INTERNATIONAL INDIAN SCHOOL, RIYADH

Class: x SUBJECT: MATHEMATICS

1. REAL NUMBERS [6marks]

1. Prove that $\sqrt{3}$ is irrational number
2. Prove that $n^2 - n$ is divisible by 2 for every positive integer n
3. Prove that $5 - \sqrt{3}$ is irrational
4. Prove that $\sqrt{2} + \sqrt{3}$ is an irrational number
5. Prove that $7 - 2\sqrt{3}$ is an irrational number
6. Show that any positive odd integer is of the form $4q + 1$ or $4q + 3$ where q is a positive integer
7. Shoe that 8^n cannot end with the digit 0 for any natural number n
8. The H.C.F and L.C.M of two numbers are 9 and 90, respectively. If one of the number is 18, find the other (45)
9. If d is the H.C.F of 45 and 27 , find x , y satisfying $d = 27x + 45y$ ($x = 2, y = -1$)
10. Given that H.C.F (306, 657) = 9, find L.C.M (306, 657) (22338)
11. Find the HCF of 72 and 96 by Euclids division algorithm and express it in the form 96m + 72n, wher m and n are integers. (24)
12. Find the HCF of 96 and 404 by prime facorisation method. Hence, find their LCM (4,9696)
13. Find the HCF of the smallest composite number and smallest prime number (2)
14. Find the HCF of 180,252 and 324 by using Euclids division algorithm (36)
15. If a ($2^2 \times 3^3 \times 5^4$) and b = ($2^3 \times 3^2 \times 5$), then find HCF(a,b) (180)
16. If HCF (a,b) = 12 and a x b = 1800, then find LCM(a,b)
17. Find the greatest number of 6 digits exactly divisible by 24, 15 and 36 (999720)
    [LCM(24,15,36) = 360 , required no = 999999 – remainder when 999999 is divisible by 360]
18. Find the greatest number which exactly divides 280 and 1245 leaving remainder 4 and 3 (138)
19. In a morning walk, three persons step of together. Their step measures 80 cm, 85cm and 90 cm. What is the minimum distance each should walk so that they cover the distance in complete steps (LCM = 12240)
20. The length, breadth and height of a room are 8m 25cm, 6m 75cm and 4m 50cm respectively. Find the length of the longest rod that can measure the three dimensions of the room respectively (HCF = 75cm)
21. Write the denominator of $\frac{91}{1250}$ in the form $2^n 5^m$, where n and m are non-negative Integers. Also write its decimal expansion without actual division ($2 \times 5^4 = 0.0728$)
22. Write the denominator of $\frac{173}{1250}$ in the form $2^n 5^m$, where n and m are non-negative Integers. Also find the value of m & n ($m = 4, n = 1$)
23. Write whether the rational number 7/75 will have a terminating decimal expansion or a non-terminating repeating decimal expansion
24. Is 7 x 5 x 3 + 3 is a composite number ? justify your answer.

25. Is it possible for the HCF & LCM of two numbers to be 18 and 378 respectively? Justify your answer
26. Determine the value of p & q so that the prime factorization of 2520 is expressible as $2^3 \times 3^p \times q \times 7$ (2, 5)
27. If the HCF of 210 & 55 is expressible in the form 210 x 5 + 55y, find y (y = - 19)
28. Explain why $\frac{29}{2^3 \times 5^3}$ is a terminating decimal expansion
29. Check whether the pair of numbers 50 and 20 are coprimes or not
30. Find the smallest positive rational number by which 1/7 should be multiplied so that its decimal expansion terminates after 2 places of decimal (7/100)

ALGEBRA [20 marks]

2. POLYNOMIALS

1. Find the zeroes of the polynomial $2x^2 + 2x - 12$ and verify the relationship between the zeroes and the coefficient (2, - 3)
2. Find the zeroes of the polynomial $4\sqrt{3}x^2 + 5x - 2\sqrt{3}$ and verify the relationship between the zeroes and the coefficient
3. Find the zeroes of the polynomial $4x^2 - 7$ and verify the relationship between the zeroes and the coefficient
4. If α and β are the zeroes of the polynomial $x^2 - 7x + 10$, find the value of $\alpha^3 + \beta^3$ (133)
5. If α & β are zeroes of $x^2 + 5x + 5$, find the value of $\alpha^{-1} + \beta^{-1}$ (- 1)
6. If α & β are the zeroes of the polynomial $x^2 - 8x + k$ such that $\alpha^2 + \beta^2 = 40$, find k (12)
7. If α & β are zeroes $x^2 - 6x + a$, find the value of a if $3\alpha + 2\beta = 20$ (a = - 16)
8. Find all the zeroes of the polynomial $x^4 - 7x^2 + 12$, if two of its zeroes are $\sqrt{3}$ and $-\sqrt{3}$ (- 2, 2)
9. Find all the zeroes of the polynomial $3x^4 + 6x^3 - 2x^2 - 10x - 5$, if two of its zeroes are $\sqrt{5/3}$ and $-\sqrt{5/3}$
10. If 1 and 3 are two zeroes of a polynomial $x^4 + x^3 - 11x^2 - 9x + 18$, then find the zeroes of the polynomial.
11. Find all the zeroes of polynomial $2x^4 - 9x^3 + 5x^2 + 3x - 1$, if two of its zeroes are $2 + \sqrt{3}$ & $2 - \sqrt{3}$ (1, - ½)
12. What is the values of p and q if the polynomial $x^4 + x^3 + 8x^2 + px + q$ is exactly divisible by $x^2 + 1$ (p = 1, q = 7)
13. If $x^4 - 2x^3 + 6x^2 - 6x + k$ is completely divisible by $x^2 - 2x + 3$, then find the value of k (9)
14. Divide ($6 + 23x + 25x^2 + 6x^3$) by ($3 + 7x + 2x^2$) and verify division algorithm (q = 3x + 2, r = 0)
15. On dividing the polynomial $4x^4 - 5x^3 - 39x^2 - 46x - 2$ by the polynomial g(x) , the quotient and remainder were $x^2 - 3x - 5$ and $-5x + 8$ respectively .Find g(x) ($4x^2 + 7x + 2$)
16. Quadratic polynomial $2x^2 - 3x + 1$ has a zeroes as α and β . Now form a quadratic polynomial whose zeroes are 3α and 3β ($2x^2 - 9x + 9$)
17. If α & β are the zeroes of the quadratic polynomial $x^2 - x - 2$, find a polynomial whose zeroes are 2α + 1 and 2β + 1 ($x^2 - 4x - 5$)
18. Find a quadratic polynomial whose zeroes are $2 + \sqrt{3}$ & $2 - \sqrt{3}$ ($x^2 - 4x + 1$)

19. Find a quadratic polynomial whose zeroes are $\frac{3+\sqrt{5}}{5}$ and $\frac{3-\sqrt{5}}{5}$ $(25x^2 - 30x + 4)$
20. If α and $1/\alpha$ are the zeroes of the polynomial $6x^2 - 13x - k + 2$, find the value of k $(k = -4)$
21. Find the value of k, if the sum of the zeroes of the polynomial $x^2 - (k + 6)x + 2(2k - 1)$ is half their product $(k = 7)$
22. If the zeroes of the polynomial $x^2 - 5x + k$ are the reciprocal of each other, then find the value of k $(k = 1)$
23. If one zero of the polynomial $(a^2 + 9)x^2 + 13x + 6a$ reciprocal of the other, then find the value of a $(a = 3)$
24. If 1 is a zero of polynomial $ax^2 - 3(a - 1) - 1$, then find the value of a $(a = 1)$
25. What should be added in the polynomial $x^3 - 6x^2 + 11x + 8$ so that it is completely divisible by $x^2 - 3x + 2$ (14)

3. LINEAR EQUATIONS IN TWO VARIABLES

1. Draw the graphs of the equation $x - y = -1$ and $3x + 2y = 12$. Determine the coordinates of the vertices of the triangle formed by these lines and the x – axis and shade the triangular region. [(-1, 0), (4,0),(2,3)]
2. Solve the following system of equation by drawing their graph :
   $x + 4y = 3$, $2x + 8y = 6$, determine whether these are consistent , inconsistent or dependent
3. The area of a rectangle get reduced by 9sq units , if its length is reduced by 5 units and breadth is increased by 3 units. If we increased the length by 3 units and breadth by 2 units , the area increases by 67 sq units. Find the dimensions of the rectangle (9,17)
4. The sum of a two digit number and the number formed by interchanging its digits is 110. If 10 is subtracted from the first number, the new number is 4 more than 5 times the sum of the digits, find the number $(x = 4, y = 6$, no = 64)
5. Seven times a two digit number is equal to four times the number obtained by reversing the order of its digits. If the difference of the digits is 3, determine the number (36)
6. 2 women & 5 men can together finished a piece of work in 4 days, while 3 women & 6 men can finish it in 3 days. Find the time taken by 1 women alone to finish the work, and that taken by 1 man alone (18, 36)
7. The sum of two numbers is 1000 and the difference between their squares is 256000. Find the numbers (266, 744)
8. The ratio of income of two persons is 9 :7 and the ratio of their expenditure is 4 : 3. If each of them saves Rs200 per month. Find their monthly expenditures (Rs1800,Rs1400)
9. The perimeter of a rectangle is 44cm. If its length is increased by 4cm and its breath by 2cm, its area is increased by 72sqcm. Find the dimensions of the rectangle (12 &10)
10. The larger of the two supplementary angles exceeds the smaller by 18 degrees. Find the angles (99°, 81°)
11. A boat goes 30km upstream and 44km downstream in 10hrs. In 13 hrs it can go 40km upstream and 55km down stream. Determine the speed of the stream and that of the boat in still water (8km/hr & 3km/hr)
12. A fraction becomes 9/11, if 2 is added to both numerator and denominator . If 3 is added to both numerator and denominator it becomes 5/6. Find the fraction (7/9)

13. Solve for x and y : $ax - by = a^2 - b^2$, $x + y = a + b$ (a, - b)
14. Solve for x and y : $x/10 + y/5 = 14$, $x/8 + y/6 = 15$ (80,30)
15. Solve for x and y : $\frac{30}{x - y} + \frac{44}{x + y} = 10$ (8,3)
$\frac{40}{x - y} + \frac{55}{x + y} = 13$
16. Solve for x : $\frac{22}{3x + 2y} + \frac{7}{3x - 2y} = 3$ (3, 1)
$\frac{33}{3x + 2y} - \frac{14}{3x - 2y} = 1$
17. Find the values of a and b for which the following system of linear equations has infinitely many solutions.: $3x - (a + 1) y = 2b - 1$, $5x + (1 - 2a) y = 3b$ (8, 5)
18. Find the value of k will the following system of linear equations have no solutions.
$3x + y = 1$, $(2k - 1) x + (k - 1) y = 2k + 1$ (k = 2)
19. Write whether the following pair of linear equations is consistent or not :
$x + y = 14$, $x - y = 4$ (consistent)
20. Solve for x & y : $99x + 101y = 499$, $101x + 99y = 501$ (x = 3, y = 2)
21. Given the linear equation $3x + 4y = 9$. Write another linear equation in two variables such that the geometrical representation of the pair so formed is :
a) intersecting lines ($3x - 5y = 10$)
b) coincident lines ($6x + 8y = 18$)

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4. QUADRATIC EQUATIONS

1. Find the value of p for which the quadratic equation $(p + 1) x^2 - 6 (p + 1) x + 3(p + 9) = 0$ has equal roots. Hence, find the roots of the equation. (P = 3, x = 3, 3)
2. Find the values of k for which the quadratic equation $9x^2 - 3kx + k = 0$ has equal roots. (0,4)
3. Find the values of k for which the quadratic equation $(k - 4) x^2 + (k - 4)x + 4 = 0$ has equal roots
4. Find the values of k for which the quadratic equation $kx (3x - 10) + 25 = 0$ has equal roots. (k = 3)
5. Find the value(s) of k for which the pair of linear equations $kx + y = k^2$ and $x + ky = 1$ have infinitely many solutions (k = 1)
6. Solve for x : $\sqrt{3}x^2 - 2\sqrt{2}x - 2\sqrt{3} = 0$ (- $\sqrt{6}/3$, $\sqrt{6}$)
7. Solve for x : $9x^2 - 9(a + b)x + (2a^2 + 5ab + 2b^2) = 0$ (2a + b/3, a + 2b/3)
8. Solve for x : $x^2 - (\sqrt{2} + 1)x + \sqrt{2} = 0$
9. Solve by the method of completing the square : $6x^2 - 2 - x = 0$ (2/3, - ½)
10. Solve for x : $\frac{2x}{x - 3} + \frac{1}{2x + 3} + \frac{3x + 9}{(x - 3)(2x + 3)} = 0$ (x = - 1)
11. Solve for x : $\sqrt{2x + 9} + x = 13$ (8, 20)
12. Solve for x : $abx^2 = (a + b)2 (x - 1)$
13. Solve for x : $\frac{1}{(x - 1)(x - 2)} + \frac{1}{(x - 2)(x - 3)} + \frac{1}{(x - 3)(x - 4)} = \frac{1}{6}$ (7, - 2)

14. Solve for x : $\frac{1}{x-3} - \frac{1}{x+5} = \frac{1}{6}$ (7, - 9)

15. Solve for x : $\frac{1}{2a+b+2x} = \frac{1}{2a} + \frac{1}{b} + \frac{1}{2x}$

16. Solve by quadratic formula : $p^2x^2 + (p^2 - q^2)x - q^2 = 0$

17. Solve by quadratic formula : $9x^2 - 6b^2x - (a^4 - b^4) = 0$ $\left\{x = \frac{b^2 \pm a^2}{3}\right\}$

18. Solve for x : $\frac{a}{x-b} + \frac{b}{x-a} = 2$ (a + b, a + b/2)

19. Solve for x : $2\left[\frac{2x-1}{x+3}\right] - 3\left[\frac{x+3}{2x-1}\right] = 5$ (- 10, - 1/5)

20. If the quadratic equation $(c^2 - ab)x^2 - 2(a^2 - bc)x + b^2 - ac = 0$ in x, has equal roots, then show that either a = 0 or $a^3 + b^3 + c^3 = 3abc$

21. If the roots of the quadratic equation $(b - c)x^2 + (c - a)x + (a - b) = 0$ are real and equal, prove that 2b = a + c

22. If the roots of the quadratic equation $(x - a)(x - b) + (x - b)(x - c) + (x - c)(x - a) = 0$ are equal , then show that a = b = c

23. If the roots of the quadratic equation $x^2 + 2px + mn = 0$ are real and equal, show that the roots of the quadratic equation $x^2 - 2(m + n)x + (m^2 + n^2 + 2p^2) = 0$ are also equal

24. Solve by the method of cross multiplication: ax + by = a – b, bx – ay = a + b

25. If 1 is the root of the quadratic equation $3x^2 + ax - 2 = 0$ and the quadratic equation $a(x^2 + 6x) - b = 0$ has equal roots, find the value of b

26. If x = 3 is a root of the equation $x^2 - x + k = 0$, find the value of p so that the roots of the equation $x^2 + k(2x + k + 2) + p = 0$ are equal

27. A train covers distance of 90 kms at a uniform speed. It would have taken 30 minutes less if the speed had been 15km/hr more. Calculate the original duration of the journey

28. Rs 9000 were divided equally among a certain number of person. Had there been 20 more persons each would have got Rs160 less. Find the original number of persons.

29. Find two consecutive odd positive integers, sum of whose squares is 290 (11, 13)

30. Two water taps together can fill a tank in 9 hrs. 36 minutes. The tap of larger diameter takes 8 hrs less than the smaller one to fill the tank separately. Find the time in which each tap can separately fill the tank (16hrs, 24hrs)

31. A passenger, while boarding the plane, slipped from the stairs and got hurt. The pilot took the passenger in the emergency clinic at the airport for treatment. Due to this, the plane got delayed half an hour. To reach the destination 1500km away in time, so that the passengers could catch the connecting flight, the speed of the plane was increased by 250 km/hr than the usual speed. Find the usual speed of the plane (750km/hr)

32. The sum of the squares of two consecutive odd numbers is 394. Find the numbers (13, 15)

33. The sum of the squares of two consecutive multiples of 7 is 637. Find the multiples. (14, 21)

34. The difference of two numbers is 4. If the difference of their reciprocals is 4/21, find the numbers (3,7)

35. A train travels 180km at a uniform speed. If the speed had been 9km/hr more , it would have taken 1 hr less for the same journey. Find the speed of the train (36km/hr)
36. The speed of a boat in still water is 15km/hr.It can go 30km upstream and return downstream to the original point in 4hrs 30min. Find out the speed of the stream (5km/hr)
37. A pole has to be erected at a point on the boundary of a circular park of diameter 13m in such a way that the differences of its distances from two diametrically opposite fixed gates A & B on the boundary is7 m . Is it possible to do so, if yes , at what distances from the two gates should the pole be erected (x = 5)
38. The numerator of a fraction is 3 less than its denominator . If 1 is added to the denominator, the fraction is decreased by 1/15. Find the fraction (2/5)
39. Three consecutive positive integers are such that the sum of the square of the first and the product of the other two is 46. Find the integers (4,5,6)

5. ARITHMETIC PROGRESSION

1. Find the 31^{st} term of an A.P whose 11^{th} term is 38 and 16^{th} term is 73 (178)
2. Find the 9^{th} term from the end of the A.P : 5, 9, 13, ……, 185 (153)
3. Find the 10^{th} term from the end of the A.P : 4,9,14, ……, 254
4. Which term of the sequence 114, 109, 104, …….. is the first negative term (24)
5. Which term of the sequence 20, 19 ¼ , 18 ½ ,,,,,,,,. is the first negative term (28)
6. For what value of k will k + 9 , 2k – 1 and 2k + 7 are the consecutive terms of an A.P (18)
7. The 4^{th} term of an A.P is 0, prove that 25^{th} term of the A.P is three times its 11^{th} term
8. Find the middle term of the A.P : 6, 13, 20, ……., 216 (n = 31, a_{16} = 111)
9. The 9^{th} term of an A.P is – 32, and the sum of its 11^{th} and 13^{th} terms is – 94. Find the common difference of the A.P (d = - 5)
10. Find the sum of first 22 terms of an A.P in which d = 7 and 22^{nd} term is 149 (1661)
11. Find the number of all three digit natural numbers which are divisible by 9 (100)
12. Find the number of three digit natural numbers which are divisible by 11 (81)
13. Find the sum of all the natural numbers less than 100 which are divisible by 6
14. Find the sum of 3 digit numbers which are not divisible by 7 (424214)
15. Find the sum of first n odd natural numbers ($S_n = n^2$)
16. The sum of first n terms of an A.P is $3n^2 + 4n$. Find the 10^{th} term of this A.P
17. The sum of first n terms of an A.P is $5n – n^2$. Find the 25^{th} term of this A.P
18. The sum of the first n terms of an A.P is $3n^2 - 4n$. Find the nth term of this A.P (6n – 7)
19. If the sum of first p terms of an A.P is $ap^2 + bp$, find its common difference (d = 2a)
20. The 5^{th} term of an A.P exceeds its 12^{th} term by 14. If its 7^{th} term is 4., find the A.P (16, 14,12……)
21. Determine the A.P whose 4^{th} term is 18 and the difference of the 9^{th} term from the 15^{th} term is 30 (3, 8, 13, …….)
22. The eight term of an A.P is half its second term and the eleventh term exceed one third of its fourth term by 1. Find the 15^{th} term.
23. For what value of n, the n^{th} term of two A.P 63, 65, 67 ……. And 3, 10, 17, …… are equal

24. Find the tenth term of the sequence $\sqrt{2}$, $\sqrt{8}$, $\sqrt{18}$, ……..
25. The ninth term of an AP is equal to seven times the second term and twelth term exceeds five times the third term by 2. Find the first term and common difference.
26. The minimum age of children to be eligible to participate in a painting competition is 8 years. It is observed that the age of youngest boy was 8 years and the ages of rest of participants are having a common difference of 4 months. If the sum of ages of all the participants is 168 years, find the age of eldest participant in the painting competition ($n = 16$, $a_{16} = 13$)
27. Find the 25^{th} term of the A.P : - 5, -5/2, 0, 5/2, ……..
28. If the common difference of an A.P is 3, then find the value of $a_{20} - a_{15}$
29. The sum of 4^{th} and 8^{th} terms of an A.P is 24 and the sum of its 6^{th} and 10^{th} terms is 44. Find its 5^{th} term
30. The sum of first six terms of an A.P is 42. The ratio of its 10^{th} term to its 30^{th} term is 1:3. Find the first term of the A.P ($a = 2$)
31. If 1 + 6 + 11 + ……+ x = 148, find the value of x (36)
32. If seven times the 7^{th} term of an A.P is equal to eleven times the 11^{th} term, then what will be the 18^{th} term
33. If the sum of the first 4 terms of an A.P is 40 and that of the first 14 terms is 280., find the sum of its first n terms ($n^2 + 6n$)
34. In an A.P of 50 terms, the sum of the first 10 terms is 210 and the sum of its last 15 terms is 2565. Find the A.P
35. The sum of the first 16^{th} terms of an A.P is 112 and the sum of its next 14^{th} terms is 518. Find the A.P (- 8, - 6, - 4 ,,,,,,)
36. The sum of the first 7 terms of an A.P is 63 and the sum of its next 7 terms is 161. Find the 28^{th} term of this A.P (57)
37. Find the sum of first n terms of an A.P. whose nth term is 5n – 1. Hence find the sum of first 20 terms
38. If the ratio of sum of the first m and n terms of an A.P is $m^2 : n^2$, show that the ratio of its mth and nth terms is (2m – 1) : (2n – 1)
39. The p^{th} , q^{th} and r^{th} terms of an A,P are a, b and c . Show that $a(q - r) + b(r - p) + c(p - q) = 0$
40. If m^{th} term of an A.P is 1/n and the n^{th} term is 1/m. Show that the sum of mn terms is ½ (mn + 1)
41. If m times the m^{th} term of an A.P is equal to n times its n^{th} term, find its $(m + n)^{th}$ term
42. If s_n denotes the sum of the first n terms of an A.P . Prove that $S_{30} = 3(S_{20} - S_{10})$
43. In an A.P , if $S_5 + S_7 = 167$ & $S_{10} = 235$, find its first term ($a = 1$)

INTERNATIONAL INDIAN SCHOOL, RIYADH

CLASS: X SUBJECT: MATHEMATICS

TRIGONOMETRY [12 marks]

1. SOME APPLICATIONS OF TRIGONOMETRY

1. A man standing on the deck of a ship, which is 10 m above water level, observes the angle of elevation of the top of a hill is 60° and the angle of depression of the base of the hill is 30°. Calculate the distance of the hill from the ship and the height of the hill
(10√3m, 40m)

2.The angle of elevation of a cloud from a point 60m above a lake is 30° and angle of depression of the reflection of Cloud in the Lake is 60°. Find the height of the cloud.
(120m)

3. The angle of elevation of a jet plane from a point A on the ground is 60°. After a flight of 15 sec the angle of elevation Changes to 30°. If the jet plane is flying at a constant height of 1500√3m, then find the speed of jet plane.
(720 km /hr)

4. A vertical tower stands on a horizontal plane and is surmounted by a vertical flagstaff of height h. At a point on the Plane, the angles of elevation at the bottom and the top of the flagstaff are α and β respectively. Prove that the height of the tower is h tan α / tanβ – tanα

5. The angle of elevation of the top of a tower from two points at distances a and b metres from the base and in the same Straight line with it are complementary. Prove that height of the tower is √ab metres.

6. The angle of elevation of the top of a tower from two points at distances 6m and 13.5m from the base and in the same Straight line with it are complementary. Prove that height of the tower is 9m.

7. The angles of elevation of the top of a rock from the top and foot of a 100 m high tower are 30°and 45°respectively. Find the Height of the rock.
(236.5 m)

8. The shadow of a tower standing on a level ground is found to be 40 m longer when the sun, s altitude is 30° than when it is 60°.Find the height of the tower .
(20√3m)

9. The angle of elevation ø of a vertical tower from a point on ground is such that its tangent is 5/12. On walking 192m towards The tower in the same straight line, the tangent of the angle of elevation is found to be ¾. Find the height of the tower
(180m)

10. A bird is sitting on the top of a tree, which is 80m high. The angle of elevation of the bird, from a point on the ground is 45°.The bird flies away from the point of observation horizontally and remains at a Constant height. After 2 sec the angle of Elevation of the bird from the point of observation becomes 30° Find the speed of flying of the bird
(29.28m/sec)

11. An aero plane at an altitude of 200m observes the angles of depression of opposite points on the two banks of a river to be 45° and 60°. Find the width of the river
(315.4m)

12. Two men on either side of a cliff, 60m high, observe the angles of elevation of the top of the cliff to be 45° and 60° Respectively. Find the distance between two men
(94.6m)

13. From the top of a tower the angle of depression of an object on the horizontal ground is found to be 60° On descending 20m vertically downwards from the top of the tower, the angle of depression of the object is found to be 30°.Find the height of the tower
(30m)

14. An observer, 1.7 m tall is $20\sqrt{3}$ m away from a tower. The angle of elevation from the eye of observer to the top of tower is 30°. Find the height of tower
(21.7m)

15. Two ships are approaching a light house from opposite directions. The angles of depression of the two ships from the top of the light house are 30°and 45°. If the distance between the two ships is 100m, find the height of the light house

16. From a point 100m above a lake the angle of elevation of a stationary helicopter is 30° and the angle of depression of reflection of the helicopter in the lake is 60° . Find the height of the helicopter above lake .
(150m)

2. INTRODUCTION TO TRIGONOMETRY

1. If $\cot\Theta = 15/8$, evaluate: $\dfrac{(2 + 2\sin\Theta)(1 - \sin\Theta)}{(1 + \cos\Theta)(2 - 2\cos\Theta)}$
(225/64)

2. If Sin A = ½, find the value of $3\cos A - 4\cos^3 A$

3. If $\cot\theta = 1/\sqrt{3}$, show that $\dfrac{\sin^2\theta}{1 + \cos^2\theta} = \dfrac{3}{5}$

4. If $\sqrt{3}\tan\theta = 3\sin\theta$, find the value of $\sin^2\theta - \cos^2\theta$

5. Evaluate: $\tan^2 60^\circ - 2\cos^2 60^\circ - \frac{3}{4}\sin^2 45^\circ - 4\sin^2 30^\circ$

(9/8)

6. Evaluate: $4(\sin^4 30° + \cos^4 60°) - 3(\cos^2 45° - \sin^2 90°)$

(2)

7. If $\sin 2x = \sin 60^\circ \cos 30^\circ - \cos 60^\circ \sin 30^\circ$, find x

(15)

8. If A = B= 30•, verify that:

Sin (A + B) = sin A cos B + cosA sinB

9. If $\sec^2\theta (1+\sin\theta)(1-\sin\theta) = k$, find the value of k

(K = 1)

10. Evaluate: $\frac{\sec(90-\theta)\operatorname{cosec}\theta - \tan(90-\theta)\cot\theta + \cos^2 35 + \cos^2 55}{\tan 5^\circ \tan 15^\circ \tan 45^\circ \tan 75^\circ \tan 85^\circ}$

(2)

11. Find the value of:

$$\frac{\frac{2\sin 68^\circ}{\cos 22^\circ} - \frac{2\cot 15^\circ}{5\tan 75^\circ} - 3\tan 45^\circ \tan 20^\circ \tan 40^\circ \tan 50^\circ \tan 70^\circ}{5}$$

(1)

12. Evaluate the following:

$$\frac{2(\cos^2 45° + \tan^2 60°) - 6(\sin^2 45° - \tan^2 60°)}{\tan 30° + \cot 60°}$$

13. Evaluate: $\frac{\cos 50°}{2\sin 40°} + \frac{4(\operatorname{cosec}^2 59° - \tan^2 31°)}{3\tan^2 45°} - \frac{2}{3}\sin 90°$

14. If $\cos(40^\circ + x) = \sin 30^\circ$, find the value of x

15. $\sin 4A = \cos(A - 20^\circ)$, where 4A is an acute angle, find the value of A

(22°)

16. Find the value of θ in $2\cos 3\theta = 1$

(20°)

17. Solve for θ: $2\sin^2\theta = \frac{1}{2}$

(30°)

18. Find the acute angles A and B, A>B, if $\sin(A + 2B) = \sqrt{3}/2$ and $\cos(A + 4B) = 0$

(30°, 15°)

19. If $\tan(A + B) = \sqrt{3}$, $\tan(A - B) = 1$, $0^\circ < A + B \leq 90^\circ$, a>b, then find A and B

(52.5°, 7.5°)

20. Express cosA in terms of tanA

21. Find the value of $\sin 60^\circ$ and $\sec 30°$ geometrically

22. If x = a sinθ, y = b tanθ. Prove that $\frac{a^2}{X^2} - \frac{b^2}{y^2} = 1$

23. Prove that: $\frac{1}{1+\sin\theta} + \frac{1}{1-\sin\theta} = 2\sec^2\theta$

24. Prove: $\sqrt{\frac{1+\sin A}{1+\sin A}} = \frac{\cos A}{1-\sin A}$

25. Prove that $\sin(90-\theta)\cos(90-\theta) = \frac{\tan\theta}{1+\tan^2\theta}$

26. Prove that $(\sec^4\theta - \sec^2\theta) = (\tan^2\theta + \tan^4\theta)$

27. Prove that $(\operatorname{cosec}\theta - \cot\theta)^2 = \frac{1-\cos\theta}{1+\cos\theta}$

28. Prove that $\frac{1}{\quad} - \frac{1}{\quad} = 1 - \frac{1}{\quad}$

$$(\sec\theta - \tan\theta)\quad \cos\theta\quad \overline{\cos\theta}\quad (\sec\theta + \tan\theta)$$

29. If $\sec\theta + \tan\theta = p$, prove that $\sin\theta = \frac{p^2 - 1}{P^2 + 1}$

30. If $x = \cot A + \cos A$ and $Y = \cot A - \cos A$. Prove that $\left[\frac{x - y}{X + y}\right]^2 + \left[\frac{x - y}{2}\right]^2 = 1$

31. If $x = a \sec\theta + b \tan\theta$ and $y = a \tan\theta + b \sec\theta$ prove that $x^2 - y^2 = a^2 - b^2$

32. If $\tan A + \sin A = m$ and $\tan A - \sin A = n$, then prove that $(m^2 - n^2) = 16mn$

33. Find the value of x if $4\left\{\frac{\sec^2 59° - \cot^2 31°}{3}\right\} - 2/3 \sin 90° + 3 \tan^2 56° \tan^2 34° = x/3$ (11)

34. Prove that $\frac{1 + \cos\theta - \sin\theta}{\cos\theta - 1 + \sin\theta} = \operatorname{cosec}\theta + \cot\theta$

35. If $x/a \cos\theta + y/b \sin\theta = 1$ and $x/a \sin\theta - y/b \cos\theta = 1$, prove that $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 2$

36. If $(2A + 45°) = \cos(30° - A)$ and $0° < A < 90°$. Find the value of A (A = 15°)

37. If $\tan\theta + \frac{1}{\tan\theta} = 2$, prove that $\tan^2\theta + \frac{1}{\tan^2\theta} = 2$

38. If $\sqrt{3} \cot^2\theta - 4 \cot\theta + \sqrt{3} = 0$, find the value of $\cot^2\theta + \tan^2\theta$ (30° or 60°)

39. Prove that $(\tan\theta + \sec\theta - 1)(\tan\theta + \sec\theta + 1) = \operatorname{cosec}\theta + \cot\theta$

40. If $p = \sin\theta + \cos\theta$, $q = \sec\theta + \operatorname{cosec}\theta$, then prove that $q(p^2 - 1) = 2p$

41. Prove that $(\sin A + \operatorname{cosec} A)^2 + (\cos A + \sec A)^2 = 7 + \tan^2 A + \cot^2 A$

42. Prove that : $(\tan\theta + \sec\theta - 1)(\tan\theta + 1 + \sec\theta) = \frac{2\sin\theta}{1 - \sin\theta}$

STATISTICS & PROBABILITY [11marks]

1. STATISTICS.

1. Find the mean, median and mode for the following data: (26.4, 27.2, 28.8)

class	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	Total
Frequency	8	16	36	34	6	100

2. Write the relationship among mean median and mode. If the mean of the data is 27 and median is 33,
then find the Mode
(45)

3. Consider the frequency distribution of the heights of 60 students of a class.

Height (in cm	No of students	Cumulative frequency
150 - 155	16	16
155 - 160	12	28
160 – 165	9	37
165 – 170	7	44
170 – 175	10	54
175 – 180	6	60

Find the sum of the lower limit of the modal class and upper limit of the median class
(315)

4. The following table gives the daily income of 50 workers. Draw both type of ogives and determine the
median of the data (median = 140)

Daily income (in Rs	No of workers
100 – 120	12
120 – 140	14
140 – 160	8
160 – 180	6
180 – 200	8

5. Find p if the mean of the given data is 15. 45
(p = 10)

Class	0 – 6	6 – 12	12 – 18	18 – 24	24 – 30
Frequency	6	8	p	9	7

6. Find the value of x from the following data if mode is 65, where frequency 6, 8, x and 12 are in ascending order

(x = 10)

Class	0 – 20	20 – 40	40 – 60	60 – 80	80 – 100	100 – 12(	Mode
Frequency	6	8	x	12	6	5	65

7. The mean of the data is 50. Find the missing frequencies: (x = 28, y = 24)

Class	0 – 20	20 – 40	40 – 60	60 – 80	80 – 100	Total
Frequency	17	x	32	y	19	120

8. Find the missing frequencies where $f_2 : f_3 = 4 : 3$ and mean = 50 (28, 32, 24)

Class interva	0 – 20	20 – 40	40 – 60	60 – 80	80 – 100	Total
Frequency	17	F_1	F_2	F_3	19	120

9. The median of the following data is 52.5. Find the values of x and y if the total frequency is 100

C.I	0 - 10	10 - 20	20 - 30	30 - 40	40 – 50	50 – 60	60- 70	70 – 80	80 – 90	90 - 100	
F	2	5	x	12	17	20	y	9	7	4	

(x = 9, y = 15)

10. Find the missing values for a, b, c, d for the following data:

Class	0 – 8	8 – 16	16 - 24	24 - 32	32 – 40	40 - 48
Frequency	15	a	b	18	9	c
Cumulative frequency	15	28	43	61	d	80

11. Find the median wage of the workers from the following data:

(median = 115 .46)

Wages	More than 150	More than 140	More than 130	More than 120	More than 110	More than100	More than 90	More than 80

No of workers	0	10	29	60	104	134	151	160

12. From a frequency distribution table from the following data find its mode (mode = 55)

Marks (out of 90)	No of students
More than or equal to 80	4
More than or equal to 70	9
More than or equal to 60	15
More than or equal to 50	23
More than or equal to 40	29
More than or equal to 30	33
More than or equal to 20	36
More than or equal to 10	38
More than or equal to 0	40

2. PROBABILITY

1. Two dice are thrown together. Find the probability that the product of the numbers on the top of the

Dice is: a) 6 b) 12 c) 7 d) less than 18 (1/9, 1/9, 0, 13/18)

2. A pair of dice is tossed once, find the probability of getting :

a) a total of 2
(1/36)

b) a total of 5
(1/9)

c) an even number as the sum
(1/2)

d) same number on each dice
(1/6)

e) 3 will not come up on either of them

f) 3 will come up on atleast once

g) 3 will come up at both dice

3. A die is thrown once. Find the probability of getting the following:

a) a prime number
(1/2)

b) a number lying between 2 and 5
(1/3)

4. Out of a pack of 52 playing cards, two black kings and 4 red cards were lost. Find the probability that

the cars drawn is a red card
(22/46)

5. One card is drawn from a well shuffled deck of 52 playing cards. Find the number of probability of

Getting: a) A face card
(3/13)

b) A black queen or a red king
(1/13)

c) a king of red colour
(1/26)
d) the jack of hearts
(1/52)
e) a spade.
(1/4)
f) either a king or a queen
(2/13)
g) neither a king nor a queen
(11/13)

6. From a pack of 52 playing cards, Jacks, Queens, Kings and Aces of red colour are removed. From the remaining, card is drawn at random. Find the probability that the card drawn is:
a) A black queen
(1/21)
b) A non – face card
(10/13)
c) A black jack
(1/22)
d) a Black King or a Red Queen
(1/13)

7. A bag contains 5 red balls and some blue balls. If the probability of drawing a blue ball from the bag is Thrice that of red ball, find the number of blue balls in the bag
(15)

8. A bag contains 6 red, 3 black and 6white balls. A ball is selected at random from the bag. Find the Probability that the selected ball is:
a)Red or black b) not black
(3/5, 4/5)

9. Cards marked with numbers 5, 6, 7,……..74 are placed in a bag and mixed thoroughly. One card is Drawn at random from the bag. Find the probability that the number on the card is a perfect square
(3/35)

10. Cards numbered 2, 3, 4, 5, 6, -------, 49 are put in a box and mixed thoroughly. If one card is drawn at random. Find the probability that the number on the card is :
a) Even number
(1/2)
b) Prime number
(5/16)
c) Divisible by 6
(1/6)
d) A perfect square
(1/8)

11. Two unbiased coins are tossed. Calculate the probability of getting :
a) Exactly two heads
(1/4)
b) At least two tails
(1/4)

12. A letter is chosen at random from the English alphabet. Find the probability that the letter chosen

a) Is a vowel

(5/26)

b) Is a consonant

(21/26)

c) Follow r

(8/26)

13. Find the probability of 53 Sundays in the year 2012

(2/7)

Coordinate geometry. [6 marks]

1. Find the area of a rhombus if its vertices are A (3, 0), B (4, 5), C (- 1, 4) and D (- 2, - 1)

(24)

2. Find the area of a quadrilateral ABCD, the coordinates of whose vertices are A (1, 2), B (6, 2), C (5, 3) & D (3, 4)

(5.5)

3. If the points A (a, 0), B (0, b) and C (1, 1) are collinear, prove that $\frac{1}{a} + \frac{1}{b} = 1$

4. Prove that the points (a, b + c), (b, c + a) and (c, a + b) are collinear

5. Find the values of p for which the points (3p + 1, p), (p + 2, p – 5) and (p + 1, - p) are collinear

(0, 3)

6. Find the values of p for which the points (- 1, 3), (2, p) and (5, - 1) are collinear

(p = 1)

7. Show that four points (0, - 1), (6, 7), (- 2, 3) and (8, 3) are the vertices of a rectangle, also find its area

(40)

8. Show that the points A (3, 5), B (6, 0), C (1, -3) & D (-2, 2) are the vertices of a square ABCD

9. Show that the points (a, a), (- a, - a) & (- √3a, √3a) are the vertices of an equilateral Δ

10. Find the relation between x and y such that the point (x, y) is equidistant from the point (3, 6) and (- 3, 4)

(3x + y = 5)

11. If the point P(x, y) is equidistant from two points A (- 3, 2) and B (4, - 5), prove that y = x – 2

12. Find the point on the y axis which is equidistant from the points (7, 6) & (- 3 4)

(0, 15)

13 The points A (2, 9), B (a, 5), C (5, 5) are the vertices of a right triangle ABC right angled at B. Find the value of a

(2)

14. Find the area of the triangle formed by joining the mid points of the sides of the triangle whose vertices are A (2, 1), B (4, 3) and C (2, 5)

(1 sq unit)

15. Three vertices of a parallelogram ABCD are A (3, - 4), B (- 1, - 3) and C (- 6, 2). Find the coordinates
of vertex D and the area of parallelogram ABCD
(15 sq units)
16. The three vertices of a rhombus taken in in order are (2, - 1), (3, 4) & (-2, 3). Find the fourth vertex

(-3, -2)
17. Find the coordinates of the point on y axis which is nearest to the point (- 2, 5)
(0, 5)
18. If (1, p/3) is the midpoint of the line segment joining the points (2, 0) and (o, 2/9) then show that
5x + 3y + 2 = 0 passes through the point (- 1, 3p)
(p = 1/3)
19. In what ratio does the x – axis divide the line segment joining the points (- 4, - 6) and (- 1, 7). Find
the coordinates of the point of division (ratio = 6 : 7),
(- 34/ 13, 0)
20. Show that ΔABC with vertices A (- 4, 0), B (0, 2) and C (2, 0) is similar to ΔDEF with vertices
D (- 4, 0), F (4, 0) and E (0, 4)
21. Find the coordinates of the points of trisection of the line segment joining the points (3, - 2) and
(- 3, - 4)
22. Prove that the points (2, - 2), (- 2, 1) and (5, 2) are the vertices of a right angled triangle. Also find
the area of this triangle (
12.5 sq units)
23. If the area of the triangle formed by points A(x, y), B (1, 2) and C (2, 1) is 6 sq units, then show that
x + y = 15
24. If A(- 2, - 1), B(a, 0) C (4, b) and D(1,2) are the vertices of a parallelogram , find the value of a and
b
(a = 1, b = 3)
25. If p (9a – 2, - b) divides the line segment joining A (3a + 1, - 3) and B (8a, 5) in the ratio 3: 1. Find the values of a and b

(a = 1, b = - 3)
26. The vertices of a Δ are A (- 1, 3), B (1, - 1) & C (5, 1). Find the length of the median through the vertex C (5 units)
27. The line segment AB joining the points A (3, - 4) and B (1, 2) is trisected at the points P (p, - 2) and Q (5/3, q). Find the
value of P and q
(p = 7/3, q = 0)
28. Find the ratio in which the point (- 3, k) divides the line segment joining the points (- 5, - 4) and (- 2, 3). Also find the
value of k
(2: 1, k = 2/3)
29. If two adjacent vertices of a parallelogram are (3, 2) & (-1, 0) and the diagonals intersect at (2, - 5), then find the

coordinates of the other two vertices

30. P and Q are the points with coordinates (2, - 1) and (- 3, 4). Find the coordinates of the point R such that PR is 2/5 of
PQ

(0, 1)

31. Find the coordinates of the points which divide the line segment joining A(2, - 3) & B(- 4, - 6) into three equal parts

[p(0, - 4), q(- 2, - 5)]

32. Find the ratio in which the line segment joining the points (1, - 3) & (4, 5) is divided by x – axis

(3:5)

33. Find the ratio in which the line segment joining the points (5, - 6) & (- 1, - 4) is divided by y – axis . Also find the
Coordinates of the point of intersection

(5:1, - 13/3)

34. For what value of k , the area of Δ with vertices (- 2,5), (k, - 4) and (2k + 1, 10) is equal to 53 squnits

(k = 3)

35. Points P, Q, R & S divide the line segment joining the points A (1, 2) & B (6, 7) in 5 equal parts. Find the coordinates of
the points P,Q & R

[P(2,3), Q(3,4), R(4,5)]

36. The midpoint P of the line segment joining the points A (- 10, 4) & B (- 2, 0) lies on the line segment joining the points
C (- 9, - 4) & D (- 4, Y). Find the ratio in which P divides CD [p (- 6, 2), (ratio = 3:2)]

37. Find the value of a , for which the point p(a/3, 2) is the midpoint of the line segment joining the points Q(- 5, 4) and
R (- 1, 0)

(a = - 9)

38. If the distance between P (a, 4) and Q (9, 10) is 10 units, find a

(17, 1)

39. The points A (4, - 2), B (7, 2), C (0, 9) & D (- 3, 5) form a parallelogram. Find the altitude of the
parallelogram on the base AB

(h = 9.8cm)

40. Two vertices of a triangle have coordinates (-8, 7) and (9, 4). If the coordinates of the centroid are
(0, 0), find the coordinates of the vertex

41. Find the area of the triangle ABC with A (1, - 4) and the midpoints of AB and BC are (2, - 1) and
(0, - 1) respectively

AREAS RELATED TO CIRCLES. & SURFACE AREAS AND VOLUMES [10 marks]

1. AREAS RELATED TO CIRCLES

1. If the circumference of a circle is equal to the perimeter of a square, then find the ratio of their areas

(14: 11)

2. Area of a sector of a circle of radius 14 cm is 154 cm^2 . Find the length of the corresponding arc of the sector

(22 cm)

3. A chord of a circle of radius 14 cm subtends an angle of 120° at the Centre. Find the area of the corresponding minor Segment of the circle (Π = 22/7, √3 = 1.73)

(120. 56 sqcm)

4. The minute hand of a clock is 12 cm long. Find the area face of the clock described by minute hand between 9 a.m and 9.35 am

(264 sq cm)

5. A chord of a circle of radius 14cm subtends an angle of 120° at the centre. Find the area of the corresponding minor Segment of the circle (use √3 = 1.73)

(120. 56 cm^2)

6. A chord 10 cm long is drawn in a circle of radius √50cm. Find the area of minor segment

(14.285cm^2)

7. The cost of fencing a circular field at the rate of Rs 24 per meter is Rs 5280. The field is to be ploughed at the rate of Rs 0.50 per m^2 . Find the cost of ploughing the field (Π= 22/7)

(Rs1925)

8. The area enclosed between the concentric circles is 770 cm^2 . If the radius of the outer circle is 21 cm, find the radius of the inner circle

(r = 14 cm)

9. The area of the shaded region between two concentric circles is 286cm^2 .The difference of the radii of two circles is7 cm , find the sum of their radii.

(R + r =13cm)

10. A wheel has diameter 84 cm. Find how many complete revolutions must it take to cover 792 meters

(300)

11. The long and short hands of a clock are 6 cm and 4 cm long respectively. Find the sum of the distances travelled by Their tips in 24 hrs (use Π= 3.14) [2 (2Πr) + 24(2ΠR) = 955. 43 cm]

12. Two circles touch internally. The sum of their areas is 116 Π cm^2 and the distance between their centres is 6 cm. Find the radii of the circles

13. Two circles touch externally . The sum of their areas is 130π sqcm and the distance between their centres is 14cm. Find the radii of the circles

(3cm, 11cm)

14. A park is of the shape of a circle of diameter 7m. It is surrounded by a path of width of 0.7m.Find the
expenditure of Cementing the path, if its cost is Rs110 per sqm
15. Find the perimeter of a sector of angle 45° of a circle of radius 14 cm
(39 cm)
16. Find the area of the minor segment of a circle of radius 42 cm, if the length of the corresponding arc is
44cm
17. The difference between the circumference and the radius of a circle is 7 cm. Find the area of the circle

(154cm^2)
18. Find the perimeter of a sector of angle 45° of a circle of radius 14cm
(39cm)
19. Four equal circles are described at the four corners of a square so that each touches two of the others.
The shaded area enclosed between the circles is 24/7cm^2. Find the radius of each circle
(2cm) 20. If the perimeter of a protractor is 72cm, calculate its area
(308cm^2)
21. Area of a sector of a circle is 1/6 to the area of circle. Find the degree measure of its minor arc

(60°)
22. The area of quadrant is 154sqcm. Find its perimeter.
(50cm)
23. Find the area of a quadrant of a circle whose circumference is 44cm
(38.5cm^2)

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2. <u>SURFACE AREAS AND VOLUMES</u>.

1. 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 1/27 of the volume of the given cone, at what height above the base is the section made

(h = 20 cm)
2. Water flowing at the rate of 15km/hr through a pipe of diameter 14 cm into a cuboidal pond which is
50m long and 44m wide. In which time will the level of water in the pond rise by 21 cm
(2hrs)
3. Water is flowing at the rate of 6km/hr through a pipe of diameter 14cm into a rectangular tank which is
60 m long and 22m wide. Determine the time in which the level of the water in the tank will rise by
7 cm
4. A farmer connects a pipe of internal diameter 25cm from a canal into a cylindrical tank in his field ,
which is 12m in Diameter and 2.5m deep. If water flows through the pipe at the rate of 3.6 km/hr, in
how much time will the tank be Filled.
(96min)

5. A farmer connects a pipe of internal diameter 20cm from a canal into a cylindrical tank in his field ,
which is 10m in Diameter and 2.m deep. If water flows through the pipe at the rate of 3km/hr, in how
much time will the tank be filled.
(100min)
6. 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 of standing water is needed
(562500m^2)
7. A hemispherical depression is cut out from one face of a cubical wooden block of edge 21 cm, such that
the diameter of the hemisphere is equal to the edge of the cube. Determine the total surface area of the
remaining block
(2992.5 cm^2)
8. The slant height of the frustum of a cone is 5 cm .If the difference between the radii of its two circular
ends is 4 cm.Find the height of the frustum
(h = 3 cm)
9. A well of diameter 3m is dug 14 m deep. The soil taken out of it is spread evenly all around it to a width
of 5m to form an embankment. Find the height of the embankment
10. A solid right circular cone of height 60 cm and radius 30 cm is dropped in a right circular cylinder full of
water of height 180 cm and radius 60 cm. Find the volume of water left in the cylinder in cubic meters

(1.98 m^3)
11. A metallic cylinder has radius 3 cm and height 5 cm. To reduce its weight, a conical hole is drilled in the
cylinder.The Conical hole has a radius of 3/2 cm and its depth is 8/9 cm. Calculate the ratio of the
volume of metal left in the cylinder to the volume of metal taken out in conical shape
12. The rain water from a 22m X 20m roof drains into a cylindrical vessel of diameter 2m and height 3.5m.
If the rain water Collected from the roof fills 4/5th of the cylindrical vessel, then find the rainfall in cm

(h = 2cm)
13. A metal container, open from the top, is in the shape of a frustum of a cone of height 21cm with radii
of its lower and Upper circular ends as 8 cm and 20 cm respectively. Find the cost of milk which can
completely fill the container at the rate of Rs 35/litre
(Rs 480. 50)

14. A cylindrical tub, whose diameter is 12 cm and height 15cm is full of ice cream. The whole ice cream is
to be divided into 10 children in equal ice cream cones, with conical base surmounted by a
hemispherical top. If the height of Conical portion is twice the diameter of base, find the diameter of

conical part of ice cream cone
(6m)
15. A bucket 0pen at the top is of the form of a frustum of a cone. The diameters of its upper and lower
circular ends are 40 cm and20 cm respectively. If a total of 17600cm^3 of water can be filled in the
bucket, find its total surface area (h = 24cm, l = 26cm, T.S.A = 2765.71 cm^2)
16. A hollow sphere of internal and external diameters 4 cm and 8 cm is melted to form a cone of base
diameter 8 cm.Find the height and the slant height of the cone (h = 14 cm, l = 2√53cm)
17. The radii of internal and external surfaces of a hollow spherical shell are 3cm and 5cm. It is melted and
recast into a solid cylinder of diameter 14 cm. Find the height of the cylinder
(2.6 cm)
18. Find the number of spherical lead shots, each of diameter 6 cm that can be made from a solid cuboid of
lead having
(168)
19. The dimensions of a metallic cuboid are 100cm x 80 cm x 64cm. It is melted and recast into a cube.
Find the surface area of the cube
20. A solid metallic cuboid of dimensions 9m X 8m X 2m is melted and recast into solid cubes of edge 2m.
Find the number of cubes so formed
21. The diameter of a metallic sphere is 6cm. The sphere is melted and drawn into a wire of uniform cross
section. If the length of the wire is 36cm, find its radius
(1mm)
22. A solid cylinder of diameter 12 cm and height 15cm is melted and recasted into 12 toys in the shape of
a right circular cone mounted on the hemisphere. Find the radius of the hemisphere and the total height
of the toy if height of the cone is 3 times the radius
(12cm)
23. A metallic sphere of total volume π is melted and recast into the shape of a right circular cylinder of
radius 0.5cm. What is the height of the cylinder
(4cm)
24. A solid is in the shape of a cone mounted on a hemisphere of same base radius. If the curved surface
areas of the Hemispherical part and the conical part are equal, then find the ratio of the radius and the
height of the conical part
(1 : √3)
25. A toy is in the shape of a cone mounted on a hemisphere of same base radius. If the volume of the toy
is 231 cm^3 and its diameter is 7 cm, then find the height of the toy
(11cm)
26. The total surface area of a solid cylinder 231 cm^2. If the curved surface area of this solid cylinder is

two – third of its total surface area , find its radius and height (r = 3.5 cm, h = 7 cm)

27. The radii of the circular ends of a bucket in the form of a frustum of a cone of height 15 cm are 14 cm and r cm (r < 14) . If the capacity of the bucket is 5390 cm^3 , Find r
(r = 7 cm)

28. A metallic right circular cone 20 cm high and whose vertical angle 60° is cut into two parts 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 2.5 cm, find the length of the wire
(4.98 m)

29. A conical vessel with base radius 5 cm height 24 cm, is full of water. This water is emptied into a cylindrical vessel of base radius 10 cm. Find the height to which the water will rise in the cylindrical vessel
(h = 2 cm)

30. A cylindrical pipe has inner diameter of 4 cm and water flows through it at the rate of 20m/minute. How long would it take to fill a conical tank of radius 40cm and depth 72cm
(4.8minutes)

31. The radii of the circular ends of a solid frustum of a cone are 18cm and 12cm and its height is 8cm. Find its total surface area (π = 3.14)
(2411.5 cm^2)

32. A solid is in the shape of a cone mounted on a hemisphere of same base radius. If the curved surface areas of the hemispherical part and the conical part are equal, then find the ratio of the radius and the height of the conical part
(r : h = 1 : √3)

33. A drinking glass is in the shape of a cone of height 14cm. The diameters of its two circular ends are 16cm and 12 cm.Find the capacity of the glass
(2170.67cm^3)

34. A 5 m wide cloth is used to make a conical tenth of base diameter 14m and height 24m.Find the cost of cloth used at the rate of Rs25/m^2 [length = csa/width, cost = csa xrate = Rs2750]

35. A hemispherical depression is cut out from one face of a cubical block of side 7cm, such that the diameter of the Hemisphere is equal to the edge of the cube. Find the surface area of the remaining solid
(332.5cm^2)

36. The radius and height of a solid right circular cone are in the ratio of 5: 12. If its volume is 314cm^3, find its total Surface area (Π = 3.14)

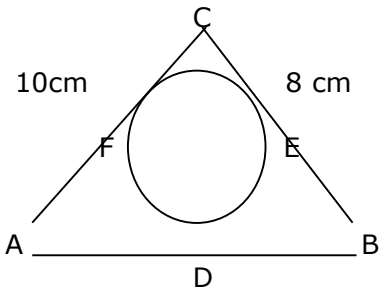
GEOMETRY [15 marks]

1. CIRCLES

1. Two tangents PA and PB are drawn from an external point P to a circle with Centre O. Prove that AOBP
is a cyclic Quadrilateral

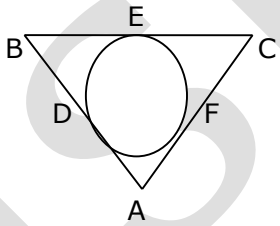
2. If circle is inscribed in a ΔABC having sides 8 cm, 10 cm, 12 cm as shown in the figure. Find AD, BE and
CF

(7cm, 5cm, 3cm)

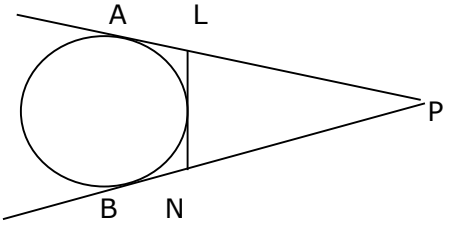


1. A circle is touching the side BC of a triangle ABC at P and AB and AC produced at Q and R respectively
Prove that AQ = AR = ½ perimeter of triangle ABC

5. In the isosceles ΔABC, AB = AC, show that BE = EC



6. In the figure, PA and PB are tangents from P to the circle with centre O. LN touches the circle at M,
then show that PL + LM = PN + NM



7. Two concentric circles are of radii 7 cm and r cm, where r > 7. A chord of the larger circle, of length
48 cm touches the smaller circle. Find the value of r
(25 cm)

8. In figure a triangle ABC is drawn to circumscribe a circle of radius 2 cm such that the tangents BD and
DC into Which BC is divided by the point of contact D are the lengths 4 cm and 3 cm. If area of
ΔABC = 21cm^2 ,then find the lengths of sides AB and AC
(7.5 cm, 6.5 cm)

9. Two tangents PA and PB are drawn to the circle with Centre O such that ∠APB = 120^0. Prove that
OP = 2 AP

10. Two concentric circles are of radii 13 cm and 5 cm. Find the length of the chord of the larger circle
which touches the smaller circle
(24cm)

11. PQ is a chord of length 16 cm of a circle of radius 10cm. The tangent at P and Q intersect at T. Find
the length of PT

12. If d_1 , d_2 be the diameters of two concentric circles and c be the length of a chord of a circle which is
tangent to the Other circle, prove that $d_2^2 = c^2 + d_1^2$ $(d_2 > d_1)$

13. ABC is a right angled Δ right angled at A with AB = 6cm, AC = 8cm. A circle with Centre O has been
inscribed inside the Triangle. Calculate the value of r, the radius of the inscribed circle.

INTERNATIONAL INDIAN SCHOOL, RIYADH

SUBJECT: MATHEMATICS TOPIC: TRIANGLES

CLASS: X

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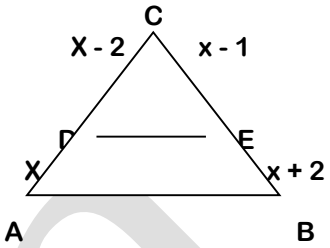
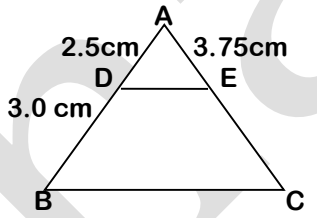
1. What value of x will make DE II AB in the given figure?



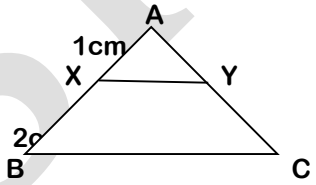
(x =4)

2. In figure, DE is parallel to base BC. If AD = 2.5 cm, BD = 3.0 cm and AE = 3.75 cm, find the length of AC



(8.25cm)

3. In the figure. XY II BC . Find the length of XY

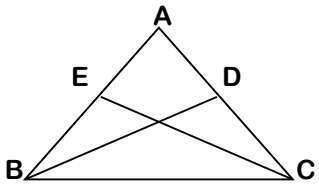


(2cm)

6cm

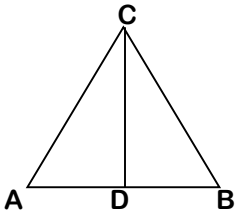
4. In figure, considering triangles BEP and CDP, prove that:

BP X PD = EP X PC



5 .D is a point on the side BC of a ∆ABC such that angle ADC = angle BAC. Prove that CA ⁄⁄ CD = CB ⁄⁄ CA

6. In figure angle ACB = 90° , CD perpendicular to AB, prove that CD^2 = BD . CD



7. A vertical pole which is 2.25m long casts a 6.75m long shadow on the ground. At the same time a vertical

Tower casts a 90m long shadow on the ground. Find the height of the tower

(30m)

8. If ∆ ABC ~ ∆ PQR. Also ar (∆ABC) = 4 ar (∆ PQR). If BC = 12cm, find QR

(6cm)

9. The areas two similar triangles ABC and DEF are 36 cm^2 and 81 cm^2 respectively. If EF = 6.9 cm, determine BC

(4.6 cm)

10. Two isosceles triangles have equal angles and their areas are in the ratio 81: 25. Find the ratio of their Corresponding heights

11. D, E and F are respectively the mid points of the sides BC, CA and AB of ∆ABC. Find the ratio of the areas of ∆ DEF and ∆ ABC

(1 : 4)

12. The perimeters of two similar triangles are 36cm and 48cm respectively. If one side of the first triangle is 9cm, what is the corresponding side of the other triangle

(12cm)

13. In triangle ABC, AB= $\sqrt{3}a$, AC = a and BC = 2a. Prove that $\angle A = 90^\circ$

14. In triangle ABC, $\angle BAC = 90^\circ$ and AD $\perp$ BC. If BD = 8cm, DC= 18 cm, find AD

15. Two poles of height 8m and 13m stand on a plane ground. If the distance between their tips is 13m, find the distance between their feet

(12m)

16.Two poles of height 10m and 15m stand vertically on a plane ground. If the distance between their feet is $5\sqrt{3}$m, find the distance between their tops

(10m)

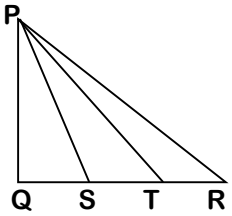
17. The perpendicular from A on side BC of a triangle ABC intersects BC at D such that BD = 3CD. Prove that $2AB^2 - 2AC^2 = BC^2$

18. In an isosceles triangle ABC with AB = AC, BD is a perpendicular from B to the side AC. Prove that $BD^2 - CD^2 = 2CD \cdot AD$

19. P and Q are points on the sides CA and CB respectively of a ∆ABC right angled at C. Prove that $AQ^2 + BP^2 = AB^2 + PQ^2$

20. In ∆ ABC, If AD is the median, show that $AB^2 + AC^2 = 2(AD^2 + BD^2)$

21. In figure, T trisects the side QR of right triangle PQR. Prove that $8PT^2 = 3PR^2 + 5PS^2$



22. If BL and CM are medians of a triangle ABC right angled at A, then prove that $4(BL^2 + CM^2) = 5BC^2$

23. In a triangle ABC, AB = BC = CA = 2a and AD perpendicular to BC. Prove that AD= $a\sqrt{3}$ and area of ∆ ABC = $\sqrt{3}\,a^2$

24. In an equilateral triangle ABC, AD is the altitude drawn from A on side BC. Prove that $3A^2 = 4AD^2$

25. In a triangle ABC, AD is perpendicular on BC , prove that $AB^2 + CD^2 = AC^2 + BD^2$

26. Prove that the sum of the squares of the sides of a rhombus is equal to the sum of the squares on its diagonals

27. P is a point in the interior of rectangle ABCD. If P is joined to each of the vertices of the rectangle, prove

That $PB^2 + PD^2 = PA^2 + PC^2$

28. Δ ABC is right angled at C. If P is the length of the perpendicular from C to AB. And a, b and c are the

length of the sides opposite angle A, B and C, then prove that $1/p^2 = 1/a^2 + 1/b^2$

29. In an equilateral triangle PQR, the side QR is trisected at S . Prove that $9\ PS^2 = 7\ PQ^2$