**COURSE STRUCTURE**

**CLASS X**

* As per CCE guidelines, the syllabus of Mathematics for class X has been divided term wise.
* The units specified for each term shall be assessed through both formative and summative assessment.
* In each term, there shall be two formative assessments each carrying 10% weightage.
* The summative assessment in I term will carry 20% weightage and the summative assessment in the II term will carry 40% weightage.
* Listed laboratory activities and projects will necessarily be assessed through formative assessments.

**SUMMATIVE ASSESSMENT -1**

|  |  |
| --- | --- |
| FIRST TERM (SA I) | MARKS: 80 |
| UNITS | MARKS |
| I NUMBER SYSTEM  Real Numbers | 10 |
| II ALGEBRA  Polynomials, pair of linear equations in two variables. | 20 |
| III GEOMETRY  Triangles | 15 |
| V TRIGONOMETRY  Introduction to trigonometry, trigonometric identity. | 20 |
| VII STATISTICS | 15 |
| TOTAL | 80 |

**SUMMATIVE ASSESSMENT -2**

|  |  |
| --- | --- |
| SECOND TERM (SA II) | MARKS: 80 |
| UNITS | MARKS |
| II ALGEBRA(contd)  Quadratic equations, arithmetic progressions | 20 |
| III GEOMETRY(contd)  Circles, constructions | 16 |
| IV MENSURATION  Areas related to Circles, Surface Area & Volumes | 20 |
| V TRIGONOMETRY(Contd)  Heights and Distances. | 08 |
| VI COORDINATE GEOMETRY | 10 |
| VII PROBABILITY | 06 |
| TOTAL | 80 |

**DETAILS OF THE CONCEPTS TO BE MASTERED BY EVERY CHILD OF CLASS X WITH EXERCISE AND EXAMPLES OF NCERT TEXT BOOK**

**SA-I**

**SYMBOLS USED**

\*:-Important Questions, \*\*:- Very important Questions, \*\*\*:- Very very important Questions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| S.No | TOPIC | CONCEPTS | DEGREE OF IMPORTANCE | References(NCERT BOOK) |
| 01 | Real Number | Euclid’s division  Lemma & Algorithm | \*\*\* | Example -1,2,3,4  Ex:1.1 Q:1,2,4 |
| Fundamental Theorem of Arithmetic | \*\*\* | Example -5,7,8  Ex:1.2 Q:4,5 |
| Revisiting Irrational Numbers | \*\*\* | Example -9,10,11  Ex: 1.3 Q:1.2 Th:1.4 |
| Revisiting Rational Number and their decimal Expansion | \*\* | Ex -1.4  Q:1 |
| 02 | Polynomials | Meaning of the zero of Polynomial | \* | Ex -2.1  Q:1 |
| Relationship between zeroes and coefficients of a polynomial | \*\* | Example -2,3  Ex-2.2  Q:1 |
| Forming a quadratic polynomial | \*\* | Ex -2.2  Q:2 |
| Division algorithm for a polynomial | \* | Ex -2.3  Q:1,2 |
| Finding the zeroes of a polynomial | \*\*\* | Example: 9  Ex -2.3 Q:1,2,3,4,5  Ex-2.4,3,4,5 |
| 03 | Linear Equation in two variables | Graphical and algebraic representation | \* | Example:2,3  Ex -3.4 Q:1,3 |
| Consistency of pair of linear equations | \*\* | Ex -3.2  Q:2,4 |
| Graphical method of solution | \*\*\* | Example: 4,5  Ex -3.2 Q:7 |
| Algebraic methods of solution   1. Substitution method 2. Elimination method 3. Cross multiplication method 4. Equation reducible to pair of linear equation in two variables | \*\* | Ex -3.3 Q:1,3  Example-13 Ex:3.4 Q:1,2  Example-15,16 Ex:3.5  Q:1,2,4  Example-19 Ex-3.6  Q :1(ii),(viii),2 (ii),(iii) |
| 04 | TRIANGLES | 1. Similarity of Triangles | \*\*\* | Theo:6.1 Example:1,2,3  Ex:6.2 Q:2,4,6,9,10 |
| 1. Criteria for Similarity of Triangles | \*\* | Example:6,7  Ex:6.3 Q:4,5,6,10,13,16 |
| 1. Area of Similar Triangles | \*\*\* | Example:9 The:6.6  Ex:6.4 Q:3,5,6,7 |
| 1. Pythagoras Theorem | \*\*\* | Theo:6.8 & 6.9  Example:10,12,14,  Ex:6.5 Q:4,5,6,7,13,14,15,16 |
| 05 | Introduction to Trigonometry | 1. Trigonometric Ratios | \* | Ex:8.1 Q:1,2,3,6,8,10 |
| 1. Trigonometric ratios of some specific angles | \*\* | Example:10,11  Ex:8.2 Q:1,3 |
| 1. Trigonometric ratios of complementary angles | \*\* | Example:14,15  Ex:8.3 Q:2,3,4,6 |
| 1. Trigonometric Identities | \*\*\* | Ex:8.4 Q:5 (iii,v,viii) |
| 06 | STATISTICS | CONCEPT 1Mean of grouped data |  |  |
| 1. Direct Method | \*\*\* | Example:2  Ex:14.1 Q:1&3 |
| 1. Assumed Mean Method | \* | Ex:14.1 Q:6 |
| 1. Step Deviation Method | \* | Ex:14.1 Q:9 |
| CONCEPT 2 |  |  |
| Mode of grouped data | \*\*\* | Example:5  Ex:14.2 Q:1,5 |
| CONCEPT 3 |  |  |
| Median of grouped data | \*\*\* | Example:7,8  Ex:14.3 Q1,3,5 |
| CONCEPT 4 |  |  |
| Graphical representation of c.f.(ogive) | \*\* | Example:9  Ex:14.4 Q:1,2,3 |

**REAL NUMBER**

**IMPORTANT CONCEPTS**

**TAKE A LOOK**

1. **Euclid’s Division lemma or**

**Euclid’s Division Algorithm:-**

For any two given Positive integers a and b there exits unique whole number q and r such that.

a=bq +r, where 0r<b



Here, we call a as dividend, b as divisor q, as quotient and r as remainder.

Dividend=(divisor x quotient)+ Remainder.

1. **Algorithm:-** Algorithm is a series of well defined steps which gives procedure for solving a type of problem.
2. **Lemma:-** A lemma is a proven statement which is used to prove another statement.
3. **Euclid’s division Algorithm:-** It is a technique to compute (Calculate or find) the Highest common factor (HCF) of two given positive integers.
4. Fundamental theorem of Arithmetic:-

Every composite number can be expressed as a product of primes, and their factorization is unique, apart from the order in which the prime factor occur. For example 98280 can be factorized as follows:-

98280

2 49140

2 24570

2 12285

3 4095

3 1365

3 455

5 91

7 13

Therefore 98280=23 x33x5x7x13 as a product of power of primes.

1. **Rational Number and their Decimal Expansion:-**

1. If a=p/q, where p and q are co- prime and q=2n x5m(n and m whole numbers) then the rational number has terminating decimal expansion.
2. If a=p/q where p and q are co- prime and q cannot be written as 2nx5m (n and m whole number) then the decimal expansion of a has non-terminating repeating decimal expansion.

**LEVEL-I**

1. Euclid’s Division lemma states that for any two positive integers a and b, there exist- unique integers q and r such that a=bq+r, where r must satisfy. Ans-0≤r<b.

2. Express 10010 and 140 as prime factors. Ans-10010=2x5x7x11x13

140=2x2x5x7

3. If p/q is a rational number (q≠0), what is the condition of q so that the decimal representation of p/q is terminating? Ans-Q should be in the form of

2nx5m where n and m are +ve integer.

4. Write any one rational number between √2 and √3. Ans-1.5321

5. Find the [HCF x LCM] for 105 and 120. Ans-12600

6. If two numbers are 26 and 91 and their H.C.F is 13 then LCM is. Ans-182

7. The decimal expansion of the rational number 33/22.5 will terminate. Ans-Two decimal places

8. HCF of two consecutive integers x and x+1 is. Ans-1

**LEVEL-II**

Q1. Use Euclid division algorithm to find the HCF of:-

i) 196 and 38220 ii)867 and 225 Ans:-i)196 ii)51

Q2. Find the greatest common factor of 2730 and 9350. Ans-10

Q3. IF HCF (90,144)=18 find LCM (90,144) Ans-720

Q4.Is 7x5x3x2+3 is a composite number? Justify your answer. Ans-213

Q5. Write 98 as product of its prime factors. Ans-2x7x7

Q6. Find the largest number which divides 245 and 1245 leaving remainder 5 in each case. Ans-40

Q7. There is a circular path around a sports field. Geeta takes 20 minutes to drive one round of the field. While Ravi takes 14 minutes for the same. Suppose they both start at the same point and at the same time, and go in the same direction. After how many minutes will they meet again at staring point?

Ans-42 minutes

**Level-III**

1. Using Euclid’s division lemma, show that the cube of any positive integer is of the form 9q, 9q+1 or 9q+8 for some integer ‘q’.
2. Show that one and only one out of n,n+2,n+4 is divisible by 3.
3. Prove that 5+√3 is an irrational no.
4. Using Euclid’s algorithm find the HCF of the following 4052 and 12576

Ans-4

1. Show that the square of any odd integer is of the form 4q+1 for some integer q.
2. Prove that √5+√3 is irrational.

**Self evaluation questions**

1. Draw the factor tree for 678.
2. The sum of two numbers is 1660 and HCF is 20 find the numbers.
3. Prove that √7 is irrational number.
4. Prove that is irrational number.



1. Write in decimal form and comment on decimal expansion.



1. If be an irrational number prove that + is irrational.



1. Show that any positive odd integer will be of the form 4q+1 or 4q+3 where q is some integer.

**POLYNOMIALS**

**IMPORTANT CONCEPTS**

**TAKE A LOOK**

1. POLYNOMIALS: An expression of the form xn +xn-1 + xn-2 + …….+ x+ where ……….are real numbers and n is whole number, is called a Polynomial in the variable x.



1. Zeroes of a Polynomial,k is said to be zero of a Polynomial p(x) if p(k) =0
2. Graph of Polynomial:
3. Graph of a linear polynomial ax+b is straight line.
4. Graph of a quadratic polynomial p(x)= is a parabola open upwards like U if a>o.



1. Graph of a quadratic polynomial p(x)= is a parabola open downwards like ∩ if a<0.



Discriminant of a quadratic polynomial.

For p(x)= , is known as its discriminant ‘D’.



∴D=



1. If D>o graph of p(x) = will intersect the x-axis at two distinct points, x- coordinates of points of intersection with x-axis is known as ‘zeroes’ of p(x).



1. If D=o, graph of p(x) = will touch the x-axis at one point only .



∴p(x) will have only one ‘zero’

1. If D<o , graph of p(x) = will neither touch nor intersect the x-axis .



∴P(x) will not have any real zeroes.

1. Relationship between the zeroes and the coefficient of a polynomial :
2. If are zeroes of p(x)= , then sum of zeroes = = -b/a =



Product of zeroes = =c/a =



1. If and are zeroes of p(x)= +cx +d



Then , sum of zeroes = + =-b/a =



+ =c/a = , Product of zeroes= -d/a = =



1. If are zeroes of quadratic polynomial p(x) , then p(x) =X2 – ()x +



1. If and are zeroes of a cubic polynomial p(x), then



P(x) = x3- ( + )x2 +(x-()



1. Division Algorithm for polynomials.

If f(x) and g(x) are any two polynomials with g(x)≠0 then we can find polynomials q(x) and such that



f(x) = q()x g()+ where =0 or degree of < degree of g



If the remainder is o or degree of remainder is less than divisor , then we can not continue the division any further .

**LEVEL-I**

1. The zeroes of the polynomial 2x2-3x-2 are
2. 1,2
3. -1/2,1
4. ½,-2
5. -1/2,2 [Ans- (d)]
6. If are zeroes of the polynomial 2x2+7x-3, then the value of 2 + 2 is



1. 49/4
2. 37/4
3. 61/4
4. 61/2 [Ans-( c ) ]
5. If the polynomial 6x3+16x2+px -5 is exactly divisible by 3x+5 , then the value of p is
6. -7
7. -5
8. 5
9. 7 [Ans- (d )]
10. If 2 is a zero of both the polynomials 3x2+ax-14 and 2x3+bx2+x-2, then the value of 2-2b is
11. -1
12. 5
13. 9
14. -9

[Ans-( c ) ]

1. A quadratic polynomial whose product and sum of zeroes are 1/3 and √2 respectively is

(a) 3x2 – x +3√2 (b) 3x2 + x - 3√2 (c) 3x2 + 3√2x +1 (d) 3x2 – 3√2x +1 Ans: (d)

**LEVEL-II**

1. If 1 is a zero of the polynomial p(x) = ax2 -3(a-1)x -1, then find the value of a.

Ans: a=1

1. For what value of k, (-4) is zero of the polynomial x2 – x – (2k+2)?

Ans: k=9

1. Write a quadratic polynomial, the sum and product of whose zeroes are 3 and -2.

Ans: x2-3x-2

1. Find the zeroes of the quadratic polynomial 2x2-9-3x and verify the relationship between the zeroes and the coefficients.

Ans: 3, -3/2

1. Write the polynomial whose zeroes are 2 +√3 and 2 - √3.

Ans:p(x)=x2-4x+1

**LEVEL – III**

1. Find all the zeroes of the polynomial 2x3+x2-6x-3, if two of its zeroes are -√3 and √3.

Ans: x=-1/2

1. If the polynomial x4+2x3+8x2+12x+18 is divided by another polynomial x2+5, the remainder comes out to be px+q. Find the value of p and q.

Ans:p=2,q=3

1. If the polynomial 6x4+8x3+17x2+21x+7 is divided by another polynomial 3x2+4x+1, the remainder comes out to be (ax+b), find a and b.

Ans:a=1, b=2

1. If two zeroes of the polynomial f(x)= x3-4x2-3x+12 are √3 and -√3, then find its third zero.

Ans: 4

1. If α, β are zeroes of the polynomial x2-2x-15 then form a quadratic polynomial whose zeroes are (2α) and (2β).

Ans: x2-4x-60

**LEVEL – IV**

1. Find other zeroes of the polynomial p(x)=2x4 +7x3-19x2-14x +30 if two of its zeroes are √2 and -√2.

Ans: 3/2 and -5

1. Divide 30x4 +11x3-82x2-12x-48 by (3x2 +2x-4) and verify the result by division algorithm.
2. If the polynomial 6x4 +8x3-5x2+ax+b is exactly divisible by the polynomial 2x2-5, then find the value of a and b.

Ans: a=-20,b=-25

1. Obtain all other zeroes of 3x4 -15x3+13x2+25x-30, if two of its zeroes are and -.



Ans: , , 2, 3



1. If α, β are zeroes of the quadratic polynomial p(x)=kx2+4x+4 such that α2 +β2=24, find the value of k.

Ans: k= or k= -1



**SELF EVALUATION**

1. If α, β are zeroes of the quadratic polynomial ax2+bx+c then find (a) (b) α2 +β2



1. If α, β are zeroes of the quadratic polynomial ax2+bx+c then find the value of α2 - β2
2. If α, β are zeroes of the quadratic polynomial ax2+bx+c then find the value of α3 +β3
3. What must be added to 6x5+5x4+11x3-3x2+x+5 so that it may be exactly divisible by 3x2-2x+4?
4. If the square of difference of the zeroes of the quadratic polynomial f(x)=x2+px+45 is equal to 144, find the value of p.

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**PAIR OF LINEAR EQUATIONS IN TWO VARIABLES**

**IMPORTANT CONCEPTS**

**TAKE A LOOK:**

1. EQUATION: The statement of an equality is called an equation.
2. Linear equation in one variable: An equation of the form ax+b=0,where a,b are real numbers,(a≠0) is called a linear equation in one variable.
3. Linear equation in two variables: An equation of the form ax+by+c=0, where a,b,c are real

numbers(a≠0,b≠0)is called a linear equation in two variables x and y.

1. Consistent system of linear equations: A system of two linear equations in two unknowns is said to be consistent if it has at least one solution.
2. Inconsistent system of linear equations: if a system has no solution, then it is called inconsistent.

The system of a pair of linear equations

x+y+=0



x +y+=0



(i) has no solution.

If /=/≠/



(ii) has an infinite number of solutions

If /=/=/



(iii) has exactly one solution.

If /≠/



1. Algebraic methods:

(i)Method of substitution

(ii)Method of elimination by addition or subtraction

(iii)Method of cross multiplication

x+y+=0



x y+=0



X= -/-,y =-/-



b1 c1 a1 b1

x y 1

b2 c2 a2 b2

**LEVEL- 1**

1. The pair 2x=3y-5 and 2y= 5x-4 of linear equations represents two lines which are

(a) Parallel (b) coincident (c) intersecting (d) either parallel or coincident [Ans(c)]

2. The pair x=p and y=q of the linear equations in two variables x and y graphically represents two lines

which are

(a) Parallel (b) coincident (c) intersecting at(p,q) (d) intersecting at(q,p) [Ans(c)]

3. If the lines represented by the pair of linear equations 2x+5y=3 and (k+1)x +2(k+2)y=2k are coincident, then

the value of k is

(a) -3 (b) 3 (c) 1(d) -2 [Ans(b)]

4. If the pair of linear equations (3k+1)x+3y-2=0 and (k2+1 )x+(k-2)y-5=0 inconsistent, then

The value of k is

(a) 1 (b) -1 (c) 2 (d)-2 [Ans(b)]

5. If the pair of linear equations 2x+3y=11 and 2px+(p+q)y=p+5q has infinitely many solution

Then (a) p=2q (b)q=2p (c)p=-2q (d) q= -2p [Ans(b)]

**LEVEL- II**

1. Find the value of k for which the given system of equations has unique solution:

2x+3y-5=0, kx-6y-8=0 [Ans k≠ -4]

1. For what value of k will the following system of linear equations have infinite number of solution.

2x+3y-5=2; (k+2)x+(2k+1)y=2(k-1) [Ans k=4]

1. Find two numbers whose sum is 18 and difference is6. [Ans 12,6]
2. Solve for x and y.

X+6/y=6, 3x-8/y=5. [Ans x=3, y=2]

1. The sum of the numerator and the denominator of a fraction is 20 if we subtract 5 from the numerator

and 5 from denominator, then the ratio of the numerator and the denominator will be 1:4 .Find the fraction. [ Ans : 7/13]

**LEVEL- III**

1 Solve the following system of equations by using the method of elimination by equating the coefficients:

x/10+y/5+1=15, x/8+y/6=15. [Ans x=80, y=30]

2. If two digit number is four times the sum of its digits and twice the product of digits. Find the number.

[Ans 36]

3.Solve the following system of equations.

bx/a- ay/b +a +b=0 [Ans x= -3a, y= -b]

bx –ay +2ab=0

4. Solve graphically the system of linear equations.

4x-3y+4=0, 4x +3y=20 also find the area of the region bounded by the lines and x-axis.

[Ans x=2, y=4, Area=12 sq. unit]

5.The sum of two naturals number is 8 and sum of their reciprocals is 8/15. Find the numbers

[Ans 5 and 3]

**LEVEL- IV**

1. Solve for x and y:

2/2x+y – 1/x-2y +5/9 =0

9/2x+y – 6/x-2y +4 =0 [Ans x=2 , y=1/2]

1. Draw the graph the following equations:

2x+3y-12=0 and 7x-3y-15=0.Determine the coordinates of the vertices of the triangle formed by the lines and the y-axis. [Ans (0,4),(3,2),(0,-5)]

1. The sum of the digits of a two- digit number is 12 the number obtained by interchanging the two

digits exceed the given number by 18. Find the number. [Ans 57]

4.Abdul traveled 300km by train and 200km by taxi, it took him 5 hours 30 minutes. But if he travels 260 km by train and 240 km by bus he takes 6 minutes longer. Find the speed of the train and of the taxi.

[Ans 100 km/hr.,80 km/hr.]

5.Solve the following pairs of equation for x and y.

15/x-y +22/x+y=5, 40/x-y +55/x+y =13. [Ans x=8, y=3]

**SELF EVALUATION**

1. Find the value of ‘p’ if(-3,p) lies on 7x+2y=14.

2. Solve the following system of linear equations using the method of cross-multiplication:

ax +by =1

bx +ay = (a+b)2 / a2+b2 =1

1. Solve for x and y.

bx +ay = a+b.

ax[1/a-b -1/a+b]+ by [1/b-a -1/b+a]=2

**TRIANGLES**

**IMPORTANT CONCEPTS**

**TAKE A LOOK**

1. **Similar Triangles:-** Two triangles are said to be similar, if (a) Their corresponding angles are equal and (b) Their corresponding sides are in proportion (or are in the same ratio).
2. Basic proportionality Theorem [ or Thales theorem for solution refer NCERT Text Book ].
3. Converse of Basic proportionality Theorem.
4. Criteria for similarity of Triangles.
5. AA or AAA similarity criterion.
6. S.A.S similarity criterion.
7. S.S.S similarity criterion.
8. Areas of similar triangles.
9. Pythagoras theorem.
10. Converse of Pythagoras theorem.

**Level I**

1. If ∆ ABC is similar to ∆ DEF ∠B=600 and ∠c=500 , then degree measure of ∠D.

Ans-700

1. In Fig-(1) if DE||BC find the value of x. A

2 cm

D E

4 cm

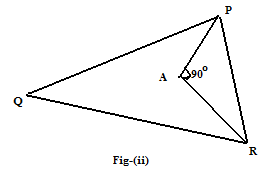
3 cm

x cm

B C

Fig(i) Ans-10cm

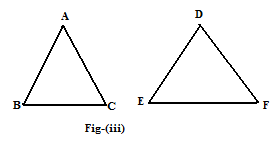
1. In the given fig-(ii) PQ 24 cm, QR=26 cm , ∠PAR=900 , PA=6cm and AR=8cm find the value of ∠QPR.



Ans-∠QPR=900

1. In given fig-(iii) ∆ ABC and ∆ DEF are similar, BC=3cm, EF=4cm, and area of triangle ABC=54cm2 find the area of ∆ DEF.

Ans-96 sq.cm



1. If the area of two similar triangles are in the ratio 16:25 then the ratio of their corresponding sides is.

Ans-4:5

1. If ar(∆ABC):ar(∆DEF)= 25:81 then AB:DE is.

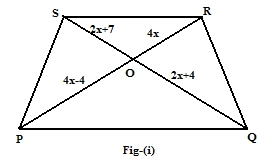
Ans-5:9

1. A right triangle has hypotenuse P cm and one side q cm. If p-q=1, Find the length of the third sides.

Ans-√2p-1

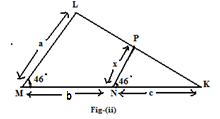
**LEVEL- II**

1. In given figure(i), PQ||SR and PO:RO=QO:SO find the value of x.



Ans : 7

1. In the given fig-(ii) express x in terms of a, b and c.

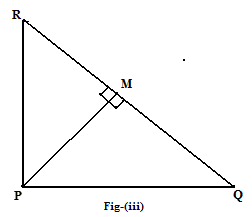


Ans : x =



1. In fig(iii) ∆PQR is a triangle right angled at P and M is point on QR such that PM ⊥ QR. Show that

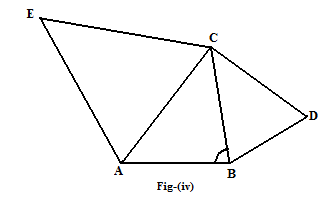
PM2= QM x MR.



1. The diagonals of a quadrilaterals intersect each other at the point 0 such that AO/OC=BO/DO show that ABCD is a trapezium.
2. A Man goes 10 m due east and then 30m due north. Find the distance from the starting points.

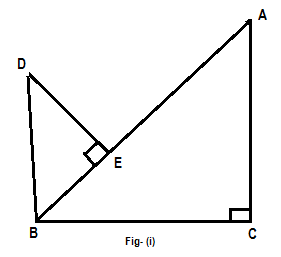
Ans-31.62m

1. Two poles of height 6m and 11m stand on a plane ground. If the distance between their feet is 12m find the distance between their tops. Ans-13cm
2. Prove that the line joining the mid points of any two sides of a triangle is parallel to the third sides.
3. ABC is an isosceles triangle angled at B. Two equilateral triangles are constructed on side BC and AC in Fig-(iv), prove that area of ∆BCD=1/2 area of ACE.



**LEVEL-III**

1. In fig-(i) BD ⊥ BC, DE ⊥ AB and AC⊥ BC, prove that = .



1. D is a point on the side of ∆ ABC such that ∠ADC =∠ BAC prove that = or CA2 =BC.CD.

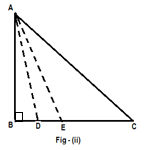


1. If the areas of two similar triangles are equal then the triangles are congruent.
2. The areas of two similar triangles ∆ABC and ∆PQR are 25 cm2 and 49 cm2 respectively. If QR=9.8 cm find BC.

Ans-7cm

1. Prove that the area of an equilateral triangle described on one side of a square is equal to half the area of an equilateral triangle described on one of it diagonals.
2. BL and CM are medians of a ∆ABC, right angled at A. Prove that 4(BL2+CM2)=5BC2
3. In an equilateral triangle prove that three times the square of one side is equal to four times the square of one of its altitudes.
4. In fig(ii) A triangle ABC is right angled at B side BC is trisected at point D and E prove that

8AE2=3AC2+5AD2

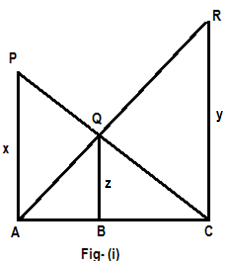


**LEVEL-IV**

1. Prove that if a line is drawn parallel to one side of a triangle the other two sides are divided in the same ratio. Ans-[For solution refer NCERT Text Book]

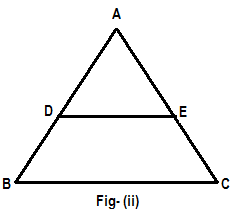
2. ABC is a triangle, PQ is a line segment intersecting AB in P and AC in Q such that PQ||BC and divides ∆ABC into two parts equal in area find BD/AB. Ans-BD/AB=√2-1/√2

3. In the Fig(i) PA,QB and RC are perpendicular to AC prove that 1/x+1/y=1/z.



4. State and prove converse of Basic proportionality theorems[ Refer to your text Book for solution]

5. In Fig-(ii) DE|| BC and AD/BD=3/5 if AC=4.8cm find the length of AE.



Ans-AE=1.8 cm

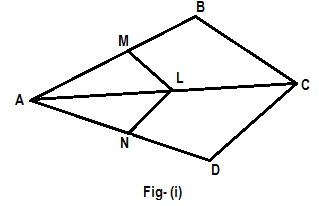
6. Prove that the ratio of the areas of two similar triangles is equal to the ratio of the squares of theirs corresponding sides [Refer to your text book for proof].

7. The areas of two similar triangles are 81cm2 and 49 cm2 respectively. If the altitude of the bigger triangle is 4. 5 cm find the corresponding altitude of the similar triangle. Ans-3.5 c m

1. State and prove Pythagoras theorem [Refer text book for proof and statement].
2. In an equilateral triangle ABC, D is a point on side BC, such that BD=1/3 BC. Prove that 9 AD2=7AB2.
3. State and prove Pythagoras and its converse theorems. [Refer text book for proof and statement].
4. ∆ ABC is an isosceles triangle in which AC=BC. If AB 2 =2AC2 then prove that ∆ ABC is a right triangle.

**SELF EVALUATION QUESTIONS**

1. D is a point on the side BC of a triangle ABC such that ∠ADC=∠BAC show that CA2=BC.CD.
2. In Fig-(i) if LM|| BC and LN || CD prove that



1. S and T are points on sides PR and QR of ∆PQR such that ∠p=∠RTS show that ∆RPQ=∆RTS.
2. D and E are points on the sides CA and CB respectively of a triangle ABC right angles at C. Prove that AE2 + BD2 =AB2+DE2.
3. Prove that the sum of the squares of the diagonals of parallelogram is equal to the sum of the squares of its sides.
4. Two poles of height a meters and b meters are p meters apart. Prove that the height of the point of intersection of the lines joining the top of each pole to the foot of the opposite pole is given by meters.



1. The perpendicular from A on side BC of a ∆ ABC intersects BC at D. Such that BD=3CD prove that 2AB2=2AC2+BC2.

**INTRODUCTION TO TRIGONOMETRY**

**IMPORTANT CONCEPTS**

**TAKE A LOOK:**

1. Trigonometric ratios of an acute angle of a right angle triangle.

C



Side opposite to angle θ

Hypotenuse



θ

B

A

Side adjacent to angle θ



1. Relationship between different trigonometric ratios



1. Trigonometric Identities.

(i) sin2 θ + cos2 θ =1

(ii) 1 + tan2 θ = sec2 θ

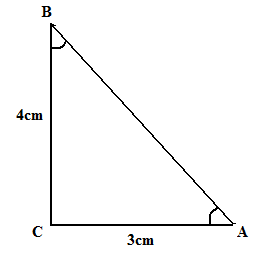
(iii) 1 +cot2 θ = cosec2 θ

1. Trigonometric Ratios of some specific angles.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **θ** | **0o** | **30o** | **45o** | **60o** | **90o** |
| sin θ | 0 | ½ | 1/√2 | √3/2 | 1 |
| cos θ | 1 | √3/2 | 1/√2 | 1/2 | 0 |
| tan θ | 0 | 1/√3 | 1 | √3 | Not defined |
| cot θ | Not defined | √3 | 1 | 1/√3 | 0 |
| sec θ | 1 | 2/√3 | √2 | 2 | Not defined |
| cosec θ | Not defined | 2 | √2 | 2/√3 | 1 |

1. Trigonometric ratios of complementary angles.
2. sin (90o - θ) = cos θ
3. cos (90o - θ) = sin θ
4. tan (90o - θ) = cot θ
5. cot (90o - θ) = tan θ
6. sec (90o - θ) = cosec θ
7. cosec (90o - θ) = sec θ

**LEVEL – 1**



Questions carrying 1 marks

1. In the adjoining figure find the values of (a) sin A (b) cos B
2. sin 2A = 2 sin A is true when A = \_\_\_\_\_\_\_\_.
3. Evaluate sin 60o.cos 30o + sin 30o.cos 60o.
4. If tan A = cot B, then show that A+B = 90o.
5. Evaluate sin2 35o + sin2 55o.

Ans : (1)a. 4/5 b.4/5 (2) A=0o (3) 1 (5) 1

**LEVEL – 2**

Questions carrying 2 marks

1. Evaluate 3sin245o +2cos230o – cot230o
2. Evaluate tan 7o tan23o tan 60o tan 67o tan83o.
3. If tan 2A = cot (A – 18o). Find the value of A.
4. If A, B and C are interior angles of ∆ABC then show that



1. Prove that



Ans : (1) 0 (2) √3 (3) A=36o

**LEVEL – 3**

Questions Carrying 3 marks

1. Express the trigonometric ratios of sin A, sec A and tan A in terms of cot A.
2. Prove that ( 1 + cot θ – cosec θ ) (1 + tan θ + sec θ ) = 2
3. Prove that



1. If 16 cot A=12 Then find the value of



1. Prove that Tan 1o . tan 2o. tan 3o.----------------. tan 89o = 1

**LEVEL – 4**

Questions Carrying 4 marks

1. Prove that



1. If sec θ + tan θ =P , prove that sin θ =



1. If tan θ + sin θ = m and tan θ - sin θ =n show that m2 – n2 = 4



1. Prove the following (cosec A – sin A) (sec A - cos A) =



1. Prove that



**SELF EVALUATION**

1. If tan(A+B) = √3 and tan(A - B) = then find A and B. [ 0o A+B 90o, A> B]



1. If tan A = √3 Find other trigonometric ratios of ∠A.
2. If 7 sin2θ + 3cos2θ = 4 show that tanθ =



1. Find the value of sin 60o geometrically.
2. Evaluate



1. Evaluate: (sin225o + sin265o) + √3 (tan5o. tan15o. tan30o. tan 75o. tan85o)
2. Prove that cosec A + cot A



1. Prove that :



**STATISTICS**

**IMPORTANT CONCEPTS**

**TAKE A LOOK**

The three measures of central tendency are :

1. Mean
2. Median
3. Mode

* Mean Of grouped frequency distribution can be calculated by the following methods.

1. **Direct Method**

Mean = =   
Where Xi is the class mark of the ith class interval and fi frequency of that class



1. **Assumed Mean method or Shortcut method**

Mean = = a +  
Where a = assumed mean



And di = Xi - a

1. **Step deviation method**.

Mean = = a +  
Where a = assumed mean



h = class size

And ui = (Xi – a)/h

* Median of a grouped frequency distribution can be calculated by

Median = l +



Where

l = lower limit of median class

n = number of observations

cf = cumulative frequency of class preceding the median class

f = frequency of median class

h = class size of the median class.

* Mode of grouped data can be calculated by the following formula.

Mode = l +



Where

l = lower limit of modal class

h = size of class interval

f1 = Frequency of the modal class

fo = frequency of class preceding the modal class

f2= frequency of class succeeding the modal class

* Empirical relationship between the three measures of central tendency.

3 Median = Mode + 2 Mean

Or, Mode = 3 Median – 2 Mean

* Ogive

Ogive is the graphical representation of the cumulative frequency distribution. It is of two types:

1. Less than type ogive.
2. More than type ogive

* Median by graphical method

The x-coordinated of the point of intersection of ‘less than ogive’ and ‘more than ogive’ gives the median.

**LEVEL – 1**

|  |  |  |
| --- | --- | --- |
| Slno | Question | Ans |
| 1 | What is the mean of 1st ten prime numbers ? | 12.9 |
| 2 | What measure of central tendency is represented by the abscissa of the point where less than ogive and more than ogive intersect? | Median |
| 3 | If the mode of a data is 45 and mean is 27, then median is \_\_\_\_\_\_\_\_\_\_\_. | 33 |
| 4 | Find the mode of the following   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | Xi | 35 | 38 | 40 | 42 | 44 |  | | fi | 5 | 9 | 10 | 7 | 2 |  | | Mode =40 |
| 5 | Write the median class of the following distribution.   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | Class | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 | | Frequency | 4 | 4 | 8 | 10 | 12 | 8 | 4 | | 30-40 |

**LEVEL – 2**

|  |  |  |
| --- | --- | --- |
| Slno | Question | Ans |
| 1 | Calculate the mean of the following distribution   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | Class interval | 50-60 | 60-70 | 70-80 | 80-90 | 90-100 | | Frequency | 8 | 6 | 12 | 11 | 13 | | 78 |
| 2 | Find the mode of the following frequency distribution   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | Marks | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | | No. of students | 12 | 35 | 45 | 25 | 13 | | 33.33 |
| 3 | Find the median of the following distribution   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | Class interval | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | | Frequency | 5 | 8 | 20 | 15 | 7 | 5 | | 28.5 |
| 4 | A class teacher has the following absentee record of 40 students of a class for the whole term.   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | No. of days | 0-6 | 6-10 | 10-14 | 14-20 | 20-28 | 28-38 | 38-40 | | No. of students | 11 | 10 | 7 | 4 | 4 | 3 | 1 |   Write the above distribution as less than type cumulative frequency distribution. |  |
|  | Answer :   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | No. of days | Less Than 6 | Less Than 10 | Less Than 14 | Less Than 20 | Less Than 28 | Less Than 38 | Less Than 40 | | No. of students | 11 | 21 | 28 | 32 | 36 | 39 | 40 | |  |

**LEVEL – 3**

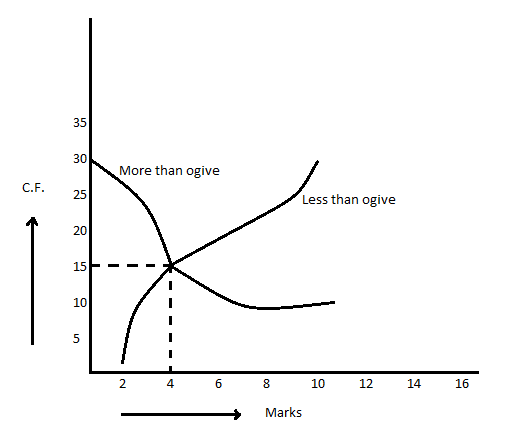
|  |  |  |
| --- | --- | --- |
| Slno | Question | Ans |
| 1 | If the mean distribution is 25   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | Class | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | | Frequency | 5 | 18 | 15 | P | 6 |   Then find p. | P=16 |
| 2 | Find the mean of the following frequency distribution using step deviation method   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | Class | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | | Frequency | 7 | 12 | 13 | 10 | 8 | | 25 |
| 3 | Find the value of p if the median of the following frequency distribution is 50   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | Class | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 | 70-80 | 80-90 | | Frequency | 25 | 15 | P | 6 | 24 | 12 | 8 | | P=10 |
| 4 | Find the median of the following data   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Marks | Less Than 10 | Less Than 30 | Less Than 50 | Less Than 70 | Less Than 90 | Less Than 110 | Less Than 130 | Less than 150 | | Frequency | 0 | 10 | 25 | 43 | 65 | 87 | 96 | 100 | | 76.36 |
|  |  |  |

**LEVEL – 4**

|  |  |  |
| --- | --- | --- |
| Slno | Question | Ans |
| 1 | The mean of the following frequency distribution is 57.6 and the sum of the observations is 50. Find the missing frequencies f1 and f2.   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | Class | 0-20 | 20-40 | 40-60 | 60-80 | 80-100 | 100-120 | Total | | Frequency | 7 | f1 | 12 | f2 | 8 | 5 | 50 | | f1 =8 and  f2 =10 |
| 2 | The following distribution gives the daily income of 65 workers of a factory   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | Daily income (in Rs) | 100-120 | 120-140 | 140-160 | 160-180 | 180-200 | | No. of workers | 14 | 16 | 10 | 16 | 9 |   Convert the above to a more than type cumulative frequency distribution and draw its ogive. |  |
| 3 | Draw less than type and more than type ogives for the following distribution on the same graph. Also find the median from the graph.   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | Marks | 30-39 | 40-49 | 50-59 | 60-69 | 70-79 | 80-89 | 90-99 | | No. of students | 14 | 6 | 10 | 20 | 30 | 8 | 12 | |  |

**SELF – EVALUATION**

1. What is the value of the median of the data using the graph in figure of less than ogive and more than ogive?



1. If mean =60 and median =50, then find mode using empirical relationship.
2. Find the value of p, if the mean of the following distribution is 18.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Variate (xi) | 13 | 15 | 17 | 19 | 20+p | 23 |
| Frequency (fi) | 8 | 2 | 3 | 4 | 5p | 6 |

1. Find the mean, mode and median for the following data.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Classes | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 |
| frequency | 5 | 8 | 15 | 20 | 14 | 8 | 5 |

1. The median of the following data is 52.5. find the value of x and y, if the total frequency is 100.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Class Interval | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 | 70-80 | 80-90 | 90-100 |
| frequency | 2 | 5 | X | 12 | 17 | 20 | Y | 9 | 7 | 4 |

1. Draw ‘less than ogive’ and ‘more than ogive’ for the following distribution and hence find its median.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Classes | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 | 70-80 | 80-90 |
| frequency | 10 | 8 | 12 | 24 | 6 | 25 | 15 |

1. Find the mean marks for the following data.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Marks | Below 10 | Below 20 | Below 30 | Below 40 | Below 50 | Below 60 | Below 70 | Below 80 | Below 90 | Below 100 |
| No. of students | 5 | 9 | 17 | 29 | 45 | 60 | 70 | 78 | 83 | 85 |

1. The following table shows age distribution of persons in a particular region. Calculate the median age.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Age in years | Below 10 | Below 20 | Below 30 | Below 40 | Below 50 | Below 60 | Below 70 | Below 80 |
| No. of persons | 200 | 500 | 900 | 1200 | 1400 | 1500 | 1550 | 1560 |

1. If the median of the following data is 32.5. Find the value of x and y.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Class Interval | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 | Total |
| frequency | x | 5 | 9 | 12 | y | 3 | 2 | 40 |

**SECTION – A (F A1)**

**MCQ(CARRING, 1 MARKS EACH)**

Q1. Euclid’s division lemma states that for any two positive integer ‘a’ and ‘b’ there exits unique integer q and r such that a=bq+r where r must satisfy.

1. 1<r<b
2. 0<r b



1. 0r<b



1. 0<r<b

Q2. If are the zeroes of the polynomial 2y2 +7y+5 then the value of is .



1. -1
2. -2
3. 1
4. 2

Q3. The value of c for which the pair of equations cx-y=2 and 6x-2y=3 will have infinitely many solution is

1. 3
2. -3
3. -12
4. No value

Q4. If in the two triangles ABC and PQR, then



1. ∆PQR∆CAB



1. ∆PQR∆ABC



1. ∆CBA∆PQR



1. ∆BCA∆PQR



A

Q5. In fig.1 ∠BAC=900 and AD⊥BC then,

1. BD.CD=BC2
2. AB.AC=BC2
3. BD.CD=AD2
4. AB.AC=AD2

B D C

**SECTION B**

(**EACH QUESTION CARRY 2 MARKS)**

Q6. Use Euclid’s Division Algorithm to find the HCF of 135 and 225.

Q7. Write a quadratic polynomial the sum and product of whose zeroes are 3,-2.

Q8. Find the number of solution of the following pair of linear equations:

X+2y-8=0 2x+4y=16

Q9. In fig:2, BC||DE.Find EC

A

1.5cm

1 cm

D

E

3 cm

C

B

P

Q10. In adjoining fig: A,B and C are points on OP,OQ and OR respectively

Such that AB||PQ and AC||PR show that BC||QR

A

O

B

C

R

Q

Q11. Solve that equation by substitution method

8x+5y=9

3x+2y=4

**SECTION C**

(**EACH QUESTION CARRIES 3 MARKS)**

Q12. Find all the zero es of the polynomial 3x4+6x2-2x2-10x-5, if two of its zeroes are and -



Q13. Prove that is irrational.



Q14. Solve the following pair of equations by reducing them to a pair of linear equation:

= and =



Q15. In an equilateral triangle prove that three times the square of one side is equal to four times the square of one of its altitudes i.e 4AD2=3AB2=3BC2=3CA2.

Q16. ABC is an isosceles triangle right angled at C. Prove that AB2=2AC2.



**SECTION D**

**(EACH QUESTION CARRIES 4 MARKS)**

Q17. State ‘Basic Proportionality theorem’ or ‘ Thales Theorem’ and prove it.

OR

Area of two similar triangles are in ratio of the squares of the corresponding sides.

Q18. Five years ago Nuri was thrice as old as Sonu. Ten years later Nuri will be twice as old as Sonu. How old are Nuri and Sonu?

ANSWERS

1. (a)
2. (a)
3. (d)
4. (a)
5. (c)
6. 45
7. X2-3x-2
8. Infinitely many solutions
9. 2 cm
10. X= -2 , Y=5
11. -1,-1
12. X=1 and Y=1

18. Nuri’s present age= 50 years, Sonu=20 years

SAMPLE PAPER FOR SA-1

CLASS – X

MATHEMATICS

Time : 3 ½ hours Maximum Marks : 80

*General Instructions:*

1. *All questions are compulsory.*
2. *The question paper consists of 34 questions divided into four sections A, B, C and D. Section A comprises of 10 questions of 1 mark each, Section B comprises of 8 questions of 2 marks each. Section C comprises of 10 questions of 3 marks each and Section D comprises of 6 questions of 4 marks each.*
3. *Question numbers 1 to 10 in Section A are multiple choice questions where you are to select one correct option out of the given four.*
4. *There is no overall choice. However, internal choice has been provided in 1 question of two marks, 3 questions of three marks each and 2 questions of four marks each. You have to attempt only one of the alternatives in all such questions.*
5. *Use of calculator is not permitted.*
6. *An additional 15 minutes time has been allotted to read this question paper only.*

**SECTION – A**

1. The HCF of 135 and 225 is :

(a) 135 (b) 35 (c) 45 (d) 65

1. If the zeroes of the quadratic polynomial x2 +(a+1)x +b are 2 and -3 then:

(a)a= -7, b= -1 (b) a= 5, b= -1 (c) a= 2, b= -6 (d) a= 0, b= -6

1. In the given figure (i) the ΔABC and ΔDEF are similar, BC=3cm, EF= 4 cm and area of triangle ABC = 54cm2. The area of ΔDEF is :

(a) 72 sq.cm (b) 36 sq.cm (c) 96 sq.cm (d) 144 sq.cm



1. If cos 9θ= sinθ and 9θ<90o, then the value of tan 5θ is :
2. 1/√3 (b) √3 (c) 0 (d) 1
3. 9sec2 A – 9 tan2A is :
4. 1 (b) 9 (c) 8 (d) 0
5. x2 -1 is divisible by 8 if x is :
6. an integer (b) natural number (c) an even integer (d) an odd integer
7. If cos(40o +x) = sin 30o, then value of x is :

(a) 30o (b) 40o (c) 20o (d) 60o

1. The mean of first 6 multiples of 3 is :

(a) 11 (b) 63 (c) 46 (d) 10.5

1. The pair of equations x=a and y=b, graphically represent lines which are :

(a) Parallel (b) Intersecting at (b,a) (c) intersecting at (a,b) (d) coincident

1. If sin A = ½ , then 4cos3A – 3cos A is

(a) 0 (b) 1 (c) √3 (d) 1/



**SECTION – B**

1. If 1 is a zero of the polynomial p(x) = ax2 -3(a-1)x -1, then find the value of a.
2. Find the HCF of 867 and 255 with the help of Euclid’s division algorithm.
3. If 7Sin2θ + 3Cos2θ = 4, show that tanθ=1/√3.

OR

If Cotθ=15/8, Evaluate



1. Three angles of a triangle are x, y and 40o. The difference between the two angles x and y is 30o. Find x and y.
2. In ΔPQR, S is any point on QR such that ∠RSP=∠RPQ, Prove that RS x RQ = RP2.
3. Write the lower limit of the median class in the following distribution:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Classes | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 |
| Frequency | 9 | 12 | 5 | 16 | 8 |

1. Is 7 x 5 x 3 x 2 +3 is a composite number? Justify your answer.
2. Mean of the following data is 21.5. Find the missing value of ‘k’.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| x | 5 | 15 | 25 | 35 | 45 |
| f | 6 | 4 | 3 | k | 2 |

**SECTION – C**

1. Prove that 2√3 is irrational.

OR

Prove that (5 - √2) is irrational.

1. Show that any positive odd integer is of the form 4q +1, 4q +3, where q is a positive integer.
2. A person rowing a boat at the rate of 5km/hour in still water take thrice as much time in going 40km upstream as in going 40km downstream. Find the speed of the stream.

OR

In a competitive examination one mark is awarded for each correct answer while ½ mark is deducted for each wrong answer. Jayanti answered 120 questions and got 90 marks. How many questions did she answer correctly?

1. If A, B and C are interior angles of a triangle ABC, then show that



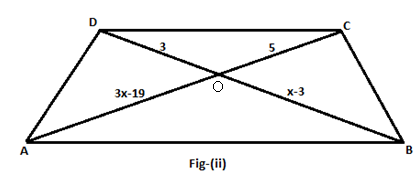
1. If α and β are two zeros of the quadratic polynomial x2 – 2x + 5, find a quadratic polynomial whose zeroes are α+β and



1. Prove that : (Sinθ + Cosecθ)2 + (Cosθ + Secθ)2 = 7 + tan2 θ + cot2θ
2. Find the mean of the following frequency distribution, using step deviation method.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Classes | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 |
| Frequency | 7 | 12 | 13 | 10 | 8 |

1. In the figure (ii), AB||CD, find the value of x.



1. ABC is an equilateral triangle with side 2a. Find the length of one of its altitudes.
2. Find the median of the following data.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Classes | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 | 70-80 | 80-90 | 90-100 |
| Frequency | 5 | 3 | 4 | 3 | 3 | 4 | 7 | 9 | 7 | 8 |

**SECTION – D**

1. State and prove converse of Pythagoras theorem.

OR

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

1. The median of the distribution given below is 14.4. Find the value of x and y. if the total frequency is 20.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| C.I. | 0-6 | 6-12 | 12-18 | 18-24 | 24-30 |
| Frequency | 4 | x | 5 | y | 1 |

1. Prove that



OR

Evaluate :



1. If Secθ + tanθ = p, prove that sinθ =



1. Find other zeroes of the polynomial p(x) = 2x4 + 7x3 -19x2 – 14x +30 if two of its zeroes are √2 and -√2.
2. Sum of a two digit number and the number obtained by reversing the order of its digits is 121. If the digits differ by 3, find the number (by cross multiplication method) for solving the problem.

---xxx---

**SECTION-A**

**MARCKING SCHEME**

**MATHEMATIC**

**CLASS X**

**SUMMATIVE ASSESSMENT -1**

1. C
2. D
3. C
4. D
5. B
6. D
7. C
8. D
9. C
10. A

**SECTION –B**

1. Ans->∴1 is a zero of the polynomial p(x)=ax2-3(a-1)x-1,

∴p(x)=0 1

P(1)=0 ½

1)2- 3(a-1).1-1=0 ½



½



a=1

1. Ans-> 867=255x3+102 ½

255=102x2+51 ½

102=51x2+0 ½

H C F (867,255)=51 ½

13. 7sin2 + 3 cos2 =4



⇒4 sin2 + 3sin2 + 3cos2=4 ½



⇒4 sin2 + 3(sin2 +cos2=4 ½



⇒4 sin2 ½



sin2



sin



= 300



Now tan300= ½



Or

1. = 1



= 2 1/2



1/2

=cot2 = =

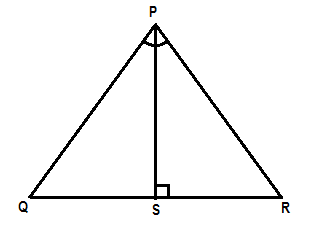


1. x+y+40=1800

x+y=1400 1/2

x-y=300 1/2

x=850 and y=55o ½+1/2



1. In ∆RSP and ∆RPQ

∠RSP=∠RPQ (Given) 1

∠R=∠R (Common)

∆RSP∆RPQ



* = ½



* =RP2 ½



|  |  |  |
| --- | --- | --- |
| C.I. | fi | c.f |
| 0-10 | 9 | 9 |
| 10-20 | 12 | 21 |
| 20-30 | 5 | 26 |
| 30-40 | 16 | 42 |
| 40-50 | 8 | 50 |

>Median class 1

Here n=50, => n/2=25 ½

Which lies in the C.I. 20-30 ½

1. 7x5x3x2+3=3(7x5x2+1) 1

=(70+1)=3x71 ½

The given number is composite number ½

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| x | 5 | 15 | 25 | 35 | 45 |
| f | 6 | 4 | 3 | k | 2 |
| fx | 30 | 60 | 75 | 35k | 90 |

Frequency table-> 1

k



∴ ½



∴



∴ 21.5 = , to find k=5 ½



**SECTION C**

1. Let if possible be a rational no. ½



= = where p and q are co primes and q≠0 p & q integers 1



* =



∴ rational number because is a rational number ½



This gives contraction because is not a rational no. our assumption is wrong ½



Hence is an irrational no. ½



Or

Let if possible 5- is a rational no ½



5- =p/q where p and q are integers and co primes q≠0 1



=p/q -5



= ½



is rational number because is a rational no. this is a contradiction because is not a rational



no. ½

Hence our supposition is wrong

∴5+is an irrational number ½



1. Let a be positive odd integer ½

by Euclid’s Division algorithm

a=4q+r, where q,r are positive

Integer and 0 r <4 1



∴ a=4q or , a=4q+2 or 4q+3 ½

But 4q and 4q+2 are both even.

∴a is the form 4q+1 or 4q+3. 1

1. Let the speed of stream be x km/hour

speed of the boat rowing upstream=(5-x)km/h

speed of the boat rowing downstream = (5+x)km/h 1

According to the eq. we have

=3 1 ½



∴ x=2.5 km/h

Hence the speed of the stream is 2.5 km/h ½

OR

Let the number of correct answer be x,

Then number of wrong answer =(120-x) 1

ATQ

we have

∴ x-1/2 (120-x)=90 ½

* 3x/2= 150 1
* X=100

Hence number of correctly answered questions =100 ½

1. ∠A+∠B+∠C=1800

* ∠B+∠C=1800 - ∠A ½
* ∠B+∠C=1800 - ∠A ½

2 2

* sin = sin(90o- - ) 1



Hence, sin = cos - 1



1. Sum of zeroes = =



Product of zeroes =5 ½



For new Q.P sum of zeroes =() +(1/+1/) ½



=12/15

Product of zeroes=(x ( ½.



=4/5

∴- = => a=5, b= -12 ½



= => c =4



Required quad pol is 5x2-12x+4 1

1. (Sin2+ 2 Sin)+ (Cos2+ 2 ) 1



=2+2+( Sin2+ Cos2) + Sec2 Cosec2 ½



=.5+( tan2+1) + (Cot2+1) 1



=7+ tan2+ cot2 ½



|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Classes | Class Mark(xi) | Frequency(fi) | Ui=xi –a/h | fiui |
| 0-10  10-20  20-30  30-40  40-50 | 5  15  25  35  45 | 7  12  13  10  8 | -2  -1  0  1  2 | -14  -12  0  10  16 |
|  |  |  |  |  |

For frequency distribution table 2

½



½



1. In ∆AOB and ∆COD

∠AOB=∠COD (Vertically opposite angles)

∠OAB=∠OCD (Alternate angles) ½

∴∆AOB∆COD (AA Criterion)



∴ = ½



* = 1



* X=10.5 1

1. Let AD⊥BC

|  |  |
| --- | --- |
| In right ΔADB using the pythogoras theorem  We have  AD2 = AB2 – BD2 ½  AD2 = 4a2 - a2  ½  AD = √3a ½  Hence,  length of one of its altitude = √3a ½ | 1 |
|  |  |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Classes | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 | 70-80 | 80-90 | 90-100 |
| Frequency | 5 | 3 | 4 | 3 | 3 | 4 | 7 | 9 | 7 | 8 |
| cumulative | 5 | 8 | 12 | 15 | 18 | 22 | 29 | 38 | 45 | 53 |

For frequency table 1 ½

Median = l +(N/2 –CF) x h ½

f

= 60 + (26.5 -22) x 10

7 ½

Median = 66.43 ½

**SECTION – D**

29. Statement ½

Given : to prove fig. construction 1 ½

Correct proof 2

OR

Given to prove construction fig 2

Correct proof 2

30.

|  |  |  |
| --- | --- | --- |
| C.I | F | CF |
| 0-6  6-12  12-18  18-24  24-30 | 4  X  5  Y  1 | 4  4+x  9+x  9+x+y  10+x+y |

For Writing table 1 ½

Formula

Median = l + ½



L=12, f=5, cf= 4+x, h=6 and x+y=10 1

To find x=4

And y=6 1

31.

LHS: 1



= 1



= 1



= 1



OR

Cosec(90o-θ)=secθ, cot(90o-θ) = tan θ, sin 55o = Cos 35o 1

tan 80o = cot 10o, tan 70o = cot 20o, tan 60o = √3 1

Given expression = 1



= = 1



32. We have,

Sec θ + tan θ = p

= ½



= ½



= ½



= 1



= ½



= ½



=



=sinθ = ½



33. p(x) = 2x4 + 7x3 -19x2 -14x +30

If two zeroes of p(x) are √2 and -√2 then (x+√2)(x-√2) = x2 -2 is factor of p(x) 1

P(x) (x2 – 2) = [2x4 + 7x3 -19x2 -14x +30](x2 -2) 1 ½



= 2x2 +7x -15

= 2x2 +10x -3x -15

= (2x -3) (x +5) 1

Hence, other two zero of p(x) are 3/2 and -5. ½

34. Let unit digit be = x

And 10th place digit be = y ½

∴No = x + 10 y

After reversing the digit the no. = 10 x + y ½

Now According to question,

X + 10 y + 10 x + y = 121

And x – y = 3

* 11x + 11 y = 121 and x – y = 3 1

x + y = 11 and x – y = 3

x + y – 11 = 0

x – y – 3 = 0 ½

* = = ½



x = 7 and y = 4 1

Here required number

X + 10 y = 7 + 10 x 4 = 47

DETAILS OF THE CONCEPTS TO BE MASTERED BY EVERY CHILD OF CLASS X WITH EXCERCISES AND EXAMPLES OF NCERT TEXT BOOK

**SUMMATIVE ASSESSMENT -II**

SYMBOLS USED

\* : Important Questions, \*\*: Very important questions, \*\*\*: Very, Very Important questions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 01 | Quadratic Equation | Standard form of quadratic equation | \* | NCERT Text book  Q.1.2, Ex 4.1 |
| Solution of quadratic equation by factorization | \*\*\* | Example 3,4,5, Q.1, 5 Ex. 4.2 |
| Solution of quadratic equation by completing the square | \*\* | Example 8,9  Q.1 Ex. 4.3 |
| Solution of quadratic equation by quadratic formula | \*\*\* | Example. 10,11,13,14,15 , Q2,3(ii) Ex.4.3 |
| Nature of roots | \*\*\* | Example 16  Q.1.2, Ex. 4.4 |
| 02 | Arithmetic progression | General form of an A.P. | \* | Exp-1,2, Ex. 5.1 Q.s2(a), 3(a),4(v) |
| nth term of an A.P. | \*\*\* | Exp. 3,7,8 Ex. 5.2 Q.4,7,11,16,17,18 |
| Sum of first n terms of an A.P. | \*\*  \*  \*\*  \*\*\* | Exp.11,13,15  Ex. 5.3, Q.No.1(i, ii)  Q3(i,iii)  Q.7,10,12,11,6, Ex5.4, Q-1 |
| 03 | Coordinate geometry | Distance formula | \*\* | Exercise 7.1, Q.No 1,2,3,4,7,8 |
| Section formula  Mid point formula | \*\*  \*\*\* | Example No. 6,7,9  Exercise 7.2, Q.No. 1,2,4,5  Example 10.  Ex.7.2, 6,8,9. Q.No.7 |
| Area of Triangle | \*\*  \*\*\* | Ex.12,14  Ex 7.3 QNo-12,4 Ex.7.4, Qno-2 |
| 04 | Some application of Trigonometry | Heights and distances |  | Example-2,3,4  Ex 9.1  Q 2,5,10,12,13,14,15,16 |
| 05 | Circles | Tangents to a circle |  | Q3(Ex10.1)  Q 1,Q6,Q7(Ex 10.2),4 |
| Number of tangents from a point to a circle | \*\*\* | Theorem 10.1,10.2  Eg 2.1  Q8,9,,10,12,13  (Ex 10.2) |
| 06 | Constructions | Division of line segment in the given ratio | \* | Const 11.1  Ex 11.1 Qno 1 |
| Construction of triangle similar to given triangle as per given scale | \*\*\* | Ex 11.1 Qno-2,4,5,7 |
| Construction of tangents to a circle | \*\*\* | Ex 11.2 Qno 1,4 |
| 07 | Area related to circles | Circumference of a circle | \* | Example 1  Exercise 12.1 Q.No 1,2,4 |
| Area of a circle | \* | Example 5,3 |
| Length of an arc of a circle | \* | Exercise 12.2 Q No 5 |
| Area of sector of a circle | \*\* | Example 2  Exercise 12.2 QNo 1.2 |
| Area of segment of a circle | \*\* | Exercise 12.2  Qno 4,7,9,3 |
| Combination of figures | \*\*\* | Ex 12.3 Example 4.5  1,4,6,7,9,12,15 |
| 08 | Surface area and volumes | Surface area of a combination of solids | \*\* | Example 1,2,3  Exercise 13.1  Q1,3,6,7,8 |
| Volume of combination of a solid | \*\* | Example 6  Exercise 13.2  Q 1,2,5,6 |
| Conversion of solids from one shape to another | \*\*\* | Example 8 & 10  Exercise 13.3  Q 1,2,6,4,5 |
| Frustum of a cone | \*\*\* | Example 12& 14  Exercise 13.4  Q 1,3,4,5 Ex-13.5, Q. 5 |
| 09 | Probability | Events | \* | Ex 15.1 Q4,8,9 |
|  |  | Probability lies between 0 and1 | \*\* | Exp- 1,2,4,6,13 |
|  |  | Performing experiment | \*\*\* | Ex 15 1,13,15,18,24 |

**QUADRATIC EQUATIONS**

**IMPORTANT CONCEPTS:-**

**TAKE A LOOK:**

1. The general form of a quadratic equation is ax2+bx+c=0, a≠o. a, b and c are real numbers.
2. A real number x is said to be a root of the quadratic equation ax2+bx+c=0 where a≠o if ax2+bx+c=0. The zeroes of the quadratic equation polynomial ax2+bx+c=0 and the roots of the corresponding quadratic equation ax2+bx+c=0 are the same.
3. Discriminant:- The expression b2-4ac is called discriminant of the equation ax2+bx+c=0 and is usually denoted by D. Thus discriminant D= b2-4ac.
4. Every quadratic equation has two roots which may be real , co incident or imaginary.
5. IF and are the roots of the equation ax2+bx+c=0 then



And =



1. Sum of the roots , + = - and product of the roots, ,



1. Forming quadratic equation, when the roots a and B are given.

x2-( +)x+. =0



1. Nature of roots of ax2+bx+c=0
2. If D0, then roots are real and unequal.



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

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

**LEVEL-I**

1. IF ½ is a root of the equation x2+kx-5/4=0, then the value of K is
2. 2 [Ans(d)]
3. -2
4. ¼
5. ½
6. IF D>0, then roots of a quadratic equation ax2+bx+c=0 are

(a) (b) (c) (d) None of these [Ans(a)]



1. Discriminant of x2 +5x+5=0 is

(a)5/2 (b) -5 (c) 5 (d)-4 [Ans(c)]

1. The sum of roots of a quadratic equation+4x-320=0 is



[Ans(a)]

(a)-4 (b)4 (c)1/4 (d)1/2

1. The product of roots of a quaradatic equation +7x-4=0 is



[Ans(d)]

(a)2/7 (b)-2/7 (c)-4/7 (d)-2

1. Values of K for which the equation +2kx-1=0 has real roots are:



[Ans(b)]

k3 (b)k3 or K-3 (c)K-3 (d) k3



**LEVEL-II**

1. Find the roots of the quadratic equation -2√6+2=0



[Ans- x= , ]



1. The sum of the squares of two consecutive odd number is 394. Find the numbers.

[ Ans- 13,15 or -15,13]

1. Find the root of +√2x-2=0 by factorization.



[Ans- x=, ]



1. The sum of two numbers is 8 . Determine the numbers if the sum of their reciprocals is 8/15.

[Ans- 5 and 3 or 3 and 5]

1. For what value of k does (k-12)x2+2(k-12)x+2=0 has equal roots?

[Ans- k=14]

1. Divide 51 into two parts whose product is 378.

[Ans-942]

**LEVEL-III**

1. For what value of k, will the equation -2(1+2k)x+(3+2k)=0 have real but distinct roots ? When will the roots be equal?



[Ans k< -5/2 or k>√5/2, k=>√5/2]



1. Solve for x: 4√3x2 +5x-2√3=0. [Ans √3/4,-2/√3]
2. Using quadratic formula solve the following quadratic equation for x:-2ax+(a2-b2)=0



[Ans a+b,a-b]

1. The speed of a boat in still water is 11 km/hr . It can go 12 km up stream and return downstream to the original point in 2 hours 45 minutes. Find the speed of the stream.

[5 km/h]

1. Solve for x: a2b2x2+b2x-a2x-1=0 [Ans 1/b2, -1/a2]
2. Solve the following quadratic equation for x:

X2-2(a+2)x+(a+1)(a+3)=0

[Ans-a+1,a+3]

**LEVEL-IV**

1. Solve for + + ; a0, b0 x0



[Ans. –a,-b]

1. An aeroplane left 30 minutes later than its scheduled time and in order to reach its destination 1500 km away in time, it has to increase its speed by 250 km/hr from its usual speed. Determine its usual speed.

[Ans 750 km/hr]

1. Using the quadratic formula solve the equation a2b2x2 –(4b4-3a4)x -12a2b2=0

[Ans ,



1. Solve for x: + =3 (x2,4)



[Ans 5/2,5]

1. If (-5) is a root of the quadratic equation 2x2+px-15=0 and the quadratic equation p(x2+x)+k=0 has equal roots then find the values of P and K.

[Ans-24m, 8m]

1. The sum or the areas of two squares is 640m2. If the difference of their perimeters is 64m . Find the sides of the two squares. [Ans24m,8m]

**SELF EVALUATION**

1. If the root of the equation (b-c)x2+(c-a)x+(a-b)=0 are equal, then prove that 2b=a+c
2. Solve by using quadratic formula

(x2+3x+2)2- 8(x2+3x)-4=0

1. If and are the roots of the equation lx2-mx+n=0, Find the equation whose roots are / and b /.



1. The difference of two numbers in 5 and the difference of their reciprocal is 1/10.Find the numbers.

**ARITHMETIC PROGRESSION**

**Important concepts:**

**Take a look:**

Sequence: - A sequence is an arrangement of numbers in a definite order according to some rule.

Progression: A sequence that follow a definite pattern is called progression.

Arithmetic Progression (A.P.): A sequence in which each term differs from its preceding term by a constant is called an arithmetic progression. This constant is called common difference of the A.P. It is denoted by ‘d’.

General form of an A.P.: The general form of an A.P. is a, a+d,a+2d,a+3d ……………………………………….

nth term of an A.P. : If ‘a’ is the first term and ‘d’ is the common difference than [ ]



nth term from the last of an A.P. : [ ]



where l = last term.

d= c.d.

Sum of n terms of an A.P. : -

=



Or Sn = . Where l = last term.



Common difference: [d = ]



* Common difference may be +ve , - ve or zero.

nth term: If Sn is given then [= ]



**Level – I**

1. Is the progression 3,9,15,21 ……………… is in A.P.?

Ans yes

1. Find the first term and common difference of the A.P.

1,5,9,13,17. Ans : a=1 , d=4

1. Find the 10th term of the A.P. 63,58,53,48 …………………………

Ans : 18

1. Find the 8th term from the end of the A.P. 7,10,13………………184.

Ans : 163

1. In the given A.P. find the missing term :

, [ ] , 5 Ans : 3



1. Find the sum of first 24th terms of the A.P.:

5,8,11,14,……………………………….. Ans : 948

**Level – 2**

1. Which term of the A.P. 84,80,76,…………………….. is zero. Ans : n=22

2. Find the sum of odd numbers between 0 and 50. Ans : 625

3. Which term of the sequence 48,43,38,33……………………….is the first –ve term. Ans : 11th

4. if the no. 4p+1,26,10p-5 are in A.P. .Find the value of p. Ans : p=4

5. If 9th  term of an A.P. is zero, prove that its 29th term is double the 19th term.

**Level – 3**

1. The 7th term of an A.P. is 32 and its 13th term is 62. Find the A.P.

Ans : 2, 7,12,………….

1. Find the sum of first 25th term of an A.P. whose nth term is given by Tn =2-3n.

Ans : -925

1. If m times the mth term of an A.P. is equal to n times its nth term; find (m+n)th term. Ans: 0
2. Which term of the A.P. 3,10,17,…………………….will be 84 more than its 13th term.

Ans : 25th

1. If the sum of first n, 2n and 3n terms of an A.P. be , and respectively then prove that



= 3().



**Level – 4**

1. How many multiple of 4 lie between 10 and 250? Also find their sum.

Ans : n=60 =7800



1. The first and last term of an A.P. is 8 and 350 respectively. If its common difference is 9, how many terms are there and what is their sum?

Ans : n=39, =6981



1. The sum of first 15 terms of an A.P. is 105 and the sum of the next 15 terms is780. Find the first 3 terms of the A.P. :

Ans : -14,-11,-8.

1. If the sum of first nth terms of an A.P. is given by , find the nth term of the A.P.



**Self Evaluation**

1. Find the common difference and write the next two terms of the A.P. 8,3,-2,-7.

2. Which term of the A.P. 4,9,14 …………………… is 89?

Also find the sum.

3. Find the sum of all two digits positive numbers divisible by 3.

4. The sum of n terms of an A.P. is 3n2+5n.find the A.P. .Also find 16th term.

5. The ratio of the sum of n and m terms of an A.P. is m2:n2. Show that the ratio of the mth term and nth term is

(2m-1):(2n-1).

**CO-ORDINATE GEOMETRY**

**IMPORTANT CONCEPTS**

**TAKE A LOOK**

1. **Distance Formula**:-

The distance between two points A(x1,y1) and B (x2,y2) is given by the formula.

AB=√(X2-X1)2+(Y2-Y1)2

COROLLARY:- The distance of the point P(x,y) from the origin 0(0,0) is give by

OP= √(X-0)2 + (Y-0)2 ie OP= √X2+Y2

1. **Section Formula :-**

The co-ordinates of the point P(x,y) which divides the line segment joining A(x1,y1) and B(x2,y2) internally in the ratio m:n are given by .

1. **Midpoint Formula:-**

If R is the mid-point, then m1=m2 and the coordinates of R are

R x1+x2 , y1+y2

2 2

1. **Co-ordinates of the centroid of triangle:-**

The co-ordinates of the centroid of a triangle whose vertices are P(x1,y1), Q(x2,y2) and R(x3,y3) are

x1+x2+x3 y1+y2+y3

3 , 3

1. **Area of a Triangle:-**

The area of the triangle formed by the points P(x1,y1) Q(x2,y2) and R(x3,y3) is the numerical value of the expression.

ar (∆PQR)=1/2 x1(y2-y3)+x2(y3-y1)+x3(y1-y2)

**LEVEL-I**

1. Find the distance of the points (6,-6) from origin. Ans-6√2 units
2. Show that the point (1,1)(-2,7) and (3,-3) are collinear.
3. Find the distance between the points R(a+b , a-b)and S(a-b, -1-b) Ans-2√a2+b2 units
4. Find the point on x-axis which is equidistant from (2,-5) and (-2,9). Ans- x=-7
5. Find the area of the triangle whose vertices(-5,-1),(3,-5)(5,2) Ans-32 sq units

**LEVEL-II**

1. Show that the points (-2,5), (3,-4) and (7,10) are the vertices of a right angled isosceles triangle.
2. Find a relation between x and y if the points (x,y),(1,2) and (7,0) are collinear.

Ans : x+3y =7

1. Find the point on y axis which is equidistance from the points (5,-2) and (-3,2) Ans-(0,-2)
2. If the points A(4,3) and B(x,5) are on the circle with the centre O(2,3) find the value of x. Ans-2
3. Find the value of ‘k’ for which the points (7,-2),(5;1) and (3,k) are collinear. Ans-k=4
4. Find the area of triangle whose vertices are (2,-4),(-1,0) and (2,4) Ans-12 sq.units
5. Find the ratio in which line segment joining the points (6,4) and (1,-7) is divided by x-axix also find the coordinates of the points of division. Ans 7:4 and (46/11, 0)

**LEVEL-III**

1. Show that the points (7,10),(-2,5) and (3,-4) are the vertices of an isosceles right triangle.
2. In what ratio does the line x-y-2=0 divide the line segment joining (3,-1) and (8,9)? Also find the coordinates of the point of intersection. Ans-(2:3)(5,3)
3. Three consecutive vertices of a parallelogram are (-2,-1),(1,0) and (4,3). Find the coordinates of the fourth vertex. Ans-(1,2)
4. Show that the points A(5,6); B(1,5); C(2,1) and D(6,2) are the vertices of a square.
5. The vertices of a triangle are (-1,3),(1,-1) and (5,1). Find the length of medians through vertices (-1,3) and (5,1) Ans-(5,5)
6. Find the value of P for which the points (-5,1),(1,P) and (4,-2) are collinear.

Ans P=-1

**SELF EVALUATION QUESTION**

1. Find the distance between points.
2. A(6,0) B(14,0)
3. A(0,-5) B(0,10)
4. A(0,p) B(P,0)
5. Show that the points (-1,-1),(1,1) and (-√3, √3) are the vertices of an equilateral triangle.
6. The line joining the points A(4,-5) and B(4,5) is divided by the point P such that AP/AB=2/5. Find the coordinates of P.
7. Find the coordinates of the points which trisect the line segment joining (1,-2) and (-3,4).
8. Determine the ratio in which the line 2x+y=4 divides the line segment joining the points (2,-2) and (3,7).
9. Find the value of K such that the point (0,2) is equidistant from the points (3,k) and (k,5).
10. Prove that the points (4,5),(7,6),(6,3) and (3,2) are the vertices of a parallelogram. Is it a rectangle?

**APPLICATIONS OF TRIGONOMETRY**

**(HEIGHT AND DISTANCES)**

**IMPORTANT CONCEPTS**

**TAKE A LOOK**

|  |  |
| --- | --- |
| **Line of sight**  Line segment joining the object to the eye of the observer is called the line of sight. |  |
| **Angle of elevation**  When an observer sees an object situated in upward direction, the angle formed by line of sight with horizontal line is called angle of elevation. |  |
| **Angle of depression**  When an observer sees an object situated in downward direction the angle formed by line of sight with horizontal line is called angle of depression. |  |

**LEVEL – 1 (Questions carrying one marks)**

1. The height of a tower is 10m. What is the length of its shadow when sun’s altitude is 45o.

Ans : 10m

1. A ladder 15m long just reaches the top of a vertical wall. If the ladder makes an angle of 60o with the wall. Find the height of the wall.

Ans: 7.5√3m

1. A pole 6cm high casts a shadow 2√3 m long on the ground, then find the sun’s elevation.

Ans : 60o

1. A bridge across a river makes an angle of 45o with the river bank. If the length of the bridge across the river is 150m, then find the width of the river.

Ans : 75√2m

1. A 6m tall tree casts a shadow of length 4m. If at the same time a flagpole casts a shadow 50m in length, then find the length of the flagpole.

Ans: 75m

**LEVEL – 2 (Questions carrying 3 marks)**

1. A tree breaks due to storm and the broken part bends so that the top of the tree touches the ground making an angle of 30o with the ground. The distance between the foot of the tree to the point where the top touches the ground is 8m. Find the height of the tree. [Ans-8√3m]
2. A kite is flying at a height of 60m above the ground. The string attached to the kite is temporarily tied to a point on the ground. The inclination of the string to the ground is 60o. Find the length of the string assuming that there is no slack in the string. [Ans-40√3m]
3. The angle of elevation of the top of a hill at the foot of the tower is 60o and the angle of elevation of the top of the tower from the foot of the hill is 30o. If the tower is 50m high, find the height of the hill. [Ans-150m]

**LEVEL – 3 (Questions carrying 4 marks**)

1. From the top of a 7m high building, the angle of elevation of the top of a cable tower is 60o and the angle of depression of the foot of the tower is 30o. Find the height of the tower. [Ans-28m]
2. The angle of elevation of an aeroplane from a point on the ground is 45o. After flight for 15 seconds the elevation changes to 30o. If the aeroplane is flying at a height of 3000m. Find the speed of the aeroplane.

[Ans-527.4km/h]

1. The angle of elevation of a cloud from a point h metres above a lake is α and the angle of derpression of its reflection in the lake is β. Prove that the height of the cloud is metres.



**SELF EVALUATION**

1. From the top of a light house, the angles of depression of two ships on opposite sides of it are observed to be α and β. If the height of the light house is h metres and the line joining the ships passes through the foot of the lighthouse, show that the distance between ships is metres.



1. The angle of elevation of the top of towers from points p and q at distances of a and b respectively from the base and in the same straight line with it are complementary. Prove that the height of the tower is .



1. A man standing on the deck of a ship which is 10m above the water level observes the angle of elevation of the top of a hill as 60o and the angle of depression of the base of the hill is 30o. Calculate the distance of the hill from the ship and the height of the hill.
2. The angle of elevation of the top of the tower as observed from a point on the ground is α and on moving ‘a’ m towards the tower, the angle of elevation is β. Prove that the height of the tower is



1. A person standing on the bank of a river observes that the angle of elevation of the top of a tree standing on the opposite bank is 60o. When he moves 40m away from the bank, he finds that angle of elevation to be 30o. Find the height of the tree and the width of the river. [use √3=1.732]

**Circles**

**Important Concepts**

**Take a look:**

Tangent to a circle :

A tangent to a circle is a line that intersects the circle at only one point.

P tangent

P= point of contact

* There is only one tangent at a point on a circle.
* There are exactly two tangents to a circle through a point lying out side the circle.
* The tangent at any point of a circle is perpendicularto the radius through the point of contact.
* The length of tangents drown from an external point to a circle are equal.

**Level -1**

1. Find the length of the tangent from T which is at a distance of 13 cm from the centre of a circle of radius 5 cm.

Ans : 12cm.

1. In the adjoining figure TP&TQ are two tangents to a circle with centre o .if <POQ=1100

then find the angle PTQ.

P

T

Q Ans : 700

1. In the adjoining figure ABC is circumscribing a circle.

Find the length of BC

A

4

11cm

3

Ans : 10cm

B C

1. In the adjoining figure a circle touches the side BC of ∆ ABC. At a point P and touches AB&AC produced at Q and R respectively . If AQ =5 cm find the perimeter of ∆ABC.

A Ans-10cm

B p C

Q R

**Level-2**

1. In the adjoining figure AB=AC. Prove that BE=EC

A

D F

B C

E

1. TP and TQ are tangents from T to the circle with center o . R is the point on the circle. Prove that

TA+AR =TB+BR

P

A

R T

Q B

3. Prove that the tangents drown at the ends of a diameter for of a circle are parallel.

4.A circle is touching the side BC of ∆ABC at P and touching.

AB and AC produced at Q and R Respectively. Prove that – A

AQ= (Perimeter of ∆ABC).



B C

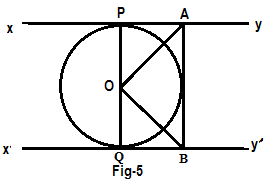
P

Q R

**Level-3**

1. Prove that the parallelogram circumscribing a circle is a rhombus.
2. In the adjoining figure XY &X’Y’ are two parallel tangents to a, circle with centre o. and another tangent AB with point of contact C intersect XY at A and X’Y’ at B is drawn.

Prove that <AOB = 900.



1. Prove that the angle between the two tangents drawn from an external point to a circle.

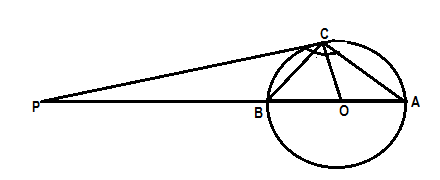
is supplementary to the angle subtended by the line segment joining the point of contact

at the centre.

1. The tangent at a point C of a circle and a diameter AB when extended intersect at P.

If <PCA= 1100 ,find <CBA.

Ans: 700



**Level-4**

1. Prove that the length of tangents drawn from an external point to a circle are equal.
2. Prove that the tangents at any point of a circle is perpendicular to the radius through the point of contact.

**SELF EVALUATION**

1. In the adjoining figure if PQ=PR

Prove that QS= SR. P

Q R

S

2. A quadrilateral ABCD is drawn to circumscribe a circle. Prove that

AB+CD= AD+BC.

3.Two concentric circles are of radii 5cm. and 3cm. Find the length of the chord of the longer circle which touches the smaller circle.

5cm 3cm

L

P Q

4. Prove that tangents drawn at the ends of a chord of a circle make equal angles with the chord.

**CONSTRUCTION**

**IMPORTANT CONCEPTS:-**

**TAKE A LOOK**

1. Division of line segment in the given ratio.
2. Construction of triangles:-
3. When three sides are given.
4. When two sides and included angle given.
5. When two angles and one side given.
6. Construction of right angled triangle.
7. Construction of triangle similar to a given triangle as per given scale.
8. Construction of tangents to a circle.

**LEVEL - I**

1. Divide a line segment in given ratio.
2. Draw a line segment AB=8cm and divide it in the ratio 4:3.
3. Divide a line segment of 7cm internally in the ratio 2:3.
4. Draw a circle of radius 4 cm. Take a point P on it. Draw tangent to the given circle at p.
5. Construct an isosceles triangle whose base 7.5 cm and altitude is 4.2 cm.

**LEVEL –II**

1. Construct a triangle of sides 4cm , 5cm and 6cm and then triangle similar to it whose side are 2/3 of corresponding sides of the first triangle.
2. Construct a triangle similar to a given ∆ABC such that each of its sides is 2/3rd of the corresponding sides of ∆ABC. It is given that AB=4cm BC=5cm and AC=6cm also write the steps of construction.
3. Draw a right triangle ABC in which ∠B=900 AB=5cm, BC=4cm then construct another triangle ABC whose sides are 5/3 times the corresponding sides of ∆ABC.
4. Draw a pair of tangents to a circle of radius 5cm which are inclined to each other at an angle of 600.
5. Draw a circle of radius 5cm from a point 8cm away from its centre construct the pair of tangents to the circle and measure their length.
6. Construct a triangle PQR in which QR=6cm ∠Q=600 and ∠R=450. Construct another triangle similar to ∆PQR such that its sides are 5/6 of the corresponding sides of ∆PQR.

**AREAS RELATED TWO CIRCLES**

**IMPORTANT CONCEPTS:-**

**TAKE A LOOK**

1. Circle: The set of points which are at a constant distance of r units from a fixed point o is called a circle with centre o.

R

r

o

1. Circumference: The perimeter of a circle is called its circumference.
2. Secant: A line which intersects a circle at two points is called secant of the circle.
3. Arc: A continuous piece of circle is called an arc of the circle..
4. Central angle:- An angle subtended by an arc at the center of a circle is called its central angle.
5. Semi Circle: - A diameter divides a circle into two equal arcs. Each of these two arcs is called a semi circle.
6. Segment :- A segment of a circle is the region bounded by an arc and a chord, including the arc and the chord.
7. Sector of a circle: The region enclosed by an arc of a circle and its two bounding radii is called a sector of the circle.
8. Quadrant:- One fourth of a circular region is called a quadrant. The central angle of a quadrant is 900.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| S.N | NAME | FIGURE | PERIMETER | AREA |
| 1.  2.  3.  4.  5. | Circle  Semi- circle  Ring (Shaded region)  Sector of a circle  Segment of a circle |  | or  + 2r  Outer =  Inner =  l+2r=  +2r Sin | 2  ½ 2  (R2-r2)  or  - sinθ |

1. Length of an arc AB= 2



A B

l

1. Area of major segment= Area of a circle – Area of minor segment
2. Distance moved by a wheel in

1 rotation=circumference of the wheel

1. Number of rotation in 1 minute

=Distance moved in 1 minute / circumference

LEVEL-I

1. If the perimeter of a circle is equal to that of square, then the ratio of their areas is
2. 22/7
3. 14/11
4. 7/22
5. 11/14 [Ans-ii]
6. The area of the square that can be inscribed in a circle of 8 cm is
7. 256 cm2
8. 128 cm2
9. 64√2 cm2
10. 64 cm2 [Ans-ii]
11. Area of a sector to circle of radius 36 cm is 54 cm2 . Then the length of the corresponding arc of the circle is



1. 6



1. 3



1. 5



1. 8



[Ans –ii]

1. A wheel has diameter 84 cm. The number of complete revolution it will take to cover 792 m is.
2. 100
3. 150
4. 200
5. 300 [Ans-iv]
6. The length of an arc of a circle with radius 12cm is 10 cm. The central angle of this arc is .



1. 1200 [Ans-iv]
2. 600
3. 750
4. 1500
5. The area of a quadrant of a circle whose circumference is 22 cm is
6. 7/2 cm2
7. 7 cm2
8. 3 cm2
9. 9.625 cm2 [Ans-iv]

LEVEL-II

1. In fig o is the centre of a circle. The area of sector OAPB is 5/18 of the area of the circle find x.

[Ans 100]

A B

P

1. If the diameter of a semicircular protractor is 14 cm, then find its perimeter . [Ans-36 cm]
2. The radius of two circle are 3 cm and 4 cm . Find the radius of a circle whose area is equal to the sum of the areas of the two circles.

[Ans-5 cm]

1. The length of the minute hand of a clock is 14 cm. Find the area swept by the minute hand in 5 minutes.

[Ans-154/3 cm]

LEVEL-III

1. Find the area of the shaded region in the figure if AC=24 cm ,BC=10 cm and o is the center of the circle (use



A [Ans- 145.33 cm2]

B C

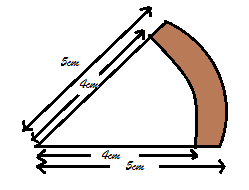
1. The inner circumference of a circular track is 440m. The track is 14m wide. Find the diameter of the outer circle of the track. [Take =22/7]



[Ans-168]

1. Find the area of the shaded region.

[Ans-9.625 m2]



1. A copper wire when bent in the form of a square encloses an area of 121 cm2 . If the same wire is bent into the form of a circle, find the area of the circle (Use =22/7)



[Ans 154 cm2]

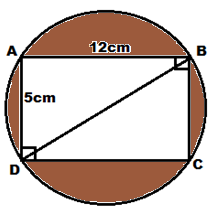
1. A wire is looped in the form of a circle of radius 28cm. It is rebent into a square form. Determine the side of the square (use



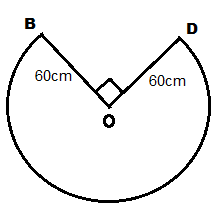
[Ans-44cm]

LEVEL-IV

1. In fig, find the area of the shaded region [use [Ans: 72.67 cm2]



1. In fig. the shape of the top of a table in a restaurant is that of a sector of a circle with centre 0 and ∠BOD=900. If OB=OD=60cm find
2. The area of the top of the table [Ans 8478 cm2]
3. The perimeter of the table top (Take [Ans 402.60 cm]



1. An arc subtends an angle of 900 at the centre of the circle of radius 14 cm. Find the area of the minor sector thus formed in terms of.



[Ans 49 cm2]



1. The length of a minor arc is 2/9 of the circumference of the circle. Write the measure of the angle subtended by the arc at the center of the circle.

[Ans 800]

1. The area of an equilateral triangle is 49√3 cm2. Taking each angular point as center, circles are drawn with radii equal to half the length of the side of the triangle. Find the area of triangle not included in the circles.

[Take √3=1.73] [Ans 777cm2]



SELF EVALUATION

1. Two circles touch externally. The sum of their areas is 130 cm2 and distance between their centers is 14 cm. Find the radii of circles.



1. Two circles touch internally. The sum of their areas is 116 cm2 and the distance between their centers is 6 cm. Find the radii of circles.



1. A pendulum swings through an angle of 300 and describes an arc 8.8 cm in length. Find length of pendulum.
2. What is the measure of the central angle of a circle?
3. The perimeter and area of a square are numerically equal. Find the area of the square.

**SURFACE AREAS AND VOLUMES**

**IMPORTANT FORMULA**

**TAKE A LOOK**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| SNo | NAME | FIGURE | LATERAL CURVED SURFACE AREA | TOTAL SURFACE AREA | VOLUME | NOMENCLATURE |
| **1** | **Cuboid** |  | **2(l+b)xh** | **2(lxb + bxh + hx l)** | **l x b x h** | **L=length, b=breadth, h=height** |
| **2** | **Cube** |  | **4l2** | **6l2** | **l3** | **l=edge of cube** |
| **3** | **Right Circular Cylinder** |  | **2πrh** | **2πr(r+h)** | **πr2h** | **r= radius**  **h=height** |
| **4** | **Right Circular Cone** |  | **πrl** | **πr(l+r)** | **πr2h** | **r=radius of base, h=height , l=slant height =** |
| **5** | **Sphere** |  | **4πr2** | **4πr2** | **πr3** | **r=radius of the sphere** |
| **6** | **Hemisphere** |  | **2πr2** | **3πr2** | **πr3** | **r=radius of hemisphere** |
| **7** | **Spherical shell** |  | **2π(R2 + r2)** | **3π(R2 - r2)** | **π(R3 - r3)** | **R=External radius, r=internal radius** |
| **8** | **Frustum of a cone** |  | **πl(R+r) where l2=h2+(R-r)2** | **π[R2 + r2 + l(R+r)]** | **πh/3[R2 + r2 + Rr]** | **R and r = radii of the base, h=height, l=slant height.** |

9. Diagonal of cuboid =



10. Diagonal of Cube = √3l

**LEVEL-I**

1. In a right circular cone the cross section made by a plane parallel to the base is a.
2. Circle
3. Frustum of a cone
4. Sphere
5. Semi sphere [Ans-i]
6. The radius and height of cylinder are in the ratio 5:7 and its volume is 550 cm3. Its radius is
7. 1 cm
8. 7 cm
9. 5 cm
10. 6 cm [Ans-iii]
11. A cylinder, a cone and a hemisphere are of equal base and have the same height. What is the ratio of their volumes.
12. 1:2:3
13. 3:1:3
14. 3:1:2
15. 2/3:1/3:1 [Ans-iii]
16. If surface areas of two spheres are in the ratio 4:9 then the ratio of their volumes is :
17. 16/27
18. 4/27
19. 8/27
20. 9/27

[Ans-iii]

1. Determine the ratio of the volume of a cube to that of a sphere which will exactly fit inside the cube:
2. 4:



1. 6: [Ans-iv]



**LEVEL-II**

1. The slant height of a frustum of a cone is 10 cm. If the height of the frustum is 8 cm, then find the difference of the radius of its two circular ends.

[Ans r,r2=6cm]

1. A solid metallic sphere of radius 12 cm is melted and recast into a number of small cones each of radius 4 cm and height 3 cm . Find the number of cones so formed.

[Ans-144]

1. How many spherical lead shots of radius 2 cm can be made out of a solid cube of lead whose edge measures 44 cm? [Ans-2541]
2. Three cubes of metal whose edges are in the ratio 3:4:5 are melted and converted into a single cube of diagonal 24√3 cm. Find the edges of the three cubes.

[Ans-12cm,16,cm,20cm]

1. A heap of rice in the form of a cone of radius 3 m and height 3 m. Find the volume of the rice. How much cloth is required to just cover the heap?

[Ans 9 cm3, 9√2m2]



**LEVEL-III**

1. Three solid metallic spheres of radii 3 cm , 4cm and 5cm respectively are melted to form a single solid sphere. Find the diameter of the resulting sphere.

[Ans 12 cm]

1. Find the number of coins 1.5 cm in diameter and 0.2 cm thick to be melted to form a right circular cylinder of height 10 cm and diameter 4.5 cm.

[Ans-450]

1. The rain water from a roof 22m x 20m drains into a cylindrical vessel having diameter of base 2 m and height 3.5 of the vessel is just full . Find the rainfall in cm.

[Ans 2.5 cm]

1. The radius of the base and the height of a solid right circular cylinder are in the ratio of 2:3 and its volume is 1617 cm2. Find the total surface area of the cylinder.

[Ans -770 cm2]

1. A semispherical bowl of internal radius 9 cm is full of liquid. The liquid is to be filled into cylindrical shaped small bottles each of diameter 3 cm and height 4 cm. How many bottles are needed to empty the bowl?

[Ans-54]

**LEVEL-IV**

1. A sphere of diameter 12 cm is dropped in a right circular cylindrical vessel, partly filled with water. If the sphere is completely submerged in water, the water level in the cylindrical vessel rises by 3 5/9 cm. Find the diameter of the cylindrical vessel.

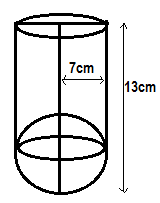
[Ans-180cm]

1. A bucket made up of metal sheet in the form of a frustum of a cone. Its depth is 24 cm and the diameters of the top and bottom are 30cm and 10cm respectively. Find the cost of milk which can completely fill the bucket at rate of Rs 20 per metre and the cost of the metal sheet used, if it costs Rs 10 per 100 cm2.

(use [Ans- Rs163.28 Rs 171.13]



1. A vessel is in the form of a semi spherical bowl mounted by a hollow cylinder. The diameter of the semisphere is 14cm and the total height of the vessel is 13 cm.Find the capacity of the vessel.(Take x=22/7] [Ans-1642.67 cm3 approx]



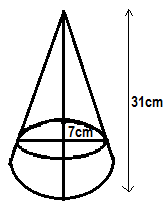
1. If the radii of the ends of a bucket, 45 cm height, are 28 cm and 7 cm determine the capacity and total suface area of the bucket,

[Ans -4850 cm3,5616.6cm2]

1. A toy is in the form of a cone mounted on a hemisphere of common base radius 7cm. The total height of the toy is 13 cm . Find the total surface of the toy.(=22/7)



[Ans- 858 cm2]



**SELF EVALUATION QUESTION**

1. The base radii of two right circular cone of the same height are in the ratio 3:5. Find the ratio of their volumes.
2. If a,b,c are the dimensions of a cuboid, S be the total surface area and v its volume then prove that 1/v=2/s(1/a+1/b+1/c).
3. If h, c, v respectively are the height, the curved surface area and volume of a cone prove that

3πvh3-c2h2 +9v2=0

1. A toy is in the form of a cone mounted on a hemisphere of radius 3.5 cm. If the total height of the toy is 15.5 cm. Find the volume of the toy .(use =22/7).

**PROBABLITY**

**IMPORTANT CONCEPTS:-**

**TAKE A LOOK**

1. **Probability:**- The theoretical probability of an event E, written as P(E) is defined as.

P(E)= Number of outcomes favourable to E

Number of all possible outcomes of the experiment

Where we assume that the outcomes of the experiment are equally likely.

1. The probability of a sure event (or certain event) is 1.
2. The probability of an impossible event is 0.
3. The probability of an Event E is number P (E) such that 0≤P(E)≤1.
4. Elementary events:- An event having only one outcome is called an elementary event. The sum of the probabilities of all the elementary events of an experiment is 1.
5. For any event E,P(E)+P()=1, where stands for not E, E and are called complementary event.



1. Performing experiments:-
2. Tossing a coin.
3. Throwing a die.
4. Drawing a card from deck of 52 cards.
5. **Sample space:-**The set of all possible outcomes in an experiment is called sample space.

**LEVEL-I**

1. Write a sample space of
2. Tossing a coin.
3. Throwing a die. Ans-{H,T},{1,2,3,4,5,6}
4. Define probability (Theoretical probability of an event).
5. A card is drawn from a well-shuffled pack of 52 cards what is the probability that it is an ace? Ans-1/13
6. A dice is thrown once. Find the probability of getting a number greater than 3.

Ans : ½

1. What is the probability that a number selected from the number 1,2,3………………16 is prime number?

Ans-3/8

1. A letter is chosen at random from the English alphabet. Find the probability that the letter chosen precedes ‘g’. Ans-3/13
2. Find the probability of getting a red heart. Ans-1/4
3. A coin is tossed twice. Find the probability of getting at least one head. Ans-3/4
4. What is the probability of a sure event? Ans-1

**LEVEL-II**

1. One card is drawn from a well shuffled deck of 52 cards. Find the probability of getting.
2. An ace
3. A face card Ans- i- 1/13

ii- 3/13

1. A bag contains 5 red balls, 4 green ball and 7 white balls. A ball is drawn at random from the bag. Find the probability that the ball drawn is (i) White (II) neither Red nor White.

Ans- (i) 7/16

(II)1/4

1. Find the probability of getting 53 Friday in a leap year. Ans-2/7
2. Two dice are thrown simultaneously. What is the probability that.
   * 1. 5 will come up on at least one?
     2. 5 will come up at both dice?

Ans-(i)11/36

(ii)1/36

1. Two coins are tossed once. Find the probability of getting.
   * 1. Exactly one head Ans-(i)1/2
     2. Almost one head (ii)3/4
2. In a lottery there are 10 prizes and 25 blank. Find the probability of getting a prize.

Ans-2/7

1. The king, the queen and the jack of clubs are removed from a deck of 52 playing cards and the remaining cards are shuffled. A card is drawn from the remaining cards. Find the probability of getting a card of .
   * 1. Heart Ans-(i)13/49 (ii)3/49 (iii)10/49
     2. Queen
     3. Clubs

**LEVEL - III**

1. Nidhi and Nisha are two friends. What is the probability that both will have

a. Same birthday Ans-(a) 1/365

b. Different birthday (ignore the leap year) (b)364/365

1. A box contains 20 balls bearing number 1,2,3,4,……..20. A ball is drawn at random from the box. What is the probability that the number on the ball is.
   1. An odd number Ans-(a)1/2 (b)13/20 (c)2/5
   2. divisible by 2 or 3
   3. Prime number
2. A card is drawn at random from a well shuffled deck of 52 cards. What is the probability of drawing
   1. King or a spade Ans-(a) 4/13 (b)3/4 (c)5/52
   2. A non spade
   3. Either a king or a 10 of heart
3. Tom was born in February 2000. What is the probability that he was born on 13th Feb?

Ans-1/29

1. Are the following outcomes equally likely or not? A baby is born “ It is a boy or a girl”.

Ans-Yes equally likely

1. Find the probability of getting 53 Mondays in a leap year 53 Tuesday in a non leap year.

Ans-2/7 and 1/7

1. A letter is selected from the letter of word MATHEMATICS. What is the probability that it is M?

Ans-2/11

1. In an N.C.C camp there are 20 boys and 15 girls. The best cadet is to be chosen. What is the probability that the best cadet is a girl? Ans-3/7
2. Out of 400 bulbs in a box 15 bulbs are defective one bulb is taken out at random from the box. Find the probability that the drawn bulb is not defective. Ans-77/80

Self evaluation questions

1. A bag contains 5 white balls, 7 red balls and 2 blue balls. One ball is drawn at random from the bag what is probability that bulb drawn is

1. White or blue
2. Black or red
3. Not white

2. A child has a die whose six faces show the letters as given below.

A B C D E A

If a die is thrown once find probability of getting A and D.

3. Find the probability of getting 53 Sundays in a leap year.

4. From a well shuffled pack of 52 cards, a card is drawn at random. Find the probability that it is a:-

1. Spade
2. King
3. Club
4. Queen
5. A red card
6. The black king
7. The queen of diamonds.
8. Two dice are thrown at the same time find the probability of getting.
   1. Same number on both dice.
   2. Different number on both dice.

6. Someone is asked to take a number from 1 to 100. Find the probability that it is not a prime number.

7. Card marked with number 5 to 50 are placed in a box and mixed throughout. A card is drawn from the

box at random. Find the probability that the number on the taken out card is

1. A Prime number less than 10
2. A number which is a perfect square
3. There are 20 cards numbered 1,2,3,………20 in a box. One card is drawn. Find the probability that the number on the card is
   1. A number divisible by 6
   2. A number divisible by 7

**FORMATIVE ASSESSMENT – III**

**TIME: 1 ½ HR MARKS : 40**

**SECTION A**

(EACH Question carries 1 MARK)

Q1. Which of the following equations has two distinct real roots?

A). 2X2+ 3√2 X+9/4 =0 b). x 2+x -5 =0

C). x2 +3x +2√2 = 0 d). 5x2 – 3x +1 = 0

Ans : (b)

Q2. The sum of first 16 terms of the A.P. : 10,6,2, …………… is.

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

Ans :(a)

Q3: The point (-4,0),(4,0) ,(0,3) are the vertices of a .

a). right angled triangle b). Isosceles triangle c). Equilateral triangle

d).scalene triangle

Ans : (b)

Q4: A pole 6m high casts a shadow 2√3m long an the ground, then the sun’s elevation is.

a). 60 0 b). 45 0 c). 30 0 d). 90 0

Ans :(a)

Q5. If radii of two concentric circles are 4cm and 5cm,

Then the length of each chord of one circle which is tangent to other circle is:

a). 3cm b).6cm c). 9cm d). 1cm

Ans : (b)

**SECTION B**

(EACH Question carries 2 MARKS)

Q6.Find a relation between x and y such that the point (x,y) is equidistant from the point (3,6)

and(-3,4).

Ans: 3x+y-5=0.

Q7.Check whether the following equation is a quadratic equation.

x2-4x+6=0 Ans: yes

Q8.The angle of elevation of the top of a tower from a point on the ground, which is 30m away from the foot of the tower is 300. Find the height of the tower.

Ans: 10√3 m.

Q9.Find the sum of the following A.P.:

-37,-33,-29,………………….. to 12 terms.

Ans:



Q10. The length of a tangent from a point A at distance 5cm from the center of the circle is 4cm.

Find the radius of the circle.

Ans: -3cm

Q11. Find the distance between the points [ -8/5,2] and [2/5,2].

Ans: 2 units.

**SECTION C**

(EACH Question carries 3 MARKS)

Q12.If (1,2),(4,y),(x,6) and (3,5) are the vertices of a gm taken in order, find x and y

Ans: x=6; y=3.

Q13. The angle of elevation of the top of a building from the foot of the tower is 300 and the angle of elevation of the top of tower from the foot of the building is 600 .If the tower is 50 meter high find the height of the building.

*Ans: 16 2/3 m.*

Q14. If triangle ABC is drown to circumscribe a circle of radius 4cm, such that the segment BD

And DC into which BC is divided by the point of contact D are of the length 8cm and 6cm respectively. Find the sides AB and AC (fig.)

A

F E

C B

6 cm D 8cm

Q15. Find the value of k for the following quadratic equation, so that they have two equal roots.

KX(X-2)+6=0

Ans: k=6.

Q16. Which term of the A.P. 3,15,27,39,…………………….will be 132 more than its 54th term.

Ans: 65th term

**SECTION D**

(EACH Question carries 4 MARKS)

Q17. Two water taps together can fill a tank in 9 (3/8) hours. The tap of longer diameter takes 10 hours less than the smaller one to fill the tank separately. Find the time in which each tap can separately fill the tank.

Ans: longer tap= 15 hours. Smaller tap=25 hours.

Q18. If the angle of elevation of a cloud from a point h meters above a lake is and the depression of its reflection in the lake , prove that the height of the cloud is



h(tan+tan )



tan - tan



OR

The length h of tangents drown from an external point to a circle are equal, prove it.

**MODEL QUESTION PAPER**

**SA-II**

**CLASS-X TIME:3 to 3.1/2 hr**

**SUBJECT- MATHS MM: 80**

**General Instructions:**

1. All questions are compulsory.
2. The question paper consists of 34 questions divided into four section- A,B,C and D.
3. Section A contains 10 question of 1 mark each which are multiple choice type questions. Section B contains 8 question of 2 marks each, Section C contains 10 question of 3 marks each and Section D contains 6 question of 4 marks each.
4. There is no overall choice in the paper. However, internal choice is provided in one question of 2 marks , three questions of 3 marks and two questions of 4 marks.
5. Use of calculator is not permitted.

**SECTION A**



Question Numbers1 to 10 carries 1 mark each. For each of the question number 1to 10, four alternative choice have been provided, of which only one is correct. Select the correct choice.

1. The perimeter (in cm) of square circumscribing a circle of radius a cm, is



* 1. 8 a
  2. 4 a
  3. 2 a
  4. 16 a

1. If A and B are the points (-6,7) and (-1,-5) respectively, then the distance 2 AB is equal to
   1. 13
   2. 26
   3. 169
   4. 238
2. If the common difference of an A.P is 3, then is.



1. 5
2. 3
3. 15
4. 20
5. If P ( a/2,4) is the midpoint of the line segment joining the points A(-6,5) and B(-2,3), then the value of a is .
6. -8
7. 3
8. -4
9. 4
10. In Figure 1 .○ O is the centre of a circle, PQ is a chord and PT is the tangent at P. If <PQR=700, then <TPQ is equal to

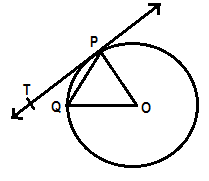


Figure 1

1. 550
2. 700
3. 450
4. 350
5. In Figure 2, AB and AC are tangent to the circle with centre O such that <BAC =400 Then <BOC is equal to

B

A 400

C

Figure- 2

1. 400
2. 500
3. 1400
4. 1500
5. The roots of the equation x2-3x-m(m+3)=0, where m is a constant are
   1. m, m+3
   2. –m, m+3
   3. m, -(m+3)
   4. –m , -(m+3)
6. A tower stands vertically on the ground. From a point on the ground which is 25m away from the foot of the tower, the angle of elevation of the top of the tower is found to be 450. Then the height (in meters) of the tower is
   1. 25√2
   2. 25√3
   3. 25
   4. 12.5
7. The surface area of solid hemisphere of radius r cm (in cm2) is



* 1. 3



* 1. 4



1. A card is drawn from a well-shuffled deck of 52 playing cards. The probability that the card is not a red king is



**SECTION – B**

**Question Numbers 11 to 18 carry 2 marks each.**

11. Two cubes each of volume 27 cm3 are joined end to end to form a solid. Find the surface area of the resulting cuboid.

OR

A cone of height 20 cm and radius of base 5 cm is made up of modeling clay. A child reshapes it in the form of a sphere. Find the diameter of the sphere.

12. Find the value of y for which the distance between the points A(3,-1) and B(11,y) is 10 units.

13. A ticket is drawn at random from a bag containing tickets numbered from 1 to 40. Find the probability that the selected ticket has a number which is a multiple of 5.

14. Find the value of m so that quadratic equation mx(x-7) + 49 =0 has two equal roots.

15. In figure 3 , a circle touches all the four side of a quadrilateral ABCD whose sides are AB=6 cm, BC=9cm and CD=8 cm. Find the length of side AD.

D C

A B

Figure-3

16. Draw a line segment AB of length 7 cm. Using ruler and compasses, find a point P on AB such that = .



17. Which term of the A.P 3,14,25,36,… will be 99 more that its 25th term?

18. In Figure 4, a semi circle is drawn with O as center and AB as diameter. Semi-circle are drawn with AO and OB as diameters. If AB=28 m, Find the perimeter of the shaded region. [Use

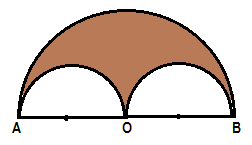


Figure- 4

**SECTION-C**

Question Numbers 19 to 28 carry 3 marks each.

19. Draw a right triangle ABC in which the sides (other than hypotenuse) are of length 4 cm and 3 cm. Then construct another triangle whose sides are 3/5 times the corresponding sides of the given triangle.

20. Solve the following quadratic equation for x. p2x2-(p2- q 2) x –q2 =0

OR,

Find the value of ‘k’ so that the quadratic equation 2kx 2- 40x +25 = 0 has real and equal roots.

21. Find the sum of first 15 terms of an AP whose nth term is given by 9 -5n..

OR

Find the sum of all 3digit numbers which leaves the remainder 3 when divided by 5.

22. A bag contains 4 red balls, 5 black ball and 6 white balls. A ball is drawn from the bag at random. Find the probability that the ball drawn is:

a. red

b. white

c. not black

d. red or black

23. If the area of ∆ ABC whose vertices are (2,4),(5,k) and (3,10) is 15 sq units, find the value of ‘k’

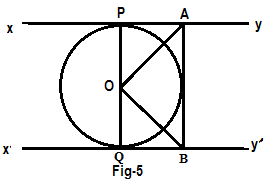
OR

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

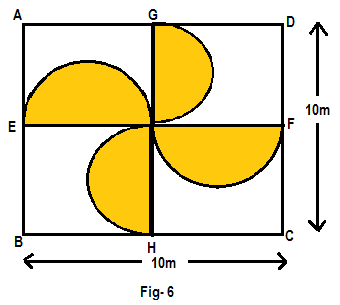
24. A kite is flying at height of 60m above the ground. The string attached to the kite is temporarily tied to a point on the ground. The inclination of the string to the ground is 600. Find the length of the string assuming that there is no slack in the string.

25. Three spherical metal ball of radii 6cm,8 cm and x cm are melted and recasted into single sphere of radius 12 cm. Find the radius of 3rd sphere.

26. XY and X’Y’ are two parallel tangents to a circle with center O and another tangent AB with point of contact C, intersecting XY at A and X’Y’ at B, is drawn. Prove that ∠AOB=900



27. ABCD is Square Park of side 10 m. It is divided into 4 equal squares parks. Semi circular flower beds are made as shown by the shaded region. Find the area of shaded region.



28. Two vertices of a triangle ABC are A(-7,6) and B(8,5). If the midpoint of the side AC is at -

5/2,2 , Find the coordinate of vertex C.

**SECTION-D**

**QUESTION NUMBERS 29 TO 34 CARRY 4 MARKS EACH**

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

30. A shopkeeper buys a number of books for RS 1200. If he had bought 10 more books for the same amount, each book would have cost him Rs.20 less. How many books did he buy?

OR,

. A passenger train take one hour less for a journey of 360 km if its speed is increased by 5 km/ hr. from its usual speed. Calculate the usual speed of the train.

31. A man standing on the deck of a ship which is 10m above the water level, observes the angle of elevation of the top of a hill as 600 and angle of depression of the base of the hill as 300. Calculate the distance of the hill from ship and the height of the hill.

32. A chord of a circle of diameter 24 cm subtends an angle 600 at the center of the circle. Find the area of the corresponding.

(a) Minor sector

(b) Minor segment

33. How many coins 1.75 cm in diameter and 2 mm thick must be melted to form a cuboid of dimensions 11 cm x 10 cm x 7 cm.

OR

If the radii of the circular ends of a bucket in the shape of frustum of a cone which is45 cm high are 28 cm and 7cm , find the capacity of the bucket.

34. The sum of first 15 terms of an AP is 105 and the sum of the next 15 terms is 780. Find the first 3 terms of the arithmetic progression.

**SA-II**

**MARKING SCHEME**

**CLASS-X (MATHS)**

EXPECTED ANSWERS/VALUE POINTS

**SECTION-A**

Q . No Marks

1.(A):8a 2. (B):26 3.(C):15 1X10 =10

4. (A) : -8 5. (D):350 6. (C):1400

7. (B): -m, m+3 8. (C):25 9. (B): 3



10.(D)



**SECTION-B**

1. Getting side of cube=3 cm

1/2m

Dimensions of the resulting cuboids are 6cm x 3cm x 3cm 1/2m

∴ Surface area = 2(6x3+3x3+3x6) cm2

=90 cm2 1m

OR

Volume of cone =1/3(5)2.20cm2 ½ m



∴ 4/3r2=1/3(5)2.20 r=5cm 1m



∴Diameter=10 cm 1/2m

1. AB= = 1/2m



=> 65+y2+2y=100 or y2+2y-35=0 1/2m

∴ y=-7 or y=5 1m

1. Total number of tickets =40

Number of ticket with number divisible by 5=8 1m

∴ Required probability =8/40 or 1/5 1m

1. mx(x-7)+49=0 => mx2-7mx+49=0

For equal roots B2-4AC=0 ½ m

½ m

∴(-7m)2-4(m)(49)=0

=>m=0 or m=4 ½ m

But m≠0 ∴m=4 ½ m

1. Let P,Q ,R,S be the points of contact

D R ∴ AP=AS

C PB=BQ

DR=DS

S Q

CR=CQ ½ m

A p B

∴ (AP+PB)+(DR+CR)=(AS+DS)+(BQ+CQ) ½ m

∴AB+CD=AD+BC

6+8=AD+9=>AD=5CM 1 m

1. For writing (or using AP:PB=3:2 For correct construction 1 ½ m
2. a25=3+24x11=3+264=267 1/2m

∴267+99=366=3+(n-1)11 1m

∴n=34 1/2m

1. Perimeter( of shaded region)=circumference of semicircle of radius 14 cm 1m

+2(circumference of semicircle of radius 7 cm) 1/2m

=(14)+2x7=28=28 x 22/7 =88cm 1m



**SECTION-C**

1. Construction ∆ABC 1 m

Equal angles, construction ║lines 1m

Construction of similar triangle 1m

1. P2x2 – P2x + q2x- q2 =0 ½m

P2x(x-1)+ q2(x-1)=0 1m

(p2x+q2) (x-1)=0 1m

x=1, -q2/P2 ½ m

OR

For real and equal roots

b2-4ac=0 1 m

a=2k,b=-40,c=25 ½ m

(-40)2-4(2K)(25)=0 1 m

16000-200K=0

200K=1600

K=8 ½ m

1. =9-5n



=4 ; = -1, = -6 (A.P) ½ m



∴a=4;d=-1-4=-5 ½ m

Sn=n/2[ 2a+(n-1)d] ½ m

=15/2[2(4)+(15-1)(-5)] ½ m

=15/2 [8-70]=15/2 x -62=15x-31 =-465 1 m

OR

3 digits numbers ae

100,101\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 999

Nos. that leave remainder 3 on dividing

by 5 are: 103:108\_\_\_\_\_\_\_\_\_\_998 ½ m

∴a= 103 d=5 ½ m

Sn=n/2[ 2a+(n-1)d]

n=?

a=a + (n-1) d 1 m

998=103 + (n-1)5

N=180

∴sn=180/2 [2(103)+(180-1)5]

=90[206+895] 1 m

=99090

1. Total no. of balls = R B W

4 + 5 + 6 =15 ½ m

P(Red ball)= = 4 ½ m



15

P(White ball)= =



P(Not black)= = ½ x 4=2 m



P(red or black)= =



1. (,) (2,4) (,) = (3,10) ½ m



(,) (5,K)



Area of ∆ =1/2 [() + () + ()] 1 m



=>½ [ s(k-10)+5(10-4) +3(4-k)] =±15 ½ m

=>2k -20 +50 -20 +12 -3k =±30

1 m

=> -k+22= + 30

K=-8 or 52

OR

Distance formulae ½ m

√ [(x-3)2 +(y-6)2 ] = √ [(x+3)2+(y-4)2 ] ½ m

2 m

Solving and getting 3x+y=5

A Correct fig. : ½ m

600

6660

string

60 m

B C

½ m

AB=ht of the kite above the

ground level =60

AC=String

<ACB=angle of elevation=600

1 m

= =cosec



= =cosec=



1m

AC= = =40 m



25. ++ = 1m



+ =



63 + 83 +x3= 123

X 3 =123 -63 - 83 1m

= 1728 – 216 – 512 = 1000.

* X3 =1000

X= 10 cm 1m

26.Join OC (length of tangents from Ext point)

∆AOP∆ AOC and ∆ BOQ ∆BOC (RHS) 1m



∴∠POA =∠COA and ∠COB=∠BOQ (cpct) 1m

∴∠POA +∠COA+∴∠COB+∴∠BOQ= 1800 ∴∠AOB=900 1m

27. Side of the square =10m

Diameter of semi circle = 5m

Radius = 5/2 m

2 semi circles of equal radii =1 circle

4 semi circles of equal radii =2 circles 1m

Hence Area of shaded region. = 2 1m



= 2x22/7x(5/2)2

= 275/7

= 39.3 m2 1m

28. (,) (-7 , 6)



(,) (8,5)



(,) ?



Let the coordinates of C be(x,y)&

A( -7,6)

Mid point of AC is 1m



* = -5/2, 1m



* X=2, = 2 => y = -2 . 1m



Hence coordinate of C are (2,-2)

**SECTION-D**

29. (Correct figure) 1m

(Given to prove) 1m

(Correct proof) 2m

30.Total amount spent= Rs 1200

Let the number of books originally bought =x

Cost of 1 book = Rs



1m

If the no. of books =x+10

Cost of each books = Rs



- =20 m



+10x-600=0



(x+30)(x-20)=0

X=20, -30

Rejecting x=-30 2 m

We get number of books=20

OR

Let the usual speed =x km/hr ½ m

∴ - =1 1½ m



X2 +5x -1800=0

D=b2-4ac=7225

X=-45(rejected 2m

Or,X=40 km/hr

A

31.

hill

P D

10m

Correct figure 1m

C B

AB=hill

1m

P=position of the man on the deck

PC=10m =DB

∠APD=600; ∠BPD=300

To find A B and BC

∆PDB, tan 300 = PD=10



∆PDB, tan 600 = AD=PD



= 10 x =30m



∴ Distance of the hill from the ship

=BC=PD=10=17.3m Approx 1m



Ht of the hill=AB=AD+DB 1m

=30+10=40m

32.

A B p

Diameter=24 cm

Radius=12cm.

Area of the minor sector

= x



x x12 x 12 2m



=75.4 cm2

Area of ∆ OAB =1/2 x r2 sin



= 1/2x 12x12x/2



=62.35 cm 2 1m

∴ area of minor segment =area of minor sector- Area of ∆

=75.4 – 62.35 =13.05 cm2 1m

33.Let the number of coins =n

D= 1.75 cm ; r= = 0.875 cm



H=2mm =0.2 cm

Vol of each coin =



=x 0.2 cm3 2m



∴vol of n coins = x 0.875 x 0.875 x0.2 x n



Vol of ‘n’ coins =volume of cuboid 1m

x 0.875 x 0.875 x0.2 x n =11x10 x 7



1m

n= 1600

OR,

Volume (frustum) = h ( +) 1m



= xx 45[(28)2 +(7)2 +(28)(7)] 2m



= 48510cm3 1m

34.Sum of first 15 terms =105

Sum of next 15 terms =780 1m

∴Sum of first 30 terms =780+105

=885

1m

* [ 2a+(15-1)d]=105 and



[ 2a+(30-1)d]=885



* 2a+14d=14 and 1m

2a+29d=59

∴a=-14 and d=3

∴The first three terms are 1m

a,a+d,a+2d……….

i.e. -14,-11,-8

**ACTIVITES (TERM-I)**

**(Any Eight)**

Activity1: To find the HCF of two Numbers Experimentally Based on Euclid Division Lemma

Activity2: To Draw the Graph of a Quadratic Polynomial and observe:

1. The shape of the curve when the coefficient of x2 is positive
2. The shape of the curve when the coefficient of x2 is negative
3. Its number is zero

Activity3: To obtain the zero of a liner Polynomial Geometrically

Activity4: To obtain the condition for consistency of system of liner Equations in two variables

Activity5: To Draw a System of Similar Squares, Using two intersecting Strips with nails

Activity6: To Draw a System of similar Triangles Using Y shaped Strips with nails

Activity7: To verify Basic proportionality theorem using parallel line board

Activity8: To verify the theorem: Ratio of the Areas of Two Similar Triangles is Equal to the Ratio of the Squares of their corresponding sides through paper cutting.

Activity9: To verify Pythagoras Theorem by paper cutting, paper folding and adjusting (Arranging)

Activity10: Verify that two figures (objects) having the same shape (and not Necessarily the same size) are similar figures. Extend the similarity criterion to Triangles.

Activity11: To find the Average Height (in cm) of students studying in a school.

Activity12: To Draw a cumulative frequency curve (or an ogive) of less than type.

Activity13: To Draw a cumulative frequency curve (or an ogive ) of more than type.

**ACTIVITES (TERM-II)**

**(Any Eight)**

Activity1: To find Geometrically the solution of a Quadratic Equation ax2+bx+c=0, a0 (where a=1) by using the method of completing the square.



Activity2: To verify that given sequence is an A.P (Arithmetic Progression) by the paper Cutting and Paper Folding.

Activity3: To verify that by Graphical method



Activity4: To verify experimentally that the tangent at any point to a circle is perpendicular to the Radius through that point.

Activity5: To find the number of Tangents from a point to the circle

Activity6: To verify that lengths of Tangents Drawn from an External Point, to a circle are equal by using method of paper cutting, paper folding and pasting.

Activity7: To Draw a Quadrilateral Similar to a given Quadrilateral as per given scale factor (Less than 1)

Activity8: (a) To make mathematical instrument clinometer (or sextant) for measuring the angle of elevation/depression of an object

(b) To calculate the height of an object making use of clinometers(or sextant)

Activity9: To get familiar with the idea of probability of an event through a double color card experiment.

Activity10: To verify experimentally that the probability of getting two tails when two coin are tossed simultaneously is ¼=(o.25) (By eighty tosses of two coins)

Activity11: To find the distance between two objects by physically demonstrating the position of the two objects say two Boys in a Hall, taking a set of reference axes with the corner of the hall as origin.

Activity12: Division of line segment by taking suitable points that intersects the axes at some points and then verifying section formula.

Activity13: To verify the formula for the area of a triangle by graphical method .

Activity14: To obtain formula for Area of a circle experimentally.

Activity15: To give a suggestive demonstration of the formula for the surface Area of a circus Tent.

Activity16: To obtain the formula for the volume of Frustum of a cone.

**PROJECTS**

Project 1 : Efficiency in packing

Project 2 : Geometry in Daily Life

Project 3: Experiment on probability

Project 4: Displacement and Rotation of a Geometrical Figure

Project 5: Frequency of letters/ words in a language text.

Project 6: Pythagoras Theorem and its Extension

Project 7: Volume and surface area of cube and cuboid.

Project 8: Golden Rectangle and golden Ratio

Project 9 : Male-Female ratio

Project 10 : Body Mass Index(BMI)

Project 11 : History of Indian Mathematicians and Mathematics

Project 12 : Career Opportunities

Project 13 : (Pie)



Project Work Assignment (Any Eight)

**ACTIVITY- 1**

**TOPIC:-** Prime factorization of composite numbers.

OBJECTIVE:- To verify the prime factorization 150 in the form

52x3x2 i.e 150=52x3x2.

PRE-REQUISITE KNOWLEDGE:- For a prime number P, P2 can be represented by the area of a square whose each side of length P units.

MATERIALS REQUIRED:-

1. A sheet of graph paper ( Pink / Green)
2. Colored (black) ball point pen.
3. A scale

TO PERFORM THE ACTIVITY:-

Steps:-

1. Draw a square on the graph paper whose each side is of length 5 cm and then make partition of this square into 25 small squares as shown in fig 1.1 each small square has its side of length 1cm.

Here, we observe that the area of the square having side of length 5 cm =52 cm2= 25 cm2

1. As shown in Fig 1.2 draw there equal squares where each square is of same size as in figure 1.1 then the total area in the fig1.2

=52+52+52 cm2

=53x3cm2 ie,75 cm2

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Fig=1.1

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Fig=1.2

1. As shown in fig 1.3 draw six equal square where each square is as same size as in Fig 1.1 Here , three squares are in one row and three squares in the second row.

We observe that the total area of six squares

=52x3cm2+52x3cm2

=c52x3x52x3cm2

=32x3x2 cm2

Also observe that the total area

=75cm2+75cm2=150cm2

Hence, we have verified that

150=52x3x2

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Fig-1.3

**ACTIVITY-2**

**TOPIC:-** Ratio of the areas of two similar triangles

**STATEMENT:-** The ratio of the area of two similar triangle is equal to the ratio of the squares of their corresponding sides.

**OBJECTIVE:-** To verify the above statement through activity.

**PRE-REQUISITE KNOWLEDGE:-**

1. The concept of similar triangles.
2. Division of a line segment into equal parts.
3. Construction of lines parallel to given line.

MATERIAL REQUIRED:-

1. White paper sheet
2. Scale /Rubber
3. Paint box
4. Black ball point pen or pencil

TO PERFORM THE ACTIVITY:-

STEPS:-

1. On the poster paper sheet, draw two similar triangle ABC and DEF. We have the ratio of their corresponding sides same and let as have

AB: DE= BC: EF=CA: FD=5:3

ie , AB/DE=5/3 , BC/EF=5/3 , CA/FD =5/3,

ie DE =3/5 AB, EF=3/5 BC,FD=3/5 CA

1. Divide each side of ∆ABC into 5 equal parts and those of ∆DEF into 3 equal parts as shown in Fig (i) and (ii).
2. By drawing parallel lines as shown in Fig (i) and (ii)., we have partition ∆ABC into 25 smaller triangle of same size and also each smaller triangle in fig (i) has same size and as that of the smaller triangle fig (ii).
3. Paint the smaller triangle as shown in Fig (i) and (ii)..

OBSERVATION:-

1. Area of ∆ABC= Area of 25 smaller triangle in fig (i)=25 square unit

Where area of one smaller triangle in fig (i)=P (square unit )

1. Area of ∆DEF=Area of a smaller triangle in Fig (ii)=9p where area of one smaller triangle in fig (ii)=P square units.
2. Area of ∆ ABC = 25 P =25

Area of ∆DEF 9P 9

1. (AB)2 (AB)2 (AB)2 25

(DE)2 = (3/5AB2) = 9/25(AB)2 =  9

Similarly

(BC)2  25 (CA)2 25

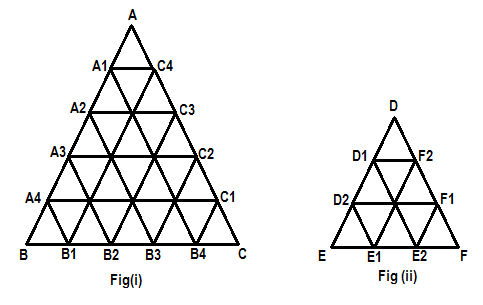
(EF)2 =  9 and (FD)2 = 9

1. From steps (3) and (4) , we conclude that

Area of ∆ ABC (AB)2 (BC)2  (CA)2

Area of ∆DEF = (DE)2 = (EF)2 = (FD)2

Hence the ratio of the areas of two similar triangles is equal to the ratio of the squares of their corresponding sides.



**ACTIVITY-3**

TOPIC:- Trigonometric identities.

STATEMENT:- sin2θ + cos2θ=1,00 < θ<900

OBJECTIVE: - To verify the above identity

PRE-REQUISITE KNOWLEDGE:- In a right angled triangle.

Side opposite to angle θ

sin θ = Hypotenuse of the triangle

Side adjacent to angle θ

cos θ = Hypotenuse of the triangle

MATERIAL REQUIRED:-

1. Drawing sheet
2. Black ball point pen
3. Geometry box
4. Scale

TO PERFORM THE ACTIVITY

Step:-

1. On the drawing sheet, draw horizontal ray Ax .
2. Construct any arbitrary (CAX= θcsay)
3. Cot AC=10 cm.
4. From c draw CB⊥ AX.
5. Measure the length sides of sides AB and BC of the right angled ∆ ABC (see fig)
6. We measure that AB=8.4 cm (approx) and BC=5.4 cm (approx)

OBSERVATION

1. Sin θ= BC/AC=5.4/10=.54 (Approx)
2. Cosθ=AB/AC=8.4/10=.84(approx)
3. Sin2 θ +cos2 θ=(.54)2+(.84)2

=.2916+.7056

=.9972(Approx)

Ie. Sin2 θ+Cos2 θ is mearly equal to 1. Hence the identity is verified.

C

8.4

10 cm

5.4cm

A B x

8.4

**ACTIVITY-4**

Topics:- Measure of the central tendencies of a data.

STATEMENT:- We have an empirical relationship for statistical data as 3x median=Mode+2 x mean.

OBJECTIVE :- To verify the above statement for a data.

PRE-REQUISITE KNOWLEDGE:-

Method to find central tendencies for grouped data.

MATERIAL REQUIRED:-

1. A data about the heights of students of a class and arranged in grouped form.
2. A ball point pen.
3. A scale.

TO PERFORM THE ACTIVITY:-

Step:-

1. Count the number of girl students in the class. The number is 51
2. Record the data about their height in centimeter.
3. Write the data in grouped form as below:-

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Height in cm | 135-140 | 140-145 | 145-150 | 150-155 | 155-160 | 160-165 | Total no of girls |
| Number of girls | 4 | 7 | 18 | 11 | 6 | 5 | 51 |

1. On three different sheets of paper find mean height on the sheet of paper , median height on the second and the modal height on the third sheet of paper.
2. Let us find mean by step deviation method:-

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Class of heights (in cm) | Frequency  -p | Class mark  xi | U1=  a= 147.5,h=5 | F1xu1 |
| 135-140  140-145  145-150  150-155  155-160  160-165 | 4  7  18  11  6  5 | 137.5  142.5  147.5  152.5  157.5  162.5 | -2  -1  0  1  2  3 | -8  -7  0  11  12  13 |

Mean=a+h x =147.5+5 x 23/51 =147.5+115/51



=(147.5+2.255)cm=149.755cm

1. Let us find median of the data:-

|  |  |  |
| --- | --- | --- |
| Class of height (in cm) | Frequency number of girls | Cumulative frequency |
| 135-140  140-145  145-150  150-155  155-160  160-165 | 4  7  18=f  11  6  5 | 4  11=cf  29  40  46  51 |
| Total | n |  |

n/2=25.5

we have median class (145-150) it gives i=145,h=5,f=18,cf=11

median=1+ x h=145 + x5



=145+14.5 x5

18

=145+4.028

=149.028cm

1. Let us find mode of the data:-

|  |  |
| --- | --- |
| Class of heights (in cm) | FREQUENCY (No of Girls) |
| 135-140  140-145  145-150  150-155  155-160  160-165 | 4  7=f1  18=fm  11=f2  6  5 |
| Total | 51 |

(Modal class)

Modal class is 145-150

Thus 12=45,h=5,fm=18,f1=7,f2=11

Mode=H xh=145 + x 5



=145+55/18 =145+3.055

=148.055 cm

1. CONCLUSION:-

Mean=149.755, median=149.028 and mode=148.055

3x median=3x149.028=447.084

Mode+xmean=148.055+2x149.755

=148.055+299.510=447.565

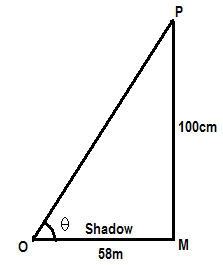
Thus we have verified that 3x median =mode +mean(Approx)

**ACTIVITY – 5**

TOPIC : Angle of Elevation

OBJECTIVE : To find the angle of elevation of the sun at a particular time on a sunny day.

PRE-REQUISITE KNOWLEDGE: knowledge of trigonometric ratios.



MATERIAL REQUIRED :

1. A metre rod
2. Measuring tape
3. Table for tangent of angles .

TO PERFORM THE ACTIVITY:

STEPS :

1. On the particular sunny day at the given time, put the metre rod on the level ground with one end on the ground and the other vertically upward.
2. Measure the length of the shadow of the metre rod from the beginning to the end. Let the length of the shadow be 58cm = 0.58m.
3. The length of the metre rod = 1m or 100cm.

OBSERVATION:

1. If θ be the angle of elevation of the sun at the given moment, then we have the following figure on a sheet of paper by taking a suitable scale.
2. From the right angle ΔOMP drawn in figure, we have

Tan =



Tan θ = √3 (approx.)

i.e. tan θ = tan 60o

θ = 60o

Hence, the required angle of elevation of the sun is 60o. For better result, we can take the help of the table of tangent of angles.

**ACTIVITY – 6**

TOPIC - Probability of events of a random experiment.

STATEMENT: For an event E of a random experiment, P(not E) = 1 – P(E).

OBJECTIVE: To verify the above statement by tossing three coin of different denominations simultaneously for head and tail. Event E happens if we get at least two heads and the event not-E happens if we do not get two or more than two heads.

PRE-REQUISITE KNOWLEDGE:

1. Probability of an event : Number of outcome which favour the happening of the event E

Total number of outcome

1. Event not-E happens when the outcome is not favourable for the event E to happen.

TO PERFORM THE ACTIVITY:

STEPS:

1. Take three fair coins of different denominations and toss these coins simultaneously.
2. We imaging about the possible outcomes as below.

HHH, HHT, HTH, THH, HTT, TTH, TTT

i.e. there can be 8 possible outcomes

favourable outcomes to the event E are

HHH, HHT, HTH, THH

Then P(E) = 4/8= ½

Now, favourable outcomes to the event not-E are HTT, THT, TTH, TTT

Then P(not-E) = 1- ½ = 1-P(E)

1. Repeating above random experiment, we record the observation of 20 trials as below:

Number of Heads: 0 1 2 3

Number of times out of 20 trials : 4 7 5 4

1. From table in step 3, we observe that for 2 heads or for 3 heads, the event E happens i.e. there are 5+4=9 chances out of 20 which favour E

Thus, we have P(E) = 9/20.

Also we observe that for 0 head or for 1 head the event not-E happens. There are 4+7=11 chances out of 20 which favour not-E.

So, P(not-E) = 11/20 = 1- 9/20 = 1-P(E).

**QUIZ**

**(REAL NUMBERS)**

Answer the following questions

1. What is a lemma?
2. State Euclid’s Division Lemma?
3. What does HCF stand for?
4. Give the full form of LCM.
5. State Euclid’s division algorithm.

**ORAL TEST**

**(REAL NUMBERS)**

Answer the following questions:

1. Euclid’s division algorithm is a technique to compute the \_\_\_\_\_\_\_\_\_\_\_ of two given positive integers.
2. HCF(124, 24) is \_\_\_\_\_\_\_\_\_\_\_.
3. “Every composite number can be expressed(factorised) as a product of primes, and this factorisation is unique, apart from the order in which the prime factors occurs”. The above statement is called \_\_\_\_\_\_\_\_\_\_\_.
4. For any two positive integers a and b,

a x b = HCF(a, b) x \_\_\_\_\_\_

1. If a number cannot be written in the form p/q, where p and q are integers and q ≠ 0, then it is called \_\_\_\_\_\_\_\_\_\_\_\_.

**QUIZ**

**(POLYNOMIALS)**

Answer the following questions:

1. What is a quadratic polynomial?
2. What is the degree of a quadratic polynomial?
3. What are the zeros of a polynomial?
4. What is the shape of curve of a quadratic polynomial graph?
5. State remainder theorem.

**ORAL TEST**

1. If P(x) is a polynomial in x, the highest power of x in P(x) is called the \_\_\_\_\_\_\_\_ of the polynomial P(x).
2. A polynomial of degree 2 is called a \_\_\_\_\_\_\_\_\_\_.
3. The linear polynomial ax + b, a≠ 0, has exactly one zero, namely, the x-coordinate of the point where the graph of y = ax + b intersects the \_\_\_\_\_\_\_\_\_.
4. A polynomial P(x) of degree n has atmost \_\_\_\_\_\_\_\_ zeroes.
5. The sum and the product of the zeroes of a quadratic polynomial x2 + 7x + 10 is \_\_\_\_ and \_\_\_\_\_\_\_.

**QUIZ**

**(Pair of linear equations in two variables)**

Answer the following questions:

1. What is a pair of linear equations in two variables?
2. Give the general form of a pair of linear equation?
3. What are the methods of solving a pair of linear equation in two variables?
4. What is the condition for inconsistent solution?
5. What is the shape of curve in graph of a linear equation?

**Oral Test**

1. Every solution (x, y) of a linear equation in two variables, ax+by +c = 0 corresponds to a \_\_\_\_ on the line representing the equation, and vice versa.
2. If the pair of linear equations in two variables have only one common point on both the lines, then we have a \_\_\_\_\_\_\_ solution.
3. A pair of equations which has no solution is called a/an \_\_\_\_\_\_\_\_ pair of linear equations.
4. Half the perimeter of a rectangular garden, whose length is 4 m more than its width is 36 m. The dimension of the garden are \_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_.
5. A pair of linear equations in two variables can be represented and solved by the graphical method and \_\_\_\_\_\_\_ method.

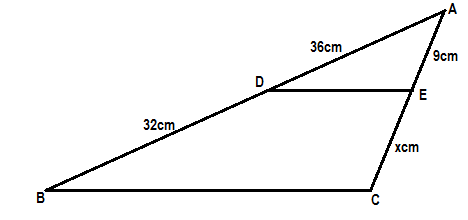
**QUIZ**

**(Triangles)**

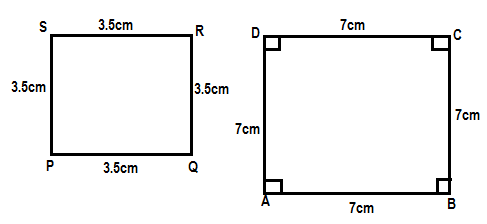
1. What is SAS similarity criterion?
2. What is the relationship between congruency and similarity of figures?
3. What is the criteria for the similarity of two triangles?
4. For what types of triangles is Pythagoras theorem applicable?
5. What is the another name of Basic Proportionality Theorem?

**ORAL TEST**

1. All \_\_\_\_\_\_\_\_\_ triangles are similar(equilateral/ isosceles/Scalene)
2. The longest side of a right angled triangle is called \_\_\_\_\_\_\_\_\_.
3. In a \_\_\_\_\_\_\_\_\_\_ the square of the hypotenuse is equal to the sum of squares of the other two sides.
4. In the given figure, if DE|| BC, then the value of x is \_\_\_\_\_\_\_\_\_



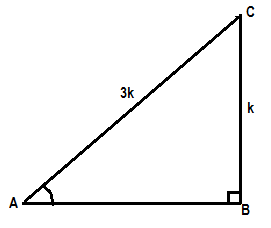
1. State whether the following quadrilateral are similar or not.



QUIZ

(Introduction to Trigonometry)

1. What is trigonometry?
2. What are trigonometric ratios of an acute angle in a right triangle?
3. From the figure find the value of cos A.



1. Write the trigonometric ratios of 60o.
2. Evaluate tan 70o / cot 20o.

ORAL TEST

1. In a right triangle ABC, right angles at B, sin A = \_\_\_\_\_\_.
2. Sec(90o – A) = \_\_\_\_\_\_\_\_\_\_
3. Sec2 A - \_\_\_\_\_\_\_\_\_ = 1 , for 0o ≤ A ≤ 90o.
4. If cot θ= 7/8, then (1+ sin θ)(1 – sin θ)/(1 + cos θ)(1 – cos θ) = \_\_\_\_\_\_\_\_\_\_\_\_\_
5. (1 – tan2 45o )/( 1 +tan2 45o )= \_\_\_\_\_\_\_\_\_\_\_

QUIZ

(STATISTICS)

1. Name the measures of central tendency.
2. What is cumulative frequency?
3. How will you represent the cumulative frequency distribution graphically?
4. How will you find the median of a grouped data graphically with the help of one ogive?
5. How will you find the median of a grouped data graphically with the help of both ogives (i.e of the less than type and of more than type)?

ORAL TEST

1. \_\_\_\_\_\_\_\_\_\_ is the sum of the values of all the observations divided by the total number of observations.
2. Class mark = \_\_\_\_\_ /2.
3. The formula for finding the mean using the step deviation method is \_\_\_\_\_\_\_\_\_.
4. The formula for finding the mode in a grouped frequency distribution is \_\_\_\_\_\_\_\_\_.
5. The formula for finding the median of grouped data is \_\_\_\_\_\_\_\_\_\_\_.

FORMATIVE ASSESSMENT

QUIZ

1. Define the fundamental theorem of arithmetic.
2. Define euclid’s division lemma.
3. What is a quadratic polynomial.
4. What is the relationship between zeros and coefficients of a quadratic polynomial.
5. Give the condition for a pair of linear equations to be inconsistent.

ORAL TEST

1. For any two positive integers a and b, HCF(a,b) x LCM(a, b) = \_\_\_\_\_\_\_\_\_
2. 5 – √3 is a/an \_\_\_\_\_\_\_\_ number.
3. A polynomial of degree 3 is called a \_\_\_\_\_\_ polynomial.
4. A quadratic polynomial having the sum and product of its zeroes respectively 5 and 6 is \_\_\_\_\_\_\_\_ .
5. All \_\_\_\_\_\_\_ triangles are similar. (equilateral/isosceles/scalene).

QUIZ

QUADRATIC EQUATION

1. What is a quadratic equation?
2. How many roots can a quadratic equation have?
3. Give the formula for finding the roots of ax2 + bx + c = 0 (a≠ 0)
4. Give the nature of roots of the equation ax2 + bx + c = 0 (a≠ 0)
5. Find the nature of the roots of the equation 3x2 – 2x +1/3 =0

ORAL TEST

1. A real number α is said to be a root of the quadratic equation ax2 + bx + c = 0 , if aα2 + bα + c = \_\_\_\_\_\_.
2. A quadratic equation ax2 + bx + c = 0 has two roots, if b2 – 4ac > 0.
3. The quadratic equation 3x2 – 4√3x + 4 = 0 has two \_\_\_\_\_\_\_ roots.
4. The roots of a quadratic equation 2x2 – 7x +3 = 0 are \_\_\_\_\_ and \_\_\_\_\_\_\_.
5. Two numbers whose sum is 27 and product is 182 are \_\_\_\_\_\_\_ and \_\_\_\_\_\_\_.

QUIZ

(ARITHMETIC PROGRESSIONS)

1. What is an A.P.?
2. What is meant by common difference in an A.P. ?
3. What is the formula for the nth term of an A.P.?
4. What is the formula for the sum of first n terms of an A.P. ?
5. What is the formula for the sum of first n natural numbers?

ORAL TEST

1. The common difference of a sequence of multiples of 7 is \_\_\_\_\_\_\_\_.
2. The difference of consecutive terms in an A.P. is always \_\_\_\_\_\_\_.
3. The sum of first 20 natural numbers is \_\_\_\_\_\_\_.
4. The sum of first eight odd natural numbers is \_\_\_\_\_\_\_\_.
5. The sum of first ten even natural numbers is \_\_\_\_\_\_\_.

QUIZ

(Coordinate geometry)

1. What is abscissa?
2. What is ordinate?
3. What is distance formula?
4. What is the distance of a point p(x,y) from origin?
5. Give the section formula.

ORAL TEST

1. If the area of a triangle is 0 square units, then its vertices are \_\_\_\_\_\_\_.
2. The area of a triangle whose vertices are (1 , -1), (-4, 6) and (-3, -5) is \_\_\_\_\_\_\_\_ square units.
3. The distance between the points (-5, 7) and (-1, 3) is \_\_\_\_\_\_ units.
4. \_\_\_\_\_\_\_ has been developed as an algebraic toll for studying geometry of figures.
5. The distance between the points (a,b) and (-a, -b) is \_\_\_\_\_\_\_\_ units.

QUIZ

(Some applications of trigonometry or heights and distance

1. Why trigonometry was invented? Give its uses.
2. What is the line of sight?
3. What is the angle of elevation?
4. What is the angle of depression?
5. What is a theodolite?

ORAL TEST

1. The other name of clinometer is \_\_\_\_\_\_\_\_\_.
2. If height of clinometer is 1 m, distance between object and clinometer is 40m and angle of elevation of object is 45o, then the height of object is \_\_\_\_\_\_\_\_\_\_\_\_.
3. A tower stands vertically on the ground. From the point on the ground, which is 25m away from the foot of the tower, the angle of elevation of the top of the tower is found to be 60o . The height of the tower is \_\_\_\_\_.
4. The angles of elevation of the top of a tower from two points at distances a and b from the base and on the same straight line with it are complementary. The height of the tower is \_\_\_\_\_\_\_\_\_\_.
5. A ladder 15m long just reaches the top of a vertical wall. If the ladder makes an angle of 60o with the wall, then the height of the wall is \_\_\_\_\_\_\_\_\_\_.

QUIZ

(CIRCLES)

1. Define tangent to a circle.
2. How many tangent(s) is/are there at a point of circle?
3. How many tangent can be drawn to a circle from a point outside the circle?
4. Define length of a tangent.
5. What is the relation between the lengths of tangents drawn from an external point to a circle?

ORAL TEST

1. A tangent to a circle intersects it in \_\_\_\_\_\_\_\_\_\_\_\_\_ point(s).
2. A line intersecting a circle in two points is called a \_\_\_\_\_\_\_\_\_\_\_.
3. A circle can have \_\_\_\_\_\_\_\_\_ parallel tangents at the most.
4. The common point of a tangent to a circle and the circle is called \_\_\_\_\_\_\_\_\_\_.
5. The tangent at any point of a circle is \_\_\_\_\_\_\_\_\_\_\_\_ to the radius through the point of contact.

QUIZ

(Constructions)

1. What is scale factor?
2. How will you draw a tangent at a point of a circle?
3. How will you locate the centre of a circle, if it is not given?
4. How many tangents can be drawn from a point outside the circle?
5. Is it possible to draw a tangent from a point inside a circle?

ORAL TEST

1. To divide a line segment AB in the ratio m:n (m, n are positive integers), draw a ray Ax so that ∠ BAx is an acute angle an then mark point on ray Ax at equal distances such that the minimum number of these points is \_\_\_\_\_\_\_.
2. To draw a pair of tangents to a circle which are inclined to each other at an angle of 45o, it is required to draw tangents at the end point of those two radii of the circle, the angle between which is \_\_\_\_\_.
3. To divide a line segment AB in the ration 4:5, a ray Ax is drawn first such that ∠BAx is an acute angle and them points A1, A2, A3… are located at equal distance on the ray Ax and the point B is joined to \_\_\_\_\_\_\_\_.
4. To construct a triangle similar to a given ΔABC with its sides 3/5 of the corresponding sides of ΔABC, first draw a ray BX such that ∠CBX is an acute angle and X lies on the opposite side of A with respect to BC. The locate points B1, B2, B3, \_\_\_\_ on BX at equal distances and next step is to join \_\_\_\_\_\_\_ to \_\_\_\_\_\_\_\_.
5. State ‘True’ or ‘False’
   1. By geometrical construction, it is possible to divide a line segment in the ratio 3+√5: 3-√5.
   2. A pair of tangents can be drawn from a point P to a circle of radius 4.5 cm situated at a distance of 4 cm from the centre.
   3. By geometrical construction, it is possible to divide a line segment in the ratio √5 : 1/√5.
   4. A pair of tangents can be constructed to a circle inclined at an angle of 175o.
   5. From a point P outside the circle we can draw only one tangent.
   6. We cannot locate the centre of a circle if it is not given.

QUIZ

(AREAS RELATED TO CIRCLES)

1. What is circumference of a circle? Give its formula.
2. Name the great Indian mathematician who gave an approximate value of π.
3. Give the formula for the area of a circle of radius r cm.
4. Give the formula for area of a sector of a circle having radius r and measuring an angle θ at the centre.
5. How will you find the area of a segment of a circle?

ORAL TEST

1. If the area of a circle is 154 cm2, then its perimeter is \_\_\_\_\_\_\_\_.
2. Area of the largest triangle that can be inscribed in a semicircle of radius r is \_\_\_\_\_\_\_\_.
3. The diameter of a circle whose area is equal to the sum of the areas of the two circles of radii 24 cm and 7 cm is \_\_\_\_\_.
4. If the areas of two circles are equal, then their circumferences are \_\_\_\_\_\_\_\_.
5. The circles which have the same centre are called \_\_\_\_\_\_\_\_ circles.

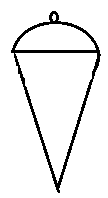
QUIZ

(SURFACE AREAS AND VOLUME)

1. A cone of height 24cm and radius of base 6cm is made up of modeling clay. A child reshapes it in the form of a sphere. Find the radius of the sphere.
2. A shuttle cork used for playing badminton has the shape of the combination of which basic solids?
3. What is a frustum of a right circular cone?
4. Does a frustum has two circular ends with equal radii?
5. Give the formula for the volume of the frustum of a cone.

ORAL TEST

1. A plumbline(sahul) shown in the figure is the combination of a \_\_\_\_\_\_\_\_ and a cone.



1. If the radii of the circular ends of a conical bucket which is 45cm high, are 28cm and 7cm then the capacity of the bucket is \_\_\_\_\_\_\_ cm3.
2. The volume of the solid formed by joining two basic solids will actually be the \_\_\_\_\_ of the volumes of the constituents.
3. The curved surface are of the frustum of a cone is \_\_\_\_\_\_\_\_\_, where l=



1. If two cubes each of volumes 64cm3 are joined end to end then the surface area of the resulting cuboid is \_\_\_\_\_\_\_\_.

QUIZ

(PROBABILITY)

1. Define the theoretical probability of an event E.
2. What is the probability of a sure event?
3. What is an elementary event?
4. What are complementary events?
5. One card is drawn from a well shuffled deck of 52 cards. Calculate the probability that the card will be a king.

ORAL TEST

1. The probability of an impossible event is \_\_\_\_\_\_\_\_.
2. The probability of an event lies between \_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_.
3. The sum of the probabilities of all the elementary events of an experiment is \_\_\_\_\_\_\_\_.
4. A die is thrown once, the probability of getting a prime number is \_\_\_\_\_\_\_\_.
5. Two coins are tossed simultaneously. The probability of at most one tail is \_\_\_\_\_\_.

**PUZZLES**

1. Catching Fish

If Five fishermen catch 5 fish in 5 minutes, how long will it take fifty fishermen to catch fifty fish?

1. Look at the Division

One day professor Agarwal went to the blackboard and demonstrated to his astonished class that one half of eight was equal to three! What did the professor do?

1. How Big

Can you guess how big the number : ninth power nine?

1. Counting Street Lights

On two sides of a street, there are 35 street lights, each one is at a distance of 30 metres from the other. The street lights on one side are arranged so that each lamp fills a gap between the two other street lights on the opposite. How long is the street?

1. Who discovered more distance

Two friends Vijay and Ajay walk with constant speed of 100m/min. Vijay takes rest for 1 min after walking 100metres while ajay takes rest for 3 min after walking 300 metres on a square path of side 400m. Both of them start from the same corner in opposite direction. Who discovered more distance, when they meet?

1. The missing Six

Place the six numbers below into empty circles, so that both the equation are true. Use each number once and only once.

+

-

=

=

1. Magic Triangle

Place the numbers 4 through 9 in the circles in such a way that every side of the triangle add up to 21.

1. Add up

Here is an equilateral triangle. Add another equilateral triangle to it in such a way that you get five equilateral triangles.

1. Magic Sticks

Just by moving one stick, make another equation.

1. Identical Four

Divide the adjoining figure into four identical pieces.

---XXX---