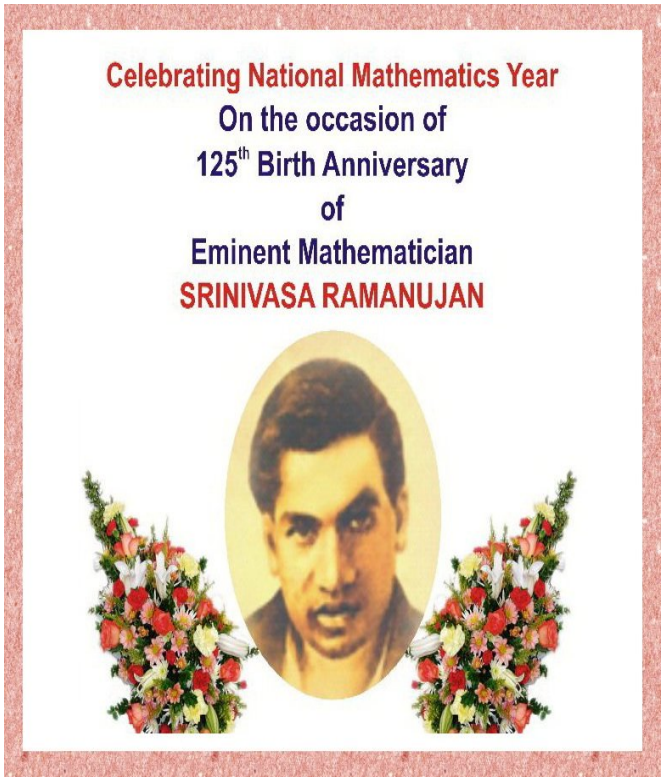
MATHEMATICS

10th CLASS-work book



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1.REAL NUMBERS

1.Concepts

- Rational numbers are numbers which can be written in the form of $\frac{p}{q}$ $(q \neq 0)$ where p and q are integers.

- Numbers which cannot be expressed in the form of $\frac{p}{q}$ $(q \neq 0)$ are irrational.
- The set of rational and irrational numbers together are called real numbers.

- **The Fundamental Theorem of Arithmetic :** Every composite number can be expressed (factorized) as a product of primes and this factorization is unique, apart from the order in which the prime factors occur.

- Let $x = \frac{p}{q}$ $(q \neq 0)$to be a rational number, such that the primefactorization of 'q' is of the form 2^m5^n, where *m, n* are non-negativeintegers. Then *x* has a decimal expansion which is terminating.

- Let $x = \frac{p}{q}$ $(q \neq 0)$be a rational number, such that the prime factorization of q is not of the form 2^m5^n, where *m, n* are non-negative integers. Then *x* has a decimal expansion which is non-terminating repeating.

- $\sqrt{p}$is irrational, which *p* is a prime. A number is called irrational if it cannot be written in the form$\frac{p}{q}$$(q \neq 0)$ where *p* and *q* are integers and $q \neq 0$.

- Let p be a prime. If p divides a^2,(where a is a positive integer) then p divides a.

- If $a^n = x$, we write it as $\log_a x = n$ where a and x are positive numbers and $a \neq 1$.

- Laws of logarithms

  1.$\log_a xy = \log_a x + \log_a y$
  2.$\log_a \frac{x}{y} = \log_a x - \log_a y$
  3.$\log_a x^m = m \log_a x$
  4.$\log_a a = 1$
  5.$\log_a 1 = 0$.

2. Oral questions

1. Define rational numbers?
2. Define Irrational numbers in two ways with examples?
3. State the fundamental theorem of arithmetic?
4. Are all integers also in real numbers? why?
5. How can you say whether the given rational $\frac{p}{q}(q \neq 0)$) will have a terminating decimal or a non-terminating , repeating decimal?
6. Define logarithm?
7. State the laws of logarithms?
8. Is the sum or difference of a rational and an irrational is irrational?
9. Is the product or quotient of a rational and an irrational is irrational?
10. The sum of two irrational numbers need not be irrational. Give an example?

3.Multiple Choice Questions

1.Numbers which can be written in the form of $\frac{p}{q}$ $(q \neq 0)$ where p and q are integers. ( )

A) integers B)rational C) irrational D) natural

2.Numbers which cannot be expressed in the form of $\frac{p}{q}$ $(q \neq 0)$ are ( )

A) integers B) rational C) irrational D) natural

3.Which of the following is true? ( )

A) NCWCZCR B) WCZCNCR C) RCZCWCN D)ZCWCRCN

4.HCF (12,15,21) = ( )

A) 2 B) 3 C) 1 D) 5

5.LCM (12,18) = ( )

A) 12 B)18 C) 6 D) 36

6. $\frac{16}{125}$is …….. decimal. ( )

A) terminating B) non-terminating, recurring

C) non-terminating, non-recurring D)none

7.$\frac{100}{81}$is …….. decimal. ( )

A) terminating B) non-terminating, recurring

C) non-terminating, non-recurring D)none

8.Let p be a prime. If p divides a^2,(where a is a positive integer) then p divides( )

A) a B)a^2 C)2a D)$\sqrt{a}$

9.Which of the following is a rational ( )

A)5-√3 B) 3√2 C) $\sqrt{2}+\sqrt{3}$ D)5+√4

10.$\log_2 512$ = ( )

A) 8 B) 7 C) 9 D) 10

11.$\log_7 1$ = ( )

A) 0 B) 1 C) 7 D) 8

12.7x11x13 +13 is …… a number. ( )

A) composite B) prime C) both D) none

13.$\log_2 2$ = ( )

A) 0 B) 1 C) 2 D) 4

14.Logarithmic form of $\sqrt{49} = 7$ is . ( )

A) $\log_{49} 7 = 2$ B) $\log_7 49 = 2$ C)$\log_7 49 = \frac{1}{2}$ D) $\log_{49} 7 = \frac{1}{2}$

15.The exponential form of $\log_a \sqrt{x} = b$ is ( )

A) a^x=b B)$\sqrt{x}^a$=b C) a^b=$\sqrt{x}$ D) $a^{\sqrt{x}}$=b

16. Which of the following numbers is irrational number ( )

A) 3.131131113... B) 4.46363636... C) 2.35 D) *B* and *C* both

17.A terminating decimal when expressed in fractional form always has ( )

Denominator in the form of —

A) 2^m3^n, m, n > 0 B) 3^m5^n, m, n > 0

C) $5^n 7^m$, m, n > 0 D) 2^m5^n, m, n > 0

18. HCF is always ( )

A) Multiple of L.C.M. B) Factor of L.C.M.

C) Divisible by L.C.M. D) *A*and *C*both

19. 7×11×13×15 +15 is a [ ]

A) Composite number B) Whole number

C) Prime number D) None of these

20. HCF of two numbers is 113, their LCM is 56952. It one number is 904. The other number is: ( )

A) 7719 B) 7119 C) 7791 D) 7911

21.2.13113111311113……is ( )

A) a rational number B) a non-terminating decimal number

C) an irrational number D) both (A) & (C)

22. π is [ ]

A) rational B) irrational

C) both (A) & (B) D) neither rational nor irrational

4.HomeAssignment-1(20marks)

1. State the fundamental theorem of arithmetic? 1m

2. Express 156 as a product of its prime factors.? 1m

3. Find the LCM and HCF of 17, 23 and 29 by the prime factorization method. ? 2m
4. Find the HCF and LCM of 12, 36 and 160, using the prime factorization method? 2m
5. State whether $\frac{6}{15}$ will have a terminating decimal expansion or a non-terminating repeatingdecimal. ? 3m
6. State whether $\frac{35}{50}$ will have a terminating decimal expansion or a non-terminating repeating decimal. ? 3m
7. Find the LCM and HCF of 192 and 8 and verify that LCM × HCF = product of the two numbers. ? 4m
8. Show that any number of the form 4^n, $n \in N$ can never end with the digit 0.? 4m

5.Home Assignment-1(20marks)

1. Prove that $7\sqrt{5}$ is irrational.? 4m
2. Prove that $\sqrt{3}$ is irrational.? 3m
3. State whether $\frac{29}{343}$ will have a terminating decimal expansion or a non-terminating repeating decimal. ? 2m
4. State whether $\frac{23}{2^3 5^2}$ will have a terminating decimal expansion or a non-terminating repeating decimal.? 1m
5. Prove that the difference and quotient of $(3+2\sqrt{3})$ and $(3-2\sqrt{3})$ are irrational? 1m
6. Show that $5-\sqrt{3}$ is irrational.? 2m
7. Expand $\log\frac{343}{125}$? 3m

8. Write $2\log 3 + 3\log 5 - 5\log 2$ as a single logarithm? 4m

2.SETS

1.Concepts

- Set theory was developed by "George Cantor"
- **Set:** A well defined collection of distinct objects is called set.
- Sets are denoted by higher case alphabets of English, where as elements are denoted by lower case alphabets of English.
- Sets can be written in the roster form and the set builder form.
- The symbol for "is belongs to" is "∈" and "is doesn't belongs to" is "∉".
- A set which does not contain any element is called an empty set or a null set,or a void set.
- i)φ = { } ii) φ ≠ { 0 }
- A set is called a finite set if it is possible to count the number of elements of that set.
- We can say that a set is infinite if it is not finite.
- The number of elements in a set is called the cardinal number of the set.
- The universal set is denoted by" μ".The universal set is usually represented by rectangles.
- A ⊂ B & B ⊂ A⇔A = B
- A ∩ B is the set containing only those elements that are common in A & B.
- A ∪ B = contains the elements that are either in A or in B or in both.
- A ∩ B = φ, then A & B are disjoint sets and n(A ∩ B) = 0
- n(A ∪ B) = n(A) + n(B) –n (A ∩ B)
- A & B are disjoint then n(A ∪ B) = n(A) + n(B)
- A-B = {x: x∈ $A\ and\ x \notin B$}
- Every set is a subset of it self
- Null set is subset of every set.
- If A⊂ $B, B \subset C\ then\ A \subset C$.
- If A⊂B then AUB=B and A∩B=A.

2. Oral questions

1. Define a set?
2. What are finite and infinite sets?
3. Give an example for null set?
4. Is an empty set is finite? Why?
5. Define subset?
6. Define equal sets?
7. Define a cardinal number of a set?
8. Draw a Venn diagram for AUB?
9. Draw a Venn diagram for A∩B?
10. Draw a Venn diagram for A-B?
11. The intersection of any two disjoint sets is a null set. Why?
12. Give an example for disjoint sets?
13. Say the set builder form of AUB, A∩B, A-B?

3.Multiple Choice Questions

1.Which of the following collection is a set? ( )

A. All good students in your class C.all boys in your class
B. Ten most talented writers D.a team of 11 best cricket batsmen.

2.The elements of G = all the factors of 20. ( )

A.{1,2,4,5,10,20} B.{1,2,3,4,5,8,10,20} C.{10,20,30,40} D.{0,20}

3.The elements of S={ x:x is a letter in the word "RAMANUJAN"} ( )

A.{R,A,M,U,J,N} B.{R,A,M,A,N,U,J,A,N} C.{R,M,N,J} D.{R,A,M,N,J}

4.A is the set of factors 12.Which one of the following is not a member of A ( )

A.1 B.4 C.5 D.12

5.Match the roster forms with set builder form ( )

1.{P,R,I,N,C,A,L} a.{x:x is a divisor of 18}
2.{0} b.{x:x∈ Z,x^2-9=0}
3.{1,2,3,6,9,18} c.{x:x∈ Z, x+1=1}
4.{3,-3} d.{x: x is a letter of word "PRINCIPAL"}

A.a,b,c,d B.d,c,a,b C.d,c,b,a D.b,c,d,a

6. Empty set is denoted by ( )

A.∅ B.{ } C. ∅or{ } D.{0}

7. n(∅) = ( )

A.1 B. ∅ C.0 D.infinite

8. Which of the following is nota empty set? ( )

A.Set of all natural numbers < 1 B.Set of even prime numbers

C.Set of odd numbers that have remainder zero, when divided by 2

D.Set of integers which lies between 2 and 3.

9. Which of the following set is infinite? ( )

A.Set of all natural numbers < 10 B.Set of prime numbers< 10

C.Set of all integers < 10 D.Set of all factors of 10.

10.The universal set is denoted by ( )

A. ∅ B.μ C.O D.A

11. Which is not true ? ( )

A.N⊂ W B.Z⊂Q C.Q⊂Q^1 D.Q^1⊂R

12.Which is a subset of every set? ( )

A. ∅ B.μ C.{O} D.NONE

13.If A⊂ B and B ⊂ A then ( )

A.A ≠ B B. A =∅ C.B = ∅ D.A = B

14.Which of the following are true ? ( )

A.{ } = ∅ B. ∅ = 0 C. 0 = {0} D. ∅ = μ

15.A = { Quadrilaterals} B = {Square, rectangle,trapezium, rhombus}. Which of the following are true ? ( )

A.A⊂ B B.B ⊂ A C.A = B D.none

16.Let A = {a,b,c,d}. How many subsets does the set A have? ( )

A.5 B.6 C.16 D.64

17.P is a set of factors of 5, Q is a set of factors of 25,R is a set of factors of 125. Which of the following are false ? ( )

A.P⊂ Q B.Q⊂R C.R⊂P D.P⊂R

18.If A⊂ B and B ⊂ C then ( )

A.A⊂ C B.C ⊂ A C.A = C D.none

19.Which of the following are false given that A = {1,2,3,4}. ( )

A.2∈ A B.2∉ {1,2,3,4} C.A⊂{1,2,3,4} D.{2,3,4}⊂{1,2,3,4}

20.A and B are disjoint sets then A∩B = ( )

A.A B.B C. $\emptyset$ D. μ

21.If A = {1,2,3,4} B = {2,4,6,8} then A∪B = ( )

A.{1,2,3,4,5,6,7,8} B.{2,4} C.{1,3,6,8} D.{1,3}

22.Let A = {1,3,7,8} B= {2,4,7,9} then A∩B = ( )

A.{1,2,3,4,6,7,8} B.{7} C.{1,3,8} D.{2,4,9}

23.If A= {6,9,11} then A∪ $\emptyset$ = ( )

A.A B. $\emptyset$ C. μ D.none

24.If A= {2,3,5} then A∩ $\emptyset$ = ( )

A.A B. $\emptyset$ C. μ D.none

25.Let A = {1,2,3,4,5} B= {4,5,6,7} then A−B = ( )

A.{1,2,3,4,5,6,7,} B.{4,5} C.{1,2,3} D.{6,7}

26.Which of the following are false? ( )

A.A∪B=B∪A B.A∩B=B∩A C.A−B=B−A D.A∪ $\emptyset = A$

27.Let A= {1,2,3,4} B={2,4,6,8,} then .(A∪B)-(A∩B)= ( )

A.{1,2,3,4,6,8} B.{2,4} C.{1,3,6,8} D.{1,6,8}

28.n(A) = 5,n(B) = 5,n(A∩B) = 2 then n(A∪B) = ( )

A.12 B.8 C.5 D.2

29..If A⊂ B then A∪B = ( )

A.A B.B C. $\emptyset$ D. μ

30..If A⊂ B then A∩B = ( )

A.A B.B C. $\emptyset$ D. μ

4.HomeAssignment-1(20marks)

1.Write A= {x: x is natural number less than 6} in roster form? 1m

2.Write P = {5,25,125,625} in the set builder form? 1m

3.Show that the sets A and B are equal, where A = {x: x is a letter in the word " "ASSASINATION"},B = {x: x is a letter in the word "station'}. 2m

4.If A = {a,b,c,d }.Write all subsets of A ? 2m

5.Illustrate A∪B in venn diagram where A = { 1,2,3,4}, B = {2,4,6,8}? 3m

6.Illustrate A∩B in venn diagram where A = { 1,2,3}, B = {3,4,5}? 3m

7.If A = { 1,2,3,4,5}, B = {4,5,6,7} then find A−B,B−A. Are they equal? 4m

8.Let A= {2,4,6,8,10} B={3,6,9,12,15} then find(A∪B)- (A∩B) ? 4m

3.POLYNOMIALS

1.Concepts

- Let x be a variable, n be a positive integer and a_0, a_1, a_2, ...,$a_n$be constants. Then $f(x) = a_nx^n + a_{n-1}x^{n-1} + \ldots\ldots\ldots + a_1x + a_0$is called a polynomial in variable x.

- The exponent of the highest degree term in a polynomial is known as its *degree*.

Degree	Name of Polynomial	Form of the Polynomial
0	Constant Polynomial	$f(x) = a$, a is constant
1	Linear Polynomial	$f(x) = ax + b$, $a \neq 0$
2	Quadratic Polynomial	$f(x) = ax^2 + bx + c$; $a \neq 0$
3	Cubic Polynomial	$f(x) = ax^3 + bx^2 + cx + d$; $a \neq 0$

- If $f(x)$ is a polynomial and kis any real number, then the real number obtained by replacing x by kin $f(x)$at x = kand is denoted by f(k).

- A real number kis a zero of a polynomial $f(x)$, if f(k) = 0.

- A polynomial of degree n can have at most n real zeroes.

- Geometrically, the zeroes of a polynomial $f(x)$ are the x-coordinates of the points where the graph $y = f(x)$ intersects x-axis.

- For any quadratic polynomial $ax^2 + bx + c = 0$, $a \neq 0$, the graph of the corresponding equation $y = ax^2 + bx + c$ has one of the two shapes either open upwards like ∪or downwards like ∩, depending on whether $a > 0$ or $a < 0$. These curves are called *Parabolas.*

- If $\alpha$and $\beta$are the zeroes of a quadratic polynomial $f(x) = ax^2 + bx + c$, $a \neq 0$ then $\alpha + \beta = \frac{coeffiecent\ of\ x}{coeffiecent\ of\ x^2} = \frac{-b}{a}$ and $\alpha\beta = \frac{constant}{coeffiecent\ of\ x^2} = \frac{c}{a}$

- If $\alpha, \beta, \gamma$are the zeroes of a cubic polynomial $f(x) = ax^3 + bx^2 + cx + d$, $a \neq 0$ then

$\alpha + \beta + \gamma = \frac{coeffiecent\ of\ x^2}{coeffiecent\ of\ x^3} = \frac{-b}{a}$ and $\alpha\beta + \beta\gamma + \gamma\alpha = \frac{coeffiecent\ of\ x}{coeffiecent\ of\ x^3} = \frac{c}{a}$

$\alpha\beta\gamma = \frac{-constant}{coeffiecent\ of\ x^2} = -\frac{d}{a}$

- **Division Algorithm :**If $f(x)$ is a polynomial and $g(x)$ is a non-zero polynomial, then there exist two polynomials $q(x)$ and $r(x)$ such that $f(x) = g(x) \times q(x) + r(x)$, where $r(x) = 0$ or degree of $r(x)$ < degree of $g(x)$.

2. Multiple choice questions

1. A real no. k is a zero of the polynomial $f(x)$ if ( )
(a) $f(k) > 0$ (b) $f(k) = 0$ (c) $f(k) < 0$ (d) none

2. The zero's of a polynomial $f(x)$ are the coordinates of the points where the graph of $y = f(x)$ intersects ( )
(a) x-axis (b) y-axis (c) origin (d) (x, y)

3. If k is 0 zero of $f(x)$ then ____ is one of the factors of $f(x)$ ( )
(a) $(x - k)$ (b) $(x - 2k)$ (c) $(x + k)$ (d) $(2x - k)$

4. If $(y - a)$ is factor of $f(y)$ then ___ is a zero of $f(y)$ ( )
(a) y (b) a (c) $2a$ (d) $2y$

5. Which of the following is not correct for : A quadratic polynomial may have
(a) no real zeros (b) two equal real zeros ( )
(c) two distinct zeros (d) three real zeros.

6. Cubic polynomial $x = f(y)$ cuts y-axis at almost ( )
(a) one point (b) two points (c) three points (d) four points

7. Polynomial $x^2 + 1$ has ___ zeros ( )
(a) only one real (b) no real
(c) only two real (d) one real and theother non-real.

8. If α, β are the zeros of the polynomials $f(x) = x^2 + x + 1$ then $\frac{1}{\alpha} + \frac{1}{\beta} =$ ( )
(a) 1 (b) –1 (c) 0 (d) none

9. If one of the zero of the polynomial $g(x) = (k^2 + 4)\, x^2 + 13x + 4k$ isreciprocal of the other then $k =$ ___ ( )
(a) 2 (b) – 2 (c) 1 (d) – 1

10. If 2 is a zero of both the polynomial, $3x^2 + ax - 14$ and $2x - b$ then $a - 2b =$ ___
(a) –2 (b) 7 (c) –8 (d) –7 ( )

11. If zeros of the polynomial $ax^2 + bx + c$ are reciprocal of each other then ( )
(a) $a = c$ (b) $a = b$ (c) $b = c$ (d) $a = -c$

12. The zeros of the polynomial $h(x) = (x - 5)(x^2 - x - 6)$ are ( )
(a) –2, 3, 5 (b) –2, –3, –5 (c) 2, –3, –5 (d) 2, 3, 5

13. Graph of $y = ax^2 + bx + c$ intersects x-axis at 2 distinct points if ( )

(a) $b^2 - 4ac > 0$ (b) $b^2 - 4ac < 0$ (c) $b^2 - 4ac = 0$ (d) none

14. Which of the following is polynomial? ( )

(a) $x^2 - 6\sqrt{x} + 2$ (b) $\sqrt{x} + \frac{1}{\sqrt{x}}$ (c) $\frac{5}{x^{2+3x+1}}$ (d) none of these

15.Polynomial $2x^4 + 3x^3 - 5x^2 + 9x + 1$ is a ( )

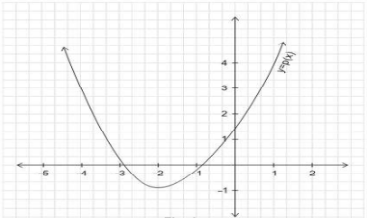
(a) Linear polynomial (b) quadratic polynomial

(c) cubic polynomial (d) Biquadratic polynomial

3.Oral questions

1.Give an example for linear polynomial?
2.Give an example for quadratic polynomial?
3.Give an example for cubic polynomial?
4.Say the general form of a first degree polynomial in one variable x?
5.Define zeroes of polynomial?
6.If $p(x) = 5x^7 - 6x^5 + 7x - 6$ then coefficient of x^5?
7.If $p(x) = 5x^7 - 6x^5 + 7x - 6$ then degree of p(x)?
8.Say the polynomial that has 2 zeroes ?
9.Say the polynomial that has 1 zero ?
10.How will you verify if it has only one zero?
11.The number of zeroes of (i) 2x+1 (ii) $x^2 - 1$ (iii) x^3?
12.The sum of the zeroes of $ax^2 + bx + c$?
13.The product of the zeroes of $ax^2 + bx + c$?
14.Say the division algorithm?
15.The sum of the zeroes of $ax^3 + bx^2 + cx + d$?
16.The product of the zeroes of $ax^3 + bx^2 + cx + d$?

4.HomeAssignment-1(20marks)



1.In the graph of a polynomial p(x) is given. Find the zeroes of the polynomial.?

2. Write the zeroes of the polynomial $x^2 - x - 6$. ?

3. Write a quadratic polynomial, sum of whose zeroes is $2\sqrt{3}$ and their product is 2. ?

4. Find a quadratic polynomial, the sum and product of whose zeroes are given as $\frac{1}{4}$,-1 respectively. ?

5. If a andb are the zeros of a given quadratic polynomial $p(x)=6x^2+x-2$, find the value of

$\frac{a}{b}+\frac{b}{a}$?

6. If two zeroes of the polynomial $x^4+3x^3-20x^2-6x+36$ are 2 and - 2 , find the other zeroes of the polynomial. ?

7. Find the zeroes of the quadratic polynomial $6x^2 – 3 – 7x$ and verify the relationship between the zeroes and the coefficients. ?

8.Obtain all the zeroes of the polynomial $f(x) = 3x^4+6x^3+2x^2+ 10x+5$ if two of its zeroes are $\sqrt{\frac{5}{3}}$and $-\sqrt{\frac{5}{3}}$?

4.PAIR OF LINEAR EQUATIONS IN TWO VARIABLES

1.Concepts

- An equation of the form ax + by + c = 0, where a, b, c are real numbers ($a \neq 0, b \neq 0$) is called a linear equation in two variables x and y.

- The most general form of a pair of linear equations is :

  $a_1x + b_1y + c_1 = 0$

  $a_2x + b_2y + c_2 = 0$

  Where $a_1, a_2, b_1, b_2, c_1, c_2$ are real numbers and $a_1^2 + b_1^2 \neq 0$, $a_2^2 + b_2^2 \neq 0$.
- The graph of a pair of linear equations in two variables is represented bytwo lines;

  (i) If the lines intersect at a point, the pair of equations is consistent.

  The point of intersection gives the unique solution of the equation.

  (ii) If the lines coincide, then there are infinitely many solutions. The pair of equations is dependent. Each point on the line will be a solution.

  (iii) If the lines are parallel, the pair of the linear equations has nosolution. The pair of linear equations is inconsistent.
- If a pair of linear equations is given by $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$

  i. $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$ ⇒the pair of linear equations is consistent. (Unique solution).

  (ii) $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$⇒the pair of linear equations is inconsistent(No solution).

(iii) $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$⇒the pair of linear equations is dependent andconsistent (infinitely many solutions).

- Algebraic methods of solving a pair of linear equations:

  (i) Substitution method

  (ii) Elimination Method

  (iii) Cross multiplication method

2.Oral Questions

1.Say the general form of a linear equation in two variables?

2.What do we mean by the solution for a pair of linear equations?

3.Whenisthe pair of equations consistent ?

4.Say the number of solutions, when the lines intersects?

5.Say the number of solutions, when the lines coincides?

6.When isthe pair of equations dependent ?

7.Say the number of solutions, when the lines are parallel?

8.When isthe pair of equations inconsistent ?

9. If a pair of linear equations is given by $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$, say the conditions for consistent, inconsistent , and dependent?

10.What are Algebraic methods of solving a pair of linear equations:?

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3.Multiple Choice Questions

1. Every linear equation in two variables has ___ solution(s). ( )
   (A) no (B) one (C) two (D) infinitely many
2. $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$is the condition for ( )
   (A) intersecting lines (B) parallel lines (C) coincident lines (D) none
3. For a pair to be consistent and dependent the pair must have ( )
   (A) no solution (B) unique solution(C) infinitely many solutions (D) none of these
4. Graph of every linear equation in two variables represent a ___
   (A) point (B) straight line (C) curve (D) triangle
5. Each point on the graph of pair of two lines is a common solution of the lines in case of
   (A) Infinitely many solutions (B) only one solution ( )
   (C) no solution (D) none of these

6. The pair of linear equations $x = y$ and $x + y = 0$ has ( )
   (A) no common solution (B) infinitely many solutions
   (C) unique solution (D) none
7. One of the common solution of $ax + by = c$ and y-axis is _____ ( )
   (A)$(0,\frac{c}{b})$ (B)$(0,\frac{-c}{b})$ (C)$(\frac{c}{b}, 0)$ (D)$(0,\frac{b}{c})$
8. For $x = 2$ in $2x – 8y = 12$ the value of y will be ( )
   (A) –1 (B) +1 (C) 0 (D) 2
9. The pair of linear equations is said to be inconsistent if they have ( )
   (A) only one solution (B) no solution
   (C) infinitely many solutions. (D) both$a$ and c
10. On representing $x = a$ and $y = b$ graphically we get ____ ( )
   (A) parallel lines (B) coincident lines
   (C) intersecting lines at (a, b) (D) intersecting lines at (b, a)
12. For $2x + 3y = 4$, y can be written in terms of x as— ( )
   (A)y= $\frac{4+2x}{3}$ (B) y=$\frac{4-2x}{3}$ (C) x=$\frac{4-2y}{3}$ (D) x=$\frac{4+2y}{3}$
13. The pair of linear equations $x = 2$ and $x = 5$ has ( )
   (A) no common solution (B) infinitely many solutions
   (C) unique solution (D) none
14. The coordinates of the point where x-axis and the line represented by $\frac{x}{2} + \frac{y}{3} = 1$ intersect, are ( )
   (A) (0, 3) (B) (3, 0) (C) (2, 0) (D) (0, 2)
15. Graphically $x – 2 = 0$ represents a line ( )
   (A) parallel to x-axis at a distance 2 units from x-axis.
   (B) parallel to y-axis at a distance 2 units from it.
   (C) parallel to x-axis at a distance 2 units from y-axis.

(D) parallel to *y*-axis at a distance 2 units from *x*-axis

16.Which of the following is not a linear equation? ( )

(A)5+4x=y=3 (B)x+2y=y-x (C)3-x=y^2+4 (D)x+y=0

17.Which of the following is not a linear equation in one variable? ( )

(A)2x+1=y-3 (B)3t-1=2t=5 (C)2x-1=x^2 (D)x^2-x+1=0

18. A solution for 2(x+3)=18? ( )

(A) 5 (B) 6 (C) 13 (D) 21

19. The value of x satisfies the equation 2x-(4-x)=5-x is ( )

(A) 4.5 (B) 3 (C) 2.25 (D) 0.5

20.The equation x-4y=5 has ( )

(A) no solution (B) infinitely many solutions

(C) unique solution (D) none

4.HomeAssignment-1

1.For which values of p does the pair of equations given below have unique solution?
4x + py + 8 = 0, 2x + 2y + 2 = 0

2.Two rails are represented by the equations x + 2y – 4 = 0 and 2x + 4y -12 = 0. Represent this situation graphically?

3. On comparing the ratio $\frac{a_1}{a_2}$, $\frac{b_1}{b_2}$,$\frac{c_1}{c_2}$find out whether the lines representing the pair of linearequation intersect at a point, is parallel or coincident: x + 3y = 6, 2x – 3y =12.?

4.Solve graphically: 3x + 2y = 14x, x – 4y = 7?

5. For which values of k will the following pair of linear equations have no solution?
3x – y – 5 = 0; 6x – 2y – k = 0.?

6. Solve the following pairs of equations:

(i) 5x + 8y = 9 , 2x + 3y = 4 (ii) 2x + 7y = 11, 3x – y = 5

7.Find the value of 'a' so that the point(3,9) lies on the line represented by 2x-3y=5 ?

8. Find the value of k for which x + 2y =5, 3x+ky+15=0 is inconsistent?

9. For what value of k, will the system of equations x+2y=5,3x+ky-15=0 has a unique solution. ?

10. 6. A boat goes 30km upstream and 44km downstream in 10 hours. In 13 hours, it can go 40kmupstream and 55km down-stream Determine the speed of the stream and that of the boat in still water.

11. The sum of the digits of a two-digit number is 9. Also, nine times this number is twice the number obtained by reversing the order of the digit. Find the number.

12. The area of a rectangle gets reduced by 9 square units, if its length is reduced by 5 units and breadth is increased by 3 units. If we increase the length by 3 units and the breadth by 2 units, the area increases by 67 square units. Find the dimensions of the rectangle.

13. 2 women and 5 men can together finish an embroidery work in 4 days, while 3 women and 6 men can finish it in 3 days. Find the time taken by 1 woman alone to finish the work, and also that taken by 1 man alone.

14. Roohi travels 300km to her home partly by train and partly by bus. She takes 4 hours if she travels 60km by train and the remaining by bus. If she travels 100km by train and theremaining by bus, she takes 10 minutes longer. Find the speed of the train and the bus separately.

15.Solve the given pair of equations using substitution method?

2x-y=5,3x+2y=11

16.Solve the given pair of equations using elimination method?

3x+2y=11, 2x+3y=4

17.Solve the given pair of equations by reducing them to a pair of linear equations?

$\frac{2}{x}+\frac{3}{y}=13, \frac{5}{x}-\frac{4}{y}=-2$

18. Aftab tells his daughter. "Seven years age I was 7 times as old as you were then, also 3 yearsfrom now I shall be 3 times as old as your will be. Represent the situation algebraically.

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5.QUADRATIC EQUATIONS

1.Concepts

1.The general form of a quadratic equation is $ax^2+bx+c=0$, $a\neq o$. a, b and c are real numbers.

2.A real number x is said to be a root of the quadratic equation $ax^2+bx+c=0$ where $a\neq o$

3. If $ax^2+bx+c=0$, The zeroes of the quadratic polynomial ax^2+bx+c, and the roots of the corresponding quadratic equation $ax^2+bx+c=0$ are the same.

4.Discriminant:- The expression b^2-4ac is called discriminant of the equation $ax^2+bx+c=0$ and is usually denoted by D. Thus discriminant $D= b^2-4ac$.

5.Every quadratic equation has two roots which may be real , co incident or imaginary.

6. Ifα and β are the roots of the equation $ax^2+bx+c=0$ then $\alpha=\frac{-b+\sqrt{b^2-4ac}}{2a}$ and $\beta=\frac{-b-\sqrt{b^2-4ac}}{2a}$

7.$\alpha+\beta=\frac{coeffiecent\ of\ x}{coeffiecent\ of\ x^2}=\frac{-b}{a}$ and $\alpha\beta=\frac{constant}{coeffiecent\ of\ x^2}=\frac{c}{a}$

8. Forming quadratic equation , when the roots α and β are given.

$x^2-(\alpha+\beta)x+\alpha\beta=0$

9.i.If D>0, then roots are real and unequal.

ii. D=0, then the equation has equal and real roots.

iii. D<0, then the equation has no real roots

10.If we can factorize$ax^2 + bx + c = 0$, $a \neq 0$ in to product of two linear factors, then the roots of the quadratic equation can be found by equating each factors to zero.

11.A quadratic equation can also be solved by the method of completing the square.

(i) $a^2 + 2ab + b^2 = (a + b)^2$ (ii) $a^2 - 2ab + b^2 = (a - b)^2$

2.Oral Questions

1. The general form of a quadratic equation is ……..
2. Number of solutions of a quadratic equation are …….
3. Discriminant of a quadratic equation $ax^2 + bx + c = 0$ is …….
4. If the roots of a quadratic equation are equal, than discriminant is ……
5. The sum of the roots of the quadraticequation $ax^2 + bx + c = 0$ is ……..
6. The product of the roots of the quadratic equation$ax^2 + bx + c = 0$ is……
7. If the quadratic equation $ax^2 + bx + c = 0$has a real root, then $b^2 - 4ac$must be ……
8. If the quadratic equation $ax^2 + bx + c = 0$ has no real root, then $b^2 - 4ac$must be ……
9. The quadratic equation whose roots α and β is……

3.Multiple Choice Questions

1.The general form of a quadratic equation is ($a \neq 0$) ( )

(A) $ax^2 + bx + c$ (B) $ax^2 + bx + c = 0$ (C) $ax + b$ (D) $ax + b = 0$

2. Number of solutions of a quadratic equation are ( )

(A) 0 (B) 1 (C) 2 (D) 3

3. Discriminant of a quadratic equation $ax^2 + bx + c = 0$ is given by ( )

(A)$\sqrt{b^2 - 4ac}$ (B) $\sqrt{b^2 + 4ac}$ (C) $b^2 - 4ac$ (D) $b^2 + 4ac$

4. Which is a quadratic equation? ( )

(A) $x + \frac{1}{x} = 2$ (B) $x^2 + 1 = (x+3)^3$ (C) $x(x+2)$ (D) $x + \frac{1}{x}$

5. If the roots of a quadratic equation are 2 and 3, then the equation is ( )

(A) $x^2 + 5x + 6 = 0$ (B) $x^2 + 5x - 6 = 0$ (C) $x^2 - 5x - 6 = 0$ (D) $x^2 - 5x + 6 = 0$

6. Roots of the equations $x^2 - 3x + 2 = 0$ are ( )

(A) 1, –2 (B) –1, 2 (C) –1, –2 (D) 1, 2

7. If the roots of a quadratic equation are equal, than discriminant is ( )

(A) 1 (B) 0 (C) greater than 0 (D) less than zero

8.If one root of $2x^2 + kx + 1 = 0$ is $\frac{1}{2}$then the value of 'k' is ( )

(A) 3 (B) –3 (C) 5 (D) –5

9.The sum of the roots of the quadratic $5x^2 - 6x + 1 = 0$ is ( )

(A) $\frac{6}{5}$ (B) $-\frac{6}{5}$ (C) $\frac{1}{5}$ (D) $-\frac{1}{5}$

10.The product of the roots of the quadratic equation $2x^2 + 5x - 7 = 0$ is ( )

(A) $\frac{5}{2}$ (B) $-\frac{5}{2}$ (C) $\frac{7}{2}$ (D) $-\frac{7}{2}$

11. If the roots of the quadratic $2x^2 + kx + 2 = 0$ are equal then the value of 'k' is ( )

(A) 4 (B) –4 (C) ± 4 (D) ± 16

12.If the sum and product of roots of a quadratic equation are $-\frac{7}{2}$ and $\frac{5}{2}$ respectively, then the equation is ( )

(A) $2x^2 + 7x + 5 = 0$ (B) $2x^2 - 7x + 5 = 0$ (C) $2x^2 - 7x - 5 = 0$ (D) $2x^2 + 7x - 5 = 0$

13.If a and b are the roots of the equation $5x^2 - 7x + 1 = 0$, then the value of $\frac{1}{\alpha} + \frac{1}{\beta}$ is( )

(A) 7 (B) 9 (C) 6 (D) 8

14. If the roots of the quadratic equation. $ax^2 + bx + c = 0$ are equal then ( )

(A) $b^2 = 4bc$ (B) $a^2 = 4bc$ (C) $c^2 = 4ab$ (D) $b^2 = 4ac$

15.If the quadratic equation $ax^2 + bx + c = 0$has a real root, then $b2 - 4ac$must be ( )

(A) ≥ 0 (B) $= 0$ (C) ≤ 0 (D) >0

16.Value of x for $x^2 - 8x + 15 = 0$ is quadratic formula is ( )

(A) 3,2 (B) 5,2 (C) 5,3 (D) 2,3

17.The quadratic equation whose root are 3 and -3 is ( )

(A) $x^2 - 9 = 0$ (B) $x^2 - 3x - 3 = 0$ (C) $x^2 - 2x + 2 = 0$ (D) $x^2 + 9 = 0$

18.The product of two Consecutive positive integers is 306. Representation is quadratic Equations ( )

(A) $x^2 + x - 306 = 0$ (B) $x^2 - x + 306 = 0$ (C) $x^2 + 2x - 106 = 0$ (D) $x^2 - x - 306 = 0$

19.If$p(x) = 0$ is a quadratic equation, then $p(x)$ is a polynomial of degree ( )

(A) one (B) two (C) three (D) four

20.Which of the following is a root of the equation $2x^2 - 5x - 3 = 0$? ( )

(A) $x = 3$ (B) $x = 4$ (C) $x = 1$ (D) $x = -3$

21.$x = \sqrt{2}$ is a solution of the equation ( )

(A) $x^2 + \sqrt{2}x - 4 = 0$ (B) $x^2 - \sqrt{2}x - 4 = 0$ (C) $3x^2 + 5x + 2 = 0$ (D) (A) and (B) both

22. 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) $3x^2 - 6x - 2 = 0$

23.The roots of $4x^2 + 4\sqrt{3}x + 3 = 0$ are ( )

(A) real and equal (B) real and unequal (C) not real (D) none of these

24. Discriminant of $x^2 + px + 2q = 0$ is ( )

(A) $p - 8q$ (B) $p^2 + 8q$ (C) $p^2 - 8q$ (D) $q^2 - 8p$

25.If the equation $x^2 + 4x + k = 0$ has real and distinct roots, then ( )

(A) $k < 4$ (B) $k > 4$ (C) $k > 4$ (D) $k < 4$

4.HomeAssignment-1

1.Check whether $(x+1)^2 = 2(x-3)$ is quadratic equation?

2.Find the roots of the quadratic equation $x - \frac{1}{3x} = \frac{1}{6}$?

3.Find the roots of thequadratic equation $x^2 - 3x - 10 = 0$?

4.Find the roots of the quadratic equation $5x^2 - 6x - 2 = 0$ by the method of completing square?

5.Find the roots of thequadratic equation $x^2 + 4x + 5 = 0$ using the quadratic formula?

6.Find the discriminant of the quadratic equation $2x^2 - 4x + 3 = 0$?

7.If one root of the equation $x^2 + 7x + k = 0$ is –2, then find the value of k and the other root.

8. For what value of 'k' the equation $2x2 + kx + 3 = 0$ has equal roots?

9. For what value of 'p', the equation $3x^2 + px + 3 = 0$ has real roots?

10. The product of two consecutive odd integers is 63. Represent this in form of a quadratic equation.?

5.Home Assignment-2

1.A two digit number is such that the product of the digit is 35, when 18 is added to the number, the digits inter change their places. Find the number.?

2. 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.?

3. A motor boat whose speed is 9 km/h in still water goes 12 km down stream and comes back in a total time 3 hours. Find the speed of the stream.?

4. A train travels 360 km at uniform speed. If the speed had been 5 km/hrmore it would have taken 1 hour less for the same journey. Find the speed of the train.?

5. The hypotenuse of right angled triangle is 6cm more than twice the shortest side. If the third side is 2 cm less than the hypotenuse, find the sides of the triangle.?

6.PROGRESSIONS

1.Concepts

1. Arithmetic progression (A.P.) :- An A.P. is a list of numbers in which each term is obtained by adding a fixed number to the preceding term except the first term.
2. This fixed number is called the common difference of the A.P.
3. If a is first term and d is common difference in A.P. , then the A.P is a , a+d , a+2d , a+3d ……..
4. The n th term of an A.P is denoted by a_n and a_n = a+(n-1) d , where a = first term and d = common deference.
5. Three terms a-d , a , a+d are in A.P with common difference d.

6. Four terms a-3d , a-d , a+d ,a+3d are with common difference 2d in A.P
7. The sum of first n natural number is $\frac{n(n+1)}{2}$
8. The sum of n terms of an A.P with first term a and common difference d is denoted by
9. $S_n = \frac{n}{2}\{ 2a+(n-1)\, d \}$ also , $\frac{n}{2}(a+l)$ where , l = last term.
10. $a_n = S_n - S_{n-1}$ where a_n the n th term of an a.p
11. d = common deference= $a_n - a_{n-1}$
12. Geometric progression (G.P) :G.P. is a list of numbers in which each term is obtained by multiplying a fixed number to the preceding term except the first term.
13. This fixed number is called the common ratio of the G.P.
14. If a is first term and r is common ratio in G.P. , then the G.P is a , ar , ar^2 , ar^3……..
15. The n th term of G.p is denoted by a_n and $a_n = ar^{n-1}$

2.Oral Questions

1. What is an arithmetic progression?
2. Give an example for an A.P.?
3. What is the general term of an A.P.?
4. Say the sum of first n natural numbers ?
5. Say the sum of first n numbers in A.P.?
6. What is an Geometric progression?
7. Give an example for an G.P.?
8. What is the general term of an G.P.?

3.Multiple Choice Questions

1. Three numbers in A.P. have sum 24. The middle term is ( )
   (A) 6 (B) 8 (C) 3 (D) 2
2. If *n*th term of an A.P. is $2n + 7$, then 7th term of the A.P. is ( )
   (A) 15 (B) 21 (C) 28 (D) 25
3. If *n*th term of the A.P. 4, 7, 10, _____ is 82, then the value of *n* is ( )
   (A) 29 (B) 27 (C) 30 (D) 26
4. If *a, b* and *c* are in A.P. then ( )
   (A)a= $\frac{b+c}{2}$ (B) b= $\frac{a+c}{2}$ (C) c= $\frac{b+a}{2}$ (D) a= b+c
5. 12th term of the A.P. $x - 7, x - 2, x + 3$ is ( )
   (A) $x + 62$ (B) $x - 48$ (C) $x + 48$ (D) $x - 62$
6. *n*th term of the A.P. –5, –2, 1, _____ is ( )
   (A) $3n + 5$ (B) $8 - 3n$ (C) $8n - 5$ (D) $3n - 8$
7. If *n*th term of an A.P. is $5 - 3n$, then common difference of the A.P. is ( )
   (A) 2 (B) –3 (C) –2 (D) 3

8. If 5, $2k - 3$, 9 are in A.P., then the value of 'k' is ( )
(A) 4 (B) 5 (C) 6 (D) –5

9. Sum of first 10 natural numbers is ( )
(A) 50 (B) 55 (C) 60 (D) 65

10. 9th term from the end of the A.P. 7, 11, 15, _____ 147 is ( )
(A) 135 (B) 125 (C) 115 (D) 110

11. The sum of 3 numbers in A.P. is 30. If the greatest number is 13, then its common difference is ( )
(A)4 (B) 3 (C)2 (D) 5

12. The sum of 6th and 7th terms of an A.P. is 39 and common difference is 3, then the first term of the A.P. is ( )
(A) 2 (B) –3 (C) 4 (D) 3

13. 2,…. , 26 the missing term in AP is ( )
(A) 12 (B) 13 (C) 14 (D) 18

14. The common difference of the A.P. 3, 1, –1, –3 ... is ( )
(A) –2 (B) 2 (C) –1 (D) 3

15. The general form of an A.P. is ( )
(A) $a, a - d, a - 2d, a - 3d, ...$ (B) $a, a + d, a + 2d, a + 3d, ...$
(C) $a, 2d, 3d, 4d, ...$ (D) none of these

16. The common difference of the A.P. 8, 11, 14, 17, 20, ... is ( )
(A) 2 (B) –2 (C) 3 (D) –3

17. The sum of first 5 multiples of 3 is ( )
(A) 45 (B) 55 (C) 65 (D) 75

18. The sum of first n natural numbers is ( )
(A) n^2 (B) $\frac{n(n+1)}{2}$ (C) $\frac{n(n-1)}{2}$ (D)n(n+1)

19. Which of the following are not G.P.? ( )
(A)6,12,24,48,…….. (B) 1,4,9,16,……
(C)1,-1,1,-1…….. (D) -4,-20,-100,-500……

20. The common ratio of 25,-5,1,-1/5…….. ( )
(A) -5 (B) 5 (C) -1/5 (D) 1/5

21. The n th term of G.p ( )
(A) ar^{n-1} (B) ar^{n+1} (C) r^{n-1} (D) r^{n+1}

22. The n th term of G.p 5,25,125,…….. ( )
(A) 5^{n-1} (B) 5^{n+1} (C) 5^n (D) 5

23. g_1, g_2, g_3 are three terms between in a and b then ab = ( )
(A) g_2^2 (B) $g_1 g_3$ (C) both A ,B (D) none

24.If K^a,K^b, K^c are in G.P., then a,b,c are in ( )

(A) AP (B) GP (C) both A ,B (D) none

25.Ifa,b,c are in GP then b = ( )

(A)$\frac{a+c}{2}$ (B) ac (C) $\sqrt{ac}$ (D) $\frac{a}{c}$

4.HomeAssignment-1

1. The p^{th} term of an AP is q and q^{th} term is p. Find its $(p + q)^{th}$term.?
2. If m times the m^{th} term of an A.P is equal to n times its n^{th} term, Show that the $(m+ n)^{th}$term of the AP is zero.?
3. Which is the next term of the AP $\sqrt{2}$, $\sqrt{8}$, $\sqrt{18}$, $\sqrt{32}$,.....
4. If the sum of three numbers in AP, be 24 and their product is 440, find the numbers?
5. If a^2 ,b^2 , c^2 are in A.P then prove that$\frac{1}{b+c}$,$\frac{1}{c+a}$, $\frac{1}{a+b}$are in A.P?

5.HomeAssignment-2

1. Determine the 12th term of a G.P. whose 8th term is 192 and common ratio is 2 ?
2. If a, b, c are 3 consecutive terms of an A.P., then prove that k^a, k^b, k^c are 3 consecutive terms of a G.P., where k is positive.?
3. If $\frac{-2}{7}$, x , $\frac{-7}{2}$ are in GP ,then find x?
4. Find x so that x, x+2, x+6 are consecutive terms of a GP ?
5. Which term of the GP 2,2$\sqrt{2}$, 4 , …… is 128?

7.COORDINATE GEOMETRY

1.Concepts

- ✓ In the rectangular coordinate system, two numberlines are drawn at right angles to each other. The point of intersection of these two number lines is called the **origin** whose coordinates are taken as (0, 0). The horizontal number line is known as the *x*-axis and the vertical one as the *y*-axis.
- ✓ In the ordered pair (*p, q*), *p* is called the ***x-coordinate***or ***abscissa***and *q* is known as***ycoordinate***or***ordinate*** of the point.
- ✓ The distance between any two points P(x_1, y_1) and Q (x_2, y_2) is given by

PQ = $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

- ✓ If O(0, 0) is the origin and P(x, y) is any point, then from the above formula, we have OP = $\sqrt{x^2 + y^2}$
- ✓ The distance between any two points P(x_1, y_1) and Q (x_2, y_2) on a line parallel to Y-axis is $|y_2 - y_1|$
- ✓ The distance between any two points P(x_1, y_1) and Q (x_2, y_2) on a line parallel to X-axis is $|x_2 - x_1|$
- ✓ The coordinates of the point P(x, y) which divides the line segment joining A(x_1, y_1) and B(x_2, y_2) internally in the ratio m : n, are given by $\left(\frac{mx_2+nx_1}{m+n}, \frac{my_2+ny_1}{m+n}\right)$
- ✓ The coordinates of the point P(x, y) which divides the line segment joining A(x_1, y_1) and B(x_2, y_2) externally in the ratio m : n, are given by $\left(\frac{mx_2-nx_1}{m-n}, \frac{my_2-ny_1}{m-n}\right)$
- ✓ The coordinates of the mid-point M of a line segment AB with end points A(x_1, y_1) and B(x_2, y_2) are $\left(\frac{x_2+x_1}{2}, \frac{y_2+y_1}{2}\right)$
- ✓ The point of intersection of the medians of a triangle is called its *centroid*.
- ✓ The coordinates of the centroid of the triangle whose vertices are (x_1, y_1), (x_2, y_2) and (x_3, y_3) are given by $\left(\frac{x_1+x_2+x_3}{3}, \frac{y_1+y_2+y_3}{3}\right)$
- ✓ The area of a DABC with vertices A(x_1, y_1), B(x_2, y_2) and C(x_3, y_3) is given by area $(\Delta ABC) = \frac{1}{2}|x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)|$
- ✓ Three given points A(x_1, y_1), B(x_2, y_2) and C(x_3, y_3) ,are collinear if $\Delta = 0$ or $\frac{1}{2}|x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)| = 0$
- ✓ Area of a triangle formula **"Heron's Formula"** A = $\sqrt{s(s-a)(s-b)(s-c)}$, where S = $\frac{a+b+c}{2}$, a,b,c are three sides of ΔABC.
- ✓ Slope of line containing the points (x_1, y_1), (x_2, y_2) is m = $\frac{y_2-y_1}{x_2-x_1}$

2.Oral Questions

1. The distance between two points (x_1, y_1) and (x_2, y_2) is …….
2. The distance of a point (x,y) from the origin is ……..
3. The section formula is ……
4. The mid point of line segment joining the points (x_1, y_1), (x_2, y_2) is……..
5. The centroid of a triangle is……
6. The formula for area of a triangle is ……..

7. The Heron's formula for area of a triangle is …….
8. The condition for collinearityof three points…….
9. Slope of line containing the points (x_1, y_1), (x_2, y_2) is……..
10. The line equation for X- axis is ……..
11. The line equation for Y- axis is ……..

3.Multiple Choice Questions

1. *P* is a point on *x* axis at a distance of 3 unit from *y* axis to its left. The coordinates of*P* are ( )
   (A) (3, 0) (B) (0, 3) (C) (–3, 0) (D) (0, –3)
2. The distance of point *P* (3, –2) from *y*-axis is ( )
   (A) 3 units (B) 2 units (C) –2 units (D 13 units
3. The coordinates of two points are (6, 0) and (0, –8). The coordinates of the mid point are ( )
   (A) (3, 4) (B) (3, –4) (C) (0, 0) (D) (–4, 3)
4. If the distance between (4, 0) and (0, *x*) is 5 units, the value of *x* will be ( )
   (A) 2 (B) 3 (C) 4 (D) 5
5. The area of triangle *OAB*, the coordinates of the points *A* (4, 0) *B* (0, –7) and *O* origin, is ( )
   (A) 11 sq. units (B) 18 sq. units (C) 28 sq. units (D) 14 sq. units
6. The distance between the line $2x + 4 = 0$ and $x – 5 = 0$ is ( )
   (A) 9 units (B) 1 unit (C) 5 units (D) 7 units
7. The distance between the points (5 cos 35°, 0) and (0, 5 cos 55°) is ( )
   (A) 10 units (B) 5 units (C) 1 unit (D) 2 units
8. The points (–4, 0), (4, 0) and (0, 3) are the vertices of a ( )
   (A) right triangle (B) Isosceles triangle
   (C) equilateral triangle (D) Scalene triangle
9. The perimeter of triangle formed by the points (0, 0), (2, 0) and (0, 2) is ( )
   (A) 4 units (B) 6 units (C) $6\sqrt{2}$ units (D) $4 + 2\sqrt{2}$ units
10. *AOBC* is a rectangle whose three vertices are A (0, 3), 0 (0, 0), B (5, 0) The length of its diagonal is ( )
    (A) 5 units (B) 3 units (C) $\sqrt{34}$ units (D) 4 units

11. If the centroid of the triangle formed by (9, *a*), (*b*, –4) and (7, 8) is (6, 8) then (*a, b*) is
    (A) (4, 5) (B) (5, 4) (C) (5, 2) (D) (3, 2)
12. The distance between the points ($Cos\theta$, $Sin\theta$) and ($Sin\theta$, - $Cos\theta$) is ( )
    (A) $\sqrt{3}$ (B) 2 (C) 1 (D)$\sqrt{2}$
13. The area of Δ whose vertices are (1,-1),(-4,6) and (-3,-5) is ( )
    (A) 21 (B) 32 (C) 24 (D) 25
14. The area of Δ whose vertices are (1,-1),(-4,6) and (-3,-5)is ( )
    (A) 21 (B) 32 (C) 24 (D) 25
15. The coordinates of the point which divides the join of (-1,7) and (4,-3) in the ratio

2:3 is ( )
(A) (1,3) (B) (2,3) (C) (3,1) (D) (1,1)

16. The coordinates of a point A, where AB is the diameters of a circle whose Centre (2,-3) and B is (1, 4) is ( )
(A) (3,-9) (B) (2,9) (C) (3,-10) (D) (4,5)

17. The ratio of the points of trisection of the line segment joining the points $A(2,-2)$and $B(-7, 4)$ are ( )
(A) 1:2, 2:1 (B) 1:3, 3:1 (C) 1:1, 2:1 (D) 1:2, 1:2

18. The value of K if the points $A(2,3)$, $B(4,K)$and $C(6,-3)$ are collinear is ( )
(A) 1 (B) -1 (C) 2 (D) 0

19. The mid-point of the line segment joining $(2a,4)$ and $(-2,3b)$ is $(1,2a+1)$. The values of a and b is ( )
(A) $a= 2, b = 2$ (B) $a =1, b = 3$ (C) $a = 2, b = 3$ (D) $a =1, b =1$

20. Coordinate of A and B are (-3,a)and (1,a + 4). The mid-point of AB is (-1,1) . The value of a is ( )
(A) (-1) (B) (2) (C) (3) (D) (1)

21. The ratio n which the points (2,-3)and (5,6) divided by the x - axis is ( )
(A) $\frac{1}{2}$:2 (B) 2:$\frac{1}{2}$ (C) 2 :1 (D) 1:2

22. The distance between $P(a,7)$ and Q (1,3) is 5. The value of a is ( )
(A) (4, 2) (B) (-4,-2) (C) (4,-2) (D) (4,1)

23. On which axes point (-4,0) lie ( )
(A) *x- axis* (B) *y - axis* (C) both (D) none of these

24. The distance of the point (-4,-6) from the origin is ( )
(A) 53 (B) $2\sqrt{13}$ (C) $2\sqrt{12}$ (D)$\sqrt{13}$

25. The coordinates of the mid point of the line segment joining (-5,4) and (7,-8) is
(A) (1,-2) (B) (1,2) (C) (1,3) (D) (-1,-2)

26. Two vertices of a D*ABC* are $A(1,-1)$ and $B(5,1)$. If the coordinates of its centroid be then the coordinates of the third vertex C is ( )
(A) (-1,-3) (B) (1,3) (C) (-1,3) (D) (1,2)

27. The abscissa of every point on y-axis is ( )
(A) 0 (B) 1 (C) 2 (D) -1

28. The ordinate of every point on x -axis is ( )
(A) 0 (B) 1 (C) 2 (D) -1

29. If the points (0, 0), (1, 2) and (x, y) are collinear then ( )
(A) $x = y$ (B) $2x = y$ (C) $x = 2y$ (D) $2x = –y$

30. The perimeter of a triangle with vertices (0, 4), (0, 0) and (3, 0) is ( )
(A) 8 (B) 10 (C) 12 (D) 15

31. The slope of the line joining the points (2,3), (4,5) is ( )
(A) 1 (B) 4 (C) 3 (D) -1

32. 2 is the slope of the line through (2,5) and (x,3) then x = ( )
(A) 1 (B) 4 (C) 3 (D) -1

4.HomeAssignment-1

1. For what value of P are the points (2,1) (p,-1) and (-13) collinear?
2. Find the third vertex of a D if two of its vertices are at (1,2) and (3,5) and thecentroid is at the origin.?
3. Show that (1,1), (-1,-1),($\sqrt{3}$, $\sqrt{3}$)are the vertices of an equilateral triangle ?
4. If the point $P(x, y)$ is equidistant from the points $A(5,1)$ and $B(1,5)$, prove that$x = y$?
5. Find the lengths of the medians of the triangle whose vertices are (1,-1),(0, 4) and (-5,3) .?
6. The area of a D is 5. Two of its vertices are (2,1) and (3,-2) . The third vertex lies on $y = x + 3$. Find the third vertex.?
7. Prove that the point (a,o),(a,b) and (1,1) are collinear if$\frac{1}{a} + \frac{1}{b} = 1$?
8. In what ratio is the line segment joining the points (-2,3) and (3,7) divided by the y-axis?
9. Find the relation between x and y such that the point $(x, y)$is equidistant from the points (7,1) and (3,5) ?
10. The coordinates of the vertices of DABC are $A(4,1)$, $B(-3, 2)$ and $C(O,K)$. Given that three area of DABC is 12, find the value of K.?
11. Using section formula show that the points (-1,2)(5,0) and (2,1) are collinear.?
12. Find the area of the quadrilateral whose vertices taken in order are (-4,-2),(-3,5),(3,-2) and (2,3)?
13. Find the centroid of the D whose vertices are (4,-8)(-9,7) and (8,13) ?
14. Find the vertices of the D the mid points of whose sides are (3,1),(5,6) and (-3,2)?
15. Find the distance between the points (Cosq ,Sinq) and (Sinq , - Cosq) ?

8.SIMILAR TRIANGLES

1.Concepts

1. Two figures having the same shape but not necessarily the same size are called similar figures.. Congruent figures are similar but the converse is not true
2. All regular polygons of same number of sides are similar. They are equilateral triangles, squares etc. All circles are also similar.
3. Two polygons of the same number of sides are similar, if (*i*) their corresponding angles are equal and (*ii*) their corresponding sides are in the same ratio (*i.e.,* proportion).
4. Two triangles are similar if their corresponding are equal and corresponding sides are proportional.
5. **Basic Proportionality Theorem or Thales Theorem**.
   If a line is drawn parallel to one side of a triangle, to interest the other two sides indistinct points, the other two sides are divided in the same ratio.
6. **Converse of Basic Proportionality Theorem**
   If a line divides any two sides of a triangle in the same ratio, the line is parallel to the third side.
7. If a line divides any two sides of a triangle in the same ratio, the line is parallel to the third side.
8. **Critieria for similarities of two triangles**.
   1.**AAA** similarity criterian:If in two triangles, the corresponding angles are equal, then their corresponding sidesare proportional (i.e. in the same ratio) and hence the triangles are similar.
   In the above property if only two angles are equal, then the third angle will beautomatically equal .Hence AAA criteria is same as AA criteria.
   2.**SSS** similarity criteria :If the corresponding sides of two triangles are proportional (i.e.in the same ratio), theircorresponding angles are equal and hence the triangles are similar.
   3**. SAS**criteria:If one angles of a triangle is equal to one angle of the other and the sides includingthese angles are proportional, the triangles are similar.
9. The ratio of the areas of two similar triangles are equal to the ratio of the squares of any two corresponding sides.
10. The areas of two similar triangles are in the ratio of the squares of the corresponding altitudes.
11. The areas of two similar triangles are in the ratio of the squares of the corresponding medians.
12. If the areas of two similar triangles are equal, then the triangles are congruent, *i.e.*, equal and similar triangles are congruent.
13. **Pythagoras Theorem. (Baudhayan Theorem)**
    In a right triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.
14. **(Converse of Pythagoras Theorem): -** In a triangle, if the square of one side is equal to the sum of the squares of the other two sides, then the angle opposite the first side is a right angle.

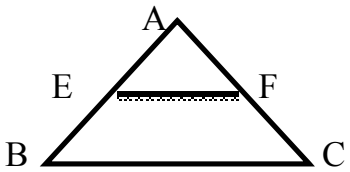
2.Oral Questions

1. What are similar triangles?

2. What are similar polygons?
3. State THALES theorem?
4. State the converse of the Basic proportionality theorem?
5. State **AAA** similarity criterion ?
6. State **SSS** similarity criterion ?
7. State **SAS** similarity criterion ?
8. State **Pythagoras** theorem?
9. State **Converse of Pythagoras Theorem**theorem?

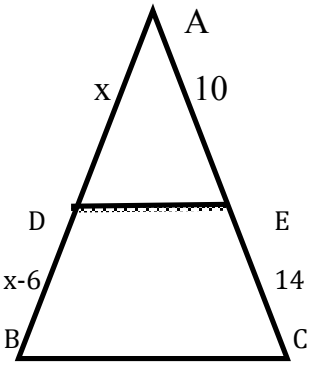
3.Multiple Choice Questions

1. In the figure, if $AE/EB = AF/FC$then we can conclude that ( )



(A) *E* and *F* are the mid-points of *AB* and *AC* respectively (B) *EF* || *BC*
(C) *EF / BC = AB / AC* (D) none of the above

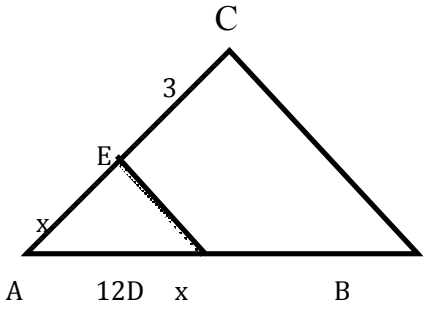
2. In the triangle *ABC*, *DE* || *BC*, then the length of *DB* is ( )



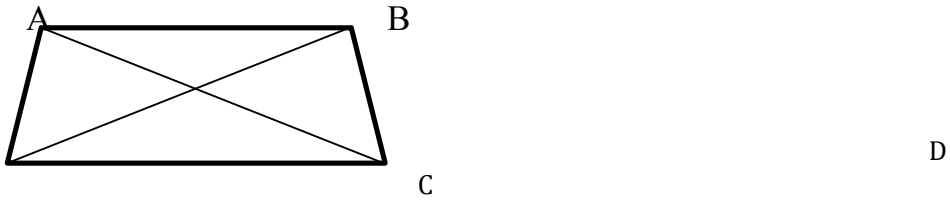
(A) 2.5 cm (B) 5 cm (C) 3.5 cm (D) 3 cm

3. In Δ*ABC*, if *DE* || *BC*, then the value of *x* is ( )

(A) 4
(B) 6
(C) 8
(D) 9

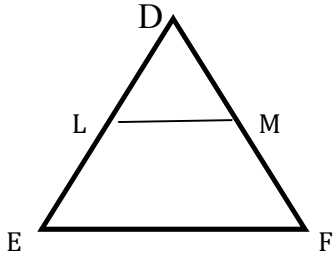


4. In the trapezium *ABCD*, *AB* || *CD*, AO = x, OC = x-3= OD,OB = x+3, then the value of *x* is ( )



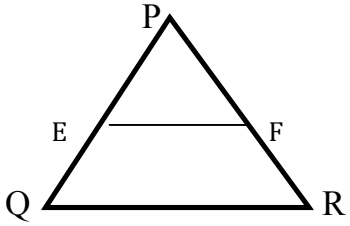
(A) 2 (B) 3 (C) –2 (D) –3

5. In the Δ*DEF*, *LM* || *EF* and *DM* / *MF*=2 / 3. If *DE* = 5.5 cm, then *DL* is ( )



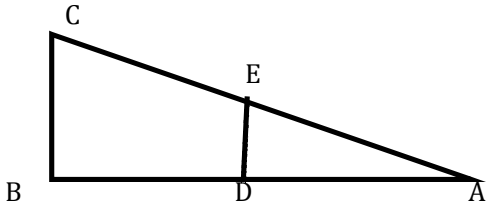
(A) 2.5 cm (B) 2.4 cm (C) 2.2 cm (D) 2 cm

6. In the given figure, *PQ* = 1.28 cm, *PR* = 2.56 cm, *PE* = 0.18 cm and *PF* = 0.36 cm, then ( )



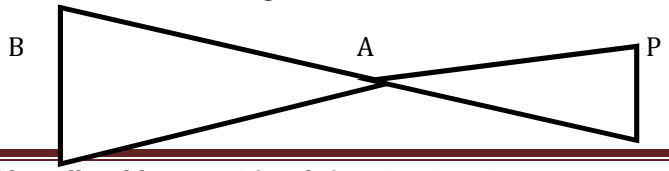
(A) *EF* is not parallel to *QR* (B) *EF* || *QR*
(C) cannot say anything (D) none of the above

7. In the given figure, if ΔADE ~ ΔABC,AE = 1.5,EC = 3, ED =1.2 then BC is equal to ( )



(A) 4.5` (B) 3 (C) 3.6 (D) 2.4

8. In the given figure. Δ*ACB* ~ Δ*APQ*. If *BC* = 8 cm, *PQ* = 4 cm, *BA* = 6.5 cm and AP = 2.8 cm, then the length of *AQ* is ( )



C Q

(A) 3.25 cm (B) 4 cm (C) 4.25 cm (D) 3 cm

9. If $\Delta ABC \sim \Delta PQR$ and $\angle P = 50°$, $\angle B = 60°$, then $\angle R$ is ( )
(A) 100° (B) 80° (C) 70° (D) cannot be determined

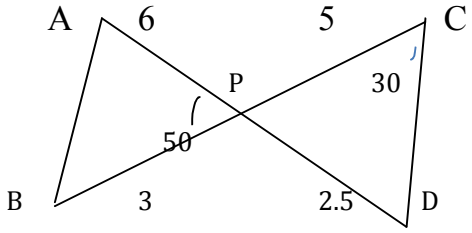
10. $\Delta ABC \sim \Delta DEF$ and the perimeters of ΔABC and ΔDEF are 30 cm and 18 cm respectively. If $BC = 9$ cm, then EF is equal to ( )
(A) 6.3 cm (B) 5.4 cm (C) 7.2 cm (D) 4.5 cm

11. $\Delta ABC \sim \Delta DEF$ such that AB = 9.1 cm and DE = 6.5 cm. If the perimeter of ΔDEF is 25 cm, then perimeter of ΔABC is ( )
(A) 35 cm (B) 28 cm (C) 42 cm (D) 40 cm

12. If $\Delta ABC \sim \Delta EDF$ and ΔABC is not similar to ΔDEF, then which of the following is not true? ( )
(A) $BC.\ EF = AC.\ FD$ (B) $AB.\ EF = AC.\ DE$
(C) $BC.\ DE = AB.\ EF$ (D) $BC.\ DE = AB.\ FD$

13. If in two triangles ABC and PQR, $AB / QR = BC/ PR = CA/ PQ$, then ( )
(A) $\Delta PQR \sim \Delta CAB$ (B) $\Delta PQR \sim \Delta ABC$
(C) $\Delta CBA \sim \Delta PQR$ (D) $\Delta BCA \sim \Delta PQR$

14. In the given figure, two line segments, AC and BD intersect each other at the point P such that $PA = 6$ cm, $PB = 3$ cm, $PC = 2.5$ cm, $PD = 5$ cm, $\angle APB = 50°$ and $\angle CDP = 30°$. Then $\angle PBA$ is equal to ( )

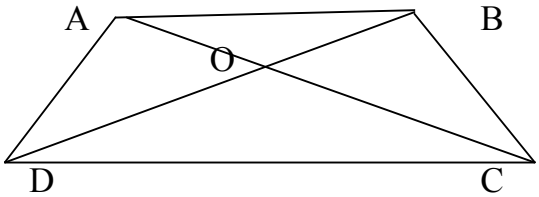


(A) 50° (B) 30° (C) 60° (D) 100°

15. If in triangles ABC and DEF, $\frac{AB}{DE} = \frac{BC}{FD}$, then they will be similar, when ( )
(A) $\angle B = \angle E$ (B) $\angle A = \angle D$ (C) $\angle B = \angle D$ (D) $\angle A = \angle F$

16. The areas of two similar triangles are 169 cm^2 and 121 cm^2, if the longest side of the larger triangle is 26 cm, then the longest side of the other triangle is ( )
(A) 12 cm (B) 14 cm (C) 19 cm (D) 22 cm

17. In the following trapezium $ABCD$, $AB \parallel CD$ and $CD = 2AB$. If area $(\Delta AOB) = 84$ cm^2, then area (ΔCOD) is ( )



(A) 168 cm^2 (B) 336 cm^2 (C) 252 cm^2 (D) none of these

18. If $\Delta ABC \sim \Delta PQR$, area $(\Delta ABC) = 80\ cm^2$ and area $(\Delta PQR) = 245\ cm^2$, then $ABPQ$ is equal to ( )

(A) 16 : 49 (B) 4 : 7 (C) 2 : 5 (D) none of these

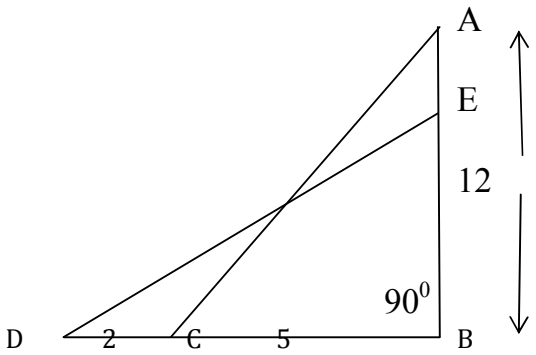
19. In the similar triangles, ΔABC and ΔDEF, $\frac{ar(\Delta ABC)}{ar(\Delta DEF)} = \frac{3}{4}$. If the median $AL = 6$ cm, then the median DM of ΔDEF is ( )

(A) $3\sqrt{2}cm$ (B) $4\sqrt{3}cm$ (C) $4\sqrt{2}cm$ (D) $3\sqrt{3}cm$

20. If a ladder of length 13 m is placed against a wall such that its foot is at a distance of 5 m from the wall, then the height of the top of the ladder from the ground is ( )

(A) 10 m (B) 11 m (C) 12 m (D) none of these

21. In the figure, if $AC = DE$, then the value of EB is ( )

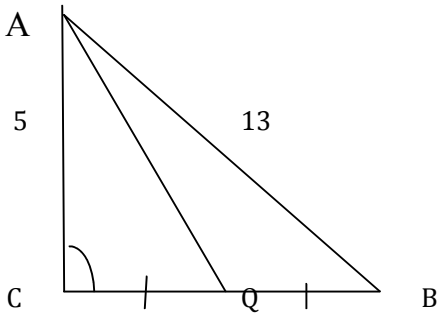


(A) $3\sqrt{30}$cm B) $2\sqrt{30}$cm (C) $3\sqrt{15}$cm (D) $4\sqrt{15}$cm

22. If diagonals of a rhombus are 12 cm and 16 cm, then the perimeter of the rhombus is :

(A)20 cm (B) 40 cm (C) 28 cm (D) 56 cm ( )

23. In the figure, ΔABC is right angled at C and Q is the mid-point of BC, then the length of AQ is ( )



(A) 6 cm (B) 12 cm (C) $\sqrt{61}$cm (D) $6\sqrt{3}$cm

24. The lengths of the diagonals of a rhombus are 24 cm and 32 cm. The perimeter of the rhombus is ( )

(A) 9 cm (B) 128 cm (C) 80 cm (D) 56 cm

25. Which of the following cannot be the sides of a right triangle ? **( )**

(A) 9 cm, 15 cm, 12 cm (B) 2 cm, 1 cm, $\sqrt{5}$ cm

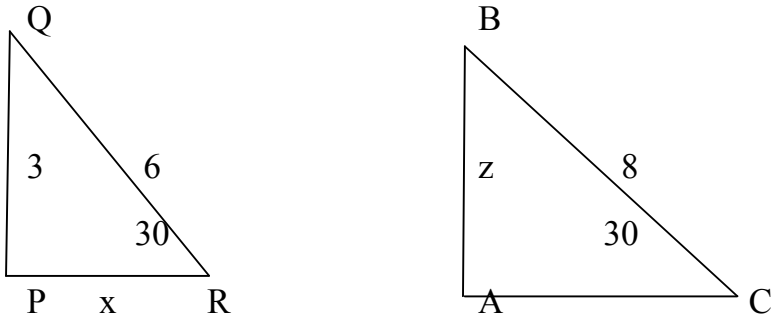
(C) 400 mm, 300 mm, 500 mm (D) 9 cm, 5 cm, 7 cm

26. $\Delta ABC \sim \Delta PQR$, M is the mid-point of BC and N is the mid point of QR. If the area of ΔABC = 100 sq. cm, the area of ΔPQR = 144 sq. cm and AM = 4 cm, then PN is ( )
(A) 4.8 cm (B) 12 cm (C) 4 cm (D) 5.6 cm

27. ΔABC is such that AB = 3 cm, BC = 2 cm and CA = 2.5 cm. If $\Delta DEF \sim \Delta ABC$ and EF = 4 cm, then perimeter of ΔDEF is ( )
(A) 15 cm (B) 22.5 cm (C) 7.5 cm (D) 30 cm

28. A vertical stick 30 m long casts a shadow 15 m long on the ground. At the same time, a tower casts a shadow 75 m long on the ground. The height of the tower is ( )
(A) 150 m (B) 100 m (C) 25 m (D) 200 m

29. In the figure $\Delta ABC \sim \Delta PQR$, then $y + z$ is ( )



(A) $2+\sqrt{3}$ (B) $4+3\sqrt{3}$ (C) $4+\sqrt{3}$ (D) $3+4\sqrt{3}$

30. If the ratio of the corresponding sides of two similar triangles is 2 : 3, then the ratio of their corresponding altitude is ( )
(A) 3 : 2 (B) 16 : 81 (C) 4 : 9 (D) 2 : 3

4.HomeAssignment-1

1. If D and E are respectively the points on the sides AB and AC of a DABC such that AD=6cm, BD=9cm, AE=8cm, EC=12cm, Then show that DE||BC.?
2. The hypotenuse of a right triangle is 6m more than the twice of the shortest side. If the third side is 2m less than the hypotenuse. Find the side of the triangle?
3. PQR is a right triangle right angled at P and M is a point on QR such that PM ⊥ QR. Show that $PM^2 = QM.MR$?
4. BL and CM are medians of ΔABC right angled at A. prove that $4(BL^2 + CM^2) = 5BC^2$?
5. ABC is a right triangle right angled at C. Let BC = a, CA = b, AB = C and let P be the length of perpendicular from C on AB prove that (i) cp = ab (ii) $\frac{1}{p^2} = \frac{1}{a^2} + \frac{1}{b^2}$?
6. Prove that the ratio of areas of two similar triangles are in the ratio of the squares of the corresponding sides. By using the above theorem solve In two similar triangles PQR and LMN, QR = 15cm and MN = 10 Find the ratio of areas of two triangles.?
7. In a quadrilateral ABCD P,Q,R,S are the mid points of the sides AB, BC, CD and DA respectively. Prove that PQRS is a parallelogram ?
8. The length of the diagonals of a rhombus are 24 cm and 10cm. find each side of Rhombus ?

9. In an isosceles right angled triangle prove that hypotenuse is $\sqrt{2}$ times the side ofa triangle ?
10. A ladder reaches a window which is 12m above the ground on one side of the street. Keeping its foot at the same point, the ladder is turned to the other side of the street to reach a window 9 m high. Find the width of the street if the length of the ladder is 15m.?

9.TANGENTS AND SECANTS TO A CIRCLE

1.Concepts

- A **circle** may be regarded as a collection of points in a plane at a fixed distance from a **fixed point**. The fixed point is called the Centre of the circle. The fixed distance between the centre of the circle and the circumference, is called **radius.**
- The perimeter of the circle is referred to as the **circumference** of the circle.
- A **chord** of a circle is a line segment joining any two points on the circumference.
- An **arc** of a circle is a part of the circumference.
- A **diameter** of a circle is a chord which passes through the Centre of the circle.
- A line, which intersects the circle in two distinct points, is called a **secant.**
- A line which has only one point common to the circle is called a **tangent** to the **circle.**
- There is one and only one tangent at a point of the circle.
- The tangent at any point of a circle is perpendicular to the radius through the point of contact.
- No tangent can be drawn from a point inside the circle.
- The lengths of tangents drawn from an external point to a circle are equal.
- The perpendicular at the point of contact to the tangent to a circle passes through the center of the circle.
- Tangents drawn at the end points of a diameter of a circle are parallel.
- Area of segment of a circle = area of the corresponding sector – area of the corresponding triangle .

- Area of the sector = $\frac{x}{360}$ x π r^2
- Area of the triangle = $\frac{1}{2}$ b h
- Area of the circle = π r^2
- Area of regular hexagon = $6\frac{\sqrt{3}}{4}$ a^2

2.Oral Questions

1. What is secant of a circle?
2. Define tangent of a circle/
3. The tangent at any point of a circle is …… to the radius through the point of contact.
4. The lengths of tangents drawn from an external point to a circle are ……..
5. Tangents drawn at the end points of a diameter of a circle are……....
6. What is area of segment of a circle?
7. How many tangents can a circle have?
8. How many tangents can be drawn to a circle from a point outside the circle?
9. What is the distance between two parallel tangents of a circle of the radius 4 cm.?
10. How many tangents can be drawn to a circle from a point inside the circle.?

3.Multiple Choice Questions

1. If tangent PA and PB from a point P to a circle with centre O are inclined to each other at an angle of 80°, then ∠POA is equal to ( )
   (A) 50° (B) 60° (C) 70° (D) 80°
2. From a point T, the length of the tangent to a circle is 24 cm and the distance of T from the centre is 25 cm. The radius of the circle is ( )
   (A) 7 cm (B) 12 cm (C) 15 cm (D) 24.5 cm
3. At one end of a diameter AB of a circle of radius 5 cm, tangent XAY is drawn to the circle. The length of the chord, parallel to XY and at a distance of 8 cm from A is
   (A) 4 cm (B) 5 cm (C) 6 cm (D) 8 cm ( )
4. If angle between two radii of a circle is 130°, the angle between the tangents at the ends of the redii is ( )
   (A) 90° (B) 50° (C) 70° (D) 40°
5. In the figure, AB is a chord of the circle and AOC is its diameter such that ∠ACB = 50°. If AT is the tangent to the circle at the point A, then ∠BAT is equal to ( )
   (A) 65° (B) 60° (C) 50° (D) 40°
6. A tangent AB at a point A of a circle of radius 5 cm meets a line through the centre O at a point B so that OB = 12 cm. Length PB is ( )

(A) 10 cm (B) 12 cm (C) 9 cm (D)$\sqrt{119}$ cm

7. The length of the tangent drawn from a point, whose distance from the centre of a circle is20 cm and radius of the circle is 16 cm, is ( )
(A) 12 cm (B) 144 cm (C) 169 cm (D) 25 cm
8. A tangent PQ at a point P of a circle of radius 15 cm meets a line through the centre O at a point Q so that OQ = 25 cm. Length of PQ is ( )
(A) 5 cm (B) 25 cm (C) 16 cm (D) 20 cm
9. In a circle of radius 7 cm, tangent LM is drawn from a point L such that LM = 24 cm. If O is the centre of the circle, then length of OL is ( )
(A) 20 cm (B) 24 cm (C) 25 cm (D) 26 cm
10. PT is a tangent to a circle with centreO. If OT = 6 cm, and OP = 10 cm, then the length of tangent PT is ( )
(A) 8 cm (B) 12 cm (C) 10 cm (D) 16 cm
11. is the centre of two concentric circles of radii 3 cm and 5 cm. PQ is a chord of outer circle which touches the inner circle. The length of chord PQ is ( )
(A) 5 cm (B) 8 cm (C) 10 cm (D) $\sqrt{34}$ cm
12. TP and TQ are two tangents to a circle with centre O, so that $\angle POQ = 140°$. $\angle PTO$ is equal to ( )
(A) 40° (B) 50° (C) 60° (D) 70°
13. Quadrilateral PQRS is circumscribed, touching the circle at A, B, C and D. If AP = 5 cm, QR = 7 cm and DR = 3 cm, then length PQ is equal to ( )
(A) 9 cm (B) 8 cm (C) 13 cm (D) 14 cm
14. The pair of tangents PA and PB drawn from an external point P to a circle with centreO ,are perpendicular to each other and length of each tangent is 5 cm. The radius of the circle is ( )
(A) 10 cm (B) 7.5 cm (C) 5 cm (D) 2.5 cm
15. 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 are drawn. The area of the quadrilateral PQOR is ( )
(A) 60 cm^2 (B) 65 cm^2 (C) 30 cm^2 (D) 32.5 cm^2
16. The perimeter of a sector of a circle of radius 8 cm is 25 what is area of sector?
(A) 50cm^2 (B) 42cm^2 (C) 52cm^2 (D) none of these
17. Tangent of circle intersect the circle ( )
(A) Only one point (B) Two points (C) Three points (D) None of these
18. How many tangents can a circle have? ( )
(A) 1 (B) 2 (C) 0 (D) infinite
19. If PA and PB are tangents from a point P lying outside the circle such that PA = 10 cm and $\angle APB = 60°$. Find length of chord AB ( )
(A) 10cm (B) 20cm (C) 30cm (D) 40cm
20. A tangent PQ at a point P to a circle of radius 5 cm meets a line through the centre at a point Q so that OQ = 13cm the length of PQ. ( )
(A) 11cm (B) 12cm (C) 10cm (D) None of these
21. If tangents PA and PB from a point P to a circle with centre O are inclined to each other at angle of 80° then $\angle POA$ is equal to ( )

(A) 50° (B) 60° (C) 70° (D) 80°

22. A quadrilateral ABCD is drawn to circumscribe a circle IF AB = 4 cm, CD = 7 cm, BC= 3 cm, Then length of AD? ( )
(A) 7 cm (B) 2cm (C) 8 cm (D) none of these

23. A circle touches all the four sides of a quadrilateral ABCD whose sides AB = 6 cm, BC = 7 cm, CD = 4 cm Then AD = --- ( )
(A) 2 cm (B) 3 cm (C) 5 cm (D) 6cm

24. The length of tangent drawn to a circle with radius 3 cm from a point 5 cm from thecentre of the circle is ( )
(A) 6 cm (B) 8 cm (C) 4 cm (D) 7 cm

25. A line intersecting a circle in two points is called ( )
(A) Tangent (B) secant (C) diameter (D) none of these

4.HomeAssignment-1

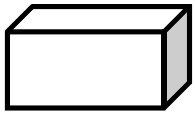
1. Two concentric circles are of radii 5 cm and 3 cm. find the length of the chord of the larger circle which touches the smaller circle ?
2. A quadrilateral ABCD is drawn to circumscribe a circle. Prove that AB+CD=AD+BC?
3. PQ is a chord of length 8 cm of a circle of radius 5 cm. The tangents at P and Q intersect at point T. Find the length TP ?
4. The length of tangent from point A at a distance at 5 cm. from the centre of the circle is 4 cm. What will be the radius of the circle?
5. A circle touches all the four sides of a quadrilateral ABCD whose sides AB = 8 cm., BC = 9cm. and CD = 6 cm. find AD.?
6. What is the distance between two parallel tangents of a circle of the radius 4 cm.?
7. If PA and PB are tangents drawn from external point P such that PA = 10cm and $\angle APB = 60°$ find the length of chord AB?
8. 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?
9. Prove that parallelogram circumscribing a circle is a rhombus?
10. The lengths of two tangents drawn from an external point to a circle are equal?

11. Draw a circle of radius 6cm. From a point 10cm away from its centre , construct the pair of tangents to the circle and measure their lengths?
12. Find the area of sector ,whose radius is 7cm, with angle 72^0?

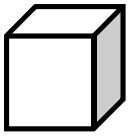
10.MENSURATION

1.Concepts

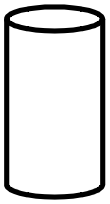
1. **Cuboid :**
   a. Lateral surface area = $2h(l + b)$
   b. Surface area = $2(lb + bh + lh)$
   c. Volume = lbh
   d. Length of diagonal = $\sqrt{l^2 + b^2 + h^2}$ where l, b, h are length, breadth and thickness of the cuboid.



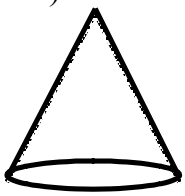
2. **Cube :**
   (a) Lateral surface area = $4l^2$
   (b) Surface area = $6l^2$
   (c) Volume = l^3
   (d) Length of diagonal = $\sqrt{3}\ l$ where, l is the edge of the cube.



3. **Cylinder :** r = radius, h = height
   a. Area of curved surface = $2\pi rh$
   b. Total surface area = $2\pi r^2 + 2p\pi h = 2\pi r(r + h)$
   c. Volume = $\pi r^2 h$
   d. Curved surface area of hollow cylinder = $2\pi h(R + r)$
   e. Total surface area of hollow cylinder = $2\pi h\ (R + r) + 2\pi(R^2 - r^2)$

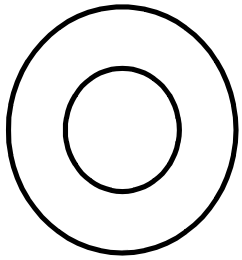


4. **Cone :** r = radius, h = height, l = slant height.
   (a) Curved surface area = $\pi rl = \pi r\sqrt{h^2 + r^2}$
   (b) Total surface area = $\pi r^2 + \pi rl = \pi r\ (r + l)$
   (c) Volume = $\frac{1}{3}\pi r^2 h$



5. **Sphere :** r = radius
   a. Surface area = $4\pi r^2$
   b. Volume = $\frac{4}{3}\pi r^3$

6. **Hemisphere (solid) :** r = radius
   (a) Curved surface area = $2\pi r^2$
   (b) Total surface area = $3\pi r^2$
   (c) Volume = $\frac{2}{3}\pi r^3$



7. **Spherical Shell :** Outer radius = R, Inner radius = r
   1. (*a*) Surface area (outer) $= 4\pi R^2$
   2. (*b*) Surface area (inner) $= 4\pi r^2$
   3. (*c*) Volume of the material $= \frac{4}{3}\pi(R^3 - r^3)$
      $= \frac{4}{3}\pi(R - r)(R^2 + Rr + r^2)$

2.Oral Questions

1. What is diagonal of a cube of edge *a ?*
2. What is the total surface area of a cuboid ?
3. Say the volume of right prism ?
4. Say the curved surface area of regular circular cylinder ?
5. What is the total surface area of a pyramid ?
6. Say the volume of sphere ?
7. Say the volume of hemi sphere ?
8. What is diagonal of a cuboid?
9. Say the lateral surface of sphere ?
10. What is the total surface area of a cube ?

3.Multiple Choice Questions

1. A funnel is combination of ( )
   (A) a cone and a cylinder
   (B) frustum of a cone and a cylinder
   (C) a hemisphere and a cylinder
   (D) a hemisphere and a cone

2. The shape of a bucket is usually in the form of ( )
   (A) a cone (B) frustum of a cone (C) a cylinder (D) a sphere
3. A flask used in the laboratory is the combination of ( )
   (A) a cylinder and a cone (B) a sphere and a cone
   (C) a sphere and a cylinder (D) frustum of a cone and a sphere
4. The ratio of the volumes of two spheres is 8 : 27. The ratio between their surface areas is ( )
   (A) 2 : 3 (B) 4 : 27 (C) 8 : 9 (D) 4 : 9
5. The curved surface area of a cylinder is 264 m^2 and its volume is 924 m^3. The height of the pillar is ( )
   (A) 3 m (B) 4 m (C) 6 m (D) 8 m
6. Volumes of two spheres are in the ratio 27 : 64. The ratio of their surface areas is
   (A) 3 : 4 (B) 4 : 3 (C) 9 : 16 (D) 16 : 9
7. If two solid hemispheres of same base radius *r* are joined together along their bases, then curvedsurface area of the new solid is ( )
   (A) $4\pi r^2$ (B) $6\pi r^2$ (C) $3\pi r^2$ (D) $8\pi r^2$
8. The total surface area of a hemisphere of radius 7 cm is ( )
   (A)$447\pi cm^2$ (B) $239\pi cm^2$ (C) $147\pi cm^2$ (D) $174\pi cm^2$
9. The ratio of the total surface area to the lateral surface area of a cylinder with base diameter 160 cm and height 20 cm is ( )
   (A)1 : 2 (B) 2 : 1 (C) 3 : 1 (D) 5 : 1

10. The radius of the base of a cone is 5 cm and its height is 12 cm. Its curved surface area is ( )
    (A) 30 πcm^2 (B) 65 π cm^2 (C) 80 πcm^2 (D) none of these
11. If a cone is cut into two parts by a horizontal plane passing through the mid-points of its axis, the ratio of the volumes of the upper part and the cone is ( )
    (A) 1 : 2 (B) 1 : 4 (C) 1 : 6 (D) 1 : 8
12. A cone, a hemisphere and a cylinder stand on equal bases and have the same height. The ratio of their volumes is ( )
    (A) 3 : 2 : 1 (B) 1 : 3 : 2 (C) 2 : 3 : 1 (D) 1 : 2 : 3
13. A solid piece of iron in the form of a cuboid of dimensions 49 cm × 33 cm × 24 cm is moulded to form a solid sphere. The radius of the sphere is ( )
    (A) 25 cm (B) 21 cm (C) 19 cm (D) 23 cm
14. The volume of a sphere (in cu. cm) is equal to its surface area (in sq. cm). The diameter of the sphere (in cm) is ( )
    (A) 3 (B) 6 (C) 2 (D) 4
15. A shuttle cock used for playing badminton has the shape of the combination of ( )
    (A) a cylinder and a sphere (B) a sphere and a cone

(C) a cylinder and a hemisphere (D) a hemisphere and frustum cone

16. A garden roller has a circumference of 4 m. The no. of revolutions it makes in moving 40 metres are ( )
(A) 12 (B) 16 (C) 8 (D) 10

17. If the radius of base of a cylinder is doubled and the height remains unchanged, its curved surface area becomes ( )
(A) double (B) three times (C) half (D) no change

18. A solid sphere of radius r is melted and recast into the shape of a solid cone of height r, thenthe radius of the base of the cone is ( )
(A) r (B) $2r$ (C) r^2 (D) $\frac{r}{2}$

19. The volume of a largest sphere that can be cut from cylindrical log of wood of base radius 1 m and height 4 m is ( )
(A) $\frac{8}{3}\pi m^3$ (B) $\frac{10}{3}\pi m^3$ (C) $\frac{16}{3}\pi m^3$ (D) $\frac{4}{3}\pi m^3$

20. Total surface area of a cube is 216 cm2, it's volume is ( )
(A) 216 cm^3 (B) 144 cm^3 (C) 196 cm^3 (D) 212 cm^3

4.HomeAssignment

1. Find the ratio of the volumes of a cylinder, a cone and a sphere, if each has the same diameter and same height.
2. A cone and a sphere have equal radii and equal volume. What is the ratio of the diameter of the sphere to the height of the cone?
3. What is the ratio of the volume of a cube to that of a sphere which will fit exactly inside the cube?
4. A solid cylinder of radius r and height h is placed over other cylinder of same height and radius. Find the total surface area of the shape so formed.
5. What is the ratio of the volume of a cube to that of a sphere which will fit exactly inside the cube?
6. Determine the ratio of the volume of a cube to that of a sphere which with exactly fit inside the cube?
7. Find the ratio of the volumes of two circular cones. If $r_1 : r_2 = 3: 5$ and $h_1: h_2 = 2 :1$

8. 2cubes each of volume 64cm3 are joined end to end. Find the surface area of the resulting cuboid.
9. What is the height of a cone whose base area and volume are numerically equal?
10. A cylinder, a cone and a hemisphere are of same base and of same height . Find the ratio of their volumes?
11. Three metallic solid cubes whose edges are 3cm, 4cm, and 5cm are melted and converted into a single cube .Find the edge of the cube so formed?
12. The volume and surface area of a sphere are numerically equal. Find the radius of the sphere?
13. The diameter and height of a cylinder and a cone are equal. What is the ratio of their volume.?
14. A cylinder, a cone and a hemisphere are of equal base and have the same height. What is the ratio in their volumes?
15. The volume of cube is $8a^3$. Find its surface area.?

11.TRIGONOMETRY

1.Concepts

1. Trigonometric ratios of an acute angle of right angled triangle:

$$\text{Sin } \theta = \frac{\textit{The side opposite to } \angle\theta}{\textit{hypotenuse}}$$

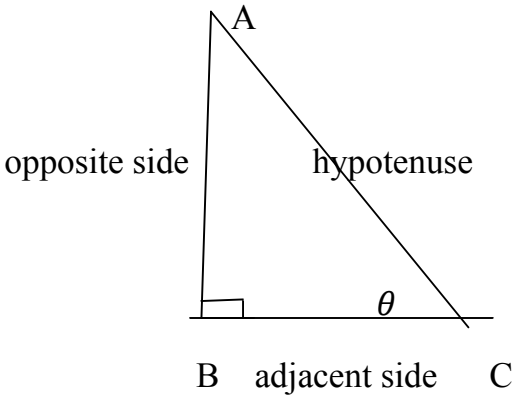
$$\text{Cos } \theta = \frac{\textit{The side adjacent to } \angle\theta}{\textit{hypotenuse}}$$

$$\text{Tan } \theta = \frac{\textit{The side opposite to } \angle\theta}{\textit{The side adjacent to } \angle\theta}$$

$$\text{Cosec } \theta = \frac{1}{\text{Sin } \theta} = \frac{\textit{hypotenuse}}{\textit{The side opposite to } \angle\theta}$$

$$\text{Sec } \theta = \frac{1}{\text{Cos } \theta} = \frac{\textit{hypotenuse}}{\textit{The side adjacent to } \angle\theta}$$

$$\text{Cot } \theta = \frac{1}{\text{Tan } \theta} = \frac{\textit{The side adjacent to } \angle\theta}{\textit{The side opposite to } \angle\theta}$$



2. Relationship between different trigonometric ratios :

$\text{Cosec } \theta = \frac{1}{\text{Sin } \theta}$ $\qquad$ $\text{Tan } \theta = \frac{\text{Sin } \theta}{\text{Cos } \theta}$

$\text{Sec } \theta = \frac{1}{\text{Cos } \theta}$ $\qquad$ $\text{Cot } \theta = \frac{\text{Cos } \theta}{\text{Sin } \theta}$

$\text{Cot } \theta = \frac{1}{\text{Tan } \theta}$

3. **Table of values of various trigonometric ratios of 0°, 30°, 45°, 60° and 90°.**

T Ratios	0^0	30^0	45^0	60^0	90^0
Sin θ	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1
Cos θ	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0
Tan θ	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	Not defined
Cosec θ	Not defined	2	$\sqrt{2}$	$\frac{2}{\sqrt{3}}$	1
Sec θ	1	$\frac{2}{\sqrt{3}}$	$\sqrt{2}$	2	Not defined
Cot θ	Not defined	$\sqrt{3}$	1	$\frac{1}{\sqrt{3}}$	0

4. **Trigonometric Identities.**

$\sin^2\theta + \cos^2\theta = 1$ or $\sin^2\theta = 1 - \cos^2\theta$ or $\cos^2\theta = 1 - \sin^2\theta$

$\sec^2\theta - \tan^2\theta = 1$ or $1 + \tan^2\theta = \sec^2\theta$ or $\tan^2\theta = \sec^2\theta - 1$

$\text{cosec}^2\theta - \cot^2\theta = 1$ or $\text{cosec}^2\theta = 1 + \cot^2\theta$ or $\cot^2\theta = \text{cosec}^2\theta - 1$

5. **Trigonometric ratios of complementary angles**

$\sin(90° - \theta) = \cos\theta$,

$\cos(90° - \theta) = \sin\theta$

$\tan(90° - \theta) = \cot\theta$,

$\cot(90° - \theta) = \tan\theta$

$\sec(90° - \theta) = \text{cosec}\,\theta$,

$\text{cosec}(90° - \theta) = \sec\theta$

2.Oral Questions

1. Say all trigonometric ratios w.r.t ∠A?
2. Say tanθ in terms of sin θ and cos θ ?
3. Say cotθ in terms of sin θ and cos θ ?
4. The value of $\sin 45^0$?
5. The value of $\sin 30^0$?

6. The value of $\cos 45^0$?
7. The value of $\tan 45^0$?
8. The value of $\sec 90^0$?
9. The value of $\cot 60^0$?
10. The value of $\sin^2 45^0 + \cos^2 45^0$?
11. The value of $\sec^2 30^0 - \tan^2 30^0$?
12. The value of $\text{cosec}^2 60^0 - \cot^2 60^0$?
13. The value of $\sin(90° - \theta)$
14. The value of $\cos(90° - \theta)$
15. The value of $\tan(90° - \theta)$
16. The value of $\cot(90° - \theta)$
17. The value of $\sec(90° - \theta)$
18. The value of $\text{cosec}(90° - \theta)$

3.Multiple Choice Questions

1. If $\cos A = 4/5$, then the value of $\tan A$ is ( )
   (A) 3/5 (B) 3/4 (C) 4/3 (D) 5/3
2. If $\sin\theta = ab$, then $\cos\theta$ is equal to ( )
   (A) $\frac{b}{\sqrt{a^2+b^2}}$ (B) $\frac{a}{\sqrt{a^2+b^2}}$ (C) $\frac{b}{a}$ (D) $\frac{\sqrt{a^2+b^2}}{b}$
3. The value of $\tan A$ is always less than 1 ( )
   (A) false (B) true
   (C) sometimes true, sometimes false (D) none of the above
4. Maximum value of $\sin\theta$ is ( )
   (A) more than 1 (B) less than 1 (C) equal to 1 (D) none of these
5. Minimum value of $\sin\theta$, where θ is acute, is ( )
   (A) zero (B) more than 1 (C) equal to 1 (D) less than 1
6. If $4\tan\theta = 3$, then $\frac{4\sin\theta - \cos\theta}{4\sin\theta + \cos\theta}$ is equal to ( )
   (A) 2/3 (B) 1/3 (C) 1/2 (D) ¾
7. If θ is an acute angle such that $\sec^2\theta = 3$, then $\tan^2\theta - \cos^2\theta / \tan^2\theta + \cos^2\theta$( )
   (A) 4/7 (B) 3/7 (C) 2/7 (D) 1/7
8. $\sin\theta = 4/3$ for some angle θ, is ( )
   (A) true (B) false
   (C) it is not possible to say anything about it definitely (D) neither (A) nor (B)

9. If cot θ = 4/3, then $\cos^2\theta - \sin^2\theta$ is equal to ( )
(A) 7/25 (B) 1 (C) – 7/25 (D) 4/25

10. If sin A = 12, then the value of cot A is ( )
(A) √3 (B) 1/√3 (C) √3/2 (D) 1

11. If $a = b \tan\theta$, 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) $\frac{a+b}{a-b}$ (D) $\frac{a-b}{a+b}$

12. If sin θ = 3/5, then the value of $(\tan\theta + \sec\theta)^2$ is equal to ( )
(A) 1 (B) 1/2 (C) 2 (D) –2

13. $\frac{1-\sin^2 45}{1+\sin^2 45}$ = ( )
(A) cos 60° (B) sin 60° (C) tan 30° (D) sin 30°

14. The value of (sin 30° + cos 30°) – (sin 60° + cos 60°) is ( )
(A) –1 (B) 0 (C) 1 (D) 2

15. The value of (sin 45° + cos 45°) is ( )
(A) 1/√2 (B) √2 (C) √3/2 (D) 1

16. If *x* tan 45°.cos 60° = sin 60°.cot 60°, then *x* is equal to ( )
(A) 1 (B) √3 (C) 1/2 (D) 1/√2

17. The value of tan30/cos60is ( )
(A) 1/√2 (B) 1/√3 (C) √3 (D) 1

18. The value of sin45°/cosec45° is ( )
(A) 1 (B) 12 (C) √2 (D) none of these

19. The value of (sin 45° cos 30° + cos 45° sin 30°) is ( )
(A) $\frac{\sqrt{3}+1}{\sqrt{2}}$ (B) $\frac{\sqrt{3}}{\sqrt{2}}$ (C) $\frac{\sqrt{3}+1}{2\sqrt{2}}$ (D) $\frac{\sqrt{3}-1}{2\sqrt{2}}$

20. The value of (sin 30° cos 60° + cos 30° sin 60°) is : ( )
(A) Sin 90° (B) Cos 90° (C) Sin 0° (D) Cos 30°

21. $\sqrt{\frac{1-\sin 60}{2}}$ = ( )
(A) Sin 60° (B) Sin 30° (C) Sin 90° (D) Sin 0°

22. The value of $3\sin 30° - 4\sin^3 30°$ is ( )
(A) 1 (B) 0 (C) 2 (D) 1/2

23. The value of sin18°/cos72° is ( )
(A) 1 (B) 0 (C) –1 (D) ½

24. cos 48° – sin 42° is ( )
(A) 1 (B) 0 (C) –1 (D) ½

25. The value of tan 80° .tan 75° . tan 15°. tan 10° is ( )
(A) –1 (B) 0 (C) 1 (D) None Of These

26. The value of tan26°/cot64° is ( )
(A) 0 (B) –1 (C) –1 (D) None Of These

27. cosec 31° – sec 59° is equal to ( )
(A) 0 (B) 1 (C) –1 (D) ½

28. The value of (tan 2° tan 4° tan 6° ... tan 88°) is ( )

(A) 1 (B) 0 (C) 2 (D) Not Defined

29. $\tan(40° + \theta) - \cot(40° - \theta)$ is equal to ( )
(A) 1 (B) 0 (C) 2 (D) 12

30. The value of $\sin(50° + \theta) - \cos(40° - \theta)$ is ( )
(A) 1 (B) 2 (C) 1/2 (D) 0

31. The value of the expression $\operatorname{cosec}(75° + \theta) - \sec(15° - \theta) - \tan(55° + \theta) + \cot(35° - \theta)$ is ( )
(A) – 1 (B) 0 (C) 1 (D) 32

32. $\sin(45° + \theta) - \cos(45° - \theta)$ is equal to ( )
(A) 2 Cosec θ (B) 0 (C) Sin θ (D) 1

33. $9\sec^2\theta - 9\tan^2\theta$ is equal to ( )
(A) 1 (B) 9 (C) 8 (D) 0

34. If $\sin A = 8/17$ and A is acute, then $\cot A$ is equal to ( )
(A) 15/8 (B) 15/17 (C) 8/15 (D) 17/8

35. $(\operatorname{cosec}^2 72° - \tan^2 18°)$ is equal to ( )
(A) 0 (B) 1 (C) 3/2 (D) None Of These

36. If $x = \sec\theta + \tan\theta$, then $\tan\theta$ is equal to ( )
(A) $\frac{x^2+1}{x}$ (B) $\frac{x^2-1}{x}$ (C) $\frac{x^2+14}{2x}$ (D) $\frac{x^2-1}{2x}$

37. $\tan^2\theta \sin^2\theta$ is equal to ( )
(A) $\tan^2\theta - \sin^2\theta$ (B) $\tan^2\theta + \sin^2\theta$ (C) $\tan^2\theta \sin^2\theta$ (D) None Of These

38. If $\cos\theta - \sin\theta = 1$, then the value of $\cos\theta + \sin\theta$ is equal to ( )
(A) ± 4 (B) ± 3 (C) ± 2 (D) ± 1

39. $\frac{1+\tan^2\theta}{1+\cot^2\theta}$ ( )
(A) $\sec^2\theta$ (B) – 1 (C) $\cot^2\theta$ (D) $\tan^2\theta$

40. $(\sec^2 10° - \cot^2 80°)$ is equal to ( )
(A) 1 (B) 0 (C) 2 (D) 12

41. The value of $\sqrt{\frac{1+\cos\theta}{1-\cos\theta}}$ = ( )
(A) $\cot\theta - \operatorname{cosec}\theta$ (B) $\operatorname{cosec}\theta + \cot\theta$ (C) $\operatorname{cosec}^2\theta + \cot^2\theta$ (D) $\cot\theta + \operatorname{cosec}^2\theta$

42. $\frac{\sin\theta}{1+\cos\theta}$ = ( )
(A) $\frac{1+\cos\theta}{\sin\theta}$ (B) $\frac{1-\cos\theta}{\sin\theta}$ (C) $\frac{1+\cot\theta}{\sin\theta}$ (D) $\frac{1-\sin\theta}{\cos\theta}$

43. If $x = a\cos\alpha$ and $y = b\sin\alpha$, then $b^2x^2 + a^2y^2$ is equal to ( )
(A) a^2b^2 (B) ab (C) a^4b^4 (D) $a^2 + b^2$

44. $\sqrt{(1+\sin\theta)(1-\sin\theta)}$ ( )
(A) $\sin\theta$ (B) $\sin^2\theta$ (C) $\cos^2\theta$ (D) $\cos\theta$

45. $\left[\frac{\sin^2 22 + \sin^2 68}{\cos^2 22 + \cos^2 68} + \sin^2 63 + \cos 63 \sin 27\right]$ = ( )
(A) 2 (B) 1 (C) 0 (D) None Of These

46. If $\cos 9\alpha = \sin\alpha$ and $9\alpha < 90°$, then the value of $\tan 5\alpha$ is ( )
(A) 0 (B) 1 (C) 3 (D) Cannot Be Determined

47. If cot A=12/5, then the value of (sin A + cos A) × cosec A is ( )
(A) 13/5 (B) 17/5 (C) 14/5 (D) 1

48. cos 1°, cos 2°, cos 3°, ... cos 180° is equal to ( )
(A) 1 (B) 0 (C) 1/2 (D) –1

49. $5\ \text{cosec}^2\theta - 5\ \cot^2\theta$ is equal to ( )
(A) 5 (B) 1 (C) 0 (D) –5

50. If sin θ = cos θ, then value of θ is ( )
(A) 0° (B) 45° (C) 30° (D) 90°

51. $9\ \sec^2\theta - 9\ \tan^2\theta$ is equal to ( )
(A) 1 (B) –1 (C) 9 (D) –9

52. If $\sin\theta + \sin^2\theta = 1$, the value of $(\cos^2\theta + \cos^4\theta)$ is ( )
(A) 3 (B) 2 (C) 1 (D) 0

53. If cosecθ=3/2,then $2\ (\text{cosec}^2\theta + \cot^2\theta)$ is ( )
(A) 3 (B) 7 (C) 9 (D) 5

54. If $x = 3\ \sec^2\theta - 1$, $y = \tan^2\theta - 2$, then $x - 3y$ is equal to ( )
(A) 3 (B) 4 (C) 8 (D) 5

55. (sec A + tan A)(1 – sin A) is equal to ( )
(A) secA (B) tan A (C) sin A (D) cos A

56. If sec θ – tan θ = 1/3, the value of (sec θ + tan θ) is ( )
(A) 1 (B) 2 (C) 3 (D) 4

57. The value of $\frac{\cot 45}{sin30+cos60}$ = ( )
(A) 1 (B) $1/\sqrt{2}$ (C) 2/3 (D) ½

58. If $\cos 3\theta = \frac{\sqrt{3}}{2}$, $0 < \theta < 90$ then the value of θ is ( )
(A) 15° (B) 10° (C) 0° (D) 12°

59. ΔABC is a right angled at A, the value of tan B × tan C is ( )
(A) 0 (B) 1 (C) –1 (D) None Of These

60. If sin,θ=1/3 then the value of $2\ \cot^2\theta + 2$ is equal to ( )
(A) 6 (B) 9 (C) 4 (D) 18

61. The value of tan 1°.tan 2°.tan 3° ..... tan 89° is ( )
(A) 0 (B) 1 (C) 2 (D) 1/2

62. If sin(A−B)=1/2 and cos(A+B)=1/2 then the value of B is ( )
(A) 45° (B) 60° (C) 15° (D) 0°

63. Value of (1 + tan θ + sec θ)(1 + cot θ - cosec θ) is ( )
(A) 1 (B) –1 (C) 2 (D) –4

64. The value of $[\sin^2 20° + \sin^2 70° - \tan^2 45°]$ is ( )
(A) 0 (B) 1 (C) 2 (D) –1

65. Given that sin,A=1/2 and cos,B=$1/\sqrt{2}$ then the value of (A + B) is ( )
(A) 30° (B) 45° (C) 75° (D) 15°

66. The value of $\frac{cosA}{cotA} + sinA$ ( )
(A) cotA (B) 2 sin A (C) 2 cos A (D) sec A

67. If tan 2A = cot (A – 18°), then the value of A is ( )
(A) 18° (B) 36° (C) 24° (D) 27°

68. Expression of sin *A* in terms of cot *A* is ( )

(A) $\frac{\sqrt{1+cot^2A}}{cotA}$ (B) $\frac{1}{\sqrt{1+cot^2A}}$ (C) $\frac{\sqrt{1-cot^2A}}{cotA}$ (D) $\frac{1}{\sqrt{1-cot^2A}}$

69. If *A* is an acute *angle* in a right Δ*ABC*, right angled at *B*, then the value of sin *A* + cos *A* is ( )

(A) equal to one (B) greater than one (C) less than one (D) equal to two

70. If cos (α + β) = 0, *then* sin (α – β) can be reduced to ( )

(A) cos β (B) cos 2β (C) sin α (D) sin 2α

71. If $\text{cosec}\theta - \cot\theta = 1/3$ the value of (cosec θ + cot θ) is ( )

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

72. If sin θ = cos θ, then the value of cosec θ is ( )

(A) 2 (B) 1 (C) $2/\sqrt{3}$ (D) $\sqrt{2}$

73. If sin 3θ = cos (θ – 26°), where 3θ and (θ – 26°) are acute angles, then value of θ is

(A) 30° (B) 29° (C) 27° (D) 26° ( )

74. If $\sin\alpha = 1/2$ and α is acute, then $(3\cos\alpha - 4\cos^3\alpha)$ = ( )

(A) 0 (B) 1/2 (C) 1/6 (D) –1

75. If $2\sin 2\theta = \sqrt{3}$ then the value of θ is ( )

(A) 90° (B) 30° (C) 45° (D) 60°

76. $[\cos^4 A - \sin^4 A]$ is equal to ( )

(A) $2\cos^2 A + 1$ (B) $2\cos^2 A - 1$ (C) $2\sin^2 A - 1$ (D) $2\sin^2 A + 1$

77. The value of the expression $[(\sec^2\theta - 1)(1 - \text{cosec}^2\theta)]$ is ( )

(A) –1 (B) 1 (C) 0 (D) ½

78. If $\tan(A-B) = 1/\sqrt{3}$ and $\sin A = 1/\sqrt{2}$ then the value of *B* is ( )

(A) 45° (B) 60° (C) 0° (D) 15°

79. In Δ*ABC* right angled at *B*, tan *A* = 1, the value of 2 sin *A* cos *A* is ( )

(A) –1 (B) 2 (C) 3 (D) 1

80. If $\sqrt{2}\sin(60 - \alpha) = 1$ then the value of α is ( )

(A) 45° (B) 15° (C) 60° (D) 30°

81. sin (60° + θ) – cos (30° – θ) is equal to ( )

(A) 2 cos θ (B) 2 sin θ (C) 0 (D) 1

4.Home Assignment

1. State whether the following are true or false. Justify your answer.

(i) sin (*A* + *B*) = sin *A* + sin *B*.

(ii) The value of sin θ increases as θ increases.

(iii) The value of cos θ increases as θ increases.

(iv) sin θ = cos θ for all values of θ.

(v) cot$A$ is not defined for $A = 0^o$.

2. If A = 30° and B = 60°, verify that :

   (i) sin (A + B) = sin A.cosB + cos A.sinB

   (ii) cos (A + B) = cos A.cosB – sin A.sinB.

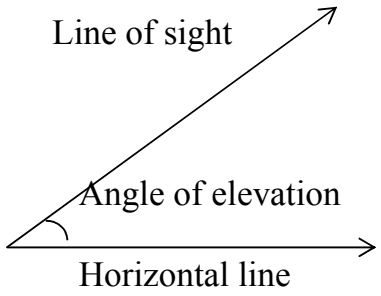
3. If sin 5A = cos 4A, where 5A and 4A are acute angles, find the value of A.?
4. Express sin 67° + cos 75° in terms of trigonometric ratios of angles between 0° and 45°.?
5. If tan A = cot B, prove that A + B = 90°.?
6. Given that sin (A + B) = sin A cos B + cos A sin B, find the value of sin 75°?
7. If cosA=7/25 find the value of tan A + cot A.?
8. Prove that $\sin^6 A + \cos^6 A + 3\sin^2 A \cos^2 A = 1$.?
9. If x= aSecθ + b tanθ, y = atanθ + bsecθ then prove that $x^2 - y^2 = a^2 - b^2$?
10. Prove that $\frac{cosA}{1+sinA} + \frac{1+sinA}{cosA} = 2$ secA?
11. If sin θ + cos θ = 1, prove that (cos θ – sin θ) = ± 1?
12. If cosec θ + cot θ = p, show that cos θ = $\frac{P^2-1}{P^2+1}$?
13. Prove that : $\cos^4\theta - \cos^2\theta = \sin^4\theta - \sin^2\theta$.?
14. If sec θ – tan θ = 4, then prove that cos θ =8/17?
15. Prove that $\sin^6\theta + \cos^6\theta = 3\sin^2\theta \cos^2\theta$.?

12.SOME APPLICATIONS OF TRIGONOMETRY

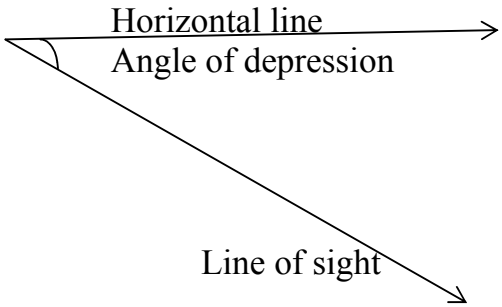
1.Concepts

- **Line of sight :**When an observer looks from a point O at an object P, then the line OP is called the *line of sight.*

- The angle of elevation of an object viewed, is the angle formed by the line of sight with the horizontal when it is above the horizontal level. i.e. the case when we raise our head to look the object.



- The angle of depression of an object viewed, is the angle formed by the line of sight with the horizontal when it is below the horizontal level. i.e., the case when we lower our head to look at the object.



2.Oral Questions

1. What is an angle of elevation?
2. What is an angle of depression?
3. Draw an angle of elevation?
4. Draw an angle of depression?
5. The length of the shadow of a man is equal to the height of man. What is the angle of elevation ?

3.Multiple Choice Questions

1. The length of the shadow of a man is equal to the height of man. The angle of elevation is ( )
   (A) 90° (B) 60° (C) 45° (D) 30°
2. The length of the shadow of a pole 30*m* high at some instant is 10 $\sqrt{3}$ m. The angle of elevation of the sun is ( )
   (A) 30° (B) 60° (C) 45° (D) 90°

3. Find the angle of depression of a boat from the bridge at a horizontal distance of 25m from the bridge, if the height of the bridge is 25m. ( )
   (A) 45° (B) 60° (C) 30° (D) 15°
4. The tops of two poles of height 10m and 18m are connected with wire. If wire makes an angle of 30° with horizontal, then length of wire is ( )
   (A) 10m (B) 18m (C) 12m (D) 16m
5. From a point 20m away from the foot of the tower, the angle of elevation of the top of the tower is 30°. The height of the tower is ( )
   (A) $20\sqrt{3}$ (B) $40\sqrt{3}$ (C) $\frac{20}{\sqrt{3}}$ (D) $\frac{40}{\sqrt{3}}$
6. The ratio of the length of a tree and its shadow is $1:\frac{1}{\sqrt{3}}$The angle of elevation of the sun is ( )
   (A) 30° (B) 45° (C) 60° (D) 90°
7. A kite is flying at a height of 50 $\sqrt{3}$ *m* above the level ground, attached to string inclined at 60° to the horizontal, the length of string is ( )
   (A) 100 m (B) 50 m (C) 150 m (D) 75 m
8. A tree is broken at a height of 10 m above the ground. The broken part touches the ground and makes an angle of 30° with the horizontal. The height of the tree is( )
   (A) 30 m (B) 20 m (C) 10 m (D) 15 m
9. In the shadow of a tree is times the height of the tree, then find the angle of elevation of the sun. ( )
   (A) 30° (B) 45° (C) 60° (D) 90°
10. The angle of elevations of a building from two points on he ground 9m and 16m away from the foot of the building are complementary, the height of the building is( )
    (A) 18 m (B) 16 m (C) 10 m (D) 12 m
11. A pole 10 m high casts a shadow 10 m long on the ground, then the sun's elevation is
    (A) 60° (B) 45° (C) 30° (D) 90° ( )
12. The angle of elevation of the top of a building 50 m high, from a point on the ground is 45°. The distance of the point from the foot of the building is ( )
    (A) 100 m (B) 50 m (C) 45 m (D) 60 m
13. A tree 6 m tall casts a 4 m long shadow. At the same time a pole casts a shadow 10 m long. The height of the pole is ( )
    (A) 40 m (B) 20 m (C) 15 m (D) 10 m
14. The angle formed by the line of sight with the horizontal, when the point being viewed is above the horizontal level is called ( )
    (A) Vertical Angle (B) Angle Of Depression (C) Angle Of Elevation (D) Obtuse Angle
15. If sun's elevation is 60°, then a pole of height 6 m will cast a shadow of length
    (A) 6 $\sqrt{3}$m (B)$\sqrt{3}$ m (C) 2 $\sqrt{3}$m (D) 3 $\sqrt{2}$ m

4.Home Assignment

1. A tower stands vertically on the ground. From a point on the ground which is 60 m away from foot of the tower, the angle of elevation of the top of the tower is found to be 60°. Find the height of the tower.?
2. A ladder 15 m long just reaches the top of a vertical wall. If the ladder makes an angle of 60° with the wall, find the height of the wall.?
3. A tower stands vertically on the ground. From a point on the ground which is 15 m away from the foot of the tower, the angle of elevation of the top of the tower is found to be 60°. Find the height of the tower.?
4. A tree breaks due to storm and the broken part bends so that the top of the tree touches the ground making an angle 30° with it. The distance between the foot of the tree to the point where the top touches the ground is 8 m. Find the height of the tree. ?
5. A kite is flying at a height of 90 m above the ground. The string attached to the kite is temporarily tied to a point on the ground. The inclination of the string with the ground is 60°. Find the length of the string assuming that there is no slack in the string. ?
6. A player sitting on the top of a tower of height20 m observes the angle of depression of a balllying on the ground as 60°. Find the distancebetween the foot of the tower and the ball.?
7. The shadow of a tower is 30 m long, when thesun's elevation is 30°. What is the length of theshadow, when sun's elevation is 60°?
8. The angle of elevation of the top of a tower from two points distant a and$b$ from the base and in the same straight line with it are complementary. Prove that the height of tower is $\sqrt{ab}$.?
9. An aeroplane, when 300 m high, passes vertically above another plane at an instant when the angle of elevation of two aeroplanes from the same point on the ground are 60° and 45° respectively. Find the vertical distance between the two planes.?
10. The angle of elevation of a bird from a point 12 metres above a lake is 30° and the angle of depression of its reflection in the lake is 60°. Find the distance of the bird from the point of observation.?

13.PROBABILITY

1.Concepts

- The science which measures the degree of uncertainty is called **probability.**
- There are two types of approaches to the study of probability. These are experimental or empirical approach and theoretical approach.
- In the experimental approach to probability, we find the probability of the occurrence of an event by actually performing the experiment a number of times and record the happening of an event.
- In the theoretical approach to probability, we predict the results without actually performing the experiment.
- The observations of an experiment are called its **outcomes**.
- An experiment in which all possible outcomes are known and the exact outcome cannot be predicted in advance, is called a **random experiment**.
- The word **unbiased** means each outcome is equally likely to occur. For example, an unbiased die indicates that each of the outcomes 1, 2, 3, 4, 5 or 6 has equal chances to occur. Throughout this chapter, we shall assume that all the experiments have equally likely outcomes.
- The theoretical probability of an event E, written as P(E) is defined as
  $P(E) = \frac{Number\ of\ outcomes\ favourable\ to\ E}{Total\ number\ of\ all\ possible\ out\ comes\ of\ the\ experminant}$
- An event having only one outcome of the experiment is called an elementary event.
- The sum of the probabilities of all the elementary events of an experiment is 1.
  In general for any event E
  P(E) = 1 – P(not E) = 1 – P($\bar{E}$)
  or P($\bar{E}$) = 1 – P(E)or P(E) + P($\bar{E}$) = 1
  Here the event $\bar{E}$, representing not E, is called the compliment of the event E.
- The probability of the event which is impossible to occur is 0. Such an event is called an **impossible event**.
- The probability of an event which is sure (or certain) to occur is 1. Such an event is called a **sure** or a **certain event**
- For an event E, we have 0 <P(E) < 1.
- A die is a well balanced cube with its six facesmarked with numbers or dots 1 to 6. When wethrow a die we are interested in the number thatoccurs on the top face.
- The pack or deck of playing cards consists of 52 cards, 26 of red colour and 26 of black colour. There are four suits each of 13 cards namely hearts (♥), spades (♠), diamonds (♦) and clubs (♣). Each suit contains ace, king, queen, jack or knave, 10, 9, 8, 7, 6, 5, 4, 3, 2. There are 4 aces, 4 kings, 4 queens, 4 jacks, 4 tens, and so on in a pack. Kings, queens, and jacks are called face cards.

2.Oral Questions

1. If E is an event then P(E) + P ($\bar{E}$) ?

2. Write the probability of a sure event. ?
3. What is the probability of an impossible event. ?
4. When a dice is thrown, then find the probability of getting an odd number less than 3.
5. Two coins are tossed simultaneously. Find the probability of getting exactly one head.?
6. A card is drawn from a well suffled deck of 52 cards. Find the probability of getting an ace.?
7. Find the probability of getting the letter M in the word "MATHEMATICS".?
8. A die is rolled once. What is the probability of getting a prime number?
9. Two coins are tossed simultaneously. What are all thepossible outcomes ?
10. If a letter of English alphabet is chosen at random, then findthe probability that the letter is a consonant ?

3.Multiple Choice Questions

1. If E is an event then P(E) + P (E) = ... ? ( )
   (A) 0 (B) 1 (C) 2 (D) –1
2. The probability of an event that is certain to happen is ( )
   (A) 0 (B) 2 (C) 1 (D) –1
3. If P(E) is0 .65 what is P (Not E)? ( )
   (A)0 .35 (B) 0.25 (C) 1 (D) 0
4. A bag contains 9 Red and 7 blue marbles. A marble is taken out randomly, what is the P (red marble)? ( )
   (A) $\frac{7}{16}$ (B) $\frac{9}{16}$ (C) $\frac{18}{16}$ (D) $\frac{14}{16}$
5. The probability of an impossible event is ( )
   (A) 0 (B) 1 (C) –1 (D) $\propto$
6. If a letter of English alphabet is chosen at random, then the probability that the letter is a consonant is ( )
   (A) $\frac{5}{26}$ (B) $\frac{21}{26}$ (C) $\frac{10}{13}$ (D) $\frac{11}{13}$
7. If two coins are tossed simultaneously, then the probability of getting at least one head is ( )
   (A) $\frac{3}{4}$ (B) $\frac{1}{2}$ (C) $\frac{1}{4}$ (D) 1
8. Two dice are thrown simultaneously. Probability of getting a prime number on both dice is ( )
   (A) $\frac{5}{18}$ (B) $\frac{2}{9}$ (C) $\frac{1}{3}$ (D) $\frac{1}{4}$
9. Two coins are tossed together. The probability of getting head on both is ( )
   (A) $\frac{3}{4}$ (B) $\frac{1}{2}$ (C) $\frac{1}{4}$ (D) 0
10. The probability that a leap year has 53 Sundays is ( )
    (A) $\frac{1}{7}$ (B) $\frac{2}{7}$ (C) $\frac{3}{7}$ (D) $\frac{4}{7}$

11. The probability of getting a number between 3 and 100 which is divisible by 7 is

(A) $\frac{1}{7}$ (B) $\frac{29}{98}$ (C)$\frac{25}{98}$ (D) $\frac{23}{98}$ ( )

12. In a throw of a pair of dice, what is the probability of getting a doublet ? ( )
(A) $\frac{1}{3}$ (B) $\frac{1}{6}$ (C)$\frac{5}{12}$ (D) $\frac{2}{3}$

13. A bag contains cards which are numbered from 2 to 90. A card is drawn at random from the bag. The probability that it bears a two digit number is ( )
(A) 88/92 (B) 88/90 (C) 81/89 (D) 89/90

14. Which of the following cannot be the probability of an event ? ( )
(A) 0 (B) 1/5 (C) 5/4 (D) 1

15. From a pack of 52 playing cards, a card is drawn at random. The probability, that the drawn card is not a face card is ( )
(A) 3/13 (B) 9/13 (C) 10/13 (D) ¾

16. The probability of getting a prime number in single throw of a dice is ( )
(A) Zero (B) 1/3 (C) ½ (D) ¼

17. The probability of drawing a green coloured ball from a bag containing 6 red and 5 black balls is ( )
(A) 0 (B) 1 (C)5/11 (D) 6/11

18. The sum of probability of all the events of an experiment is ( )
(A) 2/3 (B) 3 (C) 1 (D) 2

19. The probability of guessing the correct answer to certain question is *p*/12. If the probability of not guessing the correct answer to same question is ¾ , the value of *p* is ( )
(A) 3 (B) 4 (C) 2 (D) 1

20. Two coins are tossed simultaneously. All the possible outcomes are ( )
(A) H, T (B) HH, TT (C) HT, TT (D) HH, HT, TH, TT

4.Home Assignment

1. A die is thrown once. Find the probability of getting (a) a prime number (b) a number less than 6?
2. A game of chance consists of spinning an arrow which comes to rest pointing at one of the numbers 1, 2, 3, 4, 5, 6, 7, 8 and these are equally likely outcomes. What is the probability that it will point at (a) a prime number ? (b) a factor of 8 ?
3. In a leap year what is the probability of 53 Sundays.?
4. A coin is tossed thrice then find the probability of (i) 2 heads (ii) 2 tails (iii) 3 heads.?
5. A box contains 5 Red balls, 8 white balls and 4 Green balls. One ball is taken out of the box at random. What is the probability that ball is (i) red; (ii) white; (iii) Not green.

14.STATISTICS

1.Concepts

1. The mean for grouped data can be found by
   (i) The direct method $\bar{x} = \frac{\Sigma f_i x_i}{\Sigma f_i}$
   (ii)The assumed mean method$\bar{x}$ = a + $\frac{\Sigma f_i d_i}{\Sigma f_i}$, where $d_i = x_i - a$
   (iii)The step deviation method$\bar{x}$ = a + ($\frac{\Sigma f_i u_i}{\Sigma f_i}$) x h , where $u_i = \frac{x_i - a}{h}$
2. The mode for the grouped data can be found by using the formula
   Mode = l + ($\frac{f_1 - f_o}{2f_1 - f_o - f_2}$) x h, where
   l = lower limit of the modal class.
   f_1 = frequency of the modal class.
   f_0 = frequency of the proceeding class of the modal class.
   f_2 = frequency of the succeeding class of the modal class.
   h = size of the class interval.
   Modal class - class interval with highest frequency.
3. The median for the grouped data can be found by using the formula
   Median =l + ($\frac{\frac{n}{2} - cf}{f}$) x h , where
   l = lower limit of the median class.
   n = number of observations.
   Cf= cumulative frequency of class interval proceeding the median class.
   f = frequency of median class.
   h = class size.
4. Empirical Formula : Mode = 3 median - 2 mean
   3 Median = Mode + 2 Mean
5. Cumulative frequency curve or an Ogive :
   (i) Ogive is the graphical representation of the cumulative frequencydistribution.
   (ii) Less than type Ogive :
   • Construct a cumulative frequency table.
   • Mark the upper class limit on the x = axis.
   (iii) More than type Ogive :
   • Construct a frequency table.
   • Mark the lower class limit on the x-axis.
   (iv) To obtain the median of frequency distribution from the graph :
   - Locate point of intersection of less than type Ogive and more than type Ogive
   - Draw a perpendicular from this point on x-axis.

- The point at which it cuts the *x*-axis gives us the median.

2.Oral Questions

1. Mode is ……..
2. The correct formula for finding the mode of a grouped frequency distribution is……
3. The formula for median of a grouped data is……
4. Ogive is the graph of ……
5. The curve 'less than ogive' is always ……
6. The empirical relationship among the Median, Mode and Mean of a data is
7. The class mark of a class interval is ……..
8. The mean for grouped data can be found by the direct method ……
9. The mean for grouped data can be found by the assumed mean method……
10. The mean for grouped data can be found by the step deviation method …….
11. The mode for the grouped data can be found by using the formula……..
12. Mean is ……..
13. Median is ……..
14. Measure of central tendency is represented by the abscissa of the point where the 'less than ogive' and 'more than ogive' intersect, is ……
15. The mode of first n natural numbers……

3.Multiple Choice Questions

1. Mean of first 10 natural numbers is ( )
   (A) 5 (B) 6 (C) 5.5 (D) 6.5
2. If mean of 4, 6, 8, 10, *x*, 14, 16 is 10 then the value of '*x*' is ( )
   (A) 11 (B) 12 (C) 13 (D) 9
3. The mean of *x*, *x* + 1, *x* + 2, *x* + 3, *x* + 4, *x* + 5 and *x* + 6 is ( )
   (A) *x* (B) *x* + 3 (C) *x* + 4 (D) 3
4. The median of 2, 3, 2, 5, 6, 9, 10, 12, 16, 18 and 20 is ( )
   (A) 9 (B) 20 (C) 10 (D) 9.5
5. The median of 2, 3, 6, 0, 1, 4, 8, 2, 5 is ( )
   (A) 1 (B) 3 (C) 4 (D) 2
6. Mode of 1, 0, 2, 2, 3, 1, 4, 5, 1, 0 is ( )
   (A) 5 (B) 0 (C) 1 (D) 2
7. If the mode of 2, 3, 5, 4, 2, 6, 3, 5, 5, 2 and *x* is 2 then the value of '*x*' is ( )
   (A) 2 (B) 3 (C) 4 (D) 5
8. The modal class of the following distribution is ( )

Class Interval	10–15	15–20	20–25	25–30	30–35
Frequency	4	7	12	8	2

   (A) 30–35 (B) 20–25 (C) 25–30 (D) 15–20

9. A teacher ask the students to find the average marks obtained by theclass students in Maths the student will find ( )
(A) Mean (B) Median (C) Mode (D) Sum

10. The empirical relationship between the three measures of central tendency is( )
(A) 3 Mean = Mode + 2 Median (B) 3 Median = Mode + 2 Mean
(C) 3 Mode = Mean + 2 Median (D) Median = 3 Mode – 2 Mean

11. Class mark of the class 19.5 – 29.5 is ( )
(A) 10 (B) 49 (C) 24.5 (D) 25

12. Measure of central tendency is represented by the abscissa of the point where the 'less than ogive' and 'more than ogive' intersect, is ( )
(A) Mean (B) Median (C) Mode (D) None Of These

13. The median class of the following distribution is ( )
Class Interval : 0–1010–20 20–30 30–40 40–50 50–60 60–70
Frequency : 4 4 8 10 12 8 4
(A) 20–30 (B) 40–50 (C) 30–40 (D) 50–60

14. The mean of 20 numbers is 17, if 3 is added to each number, then the new mean is
(A) 20 (B) 21 (C) 22 (D) 24 ( )

15. The mean of 5 numbers is 18. If one number is excluded then their mean is 16, then the excluded number is ( )
(A) 23 (B) 24 (C) 25 (D) 26

16. The mean of first 5 prime numbers is ( )
(A) 5.5 (B) 5.6 (C) 5.7 (D) 5

17. The sum of deviations of the values 3, 4, 6, 8, 14 from their mean is ( )
(A) 0 (B) 1 (C) 2 (D) 3

18. If median = 15 and mean = 16, then mode is ( )
(A) 10 (B) 11 (C) 12 (D) 13

19. The mean of 11 observations is 50. If the mean of first six observations is 49 and that of last six observations is 52, then the sixth observation is ( )
(A) 56 (B) 55 (C) 54 (D) 53

20. Which of the following is not a measure of central tendency ? ( )
(A) Mean (B) Median (C) Range (D) Mode

4.Home Assignment

21. Find the mean, median and mode of the following

Class Interval	0–10	10–20	20–30	30–40	40–50	50–60	60–70
Frequency	6	8	10	15	5	4	2

22. Draw 'less than' and 'more than' ogives for the following distribution

Marks	0–10	10–20	20–30	30–40	40–50	50–60	60–70	70–80	80–90	90–100
No. of Students	5	6	8	10	15	9	8	7	7	5

Also find median from graph.?

23. The mean of 40 observations was 160. It was detected on rechecking that the value of 165 was wrongly copied as 125 for computing the mean. Find the correct mean.?

24. Find 'x' if the median of the observations in ascending order 24, 25, 26, $x + 2$, $x + 3$, 30, 31, 34 is 27.5.?

25. Will the median class and modal class of a grouped data always be different ? Justify your answer.?

15.PROJECTS

➢ PROJECT WORK: Creative mathematics project ideas

General guidelines:

- Each student is required to make a handwritten project report according to the project allotted. Please note down your project number according to your roll number.

Roll number	Project number
1-5	1
6-10	2
11-15	3
16-20	4
21-25	1
26-30	2
31-35	3
36-40	4

- A project has a specific starting date and an end date.
- It has specific objectives.
- List the sources of the information collected.
- General lay- out of the project report has following format.

Page number	Content
Cover page	Your Name, Class, Roll No, Title Of The Project
1	Table Of Contents- Page Titles
2	Brief description of project ,How would you proceed?
3-10	Procedure (with picture)
11	Mathematics used / involved
12	Conclusion / Result
13	List of resources (List of encyclopedia, websites, reference books, journals, etc)
14	Acknowledgement

- The weightage of 8 marks for project work could be further split up as under
  - ❖ Identification and statement of the project : 01 mark
  - ❖ Procedure/processes adopted : 02 marks
  - ❖ Write-up of the project : 02 marks
  - ❖ Interpretation of the result : 01 mark
  - ❖ Viva : 02 marks

PROJECTS:

Project No	Objectives	Description
1	Exploring Mathematics around us	1.Look around yourself • In the house….. • In the garden…. • In the market….. • In the bank…….. • In the nature… 2.Click photographs using a digital camera/ mobile and explore the hidden mathematics 3.Click minimum 20 photographs
2	Geometry in Daily Life	In this project we try to find situations in daily life where geometrical notions can be effectively used. In particular, in the following examples the student discovers situations in which properties of similar triangles learnt in the classroom are useful.
3	$History\ of\ \ \pi$(Pie)	1. What is the number pi? 2. Some uses of pi 3. Early history of pi 4. A discovery of Archimedes 5. Computation of pi 6. Further uses of pi 7. Recap
4	Pythagoras Theorem and its Extension	1.Three questions from real life 2. Discovering the Theorem of Pythagoras 3. Geometric interpretation 4. Pythagoras 5. Applying the Theorem of Pythagoras 6. Pythagorean triples 7. The Chinese proof 8. Euclid's elements
5	Similarity	1. Shape and size 2. Similar triangles 3. Applications of similarity 4. Similar polygons and solids 5. Internal ratios of similar figures

<table>
<tr><td></td><td></td><td>6. Perimeters of similar figures
7. Areas of similar figures
8. Volumes of similar figures</td></tr>
<tr><td>6</td><td>History of Indian Mathematicians</td><td>This project is meant to develop the student's awareness of the history of mathematics.
The student should give an outline of the Indian mathematics</td></tr>
<tr><td>7</td><td>Early History of Mathematics</td><td>This project is meant to develop the student's awareness of the history of mathematics.
The student should give an outline of the major milestones in mathematics from Euclid to say Euler.
1. Introduction
2. From Euclid to the Seventeenth Century
3. From Scratch Marks to Number Systems
4. From Numerology to Number Theory
5. The Pythagorean Theorem
6. A Shocking Discovery
7. Pi Through the Ages
8. From Astronomy to Trigonometry
9. From Archimedes to Fermat and Descartes
10. The Race for the Calculus</td></tr>
<tr><td>8</td><td>Analysis of test results and interpretation</td><td>After the half yearly or annual examination, the marks of the students may be tabulated as
follows:
<table><tr><td>Range of marks</td><td>Tally marks</td><td>Frequency</td></tr><tr><td>1-5</td><td></td><td></td></tr></table>
(Take the size of class interval = 5 preferably)
Now, present the data in the form of a histogram and a pie chart. This tabulation can be done for marks in individual subjects as well as for aggregate marks.
Interpret the data in different ways (e.g. how many children need special guidance in say mathematics, etc.)</td></tr>
<tr><td>9</td><td>Experiment on probability</td><td>1. The teacher may ask the students to either work individually or at most in groups of two.
2. They will collect the following data by visiting any (say)10 classrooms in the school.
3. They will obtain the fraction of number of children having their birthday in the month of January, February, … December from the data given in the table.
4. They will make a pie-diagram from the recorded data.
5. They will investigate if the fraction actually obtained in step 3 tallies with the calculated probability obtained for each month. e.g.: If total number of children whose birthday falls in the month of January is 38 and the total number of students is 500,
the actual fraction of children born in January = 38/500
Probability for a child to have birthday in January = 31/365
6. The students may increase their sample size, i.e. increase the number of observations and study if the actual fraction approaches the calculated probability.
They should use a random sample for this purpose.</td></tr>
</table>

<table>
<tr>
<td>10</td>
<td>Frequency of letters/ words in a language text.</td>
<td>
1. The teacher may ask the students to work individually or in groups of two.
2. Students will select any paragraph containing approximately 250 words from any source. e.g. newspaper, magazine, textbook, etc.
3. They will read every word and obtain a frequency table for each letter of the alphabet as follows
<table>
<tr><td>letters</td><td>Tally marks</td><td>Frequency</td></tr>
<tr><td></td><td></td><td></td></tr>
</table>
4.They will note down the number of two-letter words, three-letter words, …. so on and obtain a frequency table as follows
<table>
<tr><td>Words with letters</td><td>Tally marks</td><td>Frequency</td></tr>
<tr><td>2 letters
3letters..
……</td><td></td><td></td></tr>
</table>
5.Select 10 different words from the text which have frequency greater than 1. Give ranks 1, 2, 3, …., 10 in decreasing order of their frequency. Obtain a table as
Follows
<table>
<tr><td>Selected word</td><td>Frequency</td><td>rank</td></tr>
<tr><td></td><td></td><td></td></tr>
</table>
6. Investigate the following
From table 1
a) What is the most frequently occurring letter?
b) What is the least frequently occurring letter?
c) Compare the frequency of vowels
d) Which vowel is most commonly used?
e) Which vowel has the least frequency?
f) Make a pie chart of the vowels a, e, i, o, u, and remaining letters. (The pie chart will thus have 6 sectors.)
g) Compare the percentage of vowels with that of consonants in the given text.
From table 2
a) Compare the frequency of two letter words, three letter words, …..and so on.
b) Make a pie chart. Note any interesting patterns.
From table 3
a) The relation between the frequency of a word to its rank.
b) Plot a graph between the frequency and reciprocal of word rank. What do you observe? Do you see any interesting pattern?
c) Repeat the experiment by choosing text from any other language that you know and see if any common pattern emerges.
</td>
</tr>
</table>

16.ACTIVITIES

1. To obtain the conditions for consistency of a system of linear equations in twovariables by graphical method.

2. To verify that the given sequence is an arithmetic progression by paper cutting and pasting method.

3. To verify that the sum of first n natural numbers is $n(n + 1) / 2$, that is $\Sigma n = n (n + 1) / 2$, by graphical method.

4. To verify the Basic Proportionality Theorem using parallel line board and triangle cut-outs.

5. To verify the Pythagoras Theorem by the method of paper folding, cutting and pasting

6. To verify that the angle subtended by an arc at the centre of a circle is twice the angle subtended by the same arc at any other point on the remaining part of the circle, using the method of paper cutting, pasting and folding.

7. To verify that the angles in the same segment of a circle are equal, using the method of paper cutting, pasting and folding.

8. To verify, using the method of paper cutting, pasting and folding that

a. the angle in a semicircle is a right angle,

b. the angle in a major segment is acute,

c. the angle in a minor segment is obtuse.

9. To verify, using the method of paper cutting, pasting and folding that

a. the sum of either pair of opposite angles of a cyclic quadrilateral is 180^0.

b. in a cyclic quadrilateral the exterior angle is equal to the interior oppositeangle.

10. To verify using the method of paper cutting, pasting and folding that the lengths of tangents drawn from an external point are equal.

11. To verify the Alternate Segment Theorem by paper cutting, pasting and folding.

12. To make a right circular cylinder of given height and circumference of base

13. To determine the area of a given cylinder. To obtain the formula for the lateral surface area of a right circular cylinder in terms of the radius (r) of its base and height (h).

14. To give a suggestive demonstration of the formula for the volume of a right circular cylinder in terms of its height (h) and radius (r) of the base circle.

15. To make a cone of given slant length (l) and base circumference ($2\pi r$) .

16. To give a suggestive demonstration of the formula for the lateral surface area of a cone.

17. To give a suggestive demonstration of the formula for the volume of a right circular cone.

18. To give a suggestive demonstration of the formula for the surface area of a sphere in terms of its radius.

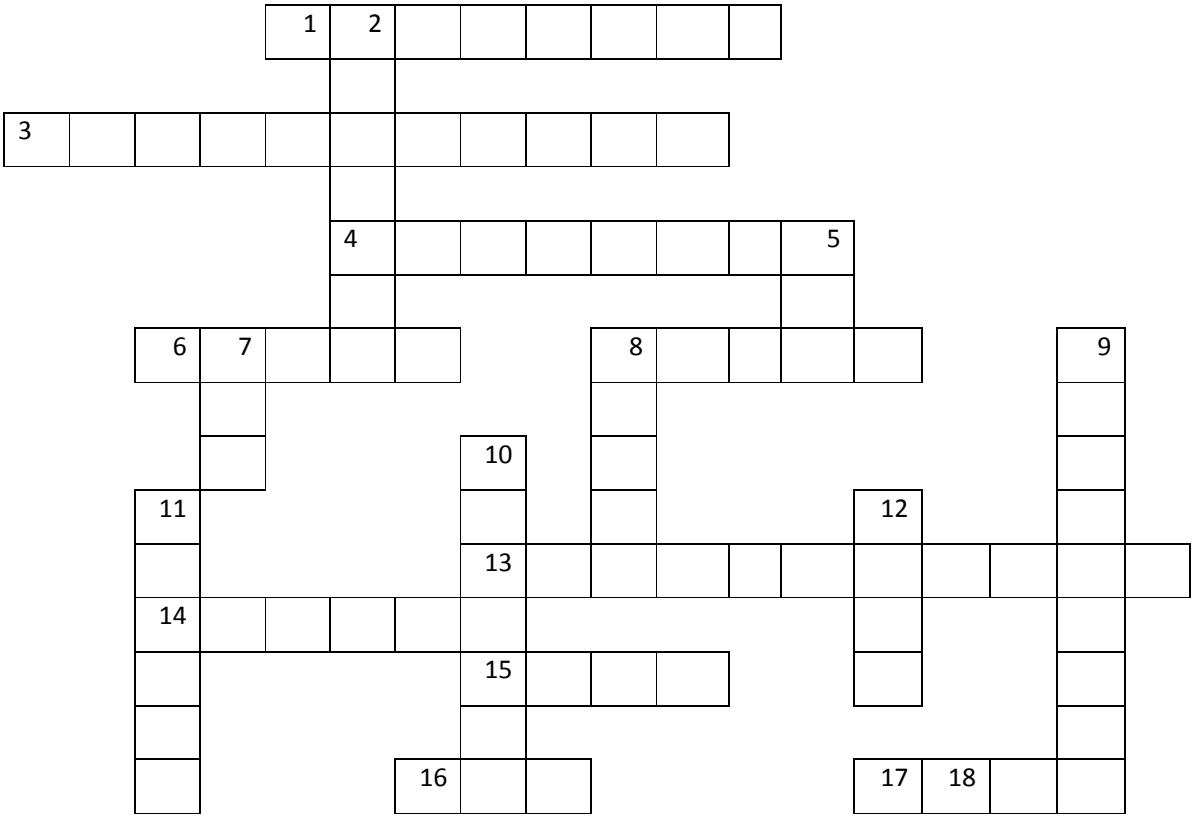
19. To give a suggestive demonstration of the formula for the volume of a sphere in terms of its radius.

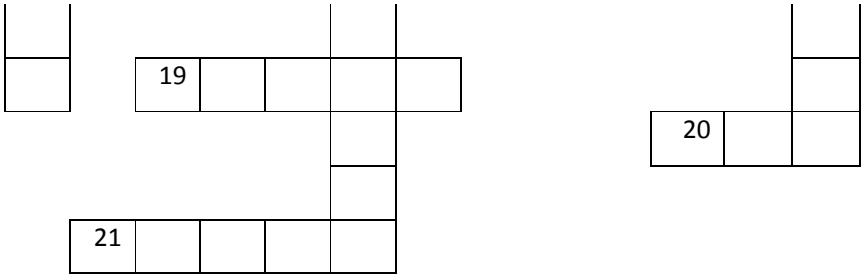
20. To get familiar with the idea of probability of an event through a double colour card experiment.

21. To make a clinometer and use it to measure the height of an object.

17.PUZZLES

Puzzle No.1 (Real numbers & Sets)





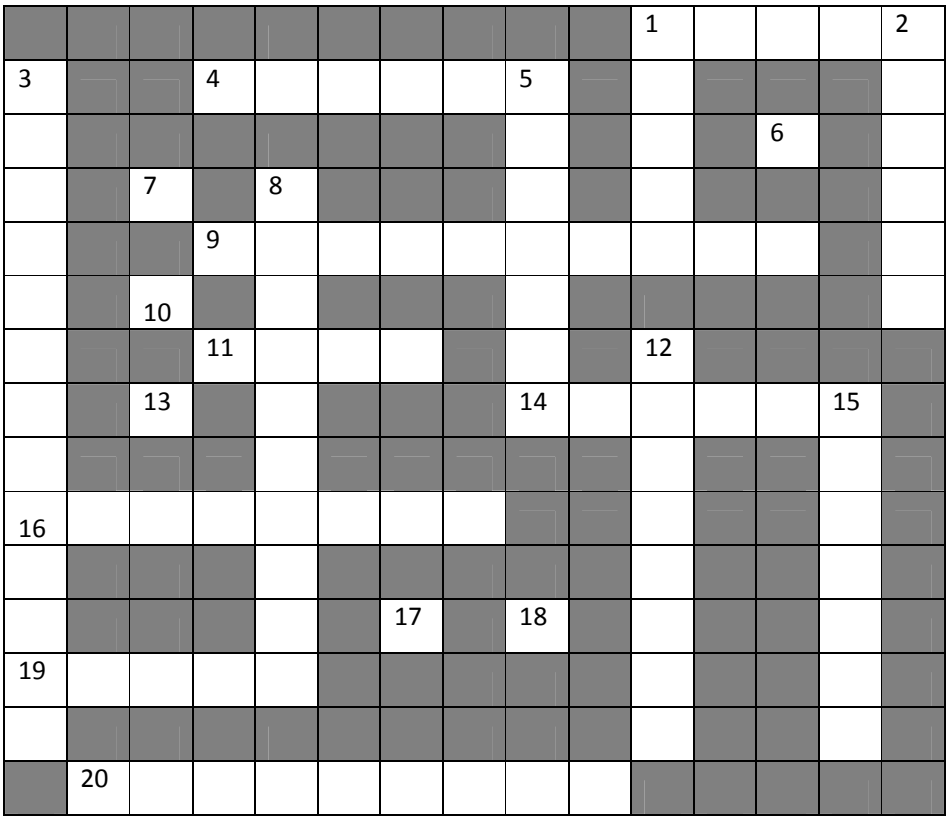
Cross:

1.zero, positive and negative numbers together are called….(8)
3.Non terminating and non recurring numbers(11)
4.The numbers in the form of $\frac{p}{q}$ (q≠ 0) (9)
6. Natural numbers with 0 (5)
8.2,3,5,7, are …….. numbers (5)
13.$\frac{3}{5}$ is ……..decimal (11)
14.The set of vowels is …….set (6)
15.Rational and irrational are together are (4)
16.A …… is well defined collection of objects (3)
17.0,2,4,6,8,……are …… numbers (4)
19.Øis …….. set (5)
20.1,3,5,7,……. are …… numbers(3)
21.AUB Is read as A…… B (5)

Down:

2.1,2,3,4,…….. are ……..numbers (7)
5.Least common multiple (3)
7.Highest common factor (3)
8. In $2x^5$, 5 is ……..of x (5)
9.Indian mathematician (9)
10.One of the operation in sets (12)
11.The set of integers is …….set (8)
12. In $2x^5$, x is ……. (4)
18.empty set (4)

Puzzle No.2 (Geometry & Mensuration)



Cross:	Down:
1.A chord can divide the circle into two segments. One of them is major, other one is…..(5) 4. A …….to a circle intersects it in two points.(6) 6.It is a irrational number. (1) 7.Rational numbers are denoted by…(1) 9.(Hypotenuse)^2 = (side)^2 + (side)^2 is ..theorem.(10) 10.Natural numbers are denoted by…(1) 11.Joker cap is an example for ……(4) 13.Integer are denoted by……(1) 14.Basic proportionality theorem is …..theorem.(6) 16.Total surface area of …….is $2\pi rh$ (8) 20. Famous Indian mathematician (9)	1.A chord can divide the circle into two segments. One of them is major, other one is…..(5) 2.Diameter of a circle is twice of its ……(6) 3.Tangent to a circle is ……..to its radius.((13) 5.A …….to a circle intersects it in one point.(7) 8.Longest side in the right triangle.(10) 12.The tangents to a circle at the end points of a diameter are ……(8) 15.Any two congruent figures are …….(7) 17.Universal set (1) 18. Empty set (1)

Puzzle No.3

A trader was moving along a road selling eggs. An idler who didn't have much work to do, started to get the trader into a wordy duel. This grew into a fight , he pulled the basket with eggs and dashed it on the floor. The eggs broke .The trader requested the Panchayat to ask the idler to pay for the broken eggs. The Panchayat asked the trader how many eggs were broken. He gave the following response:

If he counted in pairs ,one will remain,

If he counted in three ,two will remain,

If he counted in four ,three will remain,

If he counted in five, four will remain,

If he counted in six ,five will remain,

If he counted in seven ,nothing will remain,

My basket cannot accommodate more than 150 eggs. So, how many eggs were there?

Puzzle No.4

Three cartons contain stationery items, one has pens, one has pencil while the third has pens and pencils. These cartons are labelled as ‘pens’ ‘pencils’ and pens and pencils, but none of the labels is on the correct carton. You are allowed to select only one item from one carton and then tell which label should go on which carton.

Puzzle No.5

A merchant has nine gold coins which look identical but in fact one of the coins is an underweight fake. Investigate how the merchant can use only a balance to find the fake coin in just two weighings.