DEHRADUN PUBLIC SCHOOL
ASSIGNMENT (2023-24)
SUBJECT- MATHEMATICS (041)
CLASS - X

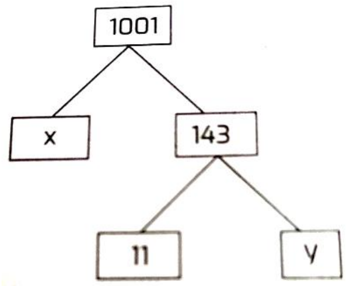
Chapter - Real Numbers

Solve the following questions:

Q1. The HCF of 2472, 1284 and a third number N is 12. If their LCM is $2^3 \times 3^2 \times 5 \times 103 \times 107$, then the number N is:

a. $2^3 \times 3^2 \times 7$ b. $2^2 \times 3^3 \times 103$ c. $2^2 \times 3^2 \times 5$ d. $2^4 \times 3^2 \times 11$

Q2. The values of x and y in the given figure are:



a. 7, 13   b. 13, 7   c. 9, 12   d. 12, 9

Q3. HCF of two numbers is 23 and their LCM is 1449. If one of the numbers is 161, then the other number is:

a. 207   b. 307   c. 1449   d. None of these

Q4. The ratio of HCF to LCM of the least composite number and the least prime number is:

a. 1:2   b. 2:1   c. 1:1   d. 1:3

Q5. In a school, there are two sections - section A and section B of class X. There are 32 students in section A and 36 students in section B. Determine the minimum number of books required for their class library so that they can be distributed equally among students of section A or section B:

a. 288   b. 388   c. 208   d. None of these

Q6. The product of a non-zero rational and an irrational number is:

a. always irrational   b. always rational

c. rational or irrational   d. none of these

Q7. The least number that is divisible by all the numbers from 1 to 10 (both inclusive) is:

a. 10   b. 100   c. 504   d. 2520

Q8. The HCF and the LCM of 12, 21, 15 respectively are:

a. 3, 140   b. 12, 420   c. 3, 420   d. 420, 2

Q9. The exponent of 2 in the prime factorization of 144 is:

a. 2 b. 4 c. 1 d. 6

Q10. If sum of two numbers is 1215 and their HCF is 81, then the possible number of pairs of such numbers are:

a. 2 b. 3 c. 4 d. 5

Q11. **Assertion (A):** If LCM $(p, q) = 30$ and HCF $(p, q) = 5$, then $p \times q = 150$.

Reason (R): LCM of $(a, b) \times$ HCF of $(a, b) = a \times b$

a. Both (A) and (R) are true and (R) is the correct explanation of (A)
b. Both (A) and (R) are true but (R) is not the correct explanation of (A)
c. (A) is true but (R) is false
d. (A) is false but (R) is true

Q12. **Assertion (A):** $\sqrt{5}$ is an irrational number.

Reason (R): If m is an odd number greater than 1, then $\sqrt{m}$ is irrational.

a. Both (A) and (R) are true and (R) is the correct explanation of (A)
b. Both (A) and (R) are true but (R) is not the correct explanation of (A)
c. (A) is true but (R) is false
d. (A) is false but (R) is true

Q13. If xy = 180 and HCF (x, y) = 3, then find the LCM (x, y).

Q14. Find the least positive integer divisible by 20 and 24.

Q15. If HCF (a, b) = 12 and a × b = 3600, then find LCM (a, b).

Q16. If p is a prime number and p divides a^2 (where 'a' is a positive integer), then p divides a. Is it true?

Q17. Is it true to say that the product of a rational number and an irrational number may be a rational or an irrational?

Q18. Find the HCF and LCM of 404 and 96. Verify that HCF × LCM = Product of the two numbers.

Q19. 3 bells ring at an interval of 4, 7 and 14 minutes. All three bells rang at 6 am, when the three balls will the ring together next?

Q20. Prove $\sqrt{5}$ is an irrational number.

Q21. Prove that $4-2\sqrt{5}$ is an irrational number.

Q22. HCF (306, 657) =9, find LCM (306, 657).

Q23. Explain why 17 × 11 × 13 + 11 is a composite number.

Q24. Find the LCM and HCF of 15, 18 and 45 by the prime factorization method.

Q25. Mathematics teacher of a school decided to have maximum number of mixed sections for a team. Each section has to accommodate equal number of boys and equal number of girls. What is the number of such sections if there are 372 boys and 444 girls?

Q26. Prove that $\sqrt{2}$ is an irrational number. Hence, show that $5 + 3\sqrt{2}$ is also an irrational number.

Case-study based question:

Q27. To enhance the reading skills of grade X students, the school nominates you and two of your friends to set up a class library. There are two sections- section A and section B of grade X. There are 32 students in section A and 36 students in section B.

Read carefully the given paragraph and answer the following questions.

i. What is the product of the powers of each prime factor of 36?

ii. If p and q are positive integers such that $p = ab^2$ and $q = a^2 b$, where a, b are prime numbers, then find the LCM (p, q).

iii. What is the minimum number of books you will acquire for the class library, so that they can be distributed equally among students of Section A or Section B?

OR

If the product of two positive integers is equal to the product of their HCF and LCM is true, then what is the HCF (32, 36)?

Chapter - Polynomials

Solve the following questions:

Q1. Graph of a quadratic polynomial is:

a. straight line b. circle c. parabola d. ellipse

Q2. The parabola representing a quadratic polynomial $f(x) = ax^2 + bx + c$ opens upward when:

a. $a > 0$ b. $a < 0$ c. $a = 0$ d. $a > 1$

Q3. The parabola representing a quadratic polynomial $f(x) = ax^2 + bx + c$ opens downward when:

a. $a < 0$ b. $a > 0$ c. $a < 1$ d. $a > 1$

Q4. If one root of the polynomial $f(x) = 3x^2 + 11x + p$ is reciprocal of the other, then the value p is:

a. 0 b. 3 c. $\frac{1}{3}$ d. -3

Q5. The zeroes of the quadratic polynomial $x^2 + kx + k$, where $k > 0$:

a. are both positive b. are both negative

c. are always equal d. are always unequal

Q6. The graph of a quadratic polynomial intersects the X-axis atmost at ___________.

a. 1 point b. 2 points c. 3 points d. 0 point

Q7. If the zeroes of the quadratic polynomial $x^2 + (a + 1)x + b$ are 2 and -3, then:

a. $a = -7, b = -1$ b. $a = 5, b = -1$ c. $a = 2, b = -6$ d. $a = 0, b = -6$

Q8. The total number of factors of a prime is:

a. 1 b. 0 c. 2 d. 3

Q9. If 2 and $\frac{1}{2}$ are the zeroes of $px^2 + 5x + r$, then:

a. p = r = 2 b. p = r = 2 c. p = 2, r = -2 d. p = -2, r = 2

Q10. If one of the zeroes of the quadratic polynomials $x^2 + 3x + k$ is 2, then the value of k is:

a. 10 b. -10 c. -7 d. -2

Q11. Assertion (A): Degree of the zero polynomial is not defined.

Reason (R): Degree of non-zero constant polynomial is 0.

a. Both (A) and (R) are true and (R) is the correct explanation of (A)
b. Both (A) and (R) are true but (R) is not the correct explanation of (A)
c. (A) is true but (R) is false
d. (A) is false but (R) is true

Q12. Assertion (A): If 2, 3 are the zeroes of a quadratic polynomial, then the polynomial is $x^2 - 5x + 6$.

Reason (R): If α, β are the zeroes of a quadratic polynomial, then polynomial is $x^2 - (\alpha + \beta)x + \alpha\beta$.

a. Both (A) and (R) are true and (R) is the correct explanation of (A)
b. Both (A) and (R) are true but (R) is not the correct explanation of (A)
c. (A) is true but (R) is false
d. (A) is false but (R) is true

Q13. How many maximum number of zeroes can a polynomial of degree 3 have?

Q14. What is the degree of the polynomial $(x+1)(x^2 - x - x^4 + 1)$?

Q15. The sum and product of zeroes of $p(x) = 63x^2 - 7x - 9$ are S and P respectively. Find 27S +14P.

Q16. Write a quadratic polynomial having zeroes 1 and −2.

Q17. If the sum of the zeroes of the quadratic polynomial $3x^2 - kx + 6$ is 3, then find the value of k.

Q18. Find the quadratic polynomial, whose zeroes are $5 - 3\sqrt{2}$ and $5 + 3\sqrt{2}$.

Q19. If one zero of the polynomial $x^2 + a$ is -3, then find its other zero.

Q20. Show that $\frac{1}{2}$ and $\frac{-3}{2}$ are the zeroes of the polynomial $4x^2 + 4x - 3$ and verify the relationship between zeroes and coefficients of the polynomial.

Q21. If the sum of the zeroes of the quadratic polynomial $(p^2 - 23)x^2 - 2x - 12$ is 1, then find the value of p.

Q22. Find the zeroes of the polynomials $7y^2 - \frac{11}{3}y - \frac{2}{3}$ and verify the relationship between the coefficients and the zeroes of the polynomials.

Q23. If α and β are the zeroes of a quadratic polynomial such that α + β= 24 and α - β = 8. Find the quadratic polynomial having α and β as its zeroes. Verify the relationship between the zeroes and coefficients of the polynomial.

Q24. If α and β are the zeroes of the quadratic polynomial p(x) = $x^2 + x - 2$, find the value of $\frac{1}{\alpha} - \frac{1}{\beta}$

Q25. If α and β are the zeroes of the quadratic polynomial p(t) = $t^2 - 4t + 3$, find the value of $\alpha^4\beta^3 + \alpha^3\beta^4$.

Case-study based question:

Q26. The below pictures show few natural examples of parabolic shape which can be represented by a quadratic polynomial. In structures, their curve represents an efficient method of load, and so can be found in bridges and in architecture in a variety of forms.

Based on the above information, answer the following questions:

i. What is the shape of the graph represented by quadratic polynomial?

ii. If the polynomial is $x^2 - 3x - 10$, then find its zeroes.

iii. Is the graph of $x^2 + 4 = 0$ touches X-axis at a point?

OR

If the sum of the roots is –p and product of the roots $-\frac{1}{p}$ is, then find the quadratic polynomial.

Chapter - Pair of Linear Equations in Two Variables

Solve the following questions:

Q1. 5 chairs and 4 tables together cost Rs. 2800 while 4 chairs and 3 tables together cost Rs. 2170. Algebraic representation of the situation can be:

a. 5x – 4y = 2800, 4x – 3y = 2170

b. 5x + 4y = 2800, 4x + 3y = 2170

c. 5x + 3y = 2800,4x + 3y = 2170

d. 5x – 3y = 2800, 4x – 3y = 2170

Q2. The sum of the numerator and denominator of a fraction is 8. If the denominator is increased by 1, the fraction becomes $\frac{1}{2}$. Algebraic representation of the situation can be:

a. x + y = 8, $\frac{x+1}{y} = \frac{1}{2}$

b. x + y = 8, $\frac{x}{y} + 1 = \frac{1}{2}$

c. $\frac{x}{y} = 8, \frac{x}{y+1} = \frac{1}{2}$

d. x + y = 8, $\frac{x}{y+1} = \frac{1}{2}$

Q3. The age of a daughter is one-third the age of her mother. If the present age of mother is x years, then the age (in years) of the daughter after 15 years is:

a. $\frac{x}{3}+15$ b. $\frac{x+15}{3}$ c. x + 5 d. $\frac{x}{3}-15$

Q4. The pair of linear equations 2x = 5y + 6 and 15y = 6x – 18 represents two lines which are:

a. intersecting b. coincident

c. parallel d. either parallel or intersecting

Q5. The graphs of the equations 6x – 2y + 9 = 0 and 3x – y + 12 = 0 are two lines which are __________.

a. coincident b. parallel

c. intersecting exactly at one point d. perpendicular to each other

Q6. Find the value of k for which the system of equations x + 3y = 4 and 3x + ky + 12 = 0 are inconsistent:

a. k = 12 b. k = -12 c. k = 9 d. k = -9

Q7. If the pair of equation ax + 2y = 7 and 3x + by = 6 represent parallel lines, then ab = __________.

a. 6 b. 8 c. 2 d. 3

Q8. The values of x and y respectively if 99x + 101y = 499 and 101x + 99y = 501 are:

a. 3 and 2 b. 5 and 6 c. -3 and 2 d. -3 and -2

Q9. In a number of two digits, unit's digit is twice the tens digit. If 36 be added to the number, the digits are reversed. The number is:

a. 36 b. 63 c. 48 d. 84

Q10. The pair of equations y = 0 and y = -7 has:

a. one solution b. two solutions

c. infinitely many solutions d. no solution

Q11. Assertion (A): If the pair of lines are coincident then we say that it has infinitely many solutions.

Reason (R): If the pair of lines are parallel, then the pair has no solution and is called inconsistent pair of equations.

a. Both (A) and (R) are true and (R) is the correct explanation of (A)
b. Both (A) and (R) are true but (R) is not the correct explanation of (A)
c. (A) is true but (R) is false
d. (A) is false but (R) is true

Q12. Assertion (A): 3x + 4y + 5 = 0 and 6x + ky + 9 = 0 represent parallel lines if k = 8.

Reason (R): $a_1 x + b_1 y + c_1 = 0$; $a_2 x + b_2 y + c_2 = 0$represent parallel lines if $\frac{a_1}{a_2}=\frac{b_1}{b_2}\neq\frac{c_1}{c_2}$.

a. Both (A) and (R) are true and (R) is the correct explanation of (A)
b. Both (A) and (R) are true but (R) is not the correct explanation of (A)
c. (A) is true but (R) is false
d. (A) is false but (R) is true

Q13. Is the line $-6x - 2y = 21$ parallel to the line $2x - 3y + 7 = 0$?

Q14. Is $5x - 7y = -2$ and $10x - 14y + 4 = 0$ a pair of dependent linear equations?

Q15. Does the pair of linear equations $3x - y = -8$ and $3x - y = 24$ represent an inconsistent system?

Q16. How many solution (s) does the pair of linear equations $4x + 6y = 9$ and $2x + 3y = 6$ have?

Q17. Sum of the two natural numbers is 25 and their difference is 7. Find the numbers.

Q18. For which value of k will the following pair of linear equation is inconsistent?

$3x+y=1$; $(2k-1)x+(k-1)y=2k+1$

Q19. The sum of two numbers is 1000 and the difference between their square is 256000. Find the numbers.

Q20. Solve for x and y: $6(ax + by) = 3a + 2b$ and $6(bx - ay) = 3b - 2a$.

Q21. Check whether the following lines are consistent or inconsistent $2x - 3y = 8$ and $4x - 6y = 9$.

Q22. Find the value of 'p' the equation$4x + py + 8 = 0$ and $2x + 2y + 2 = 0$ has unique solution.

Q23. A two-digit number is obtained by either multiplying the sum of the digits by 8 and then subtracting 5 or by multiplying the difference of the digits by 16 and then adding 3. Find the numbers.

Q24. Find the values of a and b for which the following system of linear equations has infinite number of solutions:

$(a + b)x - 2by = 5a + 2b + 1$; $3x - y = 14$

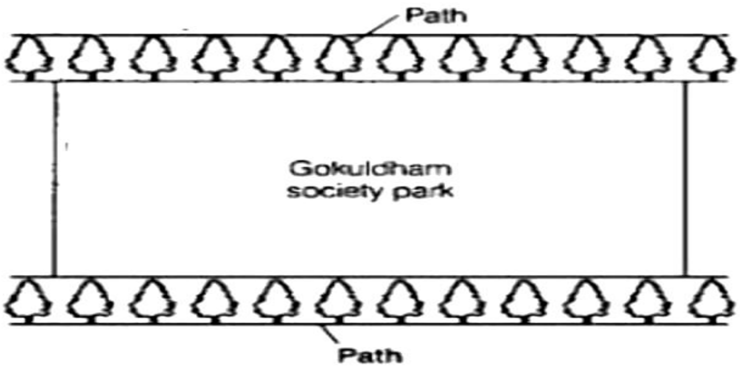
Q25. Four years ago, a father was six times as old as his son. Ten years later, the father will be two and a half times as old as his son. Determine the present ages of father and his son.

Q26. A fruit seller has certain number of oranges. He divides them into two lots *A* and *B*. He sells the lot *A* at 3 oranges for Rs 2 and the lot *B* at 1 orange for one rupee. Thus he gets Rs 400,if he had sold the first lot at 1 orange for Rs 1 and the second lot *B* at 5 oranges for Rs 4, he would have got Rs 460. Find the total number of oranges.

Q27. There are two examination rooms *A* and *B.* If 10 candidates are sent from *A* to *B,* the number of students in each room is the same. If 20 candidates are sent from *B* to *A,* the number of students in *A* is double the number of students in *B*. Find the number of students in each room.

Case-study based question:

Q28. The resident welfare association of a Radheshyam society decided to build two straight paths in their neighborhood park such that they do not cross each other and also plant trees along the boundary lines of each path. One of the members of association Shyamlal suggested that the paths should be constructed represented by the two linear equations $x - 3y = 2$ and $-2x + 6y = 5$.



Based on the above information, answer the following questions:

i. If the pair of equations $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ has infinitely solutions, then write the condition for the same.

ii. Check whether the two paths will cross each other or not.

iii. How many point(s) lie on the line $x - 3y = 2$.

OR

If the line $2x + 6y = 5$ intersect the X - axis, then find its coordinate.

Chapter - Quadratic Equations

Solve the following questions:

Q1. If $\frac{1}{2}$ is a root of the equation $x^2 + kx - \frac{5}{4} = 0$, then the value of *k* is:

a. 2 b. -2 c. $\frac{1}{4}$ d. $\frac{1}{2}$

Q2. Which of the following equations has the sum of its roots as 3?

a. $2x^2 - 3x + 6 = 0$

b. $-x^2 + 3x - 3 = 0$

c. $\sqrt{2}x^2 - \frac{3}{\sqrt{2}}x + 1 = 0$

d. $3x^2 - 3x + 3 = 0$

Q3. Which of the following equations has 2 as a root?

a. $x^2 - 4x + 5 = 0$

b. $-x^2 + 3x - 12 = 0$

c. $2x^2 - 7x + 6 = 0$

d. $3x^2 - 6x - 2 = 0$

Q4. Values of *k* for which the quadratic equation $2x^2 - kx + k = 0$ has equal roots is:

a. 0 only b. 4 c. 8 only d. 0, 8

Q5. $(x^2 + 1)^2 - x^2 = 0$ has:

a. four real roots b. two real roots c. no real roots d. one real root

Q6. Which of the following equations has no real roots?

a. $x^2 - 4x + 3\sqrt{2} = 0$ b. $x^2 + 4x - 3\sqrt{2} = 0$ c. $x^2 - 4x - 3\sqrt{2} = 0$ d. $3x^2 + 4\sqrt{3} + 4 = 0$

Q7. The quadratic equation $2x^2 - \sqrt{5}x + 1 = 0$:

a. two distinct real roots

b. two equal real roots

c. no real roots

d. more than two real roots

Q8. Is -8 is a solution of the equation $3x^2 + 8x + 2 = 0$?

a. yes

b. no

c. cannot be determined

d. none of these

Q9. If the roots of the quadratic equation $4x^2 + px + 9 = 0$ are equal, then the value of *p* is:

a. ±9 b. ±6 c. ±12 d. ±3

Q10. If $x = 2$ is a root of both the equation $3x^2 + 2x + a = 0$ and $bx^2 + 2x + a = 0$, then *ab* is___________.

a. 40 b. -48 c. 22 d. 15

Q11. Assertion (A): If the equation $x^2 - ax + b = 0$ and $x^2 + bx - a = 0$ have a common root then, $a + b \neq 0$ and $a - b = 1$.

Reason (R): A common root of two equations satisfies both the equations.

a. Both (A) and (R) are true and (R) is the correct explanation of (A)
b. Both (A) and (R) are true but (R) is not the correct explanation of (A)
c. (A) is true but (R) is false
d. (A) is false but (R) is true

Q12. Assertion (A): The roots of equation $x^2 + 3x + 4 = 0$ are imaginary.

Reason (R): If for the quadratic equation $ax^2 + bx + c = 0$, $b \neq 0$, $b^2 - 4ac < 0$, then its roots are imaginary.

a. Both (A) and (R) are true and (R) is the correct explanation of (A)
b. Both (A) and (R) are true but (R) is not the correct explanation of (A)
c. (A) is true but (R) is false
d. (A) is false but (R) is true

Q13. Find the value of k for which -1 is a root of the quadratic equation $kx^2 + x - 6 = 0$.

Q14. Find the roots of the equation $x^2 + 7x + 10 = 0$.

Q15. For what values of k, the quadratic equation $kx(x-2) = 0$ has real roots?

Q16. If one root of the quadratic equation $5x^2 + 13x + k = 0$ is reciprocal of the other, then find the value of k.

Q17. Find the values of k for which the quadratic equation $9x^2 - 3kx + k = 0$ has real roots.

Q18. The sum of the squares of two consecutive multiples of 7 is 637. Find the multiples.

Q19. Solve the quadratic equation by factorization method: $\frac{2x}{x-3} + \frac{1}{2x+3} + \frac{3x+9}{(x-3)(2x+3)} = 0$

Q20. Find the value of k for which $x^2 - 2x(1 + 3k) + 7(3 + 2k) = 0$ has equal roots.

Q21. Solve by factorization: $a^2b^2x^2 + b^2x - a^2x - 1 = 0$

Q22. The sum of two number is 11 and the sum of their reciprocals is $\frac{11}{28}$. Find the numbers.

Q23. A two-digit number is such that the product of the digits is 12. When 36 is added to the number the digits interchange their places. Find the two-digit number.

Q24. Find the roots of the equation $ax^2 + a = a^2x + x$.

Q25. Solve for x, $\sqrt{6}\,x + 7 - (2x - 7) = 0$.

Case-study based question:

Q26. Neeraj and Vasu went to a nearby pizza shop for lunch. The shop had a unique method for the price allotment of pizza every day. The price of each pizza they prepare on a specific day is equal to 4 more than twice the total number of pizzas they produced on that day. The total cost of production on that day was 448 rupees.

i. Find the quadratic equation for the given situation.
ii. What is the general form of the quadratic equation?
iii. Find the number of pizzas produced.

OR

Find the cost of each pizza.

Chapter - Arithmetic Progressions

Solve the following questions:

Q1. In an A.P., if d = -4, n = 7, a_n = 4, then a is:

a. 6 b. 7 c. 20 d. 28

Q2. The first term of an A.P. is p and common difference is q, then its 10^{th} term is:

a. $q + 9p$ b. $p - 9q$ c. $p + 9q$ d. $2p + 9q$

Q3. The 21^{st} of an A.P. whose first two terms are -3 and 4 is:

a. 17 b. 137 c. 143 d. -143

Q4. If 7 times the 7^{th} term of an A.P. is equal to11 times its 11^{th} term, then its 18^{th} term will be:

a. 7 b. 11 c. 18 d. 0

Q5. The sum of first 16 terms of the A.P. 10, 6, 2,…….. is:

a. -320 b. 320 c. -352 d. -400

Q6. In an A.P., if a = 1, a_n = 20 and S_n = 399, then n is:

a. 19 b. 21 c. 38 d. 42

Q7. The next term of the A.P. : $\sqrt{7}, \sqrt{28}, \sqrt{63}$ is:

a. $\sqrt{70}$ b. $\sqrt{80}$ c. $\sqrt{97}$ d. $\sqrt{112}$

Q11. Assertion (A): Sum of natural numbers from 1 to 100 is 5050.

Reason (R): Sum of n natural numbers is $\frac{n(n+1)}{2}$.

a. Both (A) and (R) are true and (R) is the correct explanation of (A)

b. Both (A) and (R) are true but (R) is not the correct explanation of (A)

c. (A) is true but (R) is false

d. (A) is false but (R) is true

Q12. Assertion (A): 5, 10, 15 are three consecutive terms of an A.P.

Reason (R): If a, b, c are three consecutive terms of an A.P. then 2b= a + c

a. Both (A) and (R) are true and (R) is the correct explanation of (A)

b. Both (A) and (R) are true but (R) is not the correct explanation of (A)

c. (A) is true but (R) is false

d. (A) is false but (R) is true

Q13. For the AP: $\frac{3}{2},\frac{1}{2},-\frac{1}{2},-\frac{3}{2},\ldots.$ write the first term and common difference.

Q14. Find the common difference of the AP:

$\frac{1}{a},\frac{3-a}{3a},\frac{3-2a}{3a},\ldots..,(a \neq 0).$

Q15. Find the 12th term of the AP: 5, 8, 11, 14, ...

Q16. Find the sum of all even natural number less than 100.

Q17. Find the sum of first n terms of the series $\sqrt{2}+\sqrt{8}+\sqrt{18}+\ldots.$

Q18. If 7 times the 7^{th} term of an A.P. is equal to 11 times its 11^{th} term, show that the 18^{th} term of the A.P.

Q19. Which term of the A.P: 121, 117, 113, … is its first negative term?

Q20. The 17^{th}term of an A.P is 5 more than twice its 8^{th} term. If the 11^{th} term of the A.P is 43, then find its n^{th} term.

Q21. The ratio of the 5^{th} and 3^{rd} terms of an A.P.is 2 : 5. Find the ratio of the 15^{th} and 7^{th} terms.

Q22. The sum of the first three terms of an A.P. is 33. If the product of first and third term exceeds the second term by 29, find the A.P.

Q23. An A.P. consists of 37 terms. The sum of the three middle most terms is 225 and the sum of the last three terms is 429. Find the A.P.

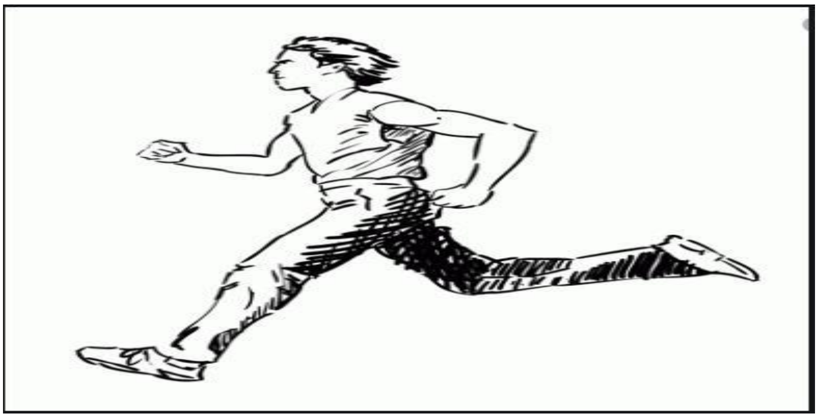
Q24. A manufacturer of TV sets produced 600 units in the third year and 700 units in the seventh year. Assuming that the production increases uniformly by a fixed number every year, find the production in i. the first year ii. the 10^{th} year iii. 7 years

Q25. The sum of four consecutive numbers in an A.P. is 32 and the ratio of the product of the first and the last term to the product of two middle terms is 7 : 15. Find the numbers.

Q26. The sum of first six terms of an A.P. is 42. The ratio of 10^{th}term to its 30^{th} term is 1 : 3. Calculate the first term and 13^{th} term of an A.P.

Case-study based question:

Q27. Your friend Veer wants to participate in a 200 m race. He can currently run that distance in 51 sec. and with each day of practice it takes him 2 sec. less. He wants to do in 31 sec.



Based on the above information, answer the following questions:

i. Is 51, 53, 55…. in an A.P. ?
ii. What is the minimum number of days he needs to practice till his goal is achieved?
iii. If n^{th} term of an AP is given by $a_n = 2n + 3$ then find the common difference of an A.P.

OR

What is the value of x, for which 2x, x+ 10, 3x + 2 are three consecutive terms of an A.P.?

Chapter - Triangles

Solve the following questions:

Q1. The height of mountains is found out using the idea of indirect measurements which is based on the______________.

a. principle of congruent figures
b. principle of similarity of figures
c. principle of equality of figures
d. None of the above

Q2. If triangle ABC is similar to triangle DEF such that 3AB = DE and BC = 9cm, then EF is equal to:

a. 27 cm
b. 3 cm
c. 6 cm
d. 9 cm

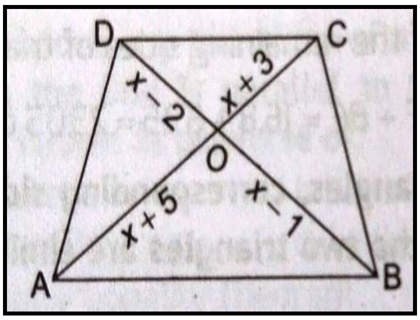
Q3. D and E are the midpoints of side AB and AC of a ΔABC, respectively and BC = 6cm. If DE || BC, then the length of DE is:

a. 2.5
b. 3
c. 5
d. 6

Q4. "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." This theorem is known as____________.

a. Pythagoras Theorem
b. Laplace Theorem
c. Thales Theorem
d. Area Theorem

Q5. In the given figure, if AB || DC, find the value of x:



a. 5 b. 7 c. 6 d. 4

Q6. In triangles ABC and DEF, $\angle B = \angle E, \angle F = \angle C$ and AB = 3 DE. Then, the two triangles are:

a. congruent but not similar
b. similar but not congruent
c. neither congruent nor similar
d. congruent as well as similar

Q7. The diagonals of a rhombus are 16cm and 12 cm, in the length. The side of the rhombus in length is:

a. 20 cm b. 8 cm c. 10 cm d. 9 cm

Q8. The height of an equilateral triangle of side 5 cm is:

a. 4.33 cm b. 3.9 cm c. 2.1 cm d. 1.8 cm

Q9. It is given that ΔABC ~ΔDEF, $\angle A = 30°, \angle C = 50°$, AB = 5 cm, AC = 8 cm and DF = 7.5 cm. Then, the following is true:

a. DE = 12 cm, $\angle F = 50^0$
b. DE = 12 cm, $\angle F = 100^0$
c. EF = 12 cm, $\angle D = 100^0$
d. EF = 12 cm, $\angle D = 30^0$

Q10.Assertion (A): The line segment joining the midpoints of any two sides of a triangle is parallel to the third side.

Reason (R): A line drawn through the midpoint of one side of a triangle parallel to another side bisects the third side.

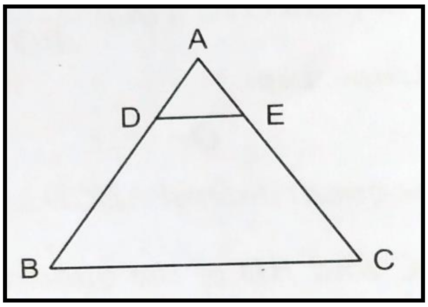
a. Both (A) and (R) are true and (R) is the correct explanation of (A)
b. Both (A) and (R) are true but (R) is not the correct explanation of (A)
c. (A) is true but (R) is false
d. (A) is false but (R) is true

Q11. Assertion (A): All congruent triangles are similar but the similar triangles need not be congruent.

Reason (R): If the corresponding sides of two triangles are proportional, then they are similar.

Both (A) and (R) are true and (R) is the correct explanation of (A)
a. Both (A) and (R) are true but (R) is not the correct explanation of (A)
b. (A) is true but (R) is false
c. (A) is false but (R) is true

Q12. If the given figure, DE||BC, AB = 5.6 cm an AD = 1.6 cm, then find AE : EC.



Q13. If in ΔABC, AB = 6 cm and DE||BC such that $AE = \frac{1}{4}AC$, then find the length of AD.

Q14. In the ΔABC, D and E are points on side AB and AC respectively such that DE||BC. If AE = 2cm, AD = 3 cm and BD = 4.5cm then find CE.

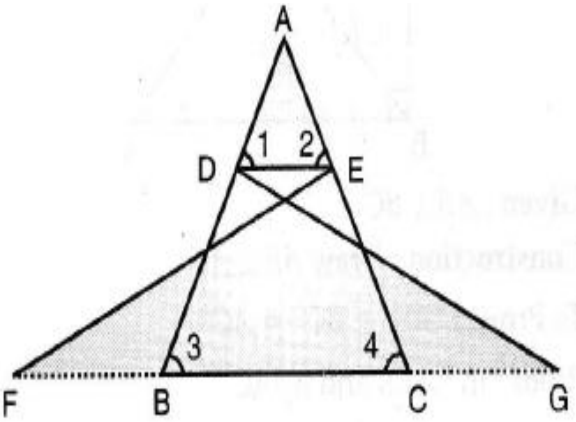
Q15. If one diagonal of a trapezium divides the other diagonal in the ratio 1:2, prove that one of the parallel sides is double the other.

Q16. In two triangles, it is given that the corresponding angles are equal. State whether the two triangles are congruent, similar or both.

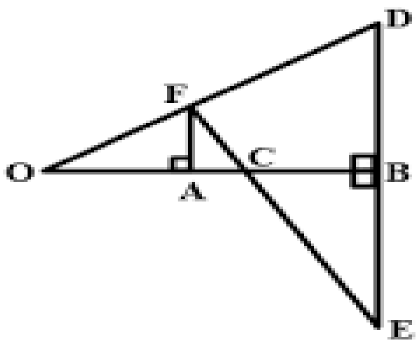
Q17. If a line is drawn parallel to one side of a triangle, to intersect the other two sides in distinct points, the other two sides are divided in the same ratio.

Q18. If one diagonal of a trapezium divides the other diagonal in the ratio 1:2, prove that one of the parallel side is double the other.

Q19. In figure, $\Delta FEC \cong \Delta GBD$ and $\angle 1 = \angle 2$. Prove that $\Delta ADE \cong \Delta ABC$.

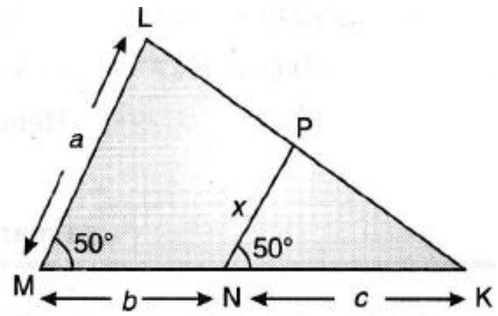


Q20. In the given figure, OB is the perpendicular bisector of the line segment DE, FA ⊥ OB and FE intersects OB at the points C. Prove that $\frac{1}{OA} + \frac{1}{OB} = \frac{2}{OC}$.

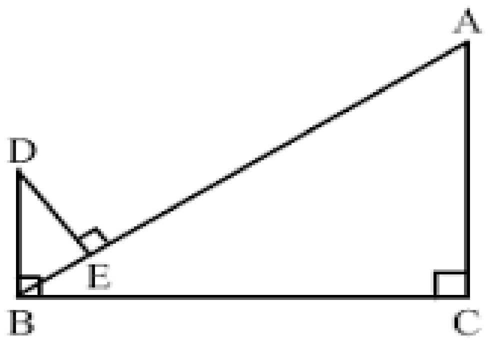


Q21. A vertical pole which is 2.25 m long casts a 6.75 m long shadow on the ground. At the same time, a vertical tower casts a 90 m long shadow on the ground. Find the height of the tower.

Q22. In the given figure, find the value of x in terms of a, b and c.

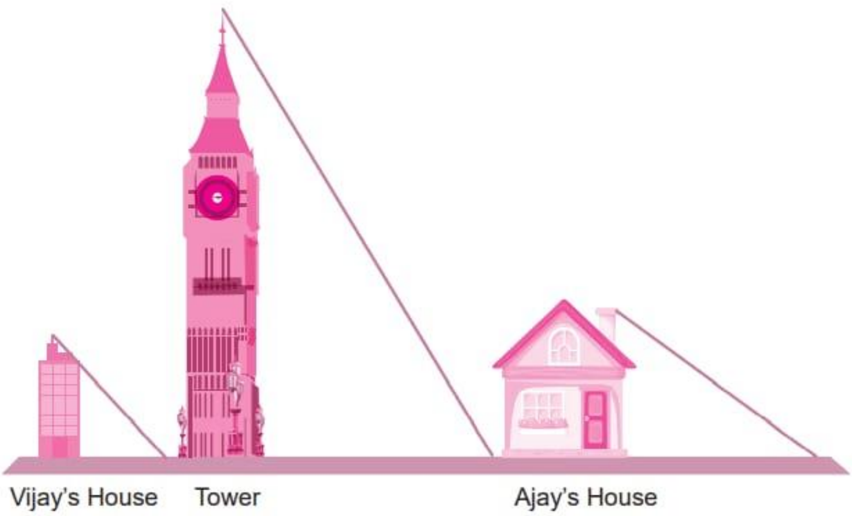


Q23. In the given figure, DB ⊥BC, AC ⊥ BC and DE ⊥ AB. Prove that $\frac{BE}{DE} = \frac{AC}{BC}$.



Case-study based question:

Q24. Vijay is trying to find the average height of a tower near his house. He is using the properties of similar triangles. The height of Vijay's house if 20m when Vijay's house casts a shadow 10m long on the ground. At the same time, the tower casts a shadow 50m long on the ground and the house of Ajay casts 20m shadow on the ground.



Based on the above information, give the answer of the following questions:

i. What is the height of the tower?
ii. What will be the length of the shadow of the tower when Vijay's house casts a shadow of 12m?
iii. When the tower casts a shadow of 40m, same time what will be the length of the shadow of Ajay's house?

OR

When the tower casts a shadow of 40m, same time what will be the length of the shadow of Vijay's house?

Chapter - Coordinate Geometry

Solve the following questions:

Q1. Distance of the point (–6, 8) from origin is:

a. 6 units b. –6 units c. 8 unit d. 10 units

Q2. If the point (x, y) is equidistant from the point (2, 1) and (1, –2), then:

a. $x + 3y = 0$ b. $3x + y = 0$ c. $x + 2y = 0$ d. $3x + 2y = 0$

Q3. If A (5, 3), B (11, –5) and P (12, y) are the vertices of a right triangle, right angled at P, then y:

a. – 2 or4 b. –2 or – 4 c. 2 or – 4 d. 2 or 4

Q4. The x-coordinate of a point P is twice its y-coordinate. If P is equidistant from Q (2, –5) and R (–3, 6), then the coordinates of P are:

a. (16, 8) b. (14, 7) c. (18, 9) d. (10, 5)

Q5. The equation of the perpendicular bisector of line segment joining points A(4, 5) and B(-2, 3)is:

a. $2x - y + 7 = 0$ b. $3x + 2y - 7 = 0$ c. $3x - y - 7 = 0$ d. $3x + y - 7 = 0$

Q6. The point which divides the line segment joining the points (7, –6) and (3, 4) in ratio 1:2 internally lies in the ______.

a. I quadrant b. II quadrant c. III quadrant d. IV quadrant

Q7. The ratio in which the line segment joining (1, – 5) and (–4, 5) is divided by the X - axis is:

a. 1 : 1 b. 1 : 2 c. 2 : 1 d. 2:3

Q8. The mid - point of the line segment AB is P(0, 4). If the coordinates of B are (–2, 3) then the coordinates of A are:

a. (2, 5) b. (–2, –5) c. (2, 9) d. (–2, 11)

Q9. Assertion (A): The distance between the points (0,0) and (36,15) is 39.

Reason (R): Distance from the origin of the point (x, y) is $\sqrt{x^2+y^2}$.

a. Both (A) and (R) are true and (R) is the correct explanation of (A)
b. Both (A) and (R) are true but (R) is not the correct explanation of (A)
c. (A) is true but (R) is false
d. (A) is false but (R) is true

Q10. Assertion (A): If P(x, y) is equidistant from the points A(7, 1) and B(3, 5), then $x - y = 2$.

Reason (R): If point P is equidistant from the points A and B, then AP = BP.

a. Both (A) and (R) are true and (R) is the correct explanation of (A)
b. Both (A) and (R) are true but (R) is not the correct explanation of (A)
c. (A) is true but (R) is false
d. (A) is false but (R) is true

Q11. Find the point on x-axis which is equidistant from the points (2, –2) and (–4, 2).

Q12. Find a point on the y-axis which is equidistant from (6,5) and (–4, 3).

Q13. If point P divides the line segment joining the points A(2,1) and B(6, 5) in the ratio 1:3, then find the coordinates of P.

Q14. If the centre of a circle is $\left(\frac{3}{2}, \frac{-5}{2}\right)$ and one end of the diameter is (2, 1), then find the coordinates of the other end.

Q15. If the mid-point of the line segment joining A(–2, 8) and B(–6, –4) is P, then find the coordinates of P.

Q16. Find the points on the x-axis which is equidistant from (2,-5) and (-2,9).

Q17. The x-coordinate of a point P is twice its y-coordinate. If P is equidistant from Q(2,-5) and R(-3,6), find the coordinates of P.

Q18. The line 2x + y = 4 divides the join of A(2,-2) and B(3,7). Also, find the coordinates of the point of their intersection.

Q19. The three vertices of a parallelogram are (6, 1), (8, 2) and (9, 4). Find the fourth vertex.

Q20. The line segment joining the points (3, -4) and (1,2) is trisected at the points P and Q. If the coordinates of P and Q are (a, -2) and ($\frac{5}{3}$, b) respectively, find the values of a and b.

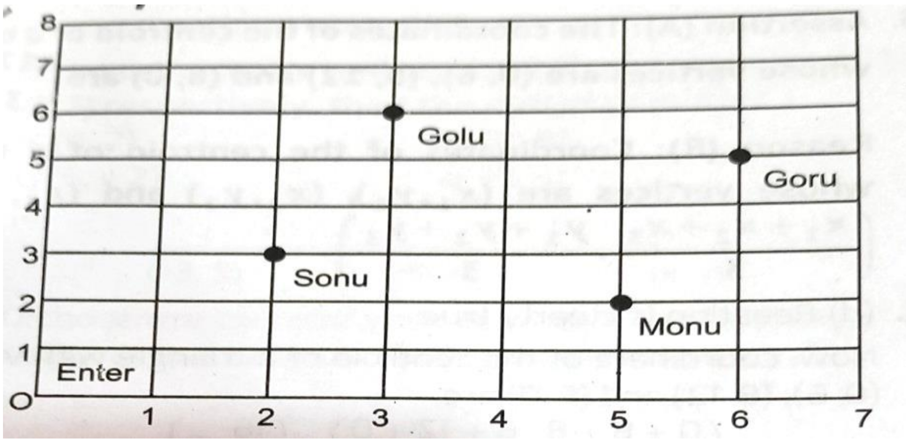
Q21. Find the coordinates of the points which divide the line segment joining A(2, -3) and B(-4, -6) into three equal parts.

Q22. Find the ratio in which the line 2x + 3y – 5 = 0 divides the line segment joining the points (8, -9) and (2, 1). Also find the coordinates of the point of division.

Q23. Show that the points (1, 7), (4, 2), (-1, -1) and (-4, 4) are the vertices of a square.

Case-study based question:

Q24. Sonu went to the lab near to his home for COVID 19 test along with his family members. The seats in the waiting area were as per the norms of distancing during this pandemic (as shown in the above figure). His family members took their seats surrounded by black circular area.



Based on the above information give the answer of the following questions.

i. Considering O as the origin, what are the coordinates of seat of Sonu and Goru respectively?

ii. What is the distance between Golu and Monu?

iii. Find the area covered by Sonu and its members, if all four seats connected with a rope.

OR

If the doctor divides the rope joining Sonu and Goru in the ratio 1 : 2, then what is the coordinates of the seat of the doctor?

Chapter - Introduction to Trigonometry

Q1. The maximum value of $\sin\theta$ is:

a. $\frac{1}{2}$ b. $\frac{\sqrt{3}}{2}$ c. 1 d. $\frac{1}{\sqrt{2}}$

Q2. If $\tan\theta = \frac{3}{4}$, then $\cos^2\theta - \sin^2\theta =$

a. $\frac{7}{25}$ b. 1 c. $\frac{-7}{25}$ d. $\frac{4}{25}$

Q3. If $\tan\theta = \frac{a}{b}$, then $\frac{(a\sin\theta - b\cos\theta)}{(a\sin\theta + b\cos\theta)} =$

a. $\frac{(a^2+b^2)}{(a^2-b^2)}$ b. $\frac{(a^2-b^2)}{(a^2+b^2)}$ c. $\frac{a^2}{(a^2+b^2)}$ d. $\frac{b^2}{(a^2+b^2)}$

Q4. $\sec^4\theta(1-\sin^2\theta) - \tan^2\theta$ is equals to:

a. 0 b. 1 c. -1 d. 2

Q5. $\sqrt{-4+\sqrt{8+16\operatorname{cosec}^4\theta + \sin^4\theta}} = A\operatorname{cosec}\theta + B\sin\theta$, then A and B are :

a. 2 and –1 b. 1 and $\frac{1}{2}$ c. $\frac{1}{2}$ and $\frac{1}{3}$ d. 3 and –4

Q6. Value of $\frac{\sin 60^0 + \cot 45^0 - \operatorname{cosec}30^0}{\sec 60^0 - \cos 30^0 + \tan 45^0}$ is:

a. $\frac{4\sqrt{3}-9}{33}$ b. $\frac{4\sqrt{3}+9}{33}$ c. $\frac{9\sqrt{3}-4}{33}$ d. $\frac{9\sqrt{3}+4}{33}$

Q7. If $(\sec^2\theta - 1)(\operatorname{cosec}^2\theta - 1)$ is equal to:

a. 1 b. –1 c. 2 d. 0

Q8. If $\sin\alpha = \frac{1}{2}$ and $\tan\beta = \frac{1}{\sqrt{3}}, \alpha > 0^0, \beta > 0^0$ then the value of $\cot(\alpha+\beta)$ is :

a. $\frac{1}{\sqrt{3}}$ b. $\sqrt{3}$ c. 1 d. 0

Q9. If $a\cos\theta + b\sin\theta = m$ and $a\sin\theta - b\cos\theta = n$, then $a^2 + b^2 =$

a. $m^2 - n^2$ b. $n^2 - m^2$ c. $m^2 + n^2$ d. m^2n^2

Q10. If $\tan\theta + \sin\theta = m$ and $\tan\theta - \sin\theta = n$, then $m^2 - n^2$ is equal to :

a. $\sqrt{mn}$ b. $\sqrt{\frac{m}{n}}$ c. $4\sqrt{mn}$ d. $\sqrt{m+n}$

Q11. Assertion (A): If $\sec\theta + \tan\theta = a$ then $\sec\theta = \frac{a^2+1}{2a}$.

Reason (R): $\operatorname{cosec}^2\theta - \cot^2\theta = 1$

a. Both (A) and (R) are true and (R) is the correct explanation of (A)
b. Both (A) and (R) are true but (R) is not the correct explanation of (A)

c. (A) is true but (R) is false

d. (A) is false but (R) is true

Q12. Assertion (A): The value of $\sin 60°\cos 30° + \sin 30°\cos 60°$ is 1.

Reason (R): $\sin 90° = 1$ and $\cos 90° = 0$.

a. Both (A) and (R) are true and (R) is the correct explanation of (A)

b. Both (A) and (R) are true but (R) is not the correct explanation of (A)

c. (A) is true but (R) is false

d. (A) is false but (R) is true

Q13. If $3\cot\theta = 2$, then what is the value of $\tan\theta$?

Q14. If $\cot A = \frac{12}{5}$, find the value of (sin A + cos A) cosec A.

Q15. Find the value of $\cos 60^0 \cos 30^0 + \sin 60^0 \sin 30^0$.

Q16. If 5 tan θ = 4, then find the value of $\frac{5\sin\theta - 3\cos\theta}{5\sin\theta + 3\cos\theta}$

Q17. Verify: $4(\sin^2 30° + \cos^2 60°) - 3(\cos^2 45° - \sin^2 90°) = 2$

Q18. If $\sin(A - B) = \frac{1}{2}$, $\cos(A + B) = \frac{1}{2}$, find A and B.

Q19. Prove that: (1 + cot A – cosec A)(1 + tan A + sec A) = 2

Q20. Evaluate: $\frac{\tan^2 60^0 + 4\sin^2 45^0 + 3\sec^2 30^0 + 5\cos^2 90^0}{\operatorname{cosec} 30^0 + \sec 60^0 - \cot^2 30^0}$

Q21. Prove that: $\frac{1}{\operatorname{cosec}\theta - \cot\theta} - \frac{1}{\sin\theta} = \frac{1}{\sin\theta} - \frac{1}{\operatorname{cosec}\theta + \cot\theta}$

Q22. Prove that: $\sec^4 A - \sec^2 A = \tan^4 A + \tan^2 A$

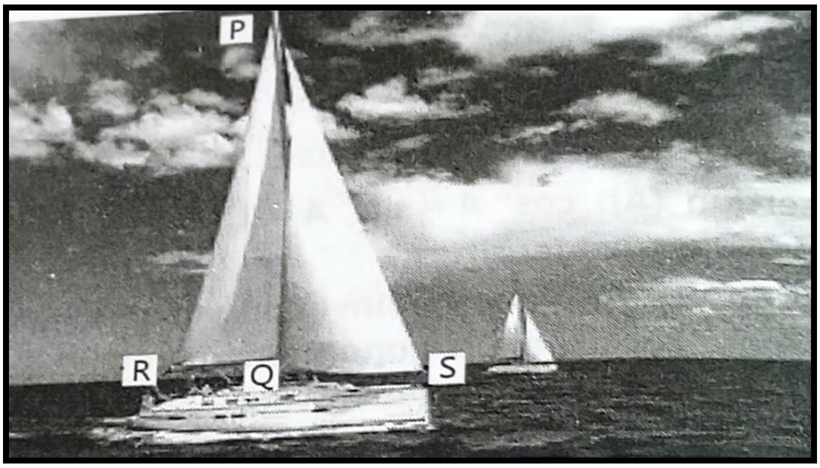
Q23. Prove that: $\frac{\sin\theta}{\cot\theta + \operatorname{cosec}\theta} = 2 + \frac{\sin\theta}{\cot\theta - \operatorname{cosec}\theta}$

Q24. Prove that: $\frac{\tan\theta}{1 - \cot\theta} + \frac{\cot\theta}{1 - \tan\theta} = 1 + \sec\theta.\operatorname{cosec}\theta$

Case-study based question:

Q25. A sailing boat with triangular masts is shown below. Two right triangles can be observed.

Triangles PQR and PQS, both right - angled at Q. The distance QR = 2m and QS = 3m and height PQ = 5m.



Based on the above information, give the answer of the following questions :

i. What is the value of sec S?

ii. What is the value of cosec R?

iii. What is the value of $\sin^2 R - \cos^2 S$?

OR

What is the value of $\sin^2 S - \cos^2 R$?

Chapter - Some Applications of Trigonometry

Solve the following questions:

Q1. A ladder of 10 m length touches a wall at height of 5 m. The angle θ made by it with the horizontal is:

a. 60° b. 90° c. 30° d. 45°

Q2. The measure of angle of elevation of top of tower $75\sqrt{3}$ m high from a point at a distance of 75 m from foot of tower in a horizontal plane is:

a. 30° b. 60° c. 90° d. 45°

Q3. A pole 10 m high cast a shadow 10 m long on the ground, then the sun's elevation is_________.

a. 60° b. 45° c. 30° d. 90°

Q4. If the ratio of height of a tower and the length of its shadow on the ground is $\sqrt{3} : 1$, then the angle of elevation of the sun is:

a. 60° b. 45° c. 30° d. 90°

Q5. If the angle of depression of an object from a 75 m high tower is 30°, then the distance of the object from base of tower is_________.

a. $75\sqrt{3}$m b. 45m c. 30m d. 90m

Q6. When the angle of elevation of sun is 30° the length of the shadow cast by 50 m high building is:

a. $\frac{50}{\sqrt{3}}$ m b. $50\sqrt{3}$ m c. $25\sqrt{3}$ m d. $100\sqrt{3}$ m

Q7. If AB = 4 m and AC = 8 m, then angle of elevation of A as observed from C is:

a. 60° b. 45° c. 30° d. 90°

Q8. If a pole 6m high casts a shadow $2\sqrt{3}$ m long on the ground, then sun's elevation is:

a. 60° b. 30° c. 45° d. 90°

Q9. The angle of elevation of the top of a tower from a point on the ground is 45°. If the observer is 42 m away from the foot of the tower, the height of the tower is:

a. 63 m b. 21 m c. 84 m d. 42 m

Q10. Assertion (A): When we move towards the object, angle of elevation decreases.

Reason (R): As we move towards the object, it subtends large angle at our eye thanbefore.

a. Both (A) and (R) are true and (R) is the correct explanation of (A)

b. Both (A) and (R) are true but (R) is not the correct explanation of (A)

c. (A) is true but (R) is false

d. (A) is false but (R) is true

Q11. Assertion (A): At some time of the day, the length of the shadow of a tower is equal to its height, then the sun's altitude is 45°.

Reason (R): The angle which the line of sight makes with the horizontal line passing through the eye of the observer, when the object is above the observer is called the angleof elevation.

a. Both (A) and (R) are true and (R) is the correct explanation of (A)
b. Both (A) and (R) are true but (R) is not the correct explanation of (A)
c. (A) is true but (R) is false
d. (A) is false but (R) is true

Q12. A ladder makes an angle of 60^0 with the ground when placed against a wall. If the foot of the ladder is 2m away from the wall, then find the length of the ladder.

Q13. The tops of two towers of height x and y, standing on level ground, subtend angles of 30^0 and 60^0 respectively at the centre of the line joining their feet, then find x : y.

Q14. The ratio of the height of a tower and the length of its shadow on the ground is $\sqrt{3}:1$. What is the angle of elevation of the sun?

Q15. If the height and the length of the shadow of a man are the same, then find the angle of elevation of the Sun.

Q16. An observer 1.5 m tall is 20.5 m away from a tower of 22 m high. Determine the angle of elevation of the tower from the eye of the observer.

Q17. A man on the top of the vertical tower observes a car moving at a uniform speed toward him. If it takes 12 min for the angle of depression to change from 30° to 45°, how soon after this, the car will reach the tower?

Q18. The angle of elevation of an aeroplane from point A on the ground is 60°. After flight of 15 seconds, the angle of elevation change to 30°. If the aeroplane is flying at a constant height of $500\sqrt{3}$ m, find the speed of the plane in km/hr.

Q19. The angle of elevation of a jet plane from a point A on the ground is 60°. After a flight of 30 seconds, the angle of elevation changes to 30°. If the jet plane is flying at a constant height of $3600\sqrt{3}$ m, find the speed of the jet plane.

Q20. A pole 5 m high is fixed at the top of a tower. The angle of depression of the top of the pole observed from a point A on the ground is 60° and the angle of depression of the point A from the top of the tower is 45°. Find the height of the tower.

Q21. The angle of depression of the top and bottom of a building 50 metres high as observed from the top of a tower are 30° and 60°, respectively. Find the height of the tower and also the horizontal distance between the building and the tower.

Q22. A moving boat is observed from the top of a 150 m high cliff moving away from the cliff. The angle of depression of the boat changes from 60° to 45° in 2 minutes. Find the speed of the boat in m/h.

Q23. From a point in the ground, the angles of elevation of the bottom and top of a tower fixed at the top of a 20 m high building are 45° and 60°respectively. Find the height of the tower.

Q24. As observed from the top of a 100 m high lighthouse from the sea-level, the angles of depression of two ships are 30˚ and 45˚. If one ship is exactly behind the other on the same side of the lighthouse, find the distance between the two ships. (Use $\sqrt{3} = 1.732$)

Case-study based question:

Q25. A group of students of class X visited India Gate on an education trip. The teacher and students had interest in history as well. The teacher narrated that **India Gate**, official name **Delhi Memorial**, originally called **All-India War Memorial**, monumental sands to near chin New Delhi, to the troops of British India who died in wars fought between 1914 and 1919.

The teacher also said that India Gate, which is located at the eastern end of the Rajpath (formerly called the Kingsway), is about 138 feet (42 metres) in height.

Based on the above information, answer the following questions:

i. What is the angle of elevation if they are standing at a distance of 42m away from the monument?
ii. The ratio of the length of a rod and its shadow is 1:1 then find the angle of elevation of the Sun.
iii. They want to see the tower at an angle of 60°. So, they want to know the distance where they should stand and hence find the distance.

OR

Find the angle formed by the line of sight with the horizontal when the object viewed is below the horizontal level.

Chapter - Circles

Solve the following questions:

Q1. If two tangents inclined at an angle 60° are drawn to a circle of radius 3 cm, then length of each tangent is equal to:

a. $\frac{3}{2}\sqrt{3}$ cm   b. 6 cm   c. 3 cm   d. $3\sqrt{3}$ cm

Q2. The number of tangents that can pass through any point lying on a circle is____________.

a. 2   b. infinitely many   c. 1   d. none of these

Q3. From a point P which is at a distance of 13 cm from the centre O of a circle of radius 5 cm, the pair of tangents PQ and PR to the circle is drawn. Then, the area of the quadrilateral PQOR is:

a. 60 cm^2 b. 65 cm^2 c. 30 cm^2 d. 32.5 cm^2

Q4. Distance between two parallel lines is 14 cm. The radius of circle which will touch both of these lines is:

a. 6 cm b. 7 cm c. 12 cm d. 14 cm

Q5. Angle between the tangent and the radius at the point of contact is________.

a. 0° b. 30° c. 60° d. 90°

Q6. If angle between two tangents drawn from a point P to a circle of radius a and centre$O$ is 90°, then OP is:

a. $\frac{\sqrt{3}a}{2}$ b. a c. $\sqrt{2}a$ d. $2a$

Q7. A tangent PQ at a point P of a circle of radius 6 cm meets a line through the centre O at a point Q, so that OQ = 14 cm, then length of PQ is:

a. $4\sqrt{10}$ cm b. $6\sqrt{10}$ cm c. $5\sqrt{10}$ cm d. $7\sqrt{10}$ cm

Q8. How many tangents can a circle have from a point lying inside the circle?

a. 2 b. 0 c. 1 d. 3

Q9. **Assertion (A):** There is one and only one tangent at any point on the circumference of a circle.

Reason (R): The perpendicular at the point of contact of the tangent to a circle never passes through the centre.

a. Both (A) and (R) are true and (R) is the correct explanation of (A)

b. Both (A) and (R) are true but (R) is not the correct explanation of (A)

c. (A) is true but (R) is false

d. (A) is false but (R) is true

Q10.Assertion (A): If the length of a tangent from an external point to a circle is 8 cm, then the length of the other tangent from the same point the circle is 8 cm.

Reason (R): Length of the tangents drawn from an external point to a circle are equal.

a. Both (A) and (R) are true and (R) is the correct explanation of (A)
b. Both (A) and (R) are true but (R) is not the correct explanation of (A)
c. (A) is true but (R) is false

d. (A) is false but (R) is true

Q11. From an external point P, tangents PA and PB are drawn to a circle with centre O. If $\angle PAB = 50^0$, then $\angle AOB$.

Q12. Find the length of the tangent drawn from a point P, 12cm away from the centre of a circle of radius 5cm.

Q13. The length of the tangent from a point A to a circle of radius 9cm is 12cm. Find the distance of A from the centre of the circle.

Q14. If two tangents inclined at an angle of 60^0 are drawn to a circle of radius 5cm, then find the length of each tangent.

Q15. Prove that the tangents drawn from an external point to a circle are equal in length.

Q16. From a point Q, 13 cm away from the centre of a circle, the length of tangent PQ to the circle is 12 cm. Find the radius of the circle.

Q17. A triangle ABC is drawn to circumscribe a circle of radius 4 cm such that the segments BD and DC into which BC is divided by the point of contact D are of lengths 8 cm and 6 cm respectively. Find the sides AB and AC.

Q18. PQ is a chord of length 8 cm of a circle of radius 5 cm. The tangents at P and Q intersect at T. Find the length of TP.

Q19. A circle is inscribed in a triangle ABC having sides 8 cm, 10 cm and 12 cm. Find AD, BE and CF.

Q20. PA and PB are the tangents to a circle with center O. If $\angle APB = 70°$. Find $\angle POA$.

Q21. Find the distance between two parallel tangents to a circle of radius 5 cm.

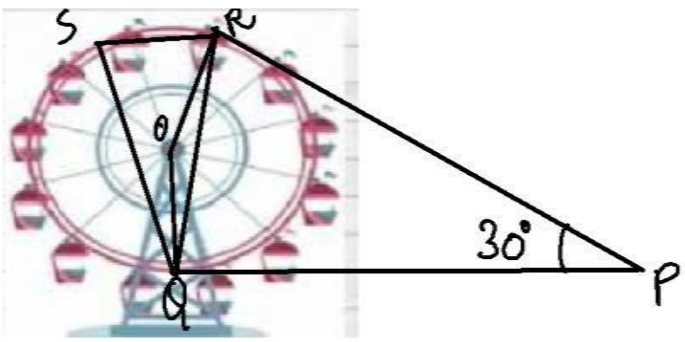
Q22. The length of tangent from a point A at distance 5 cm from the center of the circle is 4 cm. Find radius.

Q23. A circle is touching the side BC of ΔABC at P and touching AB and AC produced at Q and R respectively. Prove that AQ = ½(Perimeter of ΔABC).

Q24. Prove the tangent at any point of a circle is perpendicular to the radius through the point of contact.

Case-study based question:

Q25. A Ferris wheel (or a big wheel in the United Kingdom) is an amusement ride consisting of a rotating upright wheel with multiple passenger-carrying components (commonly referred to as passenger cars, cabins, tubs, capsules, gondolas, or pods) attached to the rim in such a way that as the wheel turns, they are kept upright, usually by gravity. After taking a ride in Ferris wheel, Aarti came out from the crowd and was observing her friends who were enjoying the ride . She was curious about the different angles and measures that the wheel will form. She forms the figure as given below.



Based on the above information, answer the following questions.

i. In the given figure, find $\angle ROQ$.
ii. Find $\angle RQP$.
iii. Find $\angle RSQ$.

OR

Find $\angle ORP$.

Chapter - Areas Related to Circles

Solve the following questions:

Q1. If the sum of the areas of two circles with radii R_1 and R_2 is equal to the area of a circle of radius R, then:

a. $R_1 + R_2 = R$ b. $R_1^2 + R_2^2 = R^2$ c. $R_1 + R_2 < R$ d. $R_1^2 + R_2^2 < R^2$

Q2. If the perimeter of a circle is equal to that of square, then the ratio of their areas is:

a. 22 : 7 b. 14 : 11 c. 7 : 22 d. 11 ; 14

Q3. The length of the minute hand of a clock is $\sqrt{21}$ cm. Find the area swept by the minute hand from 9 a.m. to 9.10 a.m.:

a. 22 cm b. 11 cm^2 c. 45 cm^2 d. 31 cm^2

Q4. A chord of a circle subtends an angle of 60^0 at the centre of the circle. If the length of the chord is 10 cm. Then the area of the major segment is: (Take $\pi = 3.14$ and $\sqrt{3} = 1.732$)

a. 304.97 cm^2 b. 295 cm^2 c. 310 cm^2 d. 335 cm^2

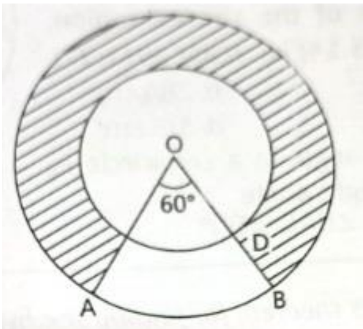
Q5. The area of the square that can be inscribed in a circle of radius 8 cm is___________.

a. 256 cm^2 b. 128 cm^2 c. $64\sqrt{2}$ cm^2 d. 64 cm^2

Q6. The perimeter (in cm) of a square circumscribing a circle of radius a cm, is__________.

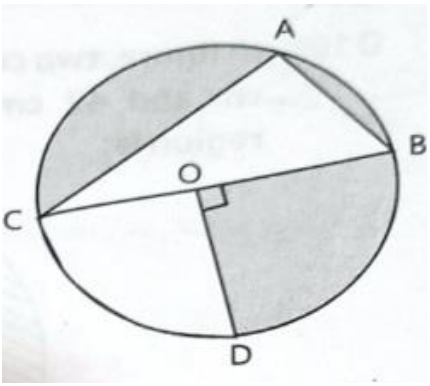
a. 4a b. 5a c. 8a d. 10a

Q7. In figure, two concentric circles with centre O, have radii 21cm and 42cm. If $\angle AOB = 60^0$, the area of the shaded region is:



a. 3465 cm^2 b. 1295 cm^2 c. 2565 cm^2 d. 3980 cm^2

Q8. In the following figure, O is the centre of the circle with AC = 24 cm, AB = 7 cm and $\angle BOD = 90^0$. The area of the shaded region is: (Use $\pi = 3.14$)



a. 248 cm^2 b. 284 cm^2 c. 298 cm^2 d. 318 cm^2

Q9. **Assertion (A):** A wire is looped in the form of a circle of radius 28 cm. It is bent into a square. Then the area of square is 1936cm^2.

Reason (R): Angle described by a minute hand in 1 minute = 6°.

a. Both (A) and (R) are true and (R) is the correct explanation of (A)

b. Both (A) and (R) are true but (R) is not the correct explanation of (A)

c. (A) is true but (R) is false

d. (A) is false but (R) is true

Q10. Assertion (A): If the circumference of two circles are in the ratio 2 : 3, then ratio of their areas is 4 : 9.

Reason (R): The circumference of a circle of radius r is $2\pi r$ and its area is πr^2.

a. Both (A) and (R) are true and (R) is the correct explanation of (A)

b. Both (A) and (R) are true but (R) is not the correct explanation of (A)

c. (A) is true but (R) is false

d. (A) is false but (R) is true

Q11. Determine the length of the arc of quadrant of a circle of radius r.

Q12. In a circle of diameter 42cm, if an arc subtends an angle of 60^0 at the centre, find the length of the arc.

Q13. Find the area of the largest triangle that can be inscribed in a semicircle of radius r.

Q14. Find the area of the minor segment of a circle of radius 14cm, when its central angle is 60°.

Q15. In a circle of radius 21 cm, an arc subtends an angle of 60° at the center. Find

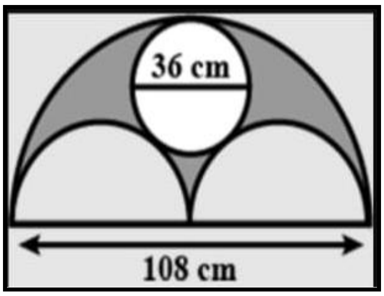
i. the area of the minor sector

ii. length of an arc

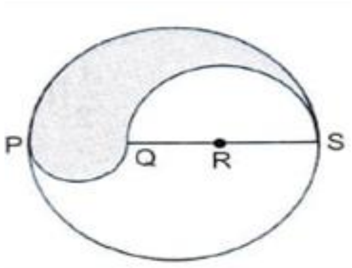
iii. perimeter of the sector

Q16. Find the area of the minor segment of a circle of radius 42 cm, if length of the corresponding arc is 44 cm.

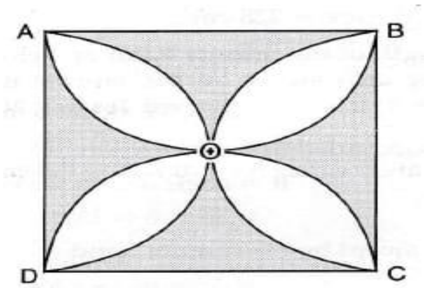
Q17. In the given figure, diameter of the largest semicircle is 108 cm and the diameter of the small circle is 36 cm. Find the area of the shaded region.



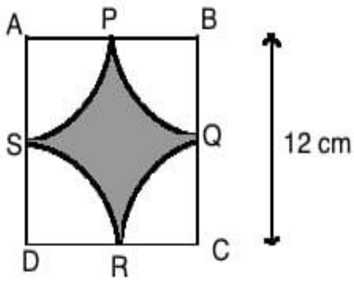
Q18. In the given figure, PQRS is a diameter of a circle of radius 6 cm.The lengths PQ, QR, and RS areequal. Semicircles are drawn on PQ and QS as diameters. Find the perimeter and area of the shaded region.



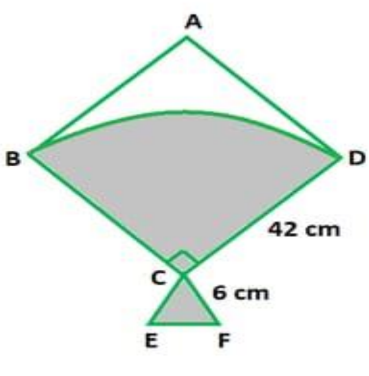
Q19. In figure, ABCD is a square of side 14 cm. Semi-circles are drawn with each side of square as diameter. Find the area of the shaded region. (use $\pi = \frac{22}{7}$)



Q20. Find the area of the shaded region in given figure, where arcs drawn with centres A, B, C and D intersect in pairs at mid-point P, Q, R and S of the sides AB, BC, CD and DA respectively of a square ABCD of side 12 cm.



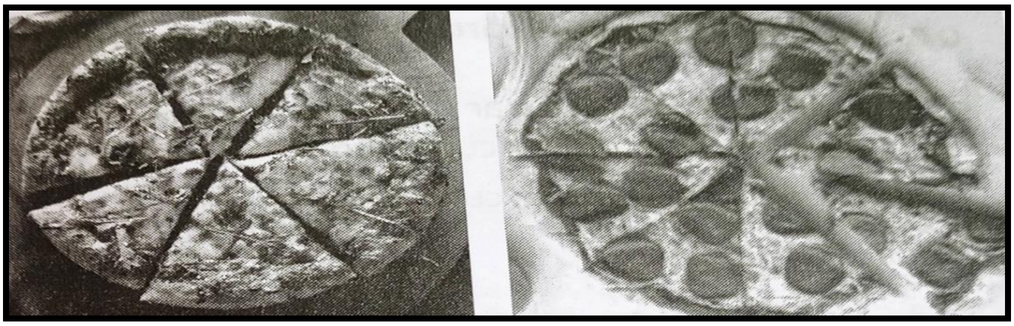
Q21. In the given figure, shows a kite in which BCD is the shape of a quadrant of a circle of radius 42 cm. ABCD is a square and ΔCEF is an isosceles right angled triangle whose equal sides are 6 cm long. Find the area of the shaded region. (use $\pi = \frac{22}{7}$)



Case-study based question:

Q22. We all love to eat pizza, especially kids and a variety of pizzas are available in India which have been modified according to Indian taste and menu. From the Greeks to the Egyptians, from the

Persians to the Indians, there have been incarnations of pizza served throughout history, Flatbreads, naan, and plakountos are all early preparations that could be considered cousins to the modern pizza, but there isn't a consensus as to which is first and whether these could even be considered precursors to pizza at all. Consider two pizzas, both of equal diameter, namely, 12 inches. The first pizza marked (I) has been cut into equal slices, whereas the second pizza, marked (II) has been cut into eight equal slices.



(I) (II)

Based on the above information, answer the following questions.

i. Find the area of one slice in pizza, marked (I).

ii. Find the perimeter of the pizza slice shown in (I).

iii. What is the relation between area of a sector A, length of the arc l, angle θ subtended by the arc at the centre and radius of circle?

OR

What is the ratio of areas of each slice of pizza (I) and (II)?

Chapter - Surface Areas and Volumes

Solve the following questions:

Q1. A cylindrical pencil sharpened at one edge is the combination of:

a. a cone and a cylinder
b. frustum of a cone and a cylinder
c. a hemisphere and a cylinder
d. two cylinders

Q2. The length of the diagonal of a cube is $6\sqrt{3}$ cm. Its total surface area is:

a. 144 cm^2
b. 216 cm^2
c. 180 cm^2
d. 108 cm^2

Q3. The curved surface area of a cylinder is 264 m^2 and its volume is 924 m^3. The ratio of its diameter to its height is:

a. 3 : 7
b. 7 : 3
c. 6 : 7
d. 7 : 6

Q4. A circular tent is cylindrical to a height of 4 m and conical above it. If its diameter is 105 m and its slant height is 40 m, then the total area of the canvas required is:

a. 1760 m^2
b. 2640 m^2
c. 3960 m^2
d. 7920 m^2

Q5. A cubical icecream brick of edge 22 cm is to be distributed among some children by filling icecream cones of radius 2 cm and height 7 cm upto its brim. How many children will get icecream cones?

a. 163
b. 263
c. 363
d. 463

Q6. If two solid hemispheres of same base radius r are joined together along their bases, then curved surface area of this new solid is:

a. $4\pi r^2$ b. $6\pi r^2$ c. $3\pi r^2$ d. $8\pi r^2$

Q7. A medicine-capsule is in the shape of a cylinder of diameter 0.5 cm with two hemispheres stuck to each of its ends. The length of entire capsule is 2 cm. The capacity of the capsule is:

a. 0.36 cm^3 b. 0.35 cm^3 c. 0.34 cm^3 d. 0.33 cm^3

Q8. A tank is made of the shape of a cylinder with a hemispherical depression at one end. The height of the cylinder is 1.45 m and radius is 30 cm. The total surface area of the tank is:

a. 30 m^2 b. 3.3 m^2 c. 30.3 m^2 d. 3300 m^2

Q9. A toy is in the form of a right circular with a hemisphere on the top. The radii of cylindrical and hemispherical parts are 5 cm each and height of cylindrical part is 14 cm. Then its curved surface area is:

a. 190π cm^2 b. 140π cm^2 c. 175π cm^2 d. 185π cm^2

Q10. Assertion (A): Length of diagonal of a cube of side 7 cm is $7\sqrt{3}$ cm.

Reason (R): Length of diagonal of a cube of edge x unit = $\frac{x}{\sqrt{3}}$ units.

a. Both (A) and (R) are true and (R) is the correct explanation of (A)
b. Both (A) and (R) are true but (R) is not the correct explanation of (A)
c. (A) is true but (R) is false
d. (A) is false but (R) is true

Q11. Assertion (A): The volume of largest right circular cone that can be cut out of a cube whose edge is 7 cm is 50 cm^3.

Reason (R): Volume of a cone is $\frac{1}{3}\pi r^2 h$.

a. Both (A) and (R) are true and (R) is the correct explanation of (A)
b. Both (A) and (R) are true but (R) is not the correct explanation of (A)
c. (A) is true but (R) is false
d. (A) is false but (R) is true

Q12. Find the slant height of a cone whose height is 4cm and radius 3 cm.

Q13. Gayatri was making a mathematical model, in which she placed 4 cubes each of edge 20 cm one above another. Find the surface area of the resulting cuboid.

Q14. Water is flowing at the rate of 7 m/s through a circular pipe whose internal diameter is 2 cm into a cylindrical tank the radius of whose base is 40 cm. Determine the increase in the water level in ½ hour.

Q15. If h, C and V respectively represent the height, curved surface area and volume of a cone, prove that $C^2 = \frac{3\pi V h^3 + 9V^2}{h^2}$.

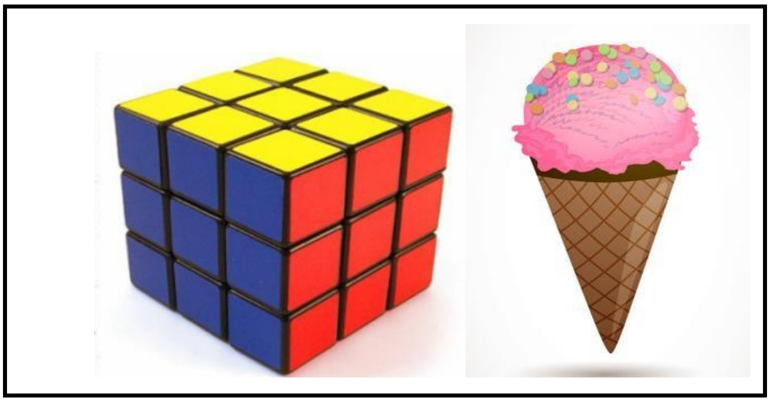
Q16. Two cones with same base radius 8 cm and height 15 cm are joined together along their bases. Find the surface area of the shape so formed.

Q17. A cylindrical tub, whose diameter is 12 cm and height 15 cm 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 hemispherical top. If the height of conical portion is twice the diameter of base, find the diameter of conical part of ice-cream cone.

Q18. 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 edge of the cube. Determine the volume of the remaining block.

Case-study based question:

Q19. On a Sunday, your Parents took you to a fair. You could see lot of toys displayed, and you wanted them to buy a RUBIK's cube and strawberry ice-cream for you.



Based on the above information, answer the following questions.

i. Find the length of the diagonal if each edge measures 6cm.

ii. What is the volume of the solid figure if the length of the edge is 7cm ?

iii. Find the total surface area of cone with hemispherical ice cream.

OR

Find the slant height of a cone, if the radius is 7cm and the height is 24 cm.

Chapter - Statistics

Solve the following questions:

Q1. Construction of a cumulative frequency table is useful in determining the:

a. mean
b. median
c. mode
d. all the above three measures

Q2. The method used to find the mean of a given data is(are):

a. direct method
b. assumed mean method
c. step deviation method
d. all the above

Q3. While computing mean of grouped data, we assume that the frequencies are:

a. centred at the class marks of the classes

b. evenly distributed over all the classes

c. centred at the upper limits of the classes

d. centred at the lower limits of the classes

Q4. The empirical relationship between the three measures of central tendency is

a. 3 Median = Mode + 2 Mean
b. 2 Median = Mode + 2 Mean
c. 3 Median = Mode + Mean
d. 3 Median = Mode – 2 Mean

Q5. The mean of following distribution is:

x_i	11	14	17	20
f_i	3	6	8	7

a. 15.6
b. 17
c. 14.8
d. 16.4

Q6. Consider the following frequency distribution:

Classes	0-5	6-11	12-17	18-23	24-29
Frequency	13	10	15	8	11

The upper limit of the median class is

a. 17
b. 17.5
c. 18
d. 18.5

Q7. The class interval of a given observation is 10 to 15, then the class mark for this interval will be:

a. 11.5
b. 12.5
c. 12
d. 14

Q8. Mode is the:

a. middle most frequent value
b. least frequent value
c. maximum frequent value
d. none of these

Q9. For the following distribution:

Classes	0-10	10-20	20-30	30-40	40-50
Frequency	13	10	15	8	11

The number of students who got marks less than 30 is:

a. 13
b. 25
c. 10
d. 12

Q10. The mode and mean is given by 7 and 8, respectively. Then the median is:

a. 1/13
b. 13/3
c. 23/3
d. 33

Q11. Assertion (A): If the median and mode of a frequency distribution are 50 and 60 respectively, then its mean is 45.

Reason (R): Mean, median and mode of a frequency distribution are related as:

Mode = 3 (Median) – 2 (Mean).

a. Both (A) and (R) are true and (R) is the correct explanation of (A)
b. Both (A) and (R) are true but (R) is not the correct explanation of (A)
c. (A) is true but (R) is false
d. (A) is false but (R) is true

Q12. Assertion (A): The mode of the following distribution is 52.

Class interval	0-20	20-40	40-60	60-80
Frequency	4	3	2	2

Reason (R): The value of the observation which occurs most often is the mode.

a. Both (A) and (R) are true and (R) is the correct explanation of (A)
b. Both (A) and (R) are true but (R) is not the correct explanation of (A)
c. (A) is true but (R) is false
d. (A) is false but (R) is true

Q13. What is the algebraic sum of the deviations of a frequency distribution from its mean?

Q14. Find the mean of first five prime numbers.

Q15. Is range a measure of central tendency in a distribution?

Q16. Write the formula for finding the mode of grouped data.

Q17. Find mean of the following frequency distribution :

Classes	0-20	20-40	40-60	60-80	80-100
Frequency	15	18	21	29	17

Q18. Find mode :

Class Interval	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	5	8	7	12	28	20	10	10

Q19. Calculate the mean for the following distribution:

x	5	6	7	8	9
f	4	8	14	11	3

Q20. Calculate the mode from the following data:

Classes	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	5	8	7	12	28	20	10	10

Q21. Calculate the median from the following data:

Classes	15-25	25-35	35-45	45-55	55-65	65-75	75-85	85-95
Frequency	8	10	15	25	40	20	15	7

Q22. If the mean of the distribution is 54, find the value of p:

Classes	0-20	20-40	40-60	60-80	80-100

Frequency	7	p	10	9	13

Q23. The mean of the frequency table is 50. But the frequencies f_1 and f_2 are missing. Find them.

Class	0-20	20-40	40-60	60-80	80-100	Total
Frequency	17	f_1	32	f_2	19	120

Q24. If the median of the frequency distribution is 46 , find the missing frequencies:

Variable	10-20	20-30	30-40	40-50	50-60	60-70	70-80	Total
Frequency	12	30	p	65	q	25	18	229

Q25. The following table gives the daily income of 50 workers of a factory:

Daily income	100-120	120-140	140-160	160-180	180-200
Number of workers	12	14	8	6	10

Find the mean, mode and median of the above data.

Q26. Calculate the missing frequency from the following distribution, it being given that the median of the distribution is 24.

Age in years	0-10	10-20	20-30	30-40	40-50
No of houses	5	25	p	18	7

Case-study based question:

Q27. The COVID-19 pandemic, also known as coronavirus pandemic, is an ongoing pandemic of coronavirus disease caused by the transmission of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) among humans.

The following tables shows the age distribution of case admitted during a day in two different hospitals

Table 1

Age (in years)	5-15	15-25	25-35	35-45	45-55	55-65
No. of cases	6	11	21	23	14	5

Table 2

Age (in years)	5-15	15-25	25-35	35-45	45-55	55-65
No. of cases	8	16	10	42	24	12

Refer to table 1

i. What is the average age for which maximum cases occurred?

ii. What is the upper limit of modal class?

Refer to table 2

iii. Find the mode of the given data.

OR

Find the median of the given data.

Chapter - Probability

Solve the following questions:

Q1. The probability expressed as a percentage of a particular occurrence can never be :
a. less than 100
b. less than 0
c. greater than 1
d. anything but a whole number

Q2. Which of the following is true?
a. $0 \le P(E) \le 1$
b. $P(E) > 1$
c. $P(E) < 0$
d. $-\frac{1}{2} \le P(E) \le \frac{1}{2}$

Q3. The probability of passing a certain test is $\frac{x}{24}$. If the probability of not passing it is $\frac{7}{8}$, then x is equal to :
a. 2
b. 3
c. 4
d. 6

Q4. A card is drawn from a deck of 52 cards. The event E is that card is not an ace of hearts. The number of outcomes favourable to E is ______________.
a. 4
b. 13
c. 48
d. 51

Q5. A letter is chosen at random from the English alphabet. Find the probability that the letter chosen succeeds X.
a. $\frac{1}{13}$
b. $\frac{1}{52}$
c. $\frac{1}{26}$
d. $\frac{1}{2}$

Q6. Two different dice are tossed together. The probability that the product of the two numbers on the top of the dice is 6, is :
a. $\frac{2}{3}$
b. $\frac{1}{3}$
c. $\frac{1}{9}$
d. $\frac{7}{36}$

Q7. Two coins are tossed simultaneously. The probability of getting exactly one head is ___________.
a. $\frac{1}{2}$
b. $\frac{1}{4}$
c. $\frac{1}{6}$
d. None of these

Q8. A bag contains 24 balls of which x are red, 2x are white and 3x are blue. A ball is selected at random. What is the probability that the drawn ball is white or blue?
a. $\frac{1}{2}$
b. 2
c. $\frac{5}{6}$
d. $\frac{7}{12}$

Q9. A letter is chosen at random from the letters of the word 'ASSASSINATION', then the probability that the letter chosen is a vowel is in the form of $\frac{6}{2x+1}$, then x is equal to :

a. 5 b. 6 c. 7 d. 8

Q10. Assertion (A): Probability of a sure event is 1.

Reason (R): For a sure event, number of favorable outcomes is less than the total number of outcomes.

a. Both (A) and (R) are true and (R) is the correct explanation of (A)
b. Both (A) and (R) are true but (R) is not the correct explanation of (A)
c. (A) is true but (R) is false
d. (A) is false but (R) is true

Q11. Assertion (A): Probability of getting an even number or an odd number in a single throw of a die is 1.

Reason(R): Each elementary event is a favourable event.

a. Both (A) and (R) are true and (R) is the correct explanation of (A)
b. Both (A) and (R) are true but (R) is not the correct explanation of (A)
c. (A) is true but (R) is false
d. (A) is false but (R) is true

Q12. Two unbiased coins are tossed simultaneously. Find the probability of getting:

i. one head ii. one tail iii. two heads iv. at least one head
v. at most one head.

Q13. If the probability of answering a question correctly is 0.3, what is the probability of getting it wrong?

Q14. A game of chance consists of spinning an arrow which comes to rest pointing at one of the numbers marked from 1 to 10. What is the probability that it will point at an even number?

Q15. If three coins are tossed simultaneously, then what is the probability of getting at least one head and one tail?

Q16. Tickets numbered 1 to 20 are mixed up and then a ticket is drawn at random. What is the probability that the ticket drawn bears a number which is a multiple of 3?

Q17. What is the probability that a leap year selected at random will contain 53 Sundays and 53 Mondays?

Q18. A number is chosen at random from the numbers -3, -2, -1, 0, 1, 2, 3. What will be the probability that square of this number is less than or equal to 1?

Q19. A carton of 24 bulbs contain 6 defective bulbs. One bulbs is drawn at random. What is the probability that the bulbs is not defective? If the bulb selected is defective and it is not replaced and a second bulb is selected at random from the rest, what is the probability that the second bulb is defective?

Q20. A child's game has 8 triangles of which 3 are blue and rest are red, and 10 squares of which 6 are blue and rest are red. One piece is lost at random. Find the probability that is a:

i. triangle, ii. square,

iii. square of the blue colour, iv. triangle of the red colour

Q21. The King, Queen and Jack of clubs are removed from a pack of 52 cards and then the remaining cards are well shuffled. A card is selected from the remaining cards. Find the probability of getting a card:

i. of spade, ii. of black king, iii. of club, iv. of jacks.

Q22. The probability of selecting a blue marble at random from a jar that contains only blue, black and green marbles is $\frac{1}{5}$. The probability of selecting a black marble at random from the same jar is $\frac{1}{4}$. If the jar contains 11 green marbles, find the total number of marbles in the jar.

Q23. An integer is chosen at random between 1 and 100. Find the probability that it is:

i. divisible by 8, ii. not divisible by 8.

Q24. All the three face cards of spades are removed from a pack of 52 cards. A card is drawn at random from the remaining cards, find the probability of getting:

i. a black face card,

ii. neither a king nor a red card,

iii. either black or queen.

Q25. Cards are numbered from 7 to 51, one card is drawn at random, find the probability of getting

i. prime number less than 20,

ii. not divisible by 10,

iii. divisible by 2 or 3.

Case-study based question:

Q26. In a club, men are playing the card game. A man named Sanjeev draw a card from a well shuffled deck of cards.

Based on the above information, give the answer of the following questions:

i. Find the probability of getting a king of black colour.

ii. Find the probability of getting a face card.

iii. Find the probability of getting a jack of clubs. And getting a black face card.

OR

Find the probability of getting a black face card.