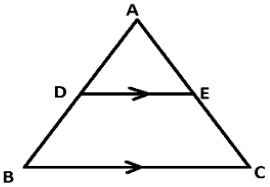
II. Answer the following questions VSA:



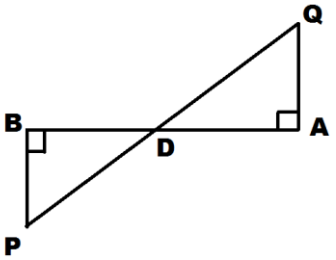


1. State Basic Proportionality Theorem (Thale’s Theorem).
2. In figure ΔABC ~ ΔPQR. Name the similarity criterion used here
3. In ΔPQR, $\angle QPR = 90^0$, then find PQ^2.
4. State Pythagoras theorem.
5. What is the length of the diagonal of a square of side 6 cm?

III. Answer the following questions : (2 marks)



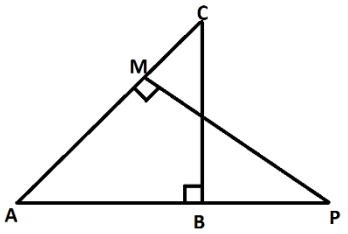
1. In ΔABC, DE∥BC. If AD = 1.5 cm, DB = 3 cm and AE = 1 cm, then find EC.



2. In figure AQ⊥AB, PB⊥AB, if AD = 20 cm, BD = 12 cm and PB = 18 cm then find the length of AQ.

3. In the trapezium ABCD AB||CD, AC and BD are diagonals which intersect each other at 'o' prove that $\frac{OA}{OC} = \frac{OB}{OD}$.

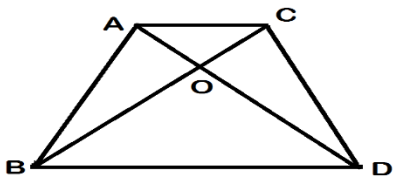
4. In figure, ABC and AMP are two right triangles, right angled at B and M respectively prove that $\Delta ABC \sim \Delta AMP$



5. The vertical pole of length 6 m casts a shadow 4 m long on the ground and at the same time a tower casts a shadow 28 m long. Find the height of the tower.
6. $\Delta ABC \sim \Delta DEF$ their areas are respectively 64 cm^2 and 121 cm^2. If EF = 15.4 cm then find BC.
7. Diagonals of a trapezium ABCD with AB||DC intersect each other at the point 'O'. If AB = 2 CD, find the ratio of the areas of triangles Δ AOB and ΔCOD.
8. ΔABC is an isosceles triangle with AC =BC. If $AB^2 = 2AC^2$, prove that ΔABC is a right triangle.
9. A ladder 10 m long reaches a window 8 m above the ground. Find the distance of foot of the ladder from the base of the wall.
10. Two poles of height 6 m and 11 m stand on a plane ground. If the distance between the feet of the poles is 12 m, find the distance between their tops.

IV. Answer the following (3/4 marks):

1. Prove that if a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, the other two sides are divided in the same ratio.
2. Prove that if in two triangles, corresponding angles are equal, then their corresponding sides are in the same ratio and hence the two triangles are similar (AAA criterion)
3. Prove that the ratio of the areas of two similar triangles is equal to the square of the ratio of their corresponding sides.
4. Prove that in a right triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.
5. Prove that the ratio of the areas of two similar triangles is equal to the square of the ratio of their corresponding medians.
6. In figure, ABC and DBE are two triangles on the same base BC. If AD intersect BC at 'O', show that $\frac{ar(ABC)}{ar(DBC} = \frac{AO}{DO}$.



7. Prove that the sum of the squares of the sides of a Rhombus is equal to the sum of the squares of its diagonals.
8. An aeroplane leaves an airport and flies due north at a speed of 1000 km/hr. At the same time another aeroplane leaves the same airport and flies due west at a speed of 1200 km/hr. How far apart will be the two planes after 1½ hour?

V. Answer the following (5 marks):

1. State and prove Basic proportionality theorem (Thales theorem)
2. State and prove Pythagoras theorem.
3. State and prove converse of Pythagoras theorem.

3. Pair Of Linear Equations

I. One mark Questions :

1. Write the standard form of pair of linear equations in two variables.
2. Write the condition for pair of liner equations to have unique solution.
3. Write the condition for pair of linear equations to have many solutions.
4. Under what condition the pair of linear equations will be parallel?

II. Two marks Questions :

1. Solve $a + b = 8$ and $a – b = 2$.
2. Solve $7x + 15y = 8$ and $x + 2y = 3$.
3. Check whether pair of linear equations $3x + 2y = 5$ and $2x–3y = 7$ is consistent.

III. Three marks Questions :

1. Solve $5x + 10y = 35$ and $2x – 4y = 28$.
2. Solve $\frac{2}{x} + \frac{3}{y} = 13$ and $\frac{5}{x} - \frac{4}{y} = 13$.
3. Ritu can row down stream 20 km in 2 hr and upstream 4 km in 2 hr. Find her speed of rowing in still water and the speed of the current.
4. Five years ago, Nuri was thrice as old as Sonu. Ten years later, Nuri will be twice as old as Sonu. How old are Nuri and Sonu?
5. The ratio of income of two persons is 9 : 7 and the ratio of their expenditures is 4 : 3. If each of them manage to save ₹2000 per month, find their monthly income.

IV. Four marks Questions :

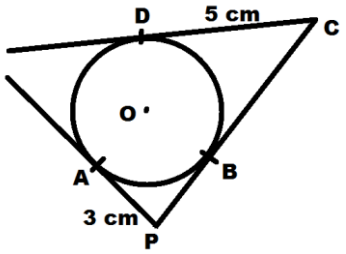
Solve the given pair of linear equations graphically:

1. $x + y = 5$ and $x – y = 4$.
2. $2x + y = 4$ and $x – y = -1$.
3. $x + 2y = 8$ and $x – y = 5$.
4. $x + y = 2$ and $x -2y = 5$.
5. $x + y = 6$ and $x – y = 2$.

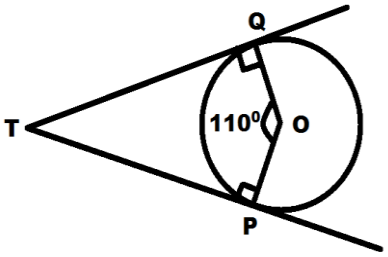
4.CIRCLES

I. Choose the correct alternative in each of the following:

1. A straight line passes through two points on a circle is
   A) chord B) secant C) tangent D) radius



2. In a given figure ‘O’ is center of a circle, PA, PC and CD are tangents. If AP = 3 cm and CD = 5 cm, then length of PC is
   A) 3 cm B) 5 cm C) 8 cm D) 2 cm



3. In given figure ‘O’ is the center of a circle. TP and TQ are tangents, $\angle QOP = 110^0$, then the measure of $\angle PTQ$
   A) 90^0 B) 110^0 C) 70^0 D) 40^0

II. Answer the following questions: (1 Marks)

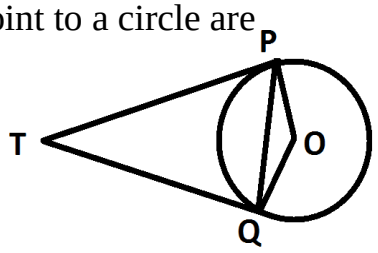
1. What is a tangent?
2. What is measure of angle between a tangent and the radius at the point of contact?
3. What is a secant?

III. Two marks Questions :

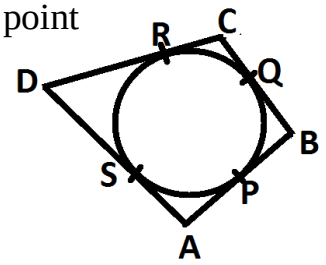
1. Prove that“The tangent at any point on a circle is perpendicular to the radius through the point of contact”

2. Prove that "the lengths of the tangents drawn from an external point to a circle are equal."

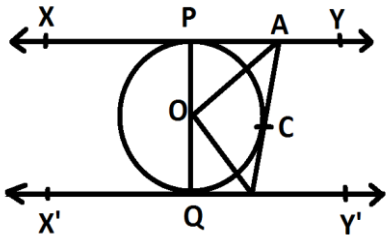
3. Two tangents TP and TQ are drawn to a circle with centre 'O' from an external point 'T'. Prove that $\angle PTQ = 2\angle OPQ$



4. A quadrilateral ABCD is drawn to circumscribe a circle. Prove that AB+ CD = AD + BC



5. In the figure XY and X^1Y^1 are the two parallel tangents to a circle with center 'O' and another tangent AB with the point of contact C intersecting XY at A and X^1Y^1 at B. Prove that $\angle AOB = 90^0$



5. Areas related to circles

I. Four alternatives are given for every question. Choose one appropriate answer :

1. Area of sector with central angle 'x' and radius of circle 'p' is

   A) $\frac{\pi p x^2}{360^0}$ B) $\frac{\pi p x^2}{270^0}$ C) $\frac{\pi x p^2}{270^0}$ D) $\frac{\pi x p^2}{360^0}$

2. Angle of the sector is 90^0, then the ratio of area of circle to area of sector is

   A) 1 : 4 B) 1 : 2 C) 4 : 1 D) 2 : 3

3. The region bounded by two radii and corresponding arc of a circle is

   A) segment B) sector C) area D) perimeter

4. Area of square inscribed in a circle of unit radius is

   A) $\frac{\pi}{2}$ sq. units B) π sq. units C) $\sqrt{2}$ sq. units D) 2 sq. units

5. If the perimeter and the area of a circle are numerically equal, then the radius of the circle is

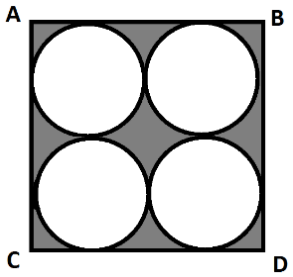
   A) 2 units B) π unis C) 4 units D) 7 units

II. One Mark Questions:

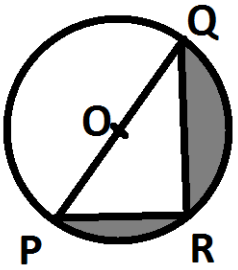
1. Write the formula to find the area of a quadrant of a circle.
2. What is the formula to find the area of a sector of a circle?
3. There is a circle of radius 'x' units. What is the formula to find area of a sector if the central angle is 'θ'
4. There is a circle of radius 'r' units. What is the formula to find the length of the arc if the central angle is 'θ'

III. Two marks questions:

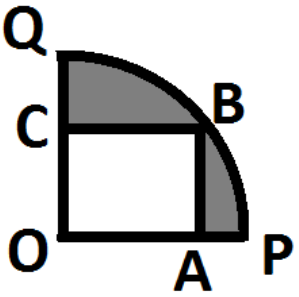
1. Find the area of sector of a circle with radius 6 cm and angle of sector 60^0.
2. Find the length of arc of circle with radius 11 cm and central angle 45^0.
3. Find the area of the shaded region when ABCD is a square of side 14 cm



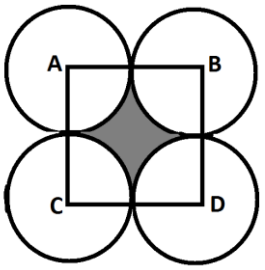
4. Find the area of the shaded region if PQ=24 cm, PR=7 cm and 'O' is the centre of the circle given.



5. OABC is a square inscribed in a quadrant OPBQ. If OA = 20 cm find the area of the shaded portion.

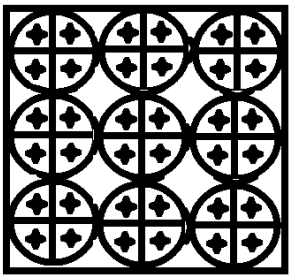


6. ABCD is a square of side 14 cm. With centres A, B, C and D, four circles are drawn such that each circle touch externally two of remaining three circles. Find the area of the area of shaded region.



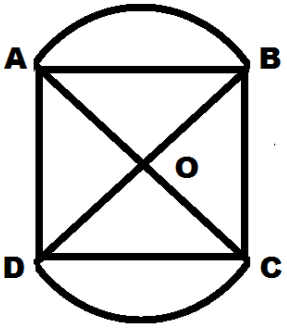
IV. Three marks questions:

1. A horse is tied to a peg at one corner of a square shaped green field of side 15 m by means of a 5 m long rope, find the area of that part of the field in which the horse can graze.
2. On a square hand kerchief, nine circular designs each of radius 7 cm are made, find the area of the remaining portion of the hand kerchief.



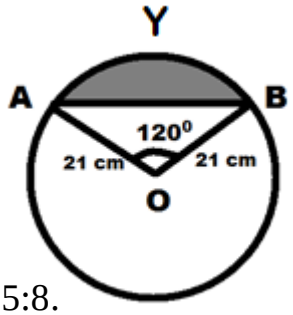
V. Five marks questions:

1. In figure two circular flower beds have been shown on two sides of a square lawn ABCD of side 56 m. If the center of each circular flower bed is the point of intersection 'O' of the diagonals of the square lawn, find the sum of the areas of the lawn and the flower beds.



2. Find the area of the segment AYB shown in the figure, if radius of the circle is 21 cm and $\angle AOB = 120^0$

[use $\pi = \frac{22}{7}$]



6. Constructions

I. Two Marks Questions:

1. Draw a line segment of length 7.6 cm and divide it in the ratio 5:8.
2. Construct a pair of tangents to a circle of radius 4 cm of the angle between the radii is 70^0.
3. Construct a pair of tangents to a circle of radius 5 cm from a point 9 cm from the centre.
4. Draw a pair of tangents to a circle of radius 5 cm which are inclined to each other at an angle of 60^0

II. Three Marks Questions:

1. Construct a triangle similar to the triangle with sides 4cm, 5cm and 6cm and then a triangle similar to it whose sides are in the ratio of $\frac{2}{3}$ of the corresponding sides of the triangle.

2. Construct a triangle similar to the triangle with sides 4cm, 5cm and 6cm and then a triangle similar to it whose sides are in the ratio of $\frac{7}{5}$ of the corresponding sides of the triangle.
3. Construct ΔABC with side BC = 6 cm, AB = 5 cm and $\angle ABC = 60^0$. Then construct a triangle whose sides are in the ratio of $\frac{5}{3}$ of the corresponding sides of the ΔABC.
4. Construct ΔABC with sides 5 cm. Then construct a triangle whose sides are in the ratio of $\frac{7}{6}$ of the corresponding sides of the ΔABC

7. Coordinate Geometry

I. Four alternatives are given for every question. Choose one appropriate answer :

1. Coordinates of origin are
   A) (1, 1) B) (-1, 0) C) (0, 1) D) (0, 0)
2. The distance of point P(x, y) from the origin is 5 units, then the coordinates of point 'P' are
   A) (1, 1) B) (-1, 0) C) (0, 1) D) (0, 0)
3. Distance between point P(x, y) and the origin is
   A) $\sqrt{x^2+y^2}$ B) $\sqrt{x+y}$ C) $\sqrt{x-y}$ D) $\sqrt{(x^2+y^2)^2}$
4. The perpendicular distance of point P(3, 5) from the x-axis is
   A) 3 units B) 5 units C) 6 units D) 8 units

II. One Marks Questions:

1. Formula to find the distance between two points.
2. Find the distance between origin and point (5, -8).
3. Write the coordinate of point on x-axis.
3. Write the co-ordinates of origin.
4. Write the formula to find mid point of a line joining any two points.

III. Two-Three Marks Questions:

1. Find the distance between the points (2,3) and (4,1)
2. Determine of the points (1,5) , (2,3) and (-2, -11) are collinear.
3. Check whether (5,-2), (6, 4) and (7,-2) are the vertices of an isosceles triangle. (3marks)
4. Find the value of 'y' for which the distance between the points (2, -3) and (10, y) is 10 units.
5. Find the co-ordinates of the points which divide the line segment joining the points (4-3) and (8,5) in the radio 3:1 internally. (3marks)
6. In what radio does the point (-4,6) divide the line segment joining the points (-6,10) and (3, -8)? (3marks)
7. Find the co-ordinates of a point A, where AB is the diameter of a circle whose center is (2, -3) and B (1, 4). (3marks)
8. Find the area of the triangle whose vertices are (2, 3), (-1, 0) and (2, -4) (3marks)

IV. Four Marks Questions:

1. Show that (3, 0), (6, 4), (-1, 3) are the vertices of a right angled triangle.
2. Show that (9, 0), (9, 6), (-9, 6) and (-9, 0) are the vertices of a rectangle.

V. Five Marks Questions:

1. Show that the points O (0, 0), A (3, $\sqrt{3}$) and B (3, $-\sqrt{3}$) are the vertices of an equilateral triangle. Find the area of this triangle.

8. Real Numbers

I. Four alternatives are given for every question. Choose one appropriate answer :

1. The H.C.F. of 26 and 91 is
   A) 7 B) 13 C) 20 D) 26
2. If the H.C.F. of 6 and 20 is 2, then the L.C.M. is
   A) 40 B) 120 C) 60 D) 240
3. 72 and 28 can be expressed using Euclid's division algorithm
   A) 28 = (72 – 16) x 2 B) 72 = 28 x 2 + 16 C) 72 = (28 x 2) – 16 D) 16 = 72- (28 + 2)

II. One Marks Questions:

1. Express 196 as product of prime factors.
2. Express 1024 as product of prime factors.
3. Find HCF of 55 and 210.
4. Find HCF of 18 and 45.
5. Find LCM of 72 and 105.
6. Is (17 x 5 x 11 x 2 + 2) A composite number.
7. Write the decimal expansion of $\frac{6}{15}$.
8. State Euclid"s division lemma.
9. State fundamental theorem of Arithmetic.

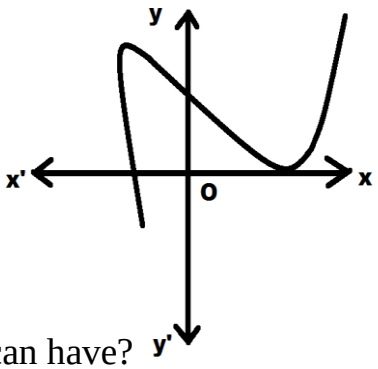
III. Two-Three Marks Questions:

1. Prove that $5 + \sqrt{6}$ is an irrational.
2. Prove that $2\sqrt{3} - 4$ is an irrational.
3. Prove that $\sqrt{3} + \sqrt{2}$ is an irrational.
4. Prove that is $\sqrt{2}$ is an irrational

9. POLYNOMIALS

I. Four alternatives are given against every question choose the correct answer.

1. The sum and product of the zeroes of the quadratic polynomial is -4 and 1. Then the quadratic polynomial is
   A) x^2-4x+1 B) x^2+4x+1 C) x^2-4x-1 D) x^2+4x-1
2. The sum of zeroes of a polynomial p(x) = $3x^2$- 2x – 8
   A) $\frac{2}{3}$ B) $\frac{-2}{3}$ C) $\frac{8}{3}$ D) $\frac{3}{2}$
3. In the figure the graph of a polynomial y = f(x) is given, the number of zeroes of f(x)
   A) 1 B) 2 C) 3 D) 4
4. In $ax^2 + bx + c$, if a = 0, then resulting polynomial is
   A) Linear polynomial B) Quadratic polynomial
   C) Cubic polynomial D) 4th degree polynomial



II. Solve the following problems. (1 marks)

1. Write the general form of quadratic polynomial.
2. Find the sum of the zeroes of quadratic polynomial x^2 -5.
3. Write the degree of the polynomial x^3 -$3x^2$ -5x +7.
4. What is the maximum number of zeroes a quadratic polynomial can have?
5. Find the value of p(x)= x^2 + 2 x – 5 at P(1).
6. Find the zero of the polynomial 2x + 3.

III. Answer the following questions. (2 marks)

1. Divide $p(x) = x^3 + 6x^2 + 11x-6$ by $g(x) = x^2 + x -1$
2. If x = 1 is a zero of the polynomial $p(x)=x^3 -2x^2 + 4x + k$ find the value of 'k'.
3. Find the zeroes of the polynomial $x^2 – 7x + 12$.
4. Find the sum and product of the zeroes of the polynomial $x^2 – 2x – 8$.
5. Find the quadratic polynomial having zeroes 5 and 3.
6. Find the quadratic polynomial whose sum and product of the zeroes are $\frac{1}{4}$ and-1

IV. Answer the following questions. (3 marks)

1. Find all the zeroes of $p(x) = x^3 + 13x^2 + 32x+20$. If one of its zero is -2.
2. On dividing $x^3 - 3x^2 + x + 2$ by a polynomial g(x) the quotient and remainder were (x-2) and (-2x + 4) respectively. Find g(x).
3. Find all the zeroes of the polynomial $p(x)=x^4-3x^3-x^2+9x-6$ if two of its zeroes are $\sqrt{3}$ and $-\sqrt{3}$.

10. Quadratic Equations

I. Choose the correct answer:

1. Which of the following equation has two equal root?
   A) $x^2 -2x-1 = 0$ B) $x^2 - 2x +1 = 0$ C) $2x^2 - 2x + 1 = 0$ D) $x^2-2x-3 = 0$
2. The nature of the roots of a quadratic equation $ax^2 + bx + c = 0$ depends on
   A) $b^2 -4ac$ B) $b^2 -ac$ C) $b^2 +4ac$ D) $b^2 +ac$
3. The roots of the quadratic equation $3x^2 – 6x = 0$ are
   A) (0,2) B) (3,6) C)(0,-2) D) (0,6)
4. The nature of the roots of the quadratic equation $2x^2 – 4x + 3 = 0$ are.
   A) real and distinct B) real and equal
   C) no real roots D) imaginary
5. The sum of the squares of two consecutive natural numbers is 20. Represent this statement in the form of a quadratic equation.
   A) $x^2 + (x + 1)^2 =20$ B) $x^2 –(x – 1)^2 = 20$
   C) $(x + 1) – x^2 =20$ D) $x^2 + (x + 1)^2 + 20 = 0$.

II. Solve the following problems. (1 marks)

1. Write the standard form of the quadratic equation.
2. Write the discriminant of the quadratic equation $ax^2 + bx + c = 0$
3. If $b^2 - 4ac < 0$ then find the nature of the roots of quadratic equation $ax^2 + bx + c = 0$.

III. Solve the following problems. (2 marks)

1. Solve the equation $x^2 – 2x - 4 = 0$ using quadratic formula.
2. Find the value of 'k' if the roots of the equation $9x^2 – 3kx +4 = 0$ are equal.
3. Determine the nature of the roots of the quadratic equation $2x^2 + 5x + 5= 0$.
4. One side of a rectangle exceeds its other side by 2 cm. If its area is $195cm^2$. Find the sides of the rectangle.
5. The length of the rectangular mango grove is twice its breadth and its area is $800\ m^2$. Find its length and breadth.

IV. Three marks questions:

1. Find the roots of the equation $x^2 - 6x - 2 = 0$ by the method of completing the square.
2. The diagonal of a rectangular field is 60 m more than the shorter side. If the longer side is 30 m more than the shorter side. Find the sides of the field.
3. The altitude of a triangle is 6 cm is greater than its base. If its area is 108 cm^2. find its base and height.
4. The altitude of a right triangle is 7 cm less than its base. If the hypotenuse is 13 cm. find the other two sides.

V. Four marks questions:

1. A train travels 15 km / hr faster, it would take one hour less to travel 180 km. find the original speed of the train.
2. A shopkeeper buys a number of books for ₹80. If he had bought 4 more books for the same amount each book would have cost ₹1 less. How many books did he buy?
3. The side of a square exceeds the side of the another square by 4 cm and the sum of the areas of the two squares is 400 sq.cm. Find the dimensions of the squares.
4. The sum of the ages of a father and his son is 45 years. Five years ago, the product of their ages was 124, determine their present ages.
5. A dealer sells a toy for ₹24 and gains as much percent as the cost price of the toy. Find the cost price of the toy.

VI. Five marks questions:

1. Anirudh bought some books for ₹60. Had he bought 5 more books for the same amount each book would have cost him ₹1 less. Find the number of books bought by Anirudh.
2. A motor boat whose speed is 15 km/hr. In still water takes 4 hours 30 minutes to go 30 km upstream than to return downstream to the same spot. Find the speed of the stream.

11. An Introduction To Trigonometry.

I. Choose the most appropriate answer for the following questions :

1. For an acute angle $'\theta'$ if $\sin\theta = \frac{5}{4}$, then the value of $\cos\theta$ is

   A) $\frac{5}{3}$ B) $\frac{16}{25}$ C) $\frac{4}{5}$ D) $\frac{25}{16}$

2. If $\theta = 90^0$, then the value of $\sin^2\theta + \cot^2\theta$ is

   A) 2 B) 1 C) 0 D) N.D.

3. If $\angle A$ is an acute angle, then $\sin(90^0 - A) =$

   A) coseA B) secA C) tanA D) cosA

4. $\sin^2 A + \sin^2(90^0 - A) =$

   A) 1 B) 0 C) $\sin 90^0$ D) $2\sin^2 A$

5. For an acute angle $'\theta'$ if $2\sin\theta = 1$, then the value of θ is

   A) 45^0 B) 60^0 C) 30^0 D) 0^0

6. $\sin^2 30^0 - \cos^2 60^0$ is

   A) $\frac{1}{2}$ B) 0 C) $\frac{-1}{2}$ D) 1

7. $\tan 0^0 =$

A) $\sin 90^0$ B) $\cos 0^0$ C) $\cos 90^0$ D) $\sec 0^0$

8. The value of $\tan 40^0 - \cot 50^0$ is same as

A) $\sin 90^0$ B) $\cos 0^0$ C) $\cos 90^0$ D) $\sec 0^0$

9. If $\theta = 30^0$, then $\sin\theta . \sec\theta =$

A) $\frac{\sqrt{3}}{4}$ B) $\sqrt{3}$ C) $\frac{4}{\sqrt{3}}$ D) $\frac{1}{\sqrt{3}}$

10. $\sin 90^0 . \cos 90^0 =$

A) $\tan 90^0$ B) $\sec 90^0$ C) $\cot 90^0$ D) $\text{cosec } 90^0$

II. Answer the following questions :

1. If $2\cos\theta = 1$ find $\sec\theta$.
2. If $3\tan\theta = \sqrt{3}$. Find θ.
3. If $\frac{1-\cos^2\theta}{\sin\theta} = 1$ find θ.
4. Show that $\sec^2\theta - \tan^2\theta = 1$.
5. Evaluate $\cot 60^0 . \cos 30^0 - \sin 60^0 . \tan 30^0$.
6. Evaluate $\text{cosec}^2(90^0 - \theta) - \tan^2\theta$.
7. Evaluate $\frac{\sin 36^0}{\cos 54^0}$
8. If $\tan A = \frac{3}{4}$, and $A + B = 90^0$, find cotB.
9. Evaluate $\tan 48^0 . \tan 23^0 . \tan 42^0 . \tan 67^0$.
10. Show that $(1 + \tan^2\theta)\cos^2\theta = 1$.
11. If cosA = sinB, show that $A + B = 90^0$.
12. If $\tan\theta = \frac{12}{5}$, find $\frac{1+\sin\theta}{1-\sin\theta}$.

III. Answer the following questions :

1. If $\sin A = \frac{3}{5}$, find cotA.
2. Find A, if tan3A = cot2A, where 3A and 2A are acute angles.
3. Find θ, if $\text{cosec}(\theta + 54^0) = \sec\theta$, where $(\theta + 54^0)$ is an acute angle.
4. Show that $\sin\frac{B+C}{2} = \cos\frac{A}{2}$, where A, B and C are interior angles of a triangle ABC.
5. Verify $\sin 2\theta = \frac{2\cot\theta}{\sec 2\theta}$ for $\theta = 30^0$.
6. Show that sinA . cosB – coaA . sinB = sin(A - B), where $\angle A = 60^0$ and $\angle B = 30^0$.
7. Find $'\theta'$ if $\frac{\cos\theta}{1-\sin\theta} + \frac{\cos\theta}{1+\sin\theta} = 2\sec\theta$, where θ is an acute angle.
8. Find 'A' if $\sin 2A = \cos(A - 18^0)$, where 2A is an acute angle.
9. Show that $\frac{2\cos^3\theta - \cos\theta}{\sin\theta - 2\sin^3\theta} = \cot\theta$.
10. If $\theta = 30^0$, show that $\cos^2\theta = \frac{1-\tan^2\theta}{1+\tan^2\theta}$.
11. Find $'\theta'$ if $\cos\theta = \cos 60^0 . \cos 30^0 - \sin 60^0 . \sin 30^0$.
12. Show that $\frac{\cos 30^0 + \sin 60^0}{1 + \cos 90^0 + \sin 90^0} = \sin 60^0$.

13. Show that $\frac{sin\theta}{1-cos\theta}$ = cosecθ + cotθ.
14. Prove that $\frac{tan\theta+1}{tan\theta}$ = sec$^2\theta$.
15. Prove that $\frac{(1+cot^2\theta)tan\theta}{sec^2\theta}$ = cotθ.
16. If 4sinA – 3cosA = 0, then find tanA + cotA.
17. Find $'\theta'$, if sinθ = cos(θ - 30^0), where θ and (θ - 30^0) are acute angles.
18. In a right angled triangle ∠A and ∠B are acute angles. If cosA = cosB, show that ∠A = ∠B.
19. If tanA = $\frac{5}{12}$, find (sinA + cosA)secA.
20. Find A and B, if sin(A + B) = 1, where $0^0 < (A + B) \leq 90^0$ and A ≥ B.

IV. Prove the following (3/4marks) :

1. $\sqrt{\frac{1-sin\theta}{1+sin\theta}}$ = secθ – tanθ.
2. $\frac{1-cos\theta}{1+cos\theta}$ = (cosecθ - cotθ)^2.
3. $\frac{sinA+cosA}{sinA-cosA} + \frac{sinA-cosA}{sinA+cosA} = \frac{2}{1-2cos^2A}$.
4. $\frac{sin\theta}{1+cos\theta} + \frac{1+cos\theta}{sin\theta}$ = 2cosecθ.
5. $\frac{sin\theta}{1-cos\theta} + \frac{tan\theta}{1+cos\theta}$ =secθ . cosecθ + cosθ.
6. $\frac{1}{secA-1} + \frac{1}{secA+1}$ = 2cosecA . cotA.
7. $\sqrt{\frac{1-cosA}{1+cosA}} + \sqrt{\frac{1+cosA}{1-cosA}}$ = 2cosecA.
8. tan^{2}A – sin^{2}A = tan^{2}A . sin^{2}A.
9. sinθ = $\frac{3}{5}$ (tanθ + secθ)^2.
10. $\frac{tan^3\theta}{1+tan^2\theta} + \frac{cot^3\theta}{1+cot^2\theta}$ = secθ . cosecθ . 2sinθ . cosθ.
11. $\frac{cosA}{cosecA+1} + \frac{cosA}{cosecA-1}$ = 2tanA.
12. $\frac{1+cos\theta-sin^2\theta}{sin\theta(1+cos\theta)}$ = cotθ.
13. $\frac{tan^2A}{1+tan^2A} + \frac{cot^2A}{1+cot^2A}$ = 1.

12. Some Applications Of Trigonometry

I. Answer the following questions:- (2 and 3marks)

1. Find the height of a vertical pole, if the angle of elevation is 30^0 when its top is observed from a point 60 m away from its foot.
2. From the top of a building 30$\sqrt{3}$ m high, the angle of depression of a car on the ground is observed to be 60^0. Find the distance of the car from the base of the building.

3. Find the angle of elevation, when an object at the top of a building of height 70 m is observed from a point on the ground $70\sqrt{3}$ m away from the base of the building.
4. Find the angle of depression, when a person standing on the ground is observed from the tip the of tower $50\sqrt{3}$ m high, who is standing $50\sqrt{3}$ m away from the foot of the tower.
5. Find the angle of depression of an observer $100\sqrt{3}$ cm tall, looks at the tip of his shadow which 1 m from his foot.
6. From the top of building 16 m high, the angular elevation of the top of a hill is 60^0 and angular depression of the foot of the hill is 30^0. Find the height of the hill.
7. Two wind mills of height 50 m and 40 m are standing on either side of a field. A person observes their tips from a point in between them. If the angle of elevation is 45^0 in each instance, find the distance between the windmills.
8. The angles of elevation of the top of a tower as seen from the top and bottom of a building are 30^0 and 60^0 respectively. If the height of the building is 15 m, then find the height of the tower.
9. On a horizontal plane, there is a vertical tower with a flag pole on the top of it. At a point 9 m away from the foot of the tower the angles of elevation of the top and bottom of the flag pole are 60^0 and 30^0 respectively. Find the height of the flag pole.
10. Two boats approach a light house in mid-sea from opposite directions. The angles of elevation of the top of the light house from the boats are 30^0 and 45^0 respectively. If the distance between them is 100 m, find the height of the light house.
11. A kite flying at a height of 80 m above the ground is tied tightly to a nail on the top of a building of height 10 m, by thread. If the angle subtended by the thread with the building is 30^0, find the length of the thread.
12. An observer, 1.5 m tall is standing 28.5 m away from the foot of a tower.If the angle of elevation of the top of the tower from his eyes is 45^0, find the height of the tower.

VI. Five marks questions:

1. A straight highway leads to the foot of at tower. A man standing at the top of the tower observes a car at an angle of depression of 30^0, which is approaching the foot of the tower with a uniform speed. Six seconds later the angle of depression of the car is found to be 60^0. Find the time taken by the car to reach the foot of the tower from the point.
2. Two poles of equal heights are standing opposite each other on either side of the road which is 80 feet width. From a point between them on the road, the angles of elevation of the top of the poles are 60^0 and 30^0 respectively, find the height of the pole and the distance of the point from the pole.
3. A TV tower stands vertically on a bank of a canal. From a point on the other bank directly opposite the tower the angle of elevation of the top of the tower is 60^0 from another point 20 m away from this point on the line joining this point to the foot of the tower. The angle of elevation of the top of the tower is 30^0. Find the height of the tower and width of the canal.
4. From the top of a 7 m height building the angle of elevation of the top of a cable tower is 60^0 and the angle of depression of its foot is 45^0. Determine the height of the tower.

13. Statistics

I. Choose the most appropriate answer for the following questions :

1. The class mark of the class interval 20-25 is

   A) 22 B)22 and 23 C) 22.5 D) 23

2. For a frequency distribution, mean, median and mode are related as

   A) Mode = 3 mean – 2 Median B) Mode = 2 Median – 3 Mean

   C) Mode = 3 Median – 2 Mean D) Mode = 3 median + 2 Mean

3. For the following distribution the modal class is

C-I	5 - 10	10 -15	15 -20	20 - 25	25 - 30
f	6	8	6	10	5

   A) 5 - 10 B) l0 - 15 C) 20 - 25 D) 25 - 30

II. Answer the following questions:- (2/3 marks)

1. Calculate the mean of the following frequency distributions.

x	5	10	15	20	25
f	6	8	6	10	5

2. Calculate the mean of the following frequency distributions.

Class interval	0-10	10-20	20-30	30-40	40-50
Frequency	7	10	15	8	10

3. Calculate mean

Class interval	0-10	10-20	20-30	30-40
Frequency	3	7	3	2

4. The arithmetic mean of the following data is 14. Find the value of ‘k’

x	5	10	15	20	25
f	7	k	8	4	5

5. A survey conduct on 20 households in a locality group of students resulted in the following frequency table for the number of members in a household.

Family size	1-3	3-5	5-7	7-9	9-11
No of families	7	8	2	2	1

III. Answer the following questions:- (3/4 marks)

1. Find the median of the following frequency distribution.

Class interval	0-20	20-40	40-60	60-80	80-100	100-120	120-140
Frequency	7	10	15	8	10	5	3

2. If the median of the distribution given below is 28.5, find the value of x and y.

Class interval	0-10	10-20	20-30	30-40	40-50	50-60
Frequency	5	x	20	15	y	5

3. The following table gives production yield per hectare of wheat 100 farms of a village draw a less than ogive.

Production yield	50-55	55-60	60-65	65-70	70-75	75-80
No of formers	2	8	12	24	38	16

4. The monthly profit (in) of 100 shops are distributed at follows: Draw more than type ogive.

Profit per shop	0-50	50-100	100-150	150-200	200-250
No of shops	12	18	27	20	17

5. The annual rainfall records of a city for 66 days it given in the following table. Calculate the median rainfall using ogives of more than type and less than type.

Rainfall in cm	0-10	10-20	20-30	30-40	40-50	50-60
No of days	22	10	8	15	5	6

14. Probability

I. Choose the correct Answer :

1. The probability of winning a game is 0.58 then the probability of losing the same game is
   A) 1 B) 0.52 C) 0.42 D) 0.32
2. If two coins are tossed simultaneously then the probability of getting at least one head is
   A) $\frac{3}{4}$ B) $\frac{1}{2}$ C) $\frac{1}{4}$ D) 1
3. Which one of the following cannot be the probability of an event?
   A) 0 B) $\frac{1}{2}$ C) 1 D) $\frac{5}{4}$
4. The probability of Sangeetha winning the tennis match is 0.62. what is the probability of Reshma winning the same match?
   A) 0.38 B) 0.62 C) 1 D) 0.48

II. Answer the following questions. (1 mark)

1. What is the probability of a sure event?
2. What is the probability of an impossible event?
3. What is the sum of probabilities of all elementary events in a random experiment?

III. Answer the following questions. (2/3 marks)

1. A dice is thrown once. Find the probability of getting
   i) a prime number ii) a square number
2. Two dice are thrown at the same find the probability of getting
   i) same number on both dice ii) different number on both dice
3. A bag contains cards numbered from 1 to 10 one card is drawn at random from the bag. Find the probability of getting?
   i) an odd number ii) a cube
4. A bag contains 4 green, 5 white, 5 black and 3 red balls. A ball is taken out of the random. Find the probability that the ball taken is?
   i) Red ii) not black

5. 12 defective pens are accidentally mixed with 132 good ones. It is not possible to just look at a pen and tell whether or not it is defective. One pen is taken out at random from this lot. Determine the probability that the pen taken out is a good one.
6. Two coins are tossed simultaneously. Find the probability of getting.
   i) at most one tail ii) exactly two heads.
7. A box contains 5 red marbles, 8 white marbles and 4 green marbles. One marbles is taken out of the box at random. What is the probability that the marble taken out will be Find the probability that the ball taken is?
   i) Red ii) White iii) Not green
8. A box contains 9 discs which are numbered from 1 to 90. If one disc is drawn at random from the box , find the probability that bears
   i) a two-digit number ii) a perfect square number iii) a number divisible by 5
9. A die is thrown once, find the probability of getting
   i) not a prime number ii) a number lying between 2 and 6
   iii) an odd number.
10. One card is drawn from well-shuffled deck of 52 cards. Find the probability of getting
   i) a king of red colour ii) a face card iii) the queen of diamonds.

15. Surface area and volumes

I. Four alternatives are given against every question / incomplete statement. Choose the correct answer.

1. The total surface area of a hemisphere is
   A) $2\pi r^2$ B) $3\pi r^2$ C) $4\pi r^2$ D) $6\pi r^2$
2. The total surface area of a cube of edge ‘a’ units is
   A) a^2 B) $4a^2$ C) $3a^2$ D) $6a^2$
3. If two solid hemispheres of same base radius ‘r’ are joint together along their bases, then curved surface area of this new solid is.
   A) $4\pi r^2$ B) $3\pi r^2$ C) $2\pi r^2$ D) πr^2
4. The ratio of volume of a cube to that of a sphere which will exactly fit inside the cube is
   A) $3 : 4\pi$ B) $3 : \pi$ C) $6 : \pi$ D) $2 : \pi$
5. If three metallic sphere of radius 6 cm, 8 cm and 10 cm are melted to form a single large sphere, the diameter of the large sphere is
   A) 12 cm B) 20 cm C) 24 cm D) 36 cm
6. The radii of the circular ends of a frustum are 6 cm and 14 cm. if its slant height is 10 cm, then its vertical height is
   A) 6 cm B) 8cm C) 4 cm D)7 cm

II. Answer the following questions:-

1. Complete the table.

Name of the solid	L.S.A/C.S.A	T.S.A	Volume
1. cylinder			
2. cone			
3. hemisphere			
4. sphere			
5. frustum			

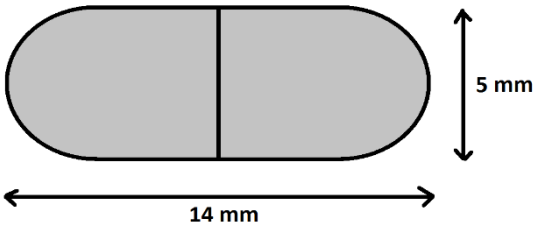
2. Write the total surface area of a cuboid of length ‘l’ breadth ‘b’ and height ‘h’
3. What is the volume of a cube of edge ’a’?

III. Answer the following questions:- (2 marks)

1. Two cubes of volume 64 cm^3 are joined end to end. Find the surface area of the resulting cuboid.
2. A toy is in the form of cone mounted on a hemisphere of same radius 7 cm. if the total height of the toy is 31 cm find its total surface area.
3. A 20 m deep well with diameter 7 m is dug and the earth from digging in evenly spread out to form a platform 22 m x 14 m. Find the height of the platform.
4. How many silver coins, each of 1.75 cm diameter and of thickness 2 mm, must be melted to form a cuboid of dimensions 5.50 cm x 10 cm x 3.5 cm?
5. The slant height of a frustum of a cone are 5 cm and the perimeters of its circular ends are 20 cm and 12 cm. find the curved surface area of the frustum.
6. The perimeters of the ends of a frustum of a cone are 48 cm and 36 cm. If the height of the frustum be 11 cm and find its volume.
7. A sphere of radius 3 cm is melted to form a cone the height of cone is 3 cm. Find the radius.

IV. Answer the following questions:- (3-4 marks)

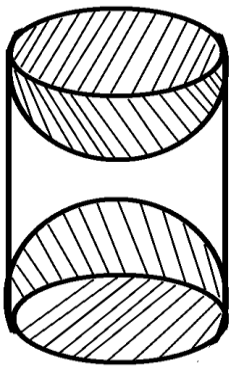
1. A solid consisting of a right circular cone of height 120 cm and radius 60 cm standing on a hemisphere of radius 60 cm is placed upright in a right circular cylinder fall of water such that if touches the bottom. Find the volume of water left in the cylinder, if the radius of the cylinder is 60 cm and height is 180 cm.
2. A tent 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 slant height of the top is 2.8 m.
   a) Find the area of the canvas used for making the tent.
   b) Find the cost of canvas of the tent at the rate ₹500/m^2 also find the volume of air enclosed in the tent.
3. The rain water from a roof of 22 m x 20 m drains into a cylindrical vessel having diameter of base 2 m and height 3.5 m. If the vessel is just fall, find the rain fall in cm.
4. A medicine capsule is in the shape of a cylinder with two hemispheres stuck to each of its ends(see figure). the length of the entire capsule is 14 mm and the diameter of the capsule is 5 mm. find its surface area of.



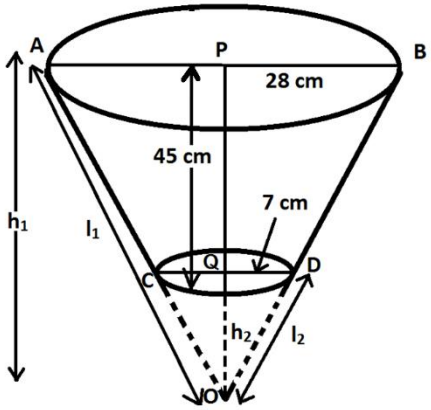
5. A vessel is in the form of inverted cone. Its height is 8 cm and the radius of its top , which is open, is 5 cm. It is filled with water up to the brim. When lead shots, each of which is a sphere of radius 0.5 cm are dropped into the vessel, one-fourth of the water flows out. Find the number of lead shots dropped in the vessel.
6. Selvi's house has an overhead tank in the shape of a cylinder. This is filled by pumping water from a sump (an underground tank) which is in the shape of cuboid. The sump has dimensions 1.57 m x 1.44 m x 95 cm. The water left in the sump after the overhead tank has been completely filled with water from the sump which had been full. Compare the capacity of the tank with that of the sump. [use $\pi = 3.14$]

VI. Five marks questions:

1. 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, find the total surface area of the article.



2. The radii of the ends of a frustum of a cone 45 cm high are 28 cm and 7 cm (see figure). Find its volume, the curved surface area and the total surface area [Take $\pi = \frac{22}{7}$].



3. A container, opened from the top and made up of a metal sheet 1 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 milk. Which can completely fill the container, at the rate of ₹20 per litre? Also find the cost of metal sheet used to make the container, if it costs ₹8 per 100 cm^2.