SAMPLE PAPER FOR SA-1

CLASS – X

MATHEMATICS

Time : 3 hours Maximum Marks : 90

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 8 questions of 1 mark 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 10 questions of 4 marks each.*
3. *Question numbers 1 to 8 in Section A are multiple choice questions where you are to select on 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] If the system of liner equations x - ky =2 and 3x + 2y =-5 has a unique solution, then the value of k is:-

[a] k = $\frac{2}{3}$ [b] k ≠- $\frac{2}{3}$ [c]k =$\frac{3}{2}$ [d] k ≠-$\frac{3}{2}$

[2] If tanθ = $\frac{3}{4}$ then the value of $\frac{1-cos\theta}{1+cos\theta}$is :-

[a]$-\frac{1}{9}$ [b]$\frac{2}{9}$ [c] 1 [d]$\frac{1}{9}$

[3] If sin3x = cos[x-26^0] and 3x is an actual angle, then the value of x is :-

[a] 29^0 [b]26^0 [c]29^0 [d]13^0

[4] If x=2^3x 3 x 5^2 , y=2^2x3^3 ,then HCF [x , y] is :-

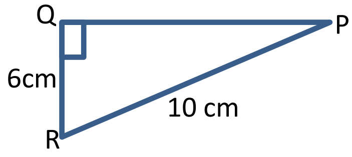
[a] 12 [b]108 [c]6 [d]36

[5] If a positive integer p is divided by 3, then the remainder can be:-

[a]1 or 3 [b]1,2 or3 [c]0,1 or 2 [d]2 or 3

[6] If the given figure, the value of tanP – cotRis:-

[a]1 [b]0 [c] -1 [d] 2

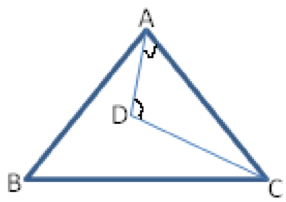


[7] Construction of a cumulative frequency table is useful in determining the :-

[a]Mean [b] Median [c] Mode [d]All the above

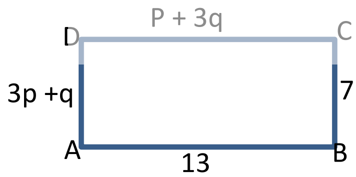
[8]In the given figure, if ∠A= ∠D = 90^0, AD=6cm , CD = 8cm and BC =26cm then ar(ΔABC) is :-

[a]240cm^2 [b]48cm^2 [c]120^2 [d]260cm^2



SECTION – B

[9]Find the value of p and q in the given figure, if ABCD is a rectangle



[10]If α and $\frac{1}{\alpha}$ are the zeroes of the polynomial $p(x) = 4x^2 - 2x + k - 4$, then find the value of k

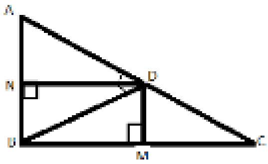
Or

Divide the polynomial p(x) =5 – 3x +3x^2 – x^3 by g(x) = x^2- x +1 and find the quotient and remainder

[11] Without actually performing the long division, state whether $\frac{39}{343}$ will have a terminating or non-terminating, repeating decimal expansion

[12]Find the value of k , if $\frac{\cos 35^0}{sin 55^0}$+ $\frac{2\, sin\theta}{\cos(90^0 - \theta)}$=$\frac{k}{2}$

[13] ABC is right angle triangle with $\angle$ABC =90^0 , BD$\perp$AC , DM $\perp$BC , and DN$\perp$AB. prove that $DM^2 = DN\ X\ BC$.



[14] The following table gives production yield per hectare of wheat of 100 farms of village:-

Production (in kg/hec)	25-35	35-45	45-55	55-65	65-75	75-85
No.of farms	4	6	10	26	35	19

Write the above distribution to a more than type distribution.

SECTION - C

[15] Prove that $\frac{7\sqrt{7}}{4}$is irrational.

Or

Prove that (16-5$\sqrt{7}$)is irrational.

[16] If one diagonal of a trapezium divides the other diagonal in the ratio 1:2 . Prove that one of the parallel sides is double the other?

[17] Prove that:$\frac{sin\theta}{cot\theta + cosec\theta}$= 2 +$\frac{sin\theta}{cot\theta - cosec\theta}$?

[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 become $\frac{3}{4}$. Find the fraction.

Or

Seven times a two digit number is equal to 4 times the number obtained by reversing the order of its digits. If the difference of digit is 3, find the number.

[19] If one zero of the polynomial p(x) = 3x^2-8x+2k+1 is seven times of other, then find the zeores and the value of k.

[20] If sinθ +sin$^2\theta$+sin$^3\theta$ =1, prove that cos$^6\theta$-4cos$^4\theta$ + 8 cos$^2\theta$ = 4.

[21]Find the mean of the following data, using step-deviation method:-

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

Or

Class Interval	0-20	20-40	40-60	60-80	80-100
Frequency	17	28	32	p	19

If the mean of the above data is 50, then find the value of p?

[22] Prove that tanθ-cotθ=$\frac{2\,sin^2\theta-1}{sin\theta\ cos\theta}$

[23] InΔ ABC, if AD is the median, then show that AB^2+AC^2=2[AD^2+BD^2].

[24] Find the median of the following data:

Class-interval	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	12	30	34	65	46	25	18

SECTION-D

[25] 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 into the same ratio.

Or

Prove that in a right triangle the square of the hypotenus is equal to the sum of the square of the other two sides?

[26] If x=a sinθ , y=b tanθ .prove that $\frac{a^2}{x^2}$ -$\frac{b^2}{y^2}$ =1.

[27] On dividing $3x^3+4x^2+5x-13$ by a polynomial g(x), the quotient and remainder are 3x+10 and 16x+43 respectively, Find the polynomial g(x).

[

28] The fraction become $\frac{9}{11}$,if 2 is added to both the numerator and the denominator. If 3 is added to both the numerator and the denominator, it becomes $\frac{5}{6}$. Find the fraction.

[29] The following table shows the ages of the patients admitted in a hospital during a year:

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

Find the mode and mean of the data given above.

[30] The perpendicular from A on the side BC of the ΔABC intersects BC at D such that DB=3CD Prove that $2AB^2 = 2AC^2 + BC^2$.

[31] Draw the graph of following eq^n:-

2x+3y = 12 and x-y =1

Shade the region between the two lines and x – axis. Also, determine the vertices of the triangle so formed.

[32]Prove that: -$\frac{\cos\theta}{1-\tan\theta}$ +$\frac{\sin^2\theta}{\sin\theta-\cos\theta}$= $\sin\theta + \cos\theta$

Or

Evaluate: -$\frac{\sin^2\theta+\sin^2(90^0-\theta)}{3(\sec^2 61^0-\cot^2 29^0)}$ --$\frac{3\cot^2 30^0 \sin^2 54^0 \sec^2 36^0}{2(\operatorname{cosec}^2 65^0-\tan^2 25^0)}$.

[33] In a sports meet, the number of players in Football, Hockey and Athletics are 48,60,132, respectively. Find the minimum number of room required, if in each room the same number of player are to be seated and all of them being in the same sports ?

[34] 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 worker	14	16	10	16	9

Convert the distribution above to a more than type cumulative frequency distribution and draw its ogive.

MARKING SCHEME

SUMMATIVE ASSESSMENT – 1

Sl.no		marks
1.	(b)	1
2.	(d)	1
3.	(a)	1
4.	(a)	1
5.	(c)	1
6.	(b)	1
7.	(b)	1
8.	(c)	1

SECTION-B

9. Since opposite sides of the rectangle are equal — 1

So. P+3q=13, 3p+q=7

Solving p=1, q=4 — 1

10. Since α and $\frac{1}{\alpha}$ are the zeros of the polynomial

P(x)= $4x^2$-2x+k-4

So, $\alpha \times \frac{1}{\alpha} = \frac{k-4}{4}$ — 1

⇒ $1= \frac{k-4}{4}$ — 1

⇒k= 8

or

x^2-x+1)-x³+3x^2-3x+5(-x+2

-x³+x^2-x — $1\frac{1}{2}$

\+ - +

$2x^2$-2x+5

$2x^2$-2x+2

\- + -

3

---------------- — 1/2

So, quotient = -x+2 , remainder = 3

11. Here, $\frac{39}{343} = \frac{3 \times 13}{7 \times 7 \times 7}$ — $\frac{1}{2}$

Since denominator contains prime factor 7 other than 2 or 5 — $\frac{1}{2}$

So, $\frac{39}{343}$ will have a non-terminating repeating decimal expansion. — 1

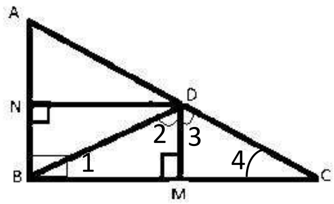
12. we have , $\frac{\cos 35°}{\sin 55°} + \frac{2sin\theta}{\cos(90°-\theta} = \frac{k}{2}$

$\frac{\cos 35°}{\cos(90°-35°} + \frac{2sin\theta}{sin\theta} = \frac{k}{2}$ — 1

$1 + 2 = \frac{k}{2}$ — 1

K = 6

13. — 1



$\because DN\perp$ AB and $\angle B = 90^0$, DM $\perp$ BC

So, DN ||BC and DM || AB

so, DNBM is a ||grm.

⇨ DN =BM

In ΔBDM and ΔDCM, — 1

∠1=∠3, ∠2=∠4,

by AA-Similarity ΔBDM~ΔDCM

⇨ $\frac{DM}{CM} = \frac{BM}{DM}$ — 1

⇨ DM^2=CM X BM

⇨ DM^2=CM X DN Proved.

14. — 1 +1

More than type	Commutative frequency
more than 25	100
more than 35	96
more than 45	90
more than 55	80
more than 65	54
more than 75	19

SECTION-C

15. Let us assume that, on contrary $\frac{7\sqrt{7}}{4}$ is rational

$\therefore \frac{7\sqrt{7}}{4} = \frac{a}{b}, where\ a, b\ are\ integers\ with\ b \neq 0$ 1

⇨ $\sqrt{7} = \frac{4a}{7b}$ 1

$\because \frac{4a}{7b}$ is a rational number. So, $\sqrt{7}$is rational .

but this contradicts the fact that $\sqrt{7}$ is irrational.

so our assumption is wrong. 1

$\therefore \sqrt{7}$is irrational.

OR

on contrary, Let 16-5$\sqrt{7}$ is rational 1

so, 16-5$\sqrt{7}$=$\frac{a}{b}$, where a, b are integers with b$\neq 0$

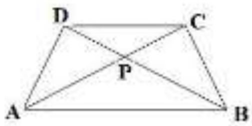
⇨ $\sqrt{7}$= $\frac{16b-a}{5b} = \frac{integer}{integer}$ 1

⇨ $\sqrt{7} = rational$ 1

But, this contradicts the fact that $\sqrt{7}$ is irrational.

so, 16-5$\sqrt{7}$ is irrational.

16. 1



Given that

to prove

fig.

$\frac{CP}{AP} = \frac{1}{2}$ 1

In Δ, ABP and ΔCDP,

∠ABP=∠CDP (alt. ∠s)

∠BAP=∠DCP (alt. ∠s)

∴ΔABP ~ ΔCDP (BY AA-Similarity)

⇨ $\frac{AB}{DC} = \frac{AP}{CP} = \frac{2}{1}$ 1

⇨ AB=2DC Proved.

17. Given: $\frac{Sin\theta}{cot\theta+cosec\theta} = 2 + \frac{Sin\theta}{cot\theta-cosec\theta}$ ½

⇨ $\frac{Sin\theta}{cot\theta+cosec\theta} - \frac{Sin\theta}{cot\theta-cosec\theta} = 2$

L.H.S.=Sin$\theta \left[\frac{1}{cot\theta+cosec\theta} - \frac{1}{cot\theta-cosec\theta}\right]$ ½

=sin$\theta \left[\frac{-2cosec\theta}{cot^2\theta-cosec^2\theta}\right]$ 1

=$\frac{-2sin\theta \cdot \frac{1}{sin\theta}}{-(cosec^2\theta-cot^2\theta)}$ = 2 Proved. 1

18. $Let\ the\ numerator\ be\ x\ and\ denominator\ be\ y, then\ fraction = \frac{x}{y}$ ½

As per question, 1

$x + y = 8$

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

solving, $x = 3,\ y = 5$ 1

fraction=$\frac{x}{y} = \frac{3}{5}$ ½

OR

Let the unit digit be x *and tens digit be* y ½
then no. $= 10y + x$
As per question 1

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

and $x - y = 3$
solving $x = 6, \quad y = 3$ 1
so No. = 36 ½

19. Let zeroes of the given polynomial $p(x)$ *be* α *and* β ½
then, as per question

$$\beta = 7\alpha$$

sum of zeroes $\alpha + \beta = \frac{-b}{a}$ 1

⇨ $\alpha + 7\alpha = \frac{8}{3}$

⇨ $\alpha = \frac{1}{3}$

also, Product of zeroes $\alpha\beta = \frac{c}{a}$ ½

⇨ $7\alpha\ X\ \alpha = \frac{2k+1}{3}$

solving, $k = \frac{2}{3}$ 1

zeroes are $\frac{1}{3}, \frac{7}{3}$

20. We have, ½

$\sin\theta + \sin^2\theta + \sin^3\theta = 1$

$\sin\theta(1+\sin^2\theta) = 1-\sin^2\theta$

⇨ $\sin^2\theta(1+\sin^2\theta) = \cos^2\theta$ squaring both sides ½

⇨ $(1-\cos^2\theta)(1+1-\cos^2\theta)^2 = \cos^4\theta$ ½

solving, $1\frac{1}{2}$

$\cos^6\theta - 4\cos^4\theta + 8\cos^2\theta = 4$

21. $1\frac{1}{2}$

Class –Interval	Mid value (x_i)	frequency (f_i)	$u_i = \frac{x_i - d}{h}$	$f_i u_i$
0-20	10	7	-2	-14
20-40	30	8	-1	-8
40-60	A=50	12	0	0
60-80	70	10	1	10
80-100	90	8	2	16
100-120	110	5	3	15
		$\sum f_i = 50$		$\sum f_i u_i = 19$

Here, A=50, h=20, $\sum f_i = 50, \sum f_i u_i = 19$ ½

Mean($\bar{x}$)= A + $\left[\frac{\sum f_i u_i}{\sum f_i}\right] X\ h$

Mean($\bar{x}$)= $50 + \frac{19}{50}\ X\ 20$ 1

= 57.6

OR

$1\frac{1}{2}$

Class	frequency (f_i)	class – mark(x_i)	$f_i x_i$
0-20	17	10	170
20-40	28	30	840
40-60	32	50	1600
60-80	p	70	70p
80-100	19	90	1710
	$\sum f_i = 96 + p$		$\sum f_i x_i = 4320 + 70p$

Mean($\bar{x}$)= $\left[\frac{\sum f_i x_i}{\sum f_i}\right]$ ½

Given $\bar{x} = 50$

⇨ $50 = \frac{4320+70p}{96+p}$ 1

$Solving\ p = 24$

22. L.H.S. $= \tan\theta - cot\theta$

$= \frac{sin\theta}{cos\theta} - \frac{cos\theta}{sin\theta}$ ½

$= \frac{sin^2\theta - cos^2\theta}{sin\theta cos\theta}$ ½

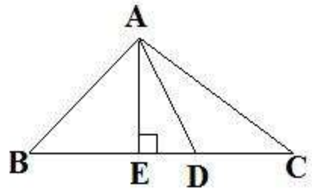
$= \frac{sin^2\theta - 1 + sin^2\theta}{sin\theta cos\theta}$ 1

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

23. construction:-Draw AE ⊥BC ½

In ∆ADE, $AD^2=AE^2+ED^2$ (Pythagoras theoren

⇨ $AE^2=AD^2-DE^2$ (I)



In ∆ABE, $AB^2=AE^2+BE^2$ (∠B=90⁰, Pythagoras theorem) 1

⇨ $AB^2=AD^2-DE^2+(BD-DE)^2$ Using (I)

⇨ $AB^2=AD^2+BD^2-2BD.DE$ -----------(II)

In ∆ACE, $AC^2=AE^2+EC^2$ 1

⇨ $AC^2 = AD^2 - DE^2 + (CD+DE)^2$

⇨ $AC^2 = AD^2+CD^2+2CD.DE$

⇨ $AC^2 = AD^2+BD^2+2BD.DE$ (As BD=CD) ------------(III)

Adding (II) and (III) ½

$AB^2+AC^2=2[AD^2+BD^2]$ Proved

24. 1

Class – Interval	Frequency (f_i)	Cumulative frequency
10-20	12	12
20-30	30	42
30-40	34	76
40-50	65	141
50-60	46	187
60-70	25	212
70-80	18	230
	N=$\sum f_i = 230$	

$\frac{N}{2} = \frac{230}{2} = 115$

Median class is 40-50 ½

$l = 40, \quad cf = 76, \quad f = 65, \quad h = 10$

$\therefore Median = l + \frac{\frac{N}{2} - cf}{f}\ X\ h$ ½ 1

= 46

25. correct given that, to prove, construction, fig. 2

correct proof 2

OR

Correct fig., given that, to prove, construction 2

correct proof 2

26. Given, $x = asin\theta, \quad y = btan\theta$ 1

⇨ $\frac{a}{x} = \frac{1}{sin\theta} \quad and \quad \frac{b}{y} = \frac{1}{tan\theta}$

⇨ $\frac{a}{x} = Cosec\theta\ and \quad \frac{b}{y} = \ cot\theta$ 1

LHS=$\frac{a^2}{x^2} - \frac{b^2}{y^2} = cosec^2\theta - cot^2\theta = 1 = RHS$ *Proved.* 1+1

27. Here, $Dividend\ p(x) = 3x^3 + 4x^2 + 5x - 13$ ½

$Quotient\ q(x) = 3x + 10$

$Remainder\ r(x) = 16x - 43$

By division algorithm ½

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

$$g(x) = \frac{p(x) - r(x)}{q(x)}$$ 1

$$= \frac{(3x^3+4x^2+5x-13)-(16x-43)}{3x+10}$$

$$= \frac{3x^3+4x^2-11x+30}{3x+10}$$

Correct division 2

$\therefore g(x) = x^2 - 2x + 3$

28. Let the fraction be $\frac{x}{y}$ ½

As per question

$\frac{x+2}{y+2} = \frac{9}{11}$ 1

$\Rightarrow$ 11x – 9y + 4 = 0

$\frac{x+3}{y+3} = \frac{5}{6}$ 1

$\Rightarrow$6x – 5y + 3 = 0

Solving above, x = 7, y = 9 1

$\therefore$ Fraction = $\frac{7}{9}$ ½

29. 1

Age (in years)	No. Of Patients (f_i)	$Class\ Mark(x_i)$	$f_i x_i$
5-15	6	10	60
15-25	11	20	220
25-35	21	30	630
35-45	23	40	920
45-55	14	50	700
55-65	5	60	300
	$\sum f_i = 80$		$\sum f_i x_i = 2830$

The modal class is 35-45 1/2

Here l= 35, f_1 = 23, f_2 = 14, f_0 = 21, h = 10

Mode = l + $\left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right) * h$ $1\frac{1}{2}$

= 36.8

Mean($\bar{x}$) = $\frac{\sum f_i x_i}{\sum f_i}$ 1

= 35.68

30. Given that, figure, to prove. ½

Proof:- ½

$\because$DB = 3 CD

$\therefore$DB = ¾ BC

and CD = ¼ BC

In right ΔADB, 1

$AB^2 = AD^2 + DB^2$

In right ΔACB,

$AC^2 = AD^2 + CD^2$

$\therefore$ $AB^2 - Ac^2 = DB^2 - CD^2$ 1

$= \left(\frac{3}{4}BC\right)^2 - \left(\frac{1}{4}BC\right)^2 = \frac{\not{8}\ 1}{\not{16}\ 2} BC^2 = \frac{1}{2}BC^2$

⇨ $AB^2 - AC^2 = \frac{1}{2}BC^2$ 1

⇨ $2AB^2 = 2AC^2 + BC^2$ Proved.

31. Given Equations are 1

$2x + 3y = 12 \;-----\; (i)$

$x - y = 1 \;------\; (ii)$

$from\ (i)\ y = \frac{12-2x}{3}$

x	0	3	6
y	4	2	0

$From\ (ii)\quad y = x - 1$ 2

Graph for above equations

x	0	1	3
y	-1	0	2

Vertices of triangle are (1,0), (6,0), (3,2) 1

32. LHS $= \frac{cos\theta}{1-tan\theta} + \frac{sin^2\theta}{sin\theta - cos\theta}$ $1\frac{1}{2}$

$= \frac{cos^2\theta}{cos\theta - sin\theta} + \frac{sin^2\theta}{sin\theta - cos\theta}$

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

$= \frac{(cos\theta + sin\theta)\,(cos\theta - sin\theta)}{cos\theta - sin\theta}$ 1

$= cos\theta + sin\theta$ 1/2

OR

$\frac{sin^2\theta + sin^2(90^0-\theta)}{3(sec^2 61^0 - cot^2 29^0)} - \frac{3cot^2 30^0 sin^2 54^0 sec^2 36^0}{2(cosec^2 65^0 - tan^2 25^0)}$ 2

$= \frac{sin^2\theta + cos^2\theta}{3(sec^2 61^0 - tan^2 61)} - \frac{3\ X\ (\sqrt{3})^2 sin^2 54^0 cosec^2 54^0}{2(cosec^2 65^0 - cot^2 65^0)}$

$= \frac{1}{3\ X\ 1} - \frac{3\ X\ 3\ \ X\ 1}{2\ X\ 1}$ 1

$= \frac{1}{3} - \frac{9}{2} = -\frac{25}{6}$ 1

33. Prime factorization of 48=$2^4\ X$ 3 1

Prime factorization of 60=$2^2\ X$ 3 X 5

Prime factorization of 132=$2^2\ X$ 3 X 11

HCF of (48, 60, 132)=2 X 2 X3 = 12 1

$\therefore$ *In each room* 12 *players of same sports can be accomodated.* 1

$\therefore number\ of\ roms\ required = \frac{Total\ number\ of\ players}{Number\ of\ players\ in\ a\ room}$

⇨ $number\ of\ roms\ required = \frac{48+60+132}{12}$ 1

= 20

34. correct table 2

correct graph 2