Paper: 03 Class-X-Math: Summative Assessment - I

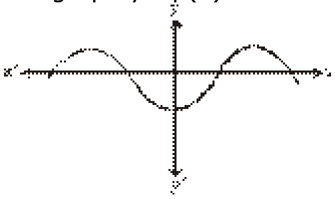
Total marks of the paper: 90 Total time of the paper: 3.5 hrs

Questions:

1] Triangle ABC is similar to triangle DEF and their areas are $64\ cm^2$ and $121\ cm^2$ respectively. If EF= 15.4 cm, then BC = ? [Marks:1]

A. 13
B. 8
C. 11
D. 11.2

2] The graph y= p(x) is shown below. How many zeroes does the polynomial p(x) have? [Marks:1]



A. 1
B. 2
C. 3
D. 4

3] Which of the following is not a measure of central tendency : [Marks:1]

A. Mode
B. Median
C. Mean
D. Range

4] The number 7 x 11 x 13 + 13+13 x 2 is [Marks:1]

A. multiple of 7
B. Neither prime nor composite
C. Prime
D. Composite

5] HCF of the smallest composite number and the smallest prime number is [Marks:1]

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

6] For what value of 'K' will the system of equations 3x + y = 1, (2K - 1) x + (K - 1) y = 2K + 1 have no solution. [Marks:1]

A. -2
B. 1
C. 3
D. 2

7] If 3cotA = 4, then $\frac{1-\tan^2 A}{1+\tan^2 A}$ = [Marks:1]

A. $\frac{7}{16}$

B. $\frac{16}{25}$

C. $\frac{9}{25}$

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

8] If tan A = cot B, then A + B = ? [Marks:1]

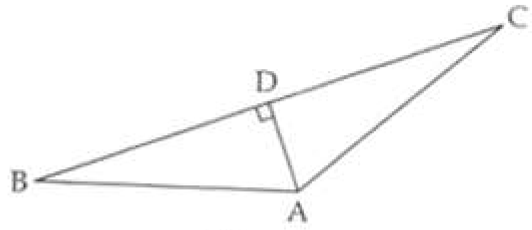
A. 60^0

B. 45^0

C. 30^0

D. 90^0

9] In figure, If AD $\perp$ BC, then prove that $AB^2 + CD^2 = AC^2 + BD^2$ [Marks:2]



10] Find LCM and HCF of 120 and 144 by fundamental theorem of Arithmetic. [Marks:2]

11] Solve the following pair of linear equations. [Marks:2]
3x + 4y = 10 and 2x - 2y = 2

12] Prove that $\sin^6\theta + \cos^6\theta + 3\sin^2\theta\cos^2\theta = 1$. [Marks:2]

13] Write a frequency distribution table for the following data: [Marks:2]

Marks	Above 0	Above 10	Above 20	Above 30	Above 40	Above 50
No. of students	30	28	21	15	10	0

14] If x - 2 is a factor of $x^3 + ax^2 + bx + 16$ and a - b = 16, find the value of a and b. [Marks:2]
OR
If m, n are the zeroes of polynomial ax^2-5x+c , find the value of a and c if m + n = m.n

15] Find the mode of the following data: [Marks:3]

Marks	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50
No. of students	3	12	32	20	6

16] In Δ ABC, if AD is the median, then show that $AB^2 + AC^2 = 2[AD^2 + BD^2]$. [Marks:3]

17] Prove that: [Marks:3]

$$\frac{1 + \cos A}{\sin A} + \frac{\sin A}{1 + \cos A} = 2\,\mathrm{cosec}\,A$$

18] The sum of the numerator and denominator of a fraction is 8. If 3 is added to both the numerator and the denominator the fraction becomes $\frac{3}{4}$. Find the fraction. [Marks:3]
OR
Seven times a two digit number is equal to four times the number obtained by reversing the order of its digits. If the difference between the digit is 3, find the number.

19] Prove that $\sqrt{11}$ is an irrational. [Marks:3]
OR
Prove that $2\sqrt{3} - 7$ is an irrational.

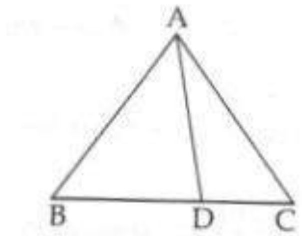
20] Find the median of the following data. [Marks:3]

Class Interval	0-20	20-40	40-60	60-80	80-100	100-120
Frequency	7	8	12	10	8	5

OR
The mean of the following data is 53,find the missing frequencies.

Age in years	0 - 20	20 - 40	40 - 60	60 - 80	80 - 100	Total
Number of people	15	f_1	21	f_2	17	100

21] In figure,
ΔABC is such that $\angle ADC = \angle BAC$. Prove that $CA^2 = CB \times CD$.



[Marks:3]

22] Prove that:
$$\frac{1 + \sec A}{\sec A} = \frac{\sin^2}{1 - \cos A}.$$
OR
Without using trigonometric tables evaluate:
$$\frac{3 \tan 35^{\circ} \tan 40^{0} \tan 50^{\circ} \tan 55^{\circ} - \frac{1}{2} \tan^2 60^{\circ}}{4\left(\cos^2 39^{\circ} + \cos^2 51^{\circ}\right)}$$
[Marks:3]

23] In dividing $x^3 - 3x^2 + x + 2$ by a polynomial g(x) the quotient q(x) and the remainder r(x) were x - 2 and -2x + 4 respectively. Find g(x). [Marks:3]

24] For what values of a and b does the following pairs of linear equations have an infinite number of solutions: [Marks:3]
2x + 3y = 7; a (x + y) -b (x - y) = 3a + b - 2

25] Use Euclid's division lemma to show that the square of any positive integer is either of the form 3m or 3m + 1 for some integer m. [Marks:4]

26] 100 surnames were randomly picked up from a local telephone directory and the frequency distribution of the number of letters in the English alphabets in the surnames was obtained as follows: [Marks:4]

No. of letters	1-4	4-7	7-10	10-13	13-16	16-19
No. of surnames	6	30	40	16	4	4

What is the average length of a surname? Which average you will use? Justify.

27] Prove that:
$$\frac{\tan\theta}{1 - \cot\theta} + \frac{\cot\theta}{1 - \tan\theta} = 1 + \tan\theta + \cot\theta$$
[Marks:4]
OR
(cosec A - sin A) (sec A - cos A) (tan A + cot A) = 1

28] State and prove Basic proportionality theorem. [Marks:4]
OR
State and prove Pythagoras theorem.

29] If $\tan\theta + \sin\theta = m$ and $\tan\theta - \sin\theta = n$. Show that $m^2 - n^2 = 4\sqrt{mn}$. [Marks:4]

30] What must be subtracted from $x^3 - 6x^2 - 15x + 80$ so that the result is exactly divisible by $x^2 + x - 12$? [Marks:4]

31] Solve graphically the pair of equations 2x + 3y = 11 and 2x - 4y = -24. Hence find the value of coordinate of the vertices of the triangle so formed. [Marks:4]

32] The mode of the following frequency distribution is 55. Find the value of f_1 and f_2. [Marks:4]

Class Interval	0 - 10	15 - 30	30 - 45	45 - 60	60 - 75	75 - 90	Total
Frequency	6	7	f_1	15	10	f_2	51

33] Prove that ratio of the areas of two similar triangles is equal to the ratio of the square of their corresponding sides. [Marks:4]

34] Prove that :

$$\frac{1}{\sec\theta - \tan\theta} - \frac{1}{\cos\theta} = \frac{1}{\cos\theta} - \frac{1}{\sec\theta + \tan\theta}$$

[Marks:4]

Solutions paper- 03:

1] $\frac{ar(\Delta ABC)}{ar(\Delta DEF)} = \frac{BC^2}{EF^2}$

$\Rightarrow \frac{64}{121} = \frac{BC^2}{(15.4)^2}$

$\Rightarrow BC^2 = \frac{64}{121} \times (15.4)^2$

$\Rightarrow BC = \frac{8}{11} \times 15.4 = 11.2$

2] Zeroes of a polynomial are the x- coordinates of the points where its graph crosses or touches the X- axis. Graph of y = p(x) intersects the X-axis at 4 points. Therefore, the polynomial p(x) has 4 zeroes

3] Range is not a measure of central tendency.

4] 7×11×13+13 +13 x 2 = 13(7×11 + 1+2) = 13(80)

5] Smallest composite number= 4 and the smallest prime number=2. HCF of 2 and 4 = 2.

6] For the system of linear equations: a1x + b1y + c1 = 0, and

a2x + b2y + c2 = 0 to have no solution $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

For the system of equations 3x + y = 1,

(2K - 1) x + (K - 1) y = 2K + 1 a1 =3, b1 = 1, c1 = 1, and

a2 = 2K-1 b2 = K-1 c2 = 2K+1

$\frac{3}{2K-1} = \frac{1}{K-1} \neq \frac{1}{2K+1}$

This gives K=2.

7] Given that 3cot A=4, we have, cot A= 4/3

Then, tan A = 3/4

Now, (1-tan2A)= 1- $\frac{9}{16} = \frac{7}{16}$

And, (1+tan2A) = 1+ $\frac{9}{16} = \frac{25}{16}$

THerefore, $\frac{1-\tan^2 A}{1+\tan^2 A} = \frac{7}{25}$

8] tan A=cot B

tan A=tan(900-B)

A=900-B or A+B=900

9] In Δ ADC, AD2 = AC2 - CD2

In Δ ABD, AD2 = AB2 - DB2

AB2 - B2 = AC2 - CD2

$\Rightarrow$AB2 + CD2 = AC2 + BD2

10] 120 = 23 $\times$3 $\times$5

144 = 24 $\times$32

LCM = 24 $\times$32 $\times$5 = 720

HCF = 23 $\times$3 = 24

11] 3x + 4y = 10

4x - 4y = 4

$\overline{7x \quad = 14}$

x = 2

x - y = 1 $\Rightarrow$y = x - 1 = 2 - 1 = 1

The solution x = 2, y = 1

12] We know that sin2θ + cos2θ =1 Taking cube of both sides (sin2θ + cos2θ)3 =13

(sin2θ)3 + (cos2θ)3 + 3 sin2θ .cos2θ (sin2θ + cos2θ)= 1

Therefore, sin6θ + cos6 θ+ 3sin2θcos2θ=1

13]

Marks	No. of students
0 - 10	2

10 - 20 20 - 30 30 - 40 40 - 50	7 6 5 10
Total	30

14] Let p(x) = x3 + ax2 + b x + 16

g(x) = x - 2 is a factor of p(x)

∴ ∴ p(2) = 0

so, p(2) = 8 + 4a + 2b + 16 = 0

= 4a + 2b = -24

= 2a + b = -12 (i)

Also a -b = 16 (ii)

Solving (i) and (ii)

$3a = 4 \Rightarrow a = \frac{4}{3}$

OR

Given polynomial p(x) = ax2 - 5x + c

Sum of zeroes m + n = $\frac{+5}{a}$

Product of zeroes mn = $\frac{c}{a}$

Given: m + n = mn = 10

$\frac{5}{a} = 10 \Rightarrow a = \frac{1}{2}$

$\frac{c}{a} = 10$

$\frac{c}{\frac{1}{2}} = 10$

$2c = 10$

$\Rightarrow c = 5$

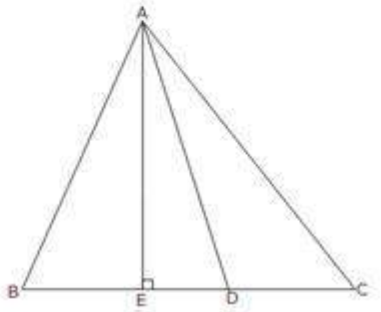
15]

Modal Class = 20-30 ? = 20, f0 = 12, f1 = 32, f2 = 20, h = 10 Mode = $\ell + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right)h$

$= 20 + \left(\frac{32 - 12}{64 - 12 - 20}\right)10$

Mode = $20 + \frac{20 \times 10}{32}$ = 26.25

16]



Construction - draw AE $\perp$ BC

In right triangle AEB and AEC

AB2 + AC2 = BC2 + AE2 + EC2 + AC2 = 2AE2 + (BD - ED)2 + (ED + DC)2

= 2AE2 + 2ED2 + BD2 + DC2

$\because$ BD = DC

AB2 + AC2 = 2AE2 + 2ED2 + 2BD2

= 2 [AE2 + ED2] + 2BD2

= 2 (AD2 + BD2)

17]

LHS = $\frac{(1 + \cos A)^2 + \sin^2 A}{\sin A\,(1 + \cos A)}$

$= \frac{1 + 2\cos A + \cos^2 A + \sin^2 A}{\sin A\,(1 + \cos A)}$

$= \frac{2\,(1 + \cos A}{\sin A\,(1 + \cos A)}$

$= \frac{2\,(1 + \cos A}{\sin A\,(1 + \cos A)}$ = 2 cosec A = RHS

18]

Let the fraction be: $\frac{x}{y}$

According to the question

x + y = 8

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

On solving we get x = 3, y = 5

The fraction is $\frac{3}{5}$

OR

Let the tens and units digits of the number be x and y respectively then

7(10x + y) = 4 (10y + x)

$\Rightarrow$70x + 7y = 40y + 4x

$\Rightarrow$66x = 33y

$\Rightarrow$y = 2x

Also, y - x = 3

On solving, x = 3, y = 6

Number = 36.

19] Let $\sqrt{11}$ be a rational number

$\therefore$ Let $\sqrt{11} = \frac{p}{q}$

$\sqrt{11}q = p$

11q2 = p2

11 divides p2 hence 11 divides P.

Let p = 11c

$\sqrt{11}q$ 11q2 = 121 c2

Or q2 = 11c2

11 divides q2 Hence 11 divides q

From (1) and (2) p and q have a common factor 11 which contradicts our assumption. $\sqrt{11}$ is irrational

OR

Let $2\sqrt{3} - 7$ is rational

$\therefore 2\sqrt{3} - 7 = \frac{p}{q}$

$\sqrt{3} = \frac{p + 7q}{2q}$

Since p and q are integer $\frac{p + 7q}{2q}$ is rational

$\therefore \sqrt{3}$ is rational

But we have that $\sqrt{3}$ is irrational

$\therefore$ our assumption is wrong. Hence $2\sqrt{3} - 7$ is irrational.

20]

Class Interval	Frequency	
0 - 20	7	7
20 - 40	8	15
40 - 60	12	27
60 - 80	10	37
80 - 100	8	45
100 - 120	5	50
Total	50	

$\frac{N}{2} = \frac{50}{2} = 25$

Median class 40 - 60

$\ell = 40$, f = 12 CF = 15 h = 20

Median = $\ell + \left(\frac{\frac{N}{2} - CF}{f}\right)h$

$= 40 + \left(\frac{25 - 15}{12}\right)20$

$= 40 + \left(\frac{25 - 15}{12}\right) 20$

$= 40 + \frac{200}{12} = 56.7$ = 56.7

OR

Age (in Years)	No. of people fi	Value xi	fixi
0 - 20	15	10	150
20 - 40	f1	30	30f1
40 - 60	21	50	1050
60 - 80	f2	70	70f2
80 - 100	17	90	1530
Total	100		2730 + 30f1 + 70 f2

53 + f1 + f2 = 100 ⇒f1 + f2 = 47 ...(1)

$53 = \frac{2730 + 30f1 + 70f2}{100}$

5300 - 2730 = 30f1 + 70f2

30f1 + 70f2 = 2570

Or 3f1 + 7f2 = 257 ...(2)

$4f2 = 116$

$\Rightarrow f2 = \frac{116}{4} = 29$

f1 + f2 = 47

f2 = 47 - 29 = 18

21] In Δ ABC and Δ DAC

$\angle$ BAC = $\angle$ ADC

$\angle$ C = $\angle$ C

$\Delta ABC \sim \Delta DAC$ (AA)

$\frac{CB}{CA} = \frac{CA}{CD}$

$\Rightarrow CA^2 = CB \times CD$

22] LHS = $\frac{1+\frac{1}{\cos A}}{\frac{1}{\cos A}} = \frac{(\cos A+1)\cos A}{\cos A}$

= 1 + cos A

= $\frac{(1+\cos A)(1-\cos A)}{1-\cos A}$

= $\frac{1-\cos^2 A}{1-\cos A} = \frac{\sin^2 A}{1-\cos A}$

OR

$\frac{3\tan 35^\circ \cot(90^\circ-55^\circ)\tan 40^\circ \cot(90^\circ-50^\circ)-\frac{1}{2}(\sqrt{3})^2}{4(\cos^2 39^\circ)}$ $= \frac{3-\frac{3}{2}}{4} = \frac{6-8}{8} = \frac{3}{8}$

23] p(x) = x3 - 3x2 + x + 2

g(x) = ?

q(x) = x - 2 r(x) = -2x + 4

p(x) = g(x) + r(x)

x3 - 3x2 + x + 2 = g(x) (x - 2) - 2x + 4

g(x) = $\frac{x^3-3x^2+x+2+2x-4}{x-2}$

= $\frac{x^3-3x^2+3x-2}{x-2}$

= x2 - x + 1

24] The system has infinitely many solutions:

$\Rightarrow \frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

$\Rightarrow \underset{(1)}{\frac{2}{a-b}} = \underset{(2)}{\frac{3}{a+b}} = \underset{(3)}{\frac{7}{3a+b-2}}$

Equating (1) and (2), we get a = 5b

Equating (2) and (3), we get 2a - 4b = 6

On solving, we get b = 1 and a = 5.

25] If a and b are one two positive integers. Then a = bq + r, 0 ≤ r ≤ b Let b = 3 Therefore, r = 0, 1, 2 Therefore, a = 3q or a = 3q + 1 or a = 3q + 2 If a = 3q a2 = 9q2 = 3(3q2) = 3m or where m = 3q2 a = 3q + 1 a2 = 9q2 + 6q + 1 = 3(3q2 + 2q) + 1 = 3m + 1 where m = 3q2 + 2q or a = 3q + 2 a2 = 9q2 + 12q + 4 = 3(3q2 + 4q + 1) + 1

= 3m + 1, where m 3q2 + 4q + 1

Therefore, the squares of any positive integer is either of the form 3m or 3m + 1.

26]

CI	1-4	4-7	7-10	10-13	13-16	16-19
fi	6	30	40	16	4	4
xi	2.5	5.5	8.5	11.5	14.5	17.5

Average most suitable here is the Mode because we are interested in knowing the length of surname for maximum no. of people

Since the maximum frequency is 40 and it lies in the class interval 7-10.

Therefore, modal class = 7-10

?= 7, h=3, f0=30 , f1=40 , f2=16

Mode = $\ell + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right) \times h$

$= 7 + \left(\frac{40 - 30}{2 \times 40 - 30 - 16}\right) \times 3$

= 7 +.88 = 7.88 years(approx.)

27] LHS = $\dfrac{\frac{\sin\theta}{\cos\theta}}{1 - \frac{\cos\theta}{\sin\theta}} + \dfrac{\frac{\cos\theta}{\sin\theta}}{1 - \frac{\sin\theta}{\cos\theta}} = \dfrac{\sin^2\theta}{\cos\theta(\sin\theta - \cos\theta)} + \dfrac{\cos^2\theta}{\sin\theta(\cos\theta - \sin\theta)}$

$= \dfrac{\sin^3\theta - \cos^3\theta}{\sin\theta\cos\theta(\sin\theta - \cos\theta)}$

$= \dfrac{(\sin\theta - \cos\theta)(\sin^2\theta + \cos^2\theta + \sin\theta\cos\theta)}{\sin\theta\cos\theta(\sin\theta - \cos\theta)}$

$= \dfrac{\sin^2\theta}{\sin\theta\cos\theta} + \dfrac{\cos^2\theta}{\sin\theta\cos\theta} + \dfrac{\sin\theta\cos\theta}{\sin\theta\cos\theta}$ = tan? + cot? + 1 = RHS

OR

LHS=(cosec A - sin A) (sec A - cos A) (tan A + cot A)

$$= \left(\frac{1}{\sin A} - \sin A\right)\left(\frac{1}{\cos A} - \cos A\right)\left(\frac{\sin A}{\cos A} + \frac{\cos A}{\sin A}\right)$$

$$= \left(\frac{1 - \sin^2 A}{\sin A}\right) \times \left(\frac{1 - \cos^2 A}{\cos A}\right) \times \left(\frac{\sin^2 A + \cos^2 A}{\cos A . \sin A}\right)$$

$$= \frac{\cos^2 A}{\cos A} \times \frac{\sin^2 A}{\cos A} \times \frac{1}{\cos A . \sin A}$$

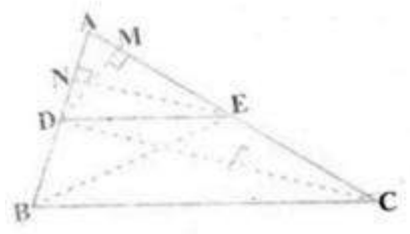
=1

= RHS

28] Basic proportionality theorem

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

Given:A triangle ABC in which a line parallel to side BC intersects other two sides AB and AC at D and E respectively (see fig.)



To prove that $\frac{AD}{BD} = \frac{AE}{EC}$.

Construction: Let us join BE and CD and then draw DM $\perp$ AC and EN $\perp$ AB.

Proof:

Now, area of $\Delta ADE \left(= \frac{1}{2} \text{ base } \times \text{ height}\right) = \frac{1}{2} AD \times EN.$

Note that Δ BDE and DEC are on the same base DE and between the same parallels BC and DE.

So, ar(BDE) = ar(DEG)

Therefore, from (1), (2) and (3), we have :

$\frac{AD}{DB} = \frac{AE}{EC}$ Hence proved.

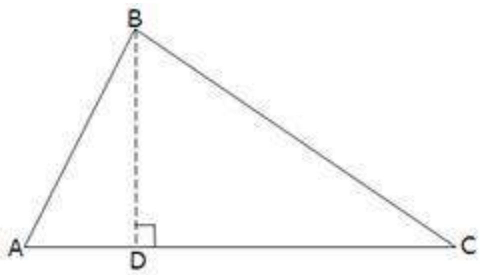
OR

Pythagoras Theorem : Statement:In a right angled triangle,the square of the hypotenuse is equal to the sum of squares of the other two sides.

Given: A right triangle ABC right angled at B.

To prove: that AC2 = AB2 + BC2

Construction:Let us draw BD $\perp$ AC (See fig.)



Proof :

Now, Δ ADB $\sim$ Δ ABC (Using Theorem: If a perpendicular is drawn from the vertex of the right angle of a right triangle to the hypotenuse ,then triangles on both sides of the perpendicular are similar to the whole triangle and to each other)

So, $\frac{AD}{AB} = \frac{AB}{AC}$ (Sides are proportional)

Or, AD.AC = AB2 (1)

Also, Δ BDC $\sim$ Δ ABC (Theorem)

So, $\frac{CD}{BC} = \frac{BC}{AC}$

Or, CD. AC = BC2

Adding (1) and (2),

AD. AC + CD. AC = AB2 + BC2

OR, AC (AD + CD) = AB2 + BC2

OR, AC.AC = AB2 + BC2

OR, AC2 = AB2 + BC2

Hence proved.

29] m2 - n2 = (m + n) (m - n)

= $\left[(\tan\theta + \sin\theta) + \tan\theta - \sin\theta\right]$

= 2 tan θ . 2 sin θ

$= 4 \tan\theta . \sin\theta$

$= 4\sqrt{\tan^2\theta \sin^2\theta}$

$= 4\sqrt{(\sec^2\theta - 1)\sin^2\theta}$

$= 4\sqrt{\sec^2\theta - \sin^2\theta}$

$= 4\sqrt{\tan^2\theta - \sin^2\theta}$

$= 4\sqrt{mn}$

30] Let p(x) = x3 - 6x2 - 15x + 80

Let say that we subtracted ax + b so that it is exactly divisible by

x2 + x - 12

s(x) = x3 - 6x2 - 15x + 80 - (ax + b)

= x3 - 6x2 - (15 + a)x + (80 - b)

Dividend = Divisor x Quotient + Remainder

But remainder = 0

∴ ∴ Dividend = Divisor x Quotient

s(x) = (x2 + x -12) x quotient

s(x) = x3 - 6x2 - (15 + a)x + (80 - b)

x (x2 + x - 12) - 7(x2 + x - 12)

= x3 + x2 - 7x2 - 12x - 7x + 84

= x3 - 6x2 - 19x + 84

Hence, x3 - 6x2 - 19x + 84 = x3 - 6x2 - (15 + a)x + (80 - b)

-15 - a = - 19 $\Rightarrow$ a = +4

and 80 - b = 84 $\Rightarrow$ b = -4

Hence if in p(x) we subtracted 4x - 4 then it is exactly divisible by

x2 + x -12.

31] We have to solve the pair of equations graphically

2x + 3y = 11 ... (1)

2x - 4y = -24 ... (2)

For (1)

X	1	4	-2
y	3	1	5

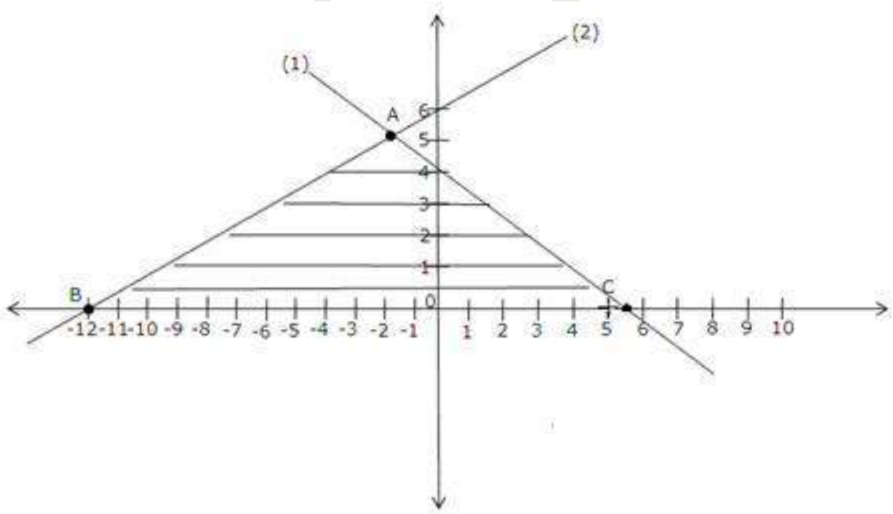
For (2)

X	-12	0	-10
y	0	6	1

point of intersection x = -2, = 5

The triangle formed is shaded as ΔABC coordinates are

A (-2,5) B (-12,0) C(5.5,0).



32]

Class Interval	Frequency
0 - 15	6
15 - 30	7
30 - 45	f1
45 - 60	15
60 - 75	10
75 - 90	f2
Total	51

Mode = 55 (Given)

∴ Modal Class 45 - 60

ℓ = 45, fo = f1 and f1 = 15

f2 = 10 h = 15

38 + f1 + f2 = 51

f1 + f2 = 51 - 38

f1 + f2 = 13 ...(1)

$$55 = 45 + \left[\frac{(15 - f1)}{30 - f1 - 10}\right] \times 15$$

$$10 = \frac{(15 - f1)\ 15}{20 - f1}$$

200 - f1 = 225 - 15f1

5f1 = 25

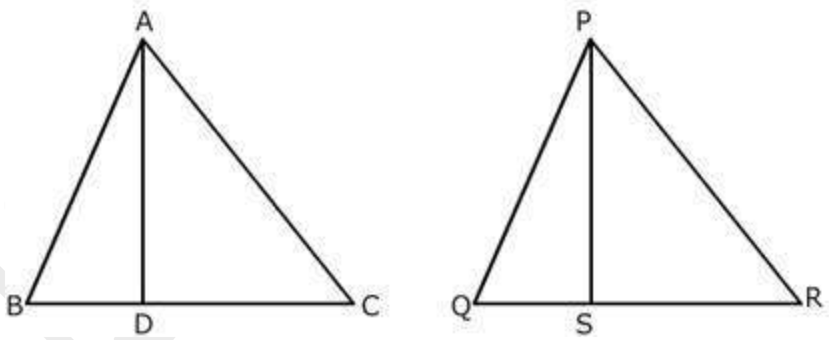
f1 = 5

f1+f2=13

$\Rightarrow$ f2=13-5=8

The missing frequencies are 5 and 8.

33]



Statement: The ratio of the areas of two similar triangles is equal to the square of the ratio of their corresponding sides.

Given: ?ABC ~ ?PQR To Prove: $\frac{AB^2}{PQ^2} = \frac{BC^2}{QR^2} = \frac{AC^2}{PR^2}$ Construction: Draw AD?BC and PS?QR

Proof: $\frac{ar(ABC)}{ar(PQR)} = \frac{\frac{1}{2} \times BC \times AD}{\frac{1}{2} \times QR \times PS} = \frac{BC}{QR} \times \frac{AD}{PS}$?ADB ~

?PSQ (AA) Therefore, $\frac{AD}{PS} = \frac{AB}{PQ}$ ... (iii) But ?ABC ~ ?PQR

Therefore, $\frac{AB}{PQ} = \frac{BC}{QR} = \frac{AC}{PR}$ ... (iv) Therefore, $\frac{AD}{PS} = \frac{BC}{QR}$

Therefore, $\frac{ar(ABC)}{ar(PQR)} = \frac{BC}{QR} \times \frac{BC}{QR} = \frac{BC^2}{QR^2}$ From (iii)

$$\frac{ar(ABC)}{ar(PQR)} = \frac{AB^2}{PQ^2} = \frac{BC^2}{QR^2} = \frac{AC^2}{PR^2}$$

34] LHS = $\frac{1}{\sec\theta - \tan\theta} - \frac{1}{\cos\theta}$

$= \frac{\sec^2\theta - \tan^2\theta}{\sec\theta - \tan\theta} - \sec\theta$

$= \frac{(\sec\theta + \tan\theta)(\sec\theta - \tan\theta)}{(\sec\theta - \tan\theta)} - \sec\theta$

$= (\sec\theta + \tan\theta) - \sec\theta = \tan\theta$

RHS = $\frac{1}{\cos\theta} - \frac{1}{\sec\theta + \tan\theta}$

$= \sec\theta - \frac{\sec^2\theta - \tan^2\theta}{\sec\theta + \tan\theta}$

$= \sec\theta - \frac{(\sec\theta + \tan\theta)(\sec\theta - \tan\theta)}{(\sec\theta + \tan\theta)}$ $= \sec\theta - (\sec\theta - \tan\theta) =$

$\tan\theta$

Hence, LHS = RHS.