CBSE Class 10 Maths SA 1 Sample Paper

(Level- 1)

1. If $\frac{p}{q}$ is a rational number $(q \neq 0)$. What is the condition on q so that the decimal representation of $\frac{p}{q}$ is terminating?

   Ans. q is of the form of $2^n.5^m$ *where n,m are non negative integers.*

2. Write a rational number between $\sqrt{2}$ *and* $\sqrt{3}$.

   Ans. 1.5

3. The decimal expansion of the rational no . $43/2^4 5^3$ will terminate after how many places of decimal ?

   Ans. After 4 places of decimal.

4. Find the *(HCF X LCM) for the numbers* 100 *and* 190.

   Ans. 19000

5. State whether the number $(\sqrt{2}-\sqrt{3})(\sqrt{2}+\sqrt{3})$ *is* rational or irrational justify.

   Ans. Rational

6. Write one rational and one irrational number lying between 0.25 and 0.32.

   Ans. One rational no. =0.26, one irrational no. = 0.27010010001.....

7. Express 107 in the form of 4q + 3 for some positive integer.

   Ans. 4 X 26 + 3

8. Write whether the rational number $\frac{51}{1500}$ will have a terminating decimal expansion or a non terminating repeating decimal expansion.

   Ans. Terminating.

(level - 2)

1. Use Euclid's division algorithm to find the HCF of 1288 and 575.

   Ans. 23.

2. Check whether $5\ X\ 3\ X\ 11 + 11$ *and* $5\ X\ 7 + 7\ X\ 3 + 3$ are composite number and justify.

   Ans. Composite number.

3. Check whether 6^n can end with the digit 0, where n is any natural number.

   Ans. No, 6^n can not end with the digit 0.

4. Given that LCM (26, 169) = 338, write HCF (26, 169).]

   Ans. 13

5. Find the HCF and LCM of 6, 72 and 120 using the prime factorization method.

   Ans. HCF = 6
   LCM = 360

(level - 3)

1. Show that $\sqrt{3}$ is an irrational number.
2. Show that $5 + 3\sqrt{2}$ is an irrational number.
3. Show that square of an odd positive integer is of the form 8m + 1, for some integer m.
4. Find the LCM & HCF of 26 and 91 and verify that $LCM\ X\ HCF = product\ of\ the\ two\ numbers.$

Ans. LCM=182, HCF=13

(PROBLEMS FOR SELF EVALUATION/HOTS)

1. State the fundamental theorem of Arithmetic.
2. Express 2658 as a product of its prime factors.
3. Show that the square of an odd positive integers is of the form 8m + 1 for some whole number m.
4. Find the LCM and HCF of 17, 23 and 29.
5. Prove that $\sqrt{2}$ is not a rational number.
6. Find the largest positive integer that will divide 122, 150 and 115 leaving remainder 5, 7 and 11 respectively.
7. Show that there is no positive integer n for which $\sqrt{n-1} + \sqrt{n+1}\ is\ rational.$
8. Using prime factorization method, find the HCF and LCM of 72, 126 and 168. Also show that $HCF\ X\ LCM\ \neq product\ of\ the\ three\ numbers.$

Value Based Questions :-

Q.1 A person wanted to distribute 96 apples and 112 oranges among poor children in an orphanage. He packed all the fruits in boxes in such a way that each box contains fruits of the same variety, and also every box contains an equal number of fruits.

(i) Find the maximum number of boxes in which all the fruits can be packed.

(ii) Which concept have you used to find it ?

(iii)Which values of this person have been reflected in above situation ?

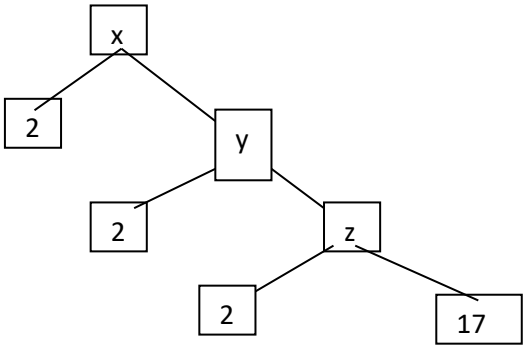
Q.2 A teacher draws the factor tree given in figure and ask the students to find the value of x without finding the value of y and z.

Shaurya gives the answer x = 136

a) Is his answer correct ?

b) Give reason for your answer.

c) Which value is depicted in this.



2. Polynomials
(Key Points)

Polynomial:

An expression of the form $p(x) = a_0 + a_1x + a_2x^2 + \text{-----} + a_nx^n$ where $a_n \neq 0$ is called a polynomial in variable x of degree n.where; $a_0, a_1, \text{-----} a_n$ are real numbers and each power of x is a non negative integer.
Ex.:- $2x^2 - 5x + 1$ is a polynomial of degree 2.
Note: $\sqrt{x} + 3$ *is not a polynomial.*

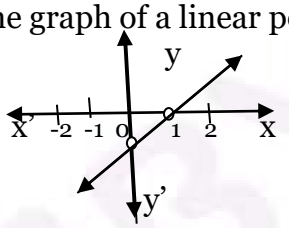
- A polynomial $p(x) = ax + b$ *of degree 1 is called a linear polynomial.* Ex. 5x -3, 2x etc
- A polynomial $p(x) = ax^2 + bx + c$ *of degree 2 is called a quadratic polynomial.*Ex. $2x^2 + x - 1$, $1 - 5x + x^2$ etc.
- A polynomial $p(x) = ax^3 + bx^2 + cx + d$ *of degree 3 is called a cubic polynomial.*
  Ex. $\sqrt{3}x^3 - x + \sqrt{5}$, $x^3 - 1$ etc.

Zeroes of a polynomial: A real number k is called a zero of polynomial p(x) if p(k) =0.If the graph of $y = p(x)$ intersects the X- axis at n times, then number of zeros of y=p(x) is n.

- A linear polynomial has only one zero.
- A Quadratic polynomial has two zeroes.
- A Cubic polynomial has three zeroes.

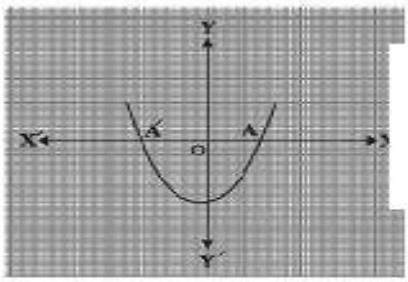
Graphs of different types of polynomials :

- Linear polynomial :- The graph of a linear polynomial ax + b is a



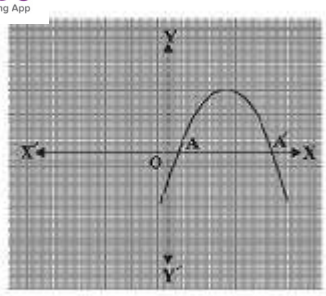
Straight line, intersecting X-axis at one point

- **Quadratic Polynomial :-** (i) Graph of a quadratic polynomial $p(x) = ax^2 + bx + c$ is a parabola open upwards like U if a > 0 & intersects x- axis at maximum two distinct points.



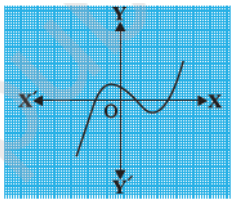
a>0

(ii) Graph of a quadratic polynomial $p(x) = ax^2 + bx + c$ is a parabola open downwards like ∩ if a <0 & intersects x- axis at maximum two distinct points.



a<0

- Cubic Polynomial and its graph



In general a polynomial p(x) of degree n crosses the x-axis at atmost n points.

For a quadratic polynomial: If α, β are zeroes of $P(x) = ax^2 + bx + c$ then :

1. Sum of zeroes = $\alpha + \beta = \frac{-b}{a} = \frac{-Coefficient\ of\ x}{coefficient\ of\ x^2}$
2. Product of zeroes = $\alpha \cdot \beta = \frac{c}{a} = \frac{Constant\ term}{coefficient\ of\ x^2}$

- A quadratic polynomial whose zeroes are α and β, is given by:
  $p(x) = x^2 - (\alpha + \beta)x + \alpha\beta$
  $= x^2 - (sum\ of\ zeroes)x + product\ of\ zeroes.$
- If $\alpha, \beta\ and\ \gamma$ are zeroes of the cubic polynomial $ax^3 + bx^2 + cx + d$ then:
  - $\alpha + \beta + \gamma = \frac{-b}{a}$
  - $\alpha\beta + \beta\gamma + \gamma\alpha = \frac{c}{a}$
  - $\alpha\beta\gamma = \frac{-d}{a}$
- If $\alpha, \beta\ \&\ \gamma$ are zeroes of a cubic polynomial p(x),

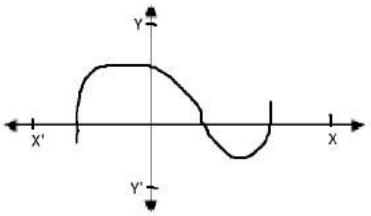
Then $P(x) = x^3 - (\alpha + \beta + \gamma)x^2 + (\alpha\beta + \beta\gamma + \gamma\alpha)x - \alpha\beta\gamma$

Division algorithm for polynomials: If $p(x)\ and\ g(x)\ are\ any\ two\ polynomials\ with\ g(x) \neq 0,$ then we can find polynomials $q(x)\ and\ r(x)\ such\ that:$

$p(x) = q(x)X\ g(x) + r(x), where\ r(x) = 0\ or\ degree\ of\ r(x) < degree\ of\ g(x).$

(Level - 1)

1. In a graph of $y = p(x), find\ the\ number\ of\ zeroes\ of\ p(x)$.



Ans. 3.

2. If α, β are the zeroes of $f\ (x) = x^2 + x + 1$, then find $\frac{1}{\alpha} + \frac{1}{\beta}$.

Ans. (-1)

3. Find a quadratic polynomial whose zeroes are $\frac{-2}{\sqrt{3}}\ and\ \frac{\sqrt{3}}{4}$.

Ans. $x^2 - \left(\frac{-2}{\sqrt{3}} + \frac{\sqrt{3}}{4}\right)x + \left(-\frac{1}{2}\right)$

4. If $p\ (x) = \frac{1}{3}x^2 - 5x + \frac{3}{2}$ then find sum and product of its zeroes.

Ans. Sum=15, Product = $\frac{9}{2}$

5. If the sum of zeroes of a given polynomial $f\ (x) = x^3 - 3kx^2 - x + 30$ is 6. Find the value of K.

Ans. $\alpha + \beta + \gamma = \frac{-b}{a} = \frac{3k}{1} = 6$

$\therefore k = 2$

6. Find the zero of polynomial $3x + 4$.

Ans. -4/3

7. Write the degree of zero polynomial.

Ans. Not defined.

(Level - 2)

1. Form a cubic polynomial with zeroes 3, 2 and -1.

Hints/Ans. $p(x) = x^3 - (\alpha + \beta + \gamma)x^2 + (\alpha\beta + \beta\gamma + \gamma\alpha)x - \alpha\beta\gamma$

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

Ans. Zeroes are 3/2 & -1/3.

3. For what value of k, (-4) is a zero of polynomial $x^2 - x - (2k + 2)$?

Ans. k=9

4. Give an example of polynomials $p(x), g(x), q(x) and\ r(x)\ which\ satisfy\ division\ algorithm\ and\ deg.p(x) = deg.g(x)$.

Ans. $3x^2 + 2x + 1,\ x^2,\ 3,\ 2x + 1$

5. Find the zeroes of $4u^2 + 8u$. Ans. 0,2

6. Find a quadratic polynomial, whose sum and the product of its zeroes are 3 , -5

Ans. $x^2 - 3x - 5$

(Level - 3)

1. Find the zeroes of polynomial $x^3 - 2x^2 - x + 2$

Ans. -1, 1, 2

2. If the zeroes of the polynomial $x^3 - 3x^2 + x + 1$ are $\alpha - \beta,\ \alpha,\ \alpha + \beta$. Find $\alpha\ and\ \beta$

Ans. $\alpha = 1,\ \beta = \pm\sqrt{2}$

3. Divide $f(x) = 6x^3 + 11x^2 - 39x - 65$ by $g(x) = x^2 - 1 + x$

Ans. Quotient=$6x + 5$; Remainder = $-38x - 60$

4. Check whether the polynomial $t^2 - 3$ is a factor of polynomial $2t^4 + 3t^3 - 2t^2 - 9t - 12\ by\ applying\ the\ division\ algorithm.$

Ans. Remainder=0, Quotient=$2t^2 + 3t + 4$, Given Polynomial is a factor.

(Level - 4)

1. Obtain all zeroes of $f(x) = x^3 + 13x^2 + 32x + 20$

Ans. -1, -2, -10

2. Obtain all other zeroes of $2x^4-7x^3-13x^2+63x-45$, if two of its zeroes are 1 and 3

Ans. 1 , 3 , -3 & 5/2

3. On dividing $2x^3 + 4x^2 +5x +7$ by a polynomial $g(x)$,the quotient and remainder were 2x and
7-5x respectively, find $g(x)$.

Ans. $x^2 + 2x +5$

(PROBLEMS FOR SELF-EVALUATION)

1. Check whether $g(x) = 3x - 2$ is a factor of $p(x) = 3x^3 + x^2 - 20x + 12$.
2. Find quotient and remainder applying the division algorithm on dividing $p(x) = x^3-6x^2+2x -4$ by $g(x) = x - 1$.
3. Find zeros of the polynomial $2x^2 - 8x + 6$
4. Find the quadratic polynomial whose sum and product of its zeros are $\frac{2}{3}$, $\frac{-1}{3}$respectively.
5. Find the zeroes of polynomial $x^3 - 2x^2 - x + 2$
6. If one of the zeroes of the polynomial $2x^2 + px + 4 = 0$ *is* 2, find the other zero, also find the value of p.
7. If α *and* β are the zeroes of the polynomial $kx^2 + 4x+4$ show that $\alpha^2 + \beta^2 = 24$, find the value of k.
8. If α *and* β are the zeroes of the equation $6x^2 + x - 2 = 0$, *find* $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$

Value Based Questions:-

Q1. Government of India allotted Relief Fund to help the families of earthquake affected village. The fund is represented by $3x^3 + x^2 + 2x + 5$. The fund is equally divided between each of the families of that village. Each family receives an amount of $3x - 5$. After distribution, $9x + 10$ amount is left. The District Magistrate decided to use this amount to open a school in that village.

i. Find the number of families which received Relief Fund from Government.

ii. What values have been depicted here?

Q2. A village of the North East India is suffering from flood. A group of students decide to help them with food items, clothes etc. So, the students collect some amount of rupees, which is represented by $x^4 + x^3 + 8x^2 + ax +b$.

i. If the number of students is represented by $x^2 + 1$, find the values of a and b.

ii. What values have been depicted by the group of students?

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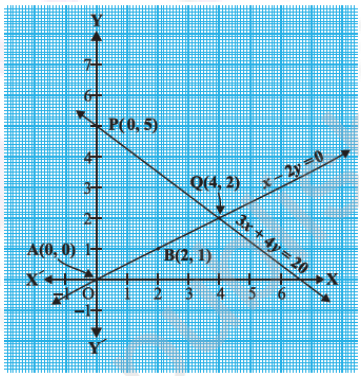
3. Pair of linear equations in two variables
(Key Points)

- An equation of the form ax + by + c = 0, where a, b, c are real nos ($a \neq 0, b \neq 0$) is called a linear equation in two variables x and y.
  Ex : (i)x – 5y + 2 =0
  (ii) $\frac{3}{2}x - y = 1$
- The general form for a pair of linear equations in two variables x and y is
  $a_1x + b_1y + c_1 = 0$
  $a_2x + b_2y + c_2 = 0$
  where $a_1, b_1, c_1, a_2, b_2, c_2$ are all real nos and $a_1 \neq 0, b_1 \neq 0, a_2 \neq 0, b_2 \neq 0$.
  Examples: $x + 3y - 6 = 0$
  $2x - 3y - 12 = 0$
- Graphical representation of a pair of linear equations in two variables:
  $a_1x + b_1y + c_1 = 0$
  $a_2x + b_2y + c_2 = 0$

(i) will represent intersecting lines if $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$

i.e. unique solution. And this type of equations are called consistent pair of linear equations.
Ex: x – 2y = 0
3x + 4y – 20 = 0

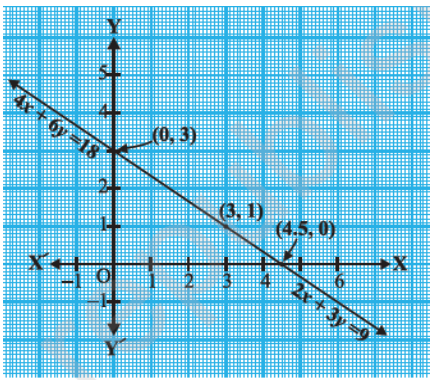
Co-ordinates of the point of intersection gives the solution of the equations.



(ii) will represent overlapping or coincident lines if $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

i.e. Infinitely many solutions, consistent or dependent pair of linear equations
Ex: 2x + 3y – 9 = 0
4x + 6y – 18 = 0

The graph is Coincident lines,



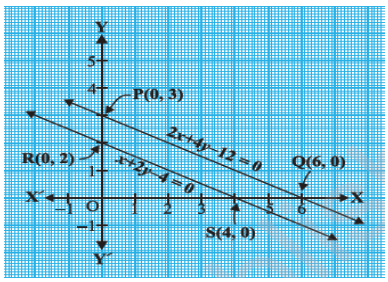
(iii) will represent parallel lines if $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

i.e. no solution and called inconsistent pair of linear equations

Ex: $x + 2y - 4 = 0$

$2x + 4y - 12 = 0$

Parallel lines, no solution.



(iv) Algebraic methods of solving a pair of linear equations:

(i) Substitution method

(ii) Elimination Method

(iii) Cross multiplication method

(Level - 1)

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

   Ans: a= 32

2. Find the value of k so that the lines $2x - 3y = 9$ and kx-9y =18 will be parallel.

   Ans: k= 6

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

   Ans: k= 6

4. Check whether given pair of lines is consistent or not $5x - 1 = 2y$, $y = \frac{-1}{2} + \frac{5}{2}x$

   Ans: consistent

5. Determine the value of 'a' if the system of linear equations $3x+2y -4 =0$ and $ax - y - 3 = 0$ will represent intersecting lines.

   Ans: $a \neq \frac{-3}{2}$

6. Write any one equation of the line which is parallel to $\sqrt{2}x - \sqrt{3}y = 5$

   Ans: $5\sqrt{2}x - 5\sqrt{3}y = 5\sqrt{5}$

7. Find the point of intersection of line $-3x + 7y = 3$ with x-axis

   Ans: (-1, 0)

8. For what value of k the following pair has infinite number of solutions.

   $(k-3)x + 3y = k$

   $k(x+y)=12$

   Ans: k= 6

9. Write condition so that $a_1x + b_1y = c_1$ and $a_2x + b_2y = c_2$ have unique solution.

   Ans: $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$

(Level - 2)

1. 5 pencils and 7pens together cost Rs. 50 whereas 7 pencils and 5 pens together cost Rs. 46. Find the cost of one pencil and that of one pen.

Ans: Cost of one pencil = Rs. 3

Cost of one pen = Rs. 5

2. Solve the equations:

$3x - y = 3$

$7x + 2y = 20$

Ans: x=2, y=3

3. Find the fraction which becomes to 2/3 when the numerator is increased by 2 and equal to 4/7 when the denominator is increased by 4

Ans: 28/45

4. Solve the equation:

$px + qy = p - q$

$qx - py = p + q$

Ans: x = 1, y = -1

(Level - 3)

1. Solve the equation using the method of substitution:

$3x - 5y = -1$

$x - y = -1$

Ans. $x = -2, \quad y = -1$

2. Solve the equations:

$\frac{1}{2x} - \frac{1}{y} = -1$

$\frac{1}{x} + \frac{1}{2y} = 8$ Where, $x \neq 0, y \neq 0$

Ans. $x = \frac{1}{6}, y = \frac{1}{4}$

3. Solve the equations by using the method of cross multiplication:

$x + y = 7$

$5x + 12y = 7$

Ans. $x = 11, y = -4$

4. A man has only 20 paisa coins and 25 paisa coins in his purse, If he has 50 coins in all totaling Rs. 11.25, how many coins of each kind does he have.

Ans. 25 coins of each kind

5. For what value of k, will the system of equations

$x + 2y = 5$

$3x + ky - 15 = 0$ has a unique solution.

Ans.$k \neq 6$

(level - 4)

1. Draw the graphs of the equations

   4x – y = 4

   4x + y = 12

   Determine the vertices of the triangle formed by the lines representing these equations and the x-axis. Shade the triangular region so formed

   Ans: (2,4)(1,0)(3,0)

2. Solve Graphically

   x – y = -1 and

   3x + 2y = 12

   Calculate the area bounded by these lines and the x- axis ,

   Ans: x = 2, y = 3 and area = 7.5 unit ^{2}

3. Solve :- for u & v

   4u – v = 14uv

   3u + 2v = 16uv where u≠0 , v≠ 0

   Ans: u = ½ , v = ¼

4. Ritu can row downstream 20 km in 2 hr , and upstream 4 km in 2 hr . find her speed of rowing in still water and the speed of the current.

   (HOTS)

   Ans: Speed of the rowing in still water = 6 km/hr

   Speed of the current = 4 km/hr .

5. In a ΔABC ,$\angle C$ = 3∠B = 2 (∠A +∠B) find the these angle.

   (HOTS)

   Ans: ∠A = 20^o ,∠B = 40^o , ∠c = 120^o .

6. 8 men and 12 boys can finish a piece of work in 10 days while 6 men and 8 boys can finish it in 14 days. Find the time taken by 1 man alone and that by one boy alone to finish the work .

   (HOTS)

   Ans: One man can finish work in 140 days

   One boy can finish work in 280 days

7. Find the value of K for which the system of linear equations 2x+5y = 3 , (k +1)x + 2(k + 2) y = 2K Will have infinite number of solutions.

   (HOTS)

   Ans: K = 3

(SELF EVALUTION/HOTS)

1. Solve for x and y:

   $x + y = a + b$

   $ax - by = a^2 - b^2$

2. For what value of k will the equation x +5y-7=0 and 4x +20y +k=0 represent coincident lines?

3. Solve graphically: 3x +y +1=0

   2x -3y +8=0

4. The sum of digits of a two digit number is 9. If 27is subtracted from the number, the digits are reversed. Find the number.

5. Draw the graph of x + 2y – 7 =0 and 2x – y -4 = 0. Shade the area bounded by these lines and Y-axis.

6. Students of a class are made to stand in rows. If one student is extra in a row, there would be 2 rows less. If one student is less in a row there would be 3 rows more. Find the number of the students in the class.

7. A man travels 370 km partly by train and partly by car. If he covers 250 km by train and the rest by the car it takes him 4 hours, but if he travels 130 km by train and the rest by car, he takes 18 minutes longer. Find the speed of the train and that of the car
8. Given linear equation 2x +3y-8=0, write another linear equation such that the geometrical representation of the pair so formed is (i) intersecting lines, (ii) Parallel Lines.

Value Based Questions :-

Q1. The owner of a taxi cab company decides to run all the cars he has on CNG fuel instead of petrol/diesel. The car hire charges in city comprises of fixed charges together with the

charge for the distance covered. For a journey of 12km, the charge paid Rs.89 and for a journey of 20 km, the charge paid is Rs. 145.

i. What will a person have to pay for travelling a distance of 30 km?

ii. Which concept has been used to find it?

iii. Which values of the owner have been depicted here?

Q2.Riya decides to use public transport to cover a distance of 300 km. She travels this distance partly by train and partly by bus. She takes 4 hours if she travels 60km by train and the remaining by bus. If she travels 100 km. by train and the remaining by bus, she takes 10 minutes more.

i. Find speed of train and bus separately.

ii. Which concept has been used to solve the above problem?

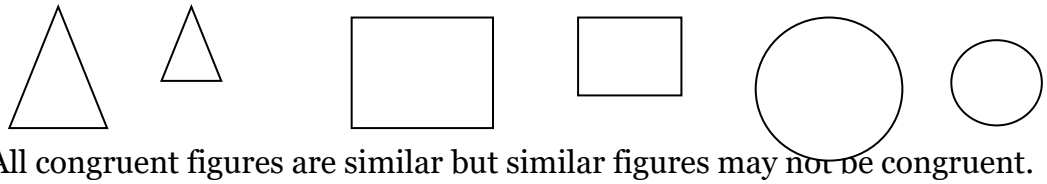
iii. Which values of Riya have been depicted here?

TRIANGLES

KEY POINTS

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).

- All regular figures are similar



- All congruent figures are similar but similar figures may not be congruent.

2. Basic proportionality Theorem [or Thales theorem].

3. Converse of Basic proportionality Theorem.

4. Criteria for similarity of Triangles.

   (a) AA or AAA similarity criterion.
   (b) SAS similarity criterion.
   (c) SSS similarity criterion.

5. Areas of similar triangles.
6. Pythagoras theorem.
7. Converse of Pythagoras theorem.

(Level -1)

1. If in two triangles, corresponding angles are equal, then the two triangles are.....
   Ans. Equiangular then similar
2. . ΔABC is right angled at B. BD is perpendicular upon AC. If AD=a, CD=b, then AB^2=
   Ans. a(a+b)
3. The areas of two similar triangles are $32cm^2$ and $48cm^2$.If the square of a side of the first Δ is $24cm^2$,then the square of the corresponding side of 2nd$triangle$ will be
   Ans. $36cm^2$
4. ABC is a triangle with DE|| BC. If AD=2cm, BD=4cm then find the value DE:BC
   Ans. 1:3
5. In ΔABC,DE ||BC, if AD=4x-3,DB=3x-1,AE=8x-7and BC=5x-3,then find the values of x
   Ans. 1, $-\frac{1}{2}$
6. The perimeters of two similar triangles are 40cm and 50 cm respectively, find the ratio of the area of the first triangle to the area of the 2nd triangle:
   Ans. 16:25
7. A man goes 150m due east and then 200m due north. How far is he from the starting point?
   Ans. 250 m

8. A ladder reaches a window which is 12m above the ground on one side of the street. Keeping its foot at the same point, the ladder is turned to the other side of the street to reach a window 9m high. If the length of the ladder is 15m, find the width of the street.

Ans. 21m

9. BO and CO are respectively the bisectors of ∠B and ∠C of ΔABC.AO produced meets BC at P,then find AB/AC

Ans. $\frac{BP}{PC}$

10. In ΔABC,the bisector of ∠B intersects the side AC at D.A line parallel to side AC intersects line segments AB,DB and CB at points P,R,Q respectively.Then, Find AB XCQ

Ans. BC X AP

11. .If Δ ABC is an equilateral triangle such that AD⊥BC,then AD^2=.....

Ans. $3CD^2$

12. .If ΔABC and ΔDEF are similar triangles such that ∠A=47°,and∠E=83° ,then find ∠C

Ans. 50°

13. Two isosceles triangles have equal angles and their areas are in the ratio 16:25,then find the ratio of their corresponding heights

Ans. 4:5

14. .Two poles of heights 6m and 11m stand vertically upright on a plane ground.If the distance between their feet is 12m, then find the distance between their tops.

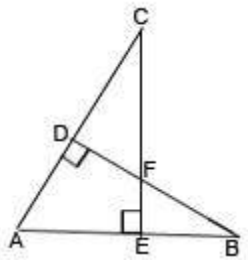
Ans.13m

15. .The lengths of the diagonals of a rhombus are 16cm and 12cm.Then, find the length of the side of the rhombus .

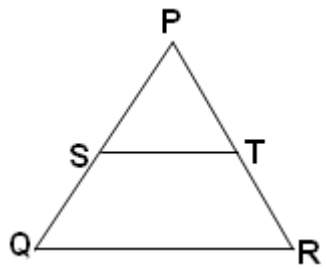
Ans. 10cm

(Level – 2)

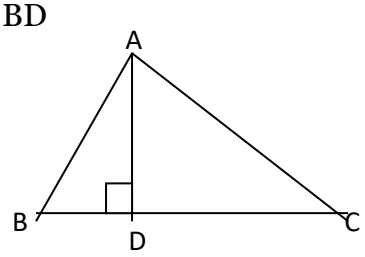
1. In given fig. BD⊥AC and CE⊥AB then prove that
   (a)ΔAEC~ΔADB
   (b)CA/AB=CE/DB



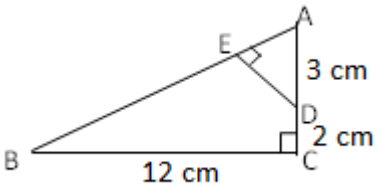
2. In the given figure fig .$\frac{PS}{SQ}=\frac{PT}{TR}$, and ∠PST=∠PRQ. Prove that ΔPQR is an isosceles triangle.



3. In given fig AD⊥BC and ∠B<90°,prove that $AC^2=AB^2+BC^2-2BC \times BD$



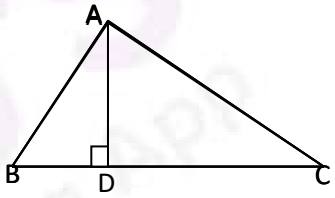
4. In given fig. ΔABC is right angled at C and DE⊥AB.Prove that ΔABC~ΔADE and hence find length of AE and DE.



Ans. $\frac{15}{13}$, $\frac{36}{13}$

5. In a ΔABC, if DE||AC and DF||AE, prove that $\frac{EF}{BF}=\frac{EC}{BE}$

6. In given fig.AD⊥BC,if $\frac{BD}{AD}=\frac{DA}{DC}$,prove that ABC is a right angled triangle.

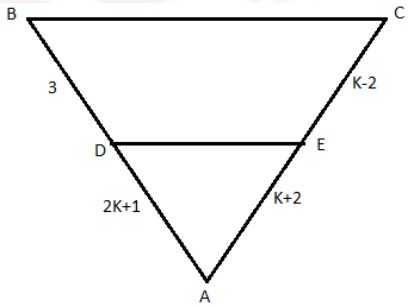


7. Two Δs ABC and DEF are similar. If ar(ΔDEF)=243cm², ar(ΔABC)=108cm² and BC=6cm,find EF.

Ans. 9 cm

8.What is the value of K in given figure if DE||BC.

Ans. K=4



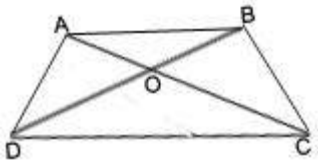
9. A pole of length 10m casts a shadow 2m long on the ground. At the same time a tower casts a shadow of length 60m on the ground then find the height of the tower.

Ans. 300m

Level – 3

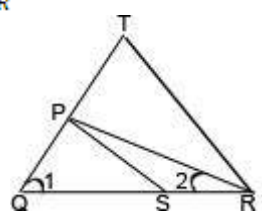
1.In given figure,AB||DC and $\frac{AO}{OC}=\frac{BO}{OD}$ then find the value of x, if .
$OA = 2x + 7, OB = 4x, OD = 4x - 4$ and $OC = 2x + 4$

Ans. 7

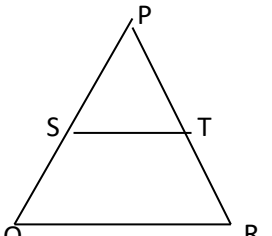


2. PQR is a right angled triangle with ∠P=90°. If PM ⊥QR, then show that $PM^2 = QM \ X \ MR$

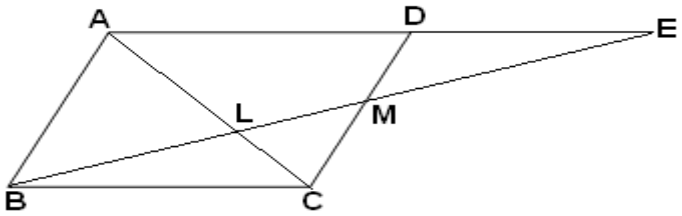
3. In given fig. $\frac{QR}{QS}=\frac{QT}{PR}$ and ∠1=∠2.Show that ΔPQS~ΔTQR.



4. Find the length of altitude of an equilateral triangle of side 2cm. Ans. $\sqrt{3}$ cm
5. In a trapezium ABCD,O is the point of intersection of AC and BD,AB||CD and AB=2CD.If the area of ΔAOB=84cm² then find area of ΔCOD. Ans. 21 cm²
6. In given fig. $\frac{PS}{SQ}=\frac{PT}{TR}=3$. If area of ΔPQR is 32cm², then find the area of the quad.STQR Ans.14 cm²

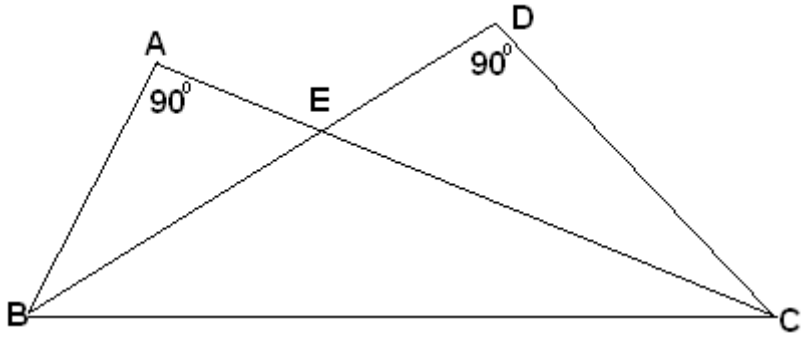


7. M is the mid-point of the side CD of a ||gmABCD.The line BM is drawn intersecting AC at L and AD produced at E.Prove that EL=2BL.



8. Prove that the ratio of the area of two similar Δs is equal to the square of the ratio of their corresponding medians.
9. D and E are points on the sides CA and CB respectively of ΔABC, right angled at C.Prove that $AE^2+BD^2=AB^2+DE^2$.

13. ABC and DBC are two Δs on the same base BC and on the same side of BC with ∠A=∠D=90°.If CA and BD meet each other at E, show that AE x EC=BE x ED.



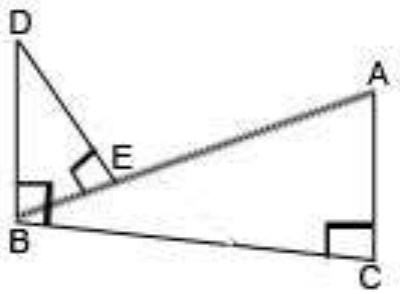
Level – 4

1. Prove that in a right angled triangle the square of hypotenuse is equal to the sum of the squares of the other two sides.
2. If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, prove that the other two sides are divided into the same ratio.
3. Δ ABC is right angled at B and D is midpoint of side BC. Prove that $AC^2 = 4\,AD^2 - 3\,AB^2$
4. Prove that the ratio of the areas of two similar triangles is equal to the ratio of square of their corresponding sides.
5. In a Δ, if the square of one side is equal to sum of the squares of the other two sides, prove that the angle opposite to the first side is a right angle.
6. In an equilateral Δ PQR, T is a point on the side QR, such that $QT = \frac{1}{3}QR$. Prove that $9\,PT^2 = 7\,PQ^2$
7. P and Q are the mid points of side CA and CB respectively of Δ ABC right angled at C. Prove that $4(AQ^2 + BP^2) = 5\,AB^2$.
8. CM and RN are respectively the medians of ΔABC and ΔPQR.If ΔABC~ΔPQR, prove that

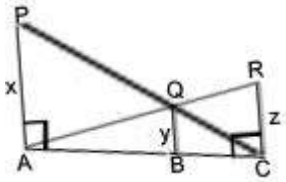
(i) ΔAMC~ΔPNR (ii) CM/RN=AB/PQ (iii) ΔCMB~ΔRNQ

SELF EVALUATION

1. The diagonal BD of a ||gm ABCD intersects the line segment AE at the point F, Where E is any point on the side BC.Prove that DF x EF=FB x FA.
2. In fig.DB⊥BC, DE⊥AB and AC⊥BC.Prove that BE/DE=AC/BC.



3. In given fig. PA, QB, RC are each perpendicular to AC. Prove that $\frac{1}{x}+\frac{1}{z}=\frac{1}{y}$



4. Prove that three times the sum of the squares of the sides of a triangle is equal to four times the sum of the squares of the medians of the triangle.
5. ABC is a right triangle with ∠A = 90° ,A circle is inscribed in it. The lengths of the two sides containing the right angle are 6 cm and 8 cm. find the radius of the incircle.

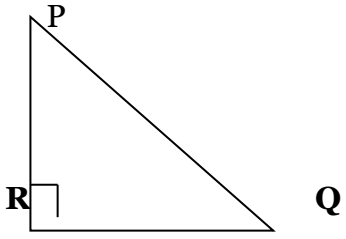
   Ans. 4cm
6. ABC is a right triangle, right angled at C. If p is the length of the perpendicular from C to AB and a, b, c have the usual meaning, then prove that

   (i) cp=ab (ii) $\frac{1}{p^2}=\frac{1}{a^2}+\frac{1}{b^2}$
7. In a trapezium ABCD, AB||DC and DC=2AB.EF||AB, where E and F lie on the side BC and AD respectively such that BE/EC=4/3.Diagonal DB intersects EF at G. Prove that EF=11AB.
8. Sides AB, AC and median AD of a triangle ABC are respectively proportional to sides PQ, PR and median PM of another triangle PQR. Show that ΔABC~ΔPQR.

Value Based Question

Q1. For going to a city Q from city P, there is a route via city R such that PR | QR, PR = 2x km and RQ = 2 (x + 7) km. Ravi a civil engineer proposed to construct a 26 km highway which directly connects the two cities P and Q.

i. Find how much distance will be saved in reaching city Q from city P, after the construction of the highway is completed.
ii. Which concept have you used to find it?
iii. Do you think more such highways should be constructed ? Why? Which values of Ravi have been depicted here?



Q.2 Some students participated in the campaign 'Save Energy Save Environment' . For the campaign, they prepared posters on triangular card boards. They divided the triangle into four parts by joining the mid points of the three sides of the taringle. In the middle, they wrote a slogan and in the remaining parts they pasted related pictures. Find the ratio of the area of the trainagle allotted for the slogan to the area of the whole triangle.

Write the values these students possess.

INTRODUCTION TO TRIGONOMETRY

IMPORTANT CONCEPTS (TAKE A LOOK):

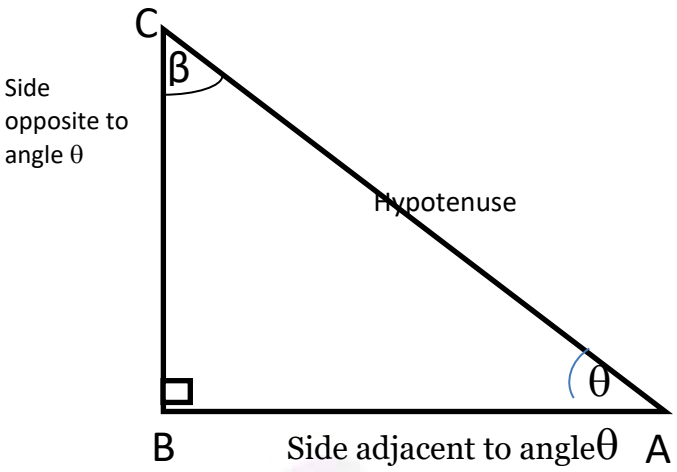
1. Trigonometric ratios of an acute angle of a right angled triangle.

$$\sin\theta = \frac{\text{Side opposite to}\angle\theta}{\text{Hypotenuse}} = \frac{BC}{AC}$$

$$\cos\theta = \frac{\text{Side adjacent to}\angle\theta}{\text{Hypotenuse}} = \frac{AB}{AC}$$

$$\tan\theta = \frac{\text{Side opposite to}\angle\theta}{\text{Side adjacent to}\angle\theta} = \frac{BC}{AB}$$

$$\text{Cot}\theta = \frac{1}{\tan\theta} = \frac{\text{side adjacent to}\angle\theta}{\text{Side opposite to}\angle\theta} = \frac{AB}{BC}$$



$$\sec\theta = \frac{1}{\cos\theta} = \frac{\text{Hypotenuse}}{\text{Side adjacent to}\angle\theta} = \frac{AC}{AB}$$

$$\text{cosec}\,\theta = \frac{1}{\sin\theta} = \frac{\text{Hypotenuse}}{\text{side Opposite to}\angle\theta} = \frac{AC}{BC}$$

For∠ β , sin β= AB/ AC, cosβ = BC/AC, tanβ= AB/BC
Cosecβ = AC/AB , secβ= AC/BC, cotβ = BC/AB

2. Relationship between different trigonometric ratios

$$\tan\theta = \frac{\sin\theta}{\cos\theta}$$

$$\cot\theta = \frac{\cos\theta}{\sin\theta}$$

$$\tan\theta = \frac{1}{\cot\theta}$$

$$\cos\theta = \frac{1}{\sec\theta}$$

$$\sin\theta = \frac{1}{\text{cosec}\,\theta}$$

3. Trigonometric Identities.
   (i) $\sin^2\theta + \cos^2\theta = 1$
   (ii) $1 + \tan^2\theta = \sec^2\theta$
   (iii) $1 + \cot^2\theta = \text{cosec}^2\theta$
4. Trigonometric Ratios of some specific angles.

θ	0°	30°	45°	60°	90°
sin θ	0	½	1/√2	√3/2	1
cosθ	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	2	√2	2/√3	1

	defined				

3. Trigonometric ratios of complementary angles.
   (i) $\sin(90^\circ - \theta) = \cos\theta$
   (ii) $\cos(90^\circ - \theta) = \sin\theta$
   (iii) $\tan(90^\circ - \theta) = \cot\theta$
   (iv) $\cot(90^\circ - \theta) = \tan\theta$
   (v) $\sec(90^\circ - \theta) = \operatorname{cosec}\theta$
   (vi) $\operatorname{cosec}(90^\circ - \theta) = \sec\theta$

(Level – 1)

1. If θ and $3\theta-30^\circ$ are acute angles such that $\sin\theta=\cos(3\theta-30^\circ)$,then find the value of $\tan\theta$.

Ans.$\frac{1}{\sqrt{3}}$

2. Find the value of $\frac{(\cos 30^\circ+\sin 60^\circ)}{(1+\cos 60^\circ+\sin 30^\circ)}$

Ans. $\sqrt{3}/2$

3. Find the value of $(\sin\theta+\cos\theta)^2+(\cos\theta-\sin\theta)^2$

Ans. 2

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

Ans.$\frac{7}{25}$

5. If $\sec\theta+\tan\theta=p$, then find the value of $\sec\theta-\tan\theta$

Ans.$\frac{1}{p}$

6. change $\sec^4\theta-\sec^2\theta$ in terms of $\tan\theta$.

Ans. $\tan^4\theta+\tan^2\theta$

7. If $\cot\theta=1/\sqrt{3}$ then find the value of $(1-\cos^2\theta)/(1+\cos^2\theta)$

Ans.$\frac{3}{5}$

8. If $\cot\theta + \frac{1}{\cot\theta} = 2$ then find the value of $\cot^2\theta + \frac{1}{\cot^2\theta}$.

Ans. 2

9. If$\sin\theta=a/b$,then find the value of$\sec\theta+\tan\theta$

Ans. $\sqrt{\frac{b+a}{b-a}}$

10. If$\cos x=\cos 60^\circ \cos 30^\circ+\sin 60^\circ \sin 30^\circ$,then find the value of x

Ans. 30°

11. If $0^\circ \le x \le 90^\circ$ and $2\sin^2 x=1/2$,then find the value of x

Ans. 30°

12. Find the value of $\operatorname{cosec}^2 30^\circ-\sin^2 45^\circ-\sec^2 60^\circ$

Ans. -2

13. Simplify $(\sec\theta+\tan\theta)(1-\sin\theta)$

Ans. $\cos\theta$

Level - 2

1. If secα=5/4 then evaluate tanα/(1+tan²α).

Ans:$\frac{12}{25}$

2. If A+B =90°,then prove that $\sqrt{\frac{tanA\ tanB+tanA\ cotB}{sinA\ secB}-\frac{sin^2B}{cos^2B}}$ = tanA

3. Prove that cosA/(1-sinA)+cosA/(1+sinA) =2secA.

4. Prove that $\sqrt{\frac{secA-1}{secA+1}}.+\sqrt{\frac{secA+1}{secA-1}}$ = 2cosecA

5. Prove that (sinθ+cosecθ)² + (cosθ+secθ)² =7+tan²θ+cot²θ.

6. Evalute$\frac{11\sin70^\circ}{7\cos20^\circ}$ -- $\frac{4\cos53^\circ\ \text{cosec}37^\circ}{7\tan15^\circ\ \tan35^\circ\ \tan55^\circ\ \tan75^\circ}$ Ans:1

7. Prove that $\sqrt{\frac{cosecA-1}{cosecA+1}}+\sqrt{\frac{cosecA+1}{cosecA-1}}$ = 2secA.

8. In a right angle triangle ABC,right angled at B, if tanA=1, then verify that 2sinA cosA = 1.

9. If tan (A-B)=√3, and sinA =1, then find A and B. Ans:90°& 30°

10. If θ is an acute angle and sinθ=cosθ, find the value of 3tan²θ + 2sin²θ – 1. Ans:3

11. If $\frac{x}{a}$cosθ + $\frac{y}{b}$ sin θ = 1 and $\frac{x}{a}$sinθ – $\frac{y}{b}$ cosθ = 1,prove that x²/a² + y²/b² = 2.

Level - 3

1. Evaluate the following :- sin²25° + sin²65° + $\sqrt{3}$(tan5° tan15° tan30° tan75° tan85°)

Ans:2

2. If$\frac{\cos\alpha}{\cos\beta}$ = m, and $\frac{\cos\alpha}{\sin\beta}$= n , show that (m²+n²) cos²β = n².
3. Prove that tan²θ + cot²θ + 2 = cosec²θ sec²θ.
4. Prove that (tanA – tanB)² + (1+tanA tanB)² = sec²A secB.
5. If (cosθ-sinθ) = √2 sinθ, then show that cosθ + sinθ = √2 cos θ.
6. Prove that (sinθ+secθ)² + (cosθ + cosecθ)² = (1+secθ cosecθ)².
7. Prove that sinθ/(1-cosθ) + tanθ/(1+cosθ) = secθcosecθ + cotθ.
8. If x = asinθ and y = btanθ . Prove that x²/a² – b²/y² = 1

9. If $\cot\theta = \frac{15}{8}$, evaluate $(2 + 2\sin\theta)(1 - \sin\theta)/(1+\cos\theta)(2 - 2\sin\theta)$.

10 Prove that $\sin6\theta + \cos6\theta = 1 - 3\sin2\theta\cos2\theta$.

Level – 4

1. Prove that $(\sec\theta+\tan\theta - 1)/(\tan\theta - \sec\theta+1) = \cos\theta/(1 - \sin\theta)$.
2. If $x = r \sin A\cos C$, $y = r\sin A\sin C$, $z = r\cos A$, Prove that $r^2 = x^2+y^2+z^2$.

3. Prove that $\frac{1}{\sec\theta-\tan\theta} - \frac{1}{\cos\theta} = \frac{1}{\cos\theta} - \frac{1}{\sec\theta+\tan\theta}$.

4. If $x = a\sin\theta$, $y = b\tan\theta$, prove that $\frac{a^2}{x^2} - \frac{b^2}{y^2} = 1$.

5. Prove that: $\frac{\cos\theta}{1-\tan\theta} - \frac{\sin^2\theta}{\sin\theta-\cos\theta} = \sin\theta + \cos\theta$

6. Evaluate $\frac{\sin^2\theta+\sin^2(90°- \theta)}{3(\sec^2 61°-\cot^2 29°)} - \frac{3\cot^2 30°\sin^2 54°\sec^2 36°}{2(\operatorname{cosec}^2 65°-\tan^2 25°)}$. Ans. $-\frac{25}{6}$

7. Prove that $\frac{1+\cos A+\sin A}{1+\cos A - \sin A} = \frac{1+\sin A}{\cos A}$.

8. Prove that $\frac{\sin\theta - 2\sin^3\theta}{2\cos^3\theta - \cos\theta} = \tan\theta$.

9. Prove that $(1 + \cos\theta + \sin\theta)/(1+ \cos\theta - \sin\theta) = (1 + \sin\theta)/\cos\theta$

10. If $\cot\theta = \frac{7}{8}$, evaluate (i)$\cos^2\theta + \sin^2\theta$ (ii)$\cos^2\theta - \sin^2\theta$. Ans. 1, $-\frac{15}{113}$

Self Evaluation

1. If a cosθ + b sinθ = c, then prove that asinθ – bcosθ = $\mp\sqrt{\mathbf{a^2 + b^2 - c^2}}$.

2. If A,B,C are interior angles of **triangle ABC, show that cosec²($\frac{B+C}{2}$) - tan² $\frac{A}{2}$**

= 1.

3. Ifsinθ + sin²θ + sin³**θ** = 1, prove that cos⁶θ – 4cos⁴θ + 8cos²**θ** = 4.

4. IftanA = ntanB, sinA = msinB, prove that cos²A = (m² - 1)/(n²-1).

5. Evaluate [secθcosec(90°- θ) – tanθ cot(90°θ) + sin²55° sin²35°] /

(tan10°tan20°tan60°tan70°tan80°). Ans:$\frac{2}{\sqrt{3}}$

6. If secθ + tanθ=p, prove that sinθ = **(**p²-1**)/(**p²+1**)**.

STATISTICS
KEY POINTS

The three measures of central tendency are :

i. Mean
ii. Median
iii. Mode

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

(i) Direct Method

Mean = $\bar{X} = \frac{\sum_{i=1}^{n} fixi}{\sum_{i=1}^{n} fi}$

Where X_i is the class mark of the i^{th} class interval and f_i frequency of that class

(ii) Assumed Mean method or Shortcut method

Mean = $\bar{X}$ = a + $\frac{\sum_{i=1}^{n} fidi}{\sum_{i=1}^{n} fi}$

Where a = assumed mean
And d_i= X_i - a

(iii) **Step deviation method**.

Mean = $\bar{X}$ = a + $\frac{\sum_{i=1}^{n} fiui}{\sum_{i=1}^{n} fi}$ x h

Where a = assumed mean
h = class size
And u_i= (X_i – a)/h

- Median of a grouped frequency distribution can be calculated by

Median = l + $\left(\frac{\frac{n}{2}-cf}{f}\right) x\ h$

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 + $\left(\frac{f1-fo}{2f1-fo-f2}\right) x\ h$

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:
  (i) Less than type ogive.
  (ii) 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 X_i: 35, 38, 40, 42, 44 f_i: 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, Less, Less, Less, Less, Less, Less	

	Than 6	Than 10	Than 14	Than 20	Than 28	Than 38	Than 40
No. of students	11	21	28	32	36	39	40

LEVEL – 3

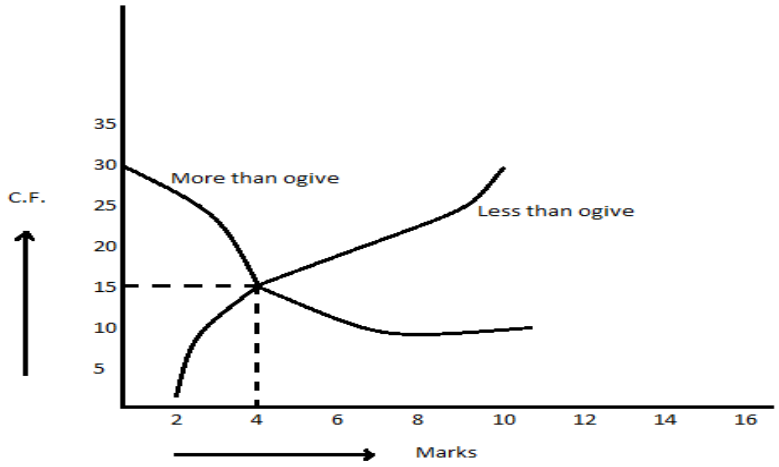
SN	Question	Ans
1	If the mean distribution is 25 Class: 0-10 | 10-20 | 20-30 | 30-40 | 40-50 Frequency: 5 | 18 | 15 | P | 6 Then find p.	P=16
2	Find the mean of the following frequency distribution using step deviation method Class: 0-10 | 10-20 | 20-30 | 30-40 | 40-50 Frequency: 7 | 12 | 13 | 10 | 8	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

SN	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 f_1 and f_2. Class: 0-20 | 20-40 | 40-60 | 60-80 | 80-100 | 100-120 | Total Frequency: 7 | f_1 | 12 | f_2 | 8 | 5 | 50	f_1 =8 and f_2 =10
2	The following distribution give 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 a 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?



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

Variate (x_i)	13	15	17	19	20+p	23
Frequency (f_i)	8	2	3	4	5p	6

4. 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

5. 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

6. 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

7. 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

8. 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

9. 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

10. The following are ages of 300 patients getting medical treatment in a hospital on a particular day.

Age(in years)	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70
Number of patients	60	42	55	70	53	20

Draw :

1. Less than type cumulative frequency distribution
2. More than type cumulative frequency distribution

Value Based Question:

Q1. The following frequency distribution gives the monthly consumption of electricity of 68 consumers of a locality.

Monthly consumption (in units)	65 – 85	85 – 105	105 – 125	125- 145	145- 165	165 – 185	185 – 205
Number of consumers	4	5	13	20	14	8	4

Mr. Sharma always saves electricity by switching of all the electrical equipment just immediately after their uses. So , his family belongs to the group 65- 85 .

(i) Find the median of the above data

(ii) How many families consumed 125 or more units of electricity during a month?

(iii) What moral values of Mr. Sharma have been depicted in this situation?

Q2. The mileage (km per litre) of 50 cars of the same models is tested by manufacturers and details are tabulated as given below:-

Mileage (km per litre)	10 – 12	12 – 14	14 - 16	16- 18

No. of cars	7	12	18	13

i. Find the mean mileage .

ii. The manufacturer claims that the mileage of the model is 16km/litre. Do you agree with this claim?

iii. Which values do you think the manufacturer should imbibe in his life?

----------x----------x----------x----------x----------x----------x----------x

Blue-Print
Summative Assessment – I

Class X **Subject: Mathematics**

	VSA	SA I	SA II	LA	Total
Number System	**2(2)**	**1(2)**	**1(3)**	**1(4)**	**5(11)**
Algebra	**1(1)**	**2(4)**	**2(6)**	**3(12)**	**8(23)**
Geometry	**1(1)**	**1(2)**	**2(6)**	**2(8)**	**6(17)**
Trigonometry	**-**	**1(2)**	**4(12)**	**2(8)**	**7(22)**
Statistics	**-**	**1(2)**	**1(3)**	**3(12)**	**5(17)**
Total	**4(4)**	**6(12)**	**10(30)**	**11(44)**	**31(90)**

- **No. of Questions outside the bracket.**
- **Marks inside the bracket.**

Summative Assessment – I 2014

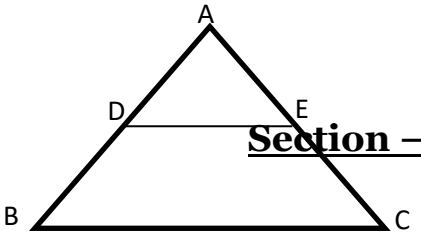
Class: X Max. Marks: 90
Subject: Mathematics Time Allowed: 3 hours
General Instructions:

i) All questions are compulsory.
ii) The question paper consists of 31 questions divided into four sections A,B,C and D. Section A comprises of 4 questions of 1 marks each. Section B comprises of 6 questions of 2 marks each. Section C comprises of 10 questions of 3 marks each and Section D comprises of 11 questions of 4 marks each.
iii) There is no overall choice in this question paper.
iv) Use of calculator is not permitted.

Section – A

Questions from 1 to 4 carry one mark each.

1. What is the value of x for which the expression $(2 \times x)^n$ ends with 0, where n is any natural number and x is a non-zero digit?
2. After how many places will the decimal expansion of $\frac{7}{2^3 \times 5^2}$ will terminate?
3. What is the value of K, for which the pair of linear equations 4x + 6y – 1 = 0 and 2x – Ky = 7 represents parallel lines?
4. If in the given figure DE || BC, AD = 3 and AB = 8cm, then find AE : EC.



Section – B

tions from 5 to 10 carry two marks each.

5. Given that HCF(306, 1314) = 18. Find LCM(306, 1314).
6. Solve by substitution method:

   x + y = 14; x – y = 4

7. Find the sum and product of the zeroes of the polynomial $6x^2 - 9x - 14$.

8. Determine whether the triangle having sides (a -1)cm, $2\sqrt{a}\ cm\ and\ (a+1)cm$ is a right angled triangle.

9. If $\cos\theta = \frac{1}{\sqrt{3}}$ then find the value of $sin^2\theta - cos^2\theta$.

10. Find the upper limit of the median class for the following data:

Weight(in Kg)	40-45	45-50	50-55	55-60	60-65	65-70	70-75
No. of students	2	3	8	6	6	3	2

Section C

Questions from 11 to 20 carry three marks each.

11. Show that $\sqrt{5}$ is an irrational number.
12. Solve:

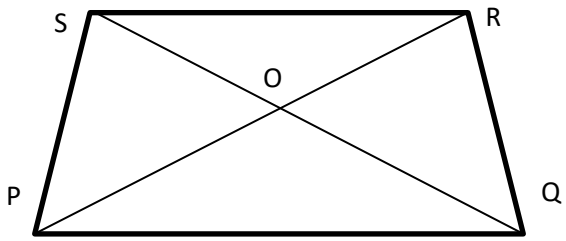
$$\frac{1}{3x+y} + \frac{1}{3x-y} = \frac{3}{4}$$

$$\frac{1}{2(3x+y)} - \frac{1}{2(3x-y)} = \frac{-1}{8}$$

13. Find a polynomial of least degree which should be subtracted from $x^4 + 2x^3 - 4x^2 + 6x - 8$ so that it becomes exactly divisible by $x^2 - x + 1$.

14. ABCD is a rhombus. Prove that $AB^2 + BC^2 + CD^2 + DA^2 = AC^2 + BD^2$.

15. In the given figure PQRS is a trapezium in which PQ || RS and the diagonals PR and QS intersect each other at O. Prove that $\frac{OP}{OR} = \frac{OQ}{OS}$



16. If $\sin A = \frac{\sqrt{3}}{2}$ and $\cos B = \frac{1}{\sqrt{2}}$ find the value of $\frac{\tan A - \tan B}{1+\tan A.\tan B}$

ind the value of the following without using trigonometric tables:

$$\frac{cos\,50^\circ}{2\,Sin40^\circ} + \frac{4(cosec^2 59^\circ - tan^2 31^\circ)}{3\,tan^2 45^\circ} - \frac{2}{3}tan12^\circ .tan78^\circ .sin90^\circ$$

18. Prove that $cos\theta(sin\theta - 2sin^3\theta) = sin\theta(2cos^3\theta - cos\theta)$

19. If $sec\theta + tan\theta = p$, show that $\frac{p^2+1}{2p} = sec\theta$

20. Find the mode of the following frequency distribution:

Class	14 – 16	16-18	18-20	20-22	22-24
Frequency	2	3	6	5	4

Section – D

Questions from 21 to 31 carry four marks each.

21. 6 retired teachers, 8 retired doctors and 10 retired defense officers are willing to render their services to a village. Each of teacher, doctor and defense officers serves equal number of different persons in that village.
    a) Find least number of persons served by each.
    b) Suggest the value depicted in the question.

22. Represent the following pair of linear equations graphically

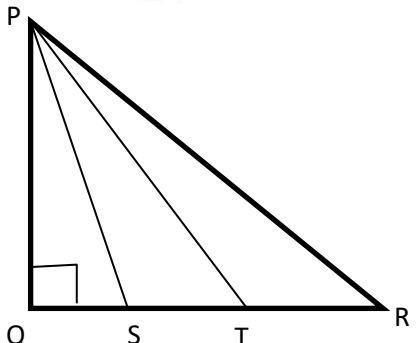
    x + y = 7
    5x + 2y = 20

    From the graph, find the points where the lines represented by these equations intersect the x-axis.

23. The present age of a father is three years more than three times the age of the son. Three years hence, father's age will be 10 years more than twice the age of the son. Determine their present ages.

24. Find the values of p and q so that 1 and -2 are the zeroes of the polynomial p$(x) = x^3 + 10\,x^2 + px + q$. Also find its third zero.

25. In the figure given below, △PQR is right angled at Q and the points S and T trisect the side QR. Then prove that $8PT^2 = 3PR^2 + 5PS^2$.



26. Prove that the ratio of the areas of two similar triangles is equal to the square of the ratio of their corresponding sides.

27. If tanθ + cot θ = 4 find the values of $tan^4\theta + cot^4\theta$

8. Prove that:

$$\frac{\tan\theta}{1-\cot\theta} + \frac{\cot\theta}{1-\tan\theta} = 1 + \sec\theta\ .cosec\ \theta$$

29. Find the mean for the following data :

Class	Frequency
24.5 – 29.5	4
29.5 – 34.5	14
34.5 – 39.5	22
39.5 – 44.5	16
44.5 – 49.5	6
49.5 – 54.5	5
54.5 – 59.5	3

30. The mean of the following frequency distribution is 62.8 and sum of frequencies is 50. Find the missing frequencies f1 and f2 :

Class	0-20	20-40	40-60	60-80	80-100	100-120
Frequency	5	f1	10	f2	7	8

31. Find the median graphically by drawing the less than origin for the following data:

Marks	30-40	40-50	50-60	60-70	70-80	80-90	90-100
No of students	3	10	17	20	25	15	10

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:

i. The shape of the curve when the coefficient of x^2 is positive

ii. The shape of the curve when the coefficient of x^2 is negative

iii. Its number of zero

Activity3: To obtain the zero of a linear Polynomial Geometrically

Activity4: To obtain the condition for consistency of system of linear 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.