KCE7XG2

Marking Scheme

SUMMATIVE ASSESSMENT – I (2015-16)
Mathematics (Class – X)

General Instructions:

1. The Marking Scheme provides general guidelines to reduce subjectivity and maintain uniformity. The answers given in the marking scheme are the best suggested answers.

2. Marking be done as per the instructions provided in the marking scheme. (It should not be done according to one's own interpretation or any other consideration).

3. Alternative methods be accepted. Proportional marks be awarded.

4. If a question is attempted twice and the candidate has not crossed any answer, only first attempt be evaluated and 'EXTRA' be written with the second attempt.

5. In case where no answers are given or answers are found wrong in this Marking Scheme, correct answers may be found and used for valuation purpose.

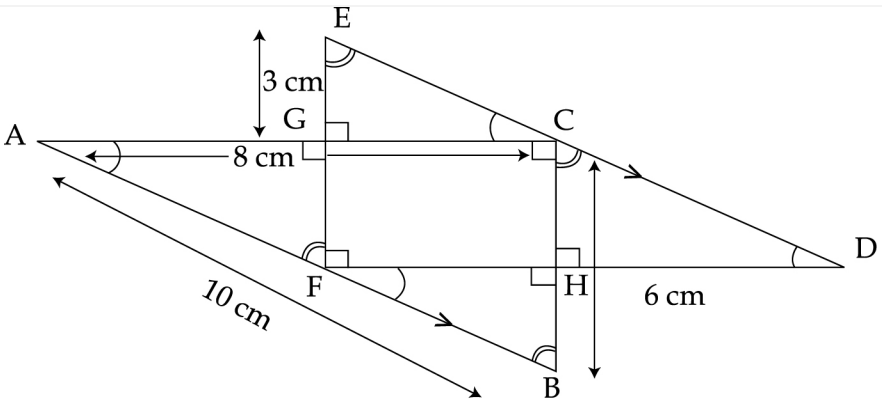
/ SECTION-A

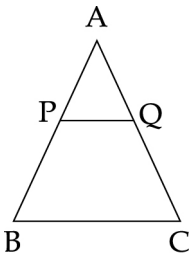
141 Question numbers **1** to **4** carry one mark each

1	$\frac{DA}{AE}=\frac{DB}{BW}$ $\frac{4}{8}=\frac{x}{24-x}$ $24-x=2x$ $3x=24$ $x=8\text{ cm}=DB=8\text{ cm}$	1
2	$\cos 30^\circ \cdot \cos 60^\circ \cdot \cos 90^\circ$ $=\frac{\sqrt{3}}{2}\cdot\frac{1}{2}\cdot 0=0$	1
3	0	1
4	Let the excluded number be x	1

		New sum $= 90 - x$ $16 = \frac{90 - x}{4}$ $x = 26$	
		/ SECTION-B **5102** Question numbers **5** to **10** carry two marks each.	
	5	We first find LCM of 36 and 54 $36 = 4 \times 9 = 2^2 \times 3^2$ $54 = 6 \times 9 = 2 \times 3^3$ LCM $= 2^2 \times 3^3 = 4 \times 27 = 108$ $\therefore$ the required number is $108 + 5 = 113$	2
	6	The decimal expansion of a rational number terminates if the denominator of rational no. $\frac{p}{q}$, when $q \neq 0$ and p, q are coprime integers is equal to $2^m 5^n$ e.g. $\frac{3}{10} = \frac{3}{2 \times 5} = 0.3$	2
	7	Let fixed charge be ₹ x and thereafter charge = ₹ y per day $x + 4y = 30$ $x + 7y = 45$ $y = 5, x = 10$ fixed charge = ₹ 10 and charge for each day = ₹ 5.	2
	8	$AB^2 = OA^2 + OB^2 = (3)^2 + (4)^2$(Pythagoras th.) AB = 5 cm	2

		$AB^2 + AC^2 = (5)^2 + (12)^2 = (13)^2 = BC^2$ $\angle CAB = 90°$(converse of Pythagoras th.)	
	9	$\sec A = \frac{1}{\cos A} = \frac{1}{\sqrt{1 - \sin^2 A}}$ $\tan A = \frac{\sin A}{\cos A} = \frac{\sin A}{\sqrt{1 - \sin^2 A}}$	2
	10	Getting $\sum f = 50, \sum fx = 2290$ Mean $\bar{x} = \frac{\sum fx}{\sum f} = 45.8$	2
		/ SECTION-C **11203** Question numbers **11** to **20** carry three marks each.	
	11	Let a be any positive integer. By Euclid lemma $a = 6q, 6q+1, 6q+2, 6q+3, 6q+4, 6q+5$ Now $a^2 = 36q^2 = 6m$ $a^2 = (6q+1)^2 = 36q^2 + 12q + 1 = 6(6q^2 + 2q) + 1 = 6m + 1$ $a^2 = (6q+2)^2 = 36q^2 + 24q + 4 = 6m + 4$ $a^2 = (6q+3)^2 = 36q^2 + 36q + 9 = 6m + 3$ $a^2 = (6q+4)^2 = 36q^2 + 48q + 16 = 6m + 4$ $a^2 = (6q+5)^2 = 36q^2 + 60q + 25 = 6m + 1$ Hence square of any positive integer cannot be of the form $6m+2$ or $6m+5$.	3
	12	Dividing by *xy*	3

		$\frac{1}{y} + \frac{4}{x} = 27$ $\qquad$ $\frac{1}{y} + \frac{2}{x} = 21$ Put $\frac{1}{y} = v$, $\qquad$ $\frac{1}{x} = u$ $4u + v = 27$ $2u + v = 21$ $u = 3$, $\qquad$ $v = 15$ $x = \frac{1}{3}$, $\qquad$ $y = \frac{1}{15}$	
13		$p(x) = x^2 + 5x + 2$ $\therefore\ p(3) = 3^2 + 5 \times 3 + 2 = 9 + 15 + 2 = 26$ $p(2) = 2^2 + 5 \times 2 + 2 = 4 + 10 + 2 = 16$ Now $p(3) + p(2) = 26 + 16 = 42$	3
14	(i) (ii) (iii)	$2x + 5y = 8$ $4x - 10y = 8$ $4x - 10y = 7$	3
15		 Since ED || AB and AC || FD also EF || CB	3

		$\therefore \Delta AGF \sim \Delta CGE \sim \Delta DHC \sim \Delta FHB \sim \Delta DFE \sim \Delta ACB$ is 15 pairs of similar Δ's.	
	16	AP = PB and AQ = QC $\Rightarrow \frac{AP}{PB} = \frac{AQ}{QC} = 1$ By converse of B.P.T PQ‖BC  	3
	17	Evaluate : cosec45°, geometrically. Correct Figure ½ Process 1½ Correct Value 1	3
	18	Getting $\frac{\sin\theta\,(1-2\sin^2\theta)}{\cos\theta\,(2\cos^2\theta-1)}$ $= \frac{\tan\theta\,(\cos^2\theta-\sin^2\theta)}{(\cos^2\theta-\sin^2\theta)} = \tan\theta$	3
	19		3

Life time in hours	0-20	20-40	40-60	60-80	80-100	100-120
No. of components	30	36	52	61	38	33

Mode class = 60-80 (1 Marks)

Mode = $60 + \frac{61-52}{122-52-38} \times 20$ (1 Marks)

$= 60 + \frac{9}{32} \times 20$

$= 60 + 5.63 = 65.63$ (1 Marks)

20

C.I	$0-10$	$10-20$	$20-30$	$30-40$	$40-50$	$50-60$
f	2	x	20	15	7	y
cf	2	$2+x$	$22+x$	$37+x$	$44+x$	$44+x+y$

$\frac{n}{2} = \frac{\Sigma f}{2} = \frac{58}{2} = 29 \Rightarrow$ median class $= 20-30$

$28.5 = 20 + \frac{29-(2+x)}{20} \times 10$

$x = 10$

$44 + x + y = 58 \Rightarrow y = 4.$

3

/ SECTION-D

21314

Question numbers **21** to **31** carry four marks each.

21

Prime factorisation of $396 = 2^2 \times 3^2 \times 11$

$342 = 2 \times 3^2 \times 19$

$HCF = 2 \times 3^2 = 18$

Thus 18 pieces of each type should be put in each box.

4

22

Let length and breadth are x and y m.

$(l+5)(b-4) = lb-160 \quad \Rightarrow \quad 4l-5b=140$

$(l-10)(b+2) = lb-100 \quad \Rightarrow \quad 2l-10b=-80$

$l = 60$ m , $b = 20$ m

dimensions of the rectangle are 60 m and 20 m.

4

23	$x^2+1 \overline{)\, x^4+x^3+8x^2+ax-b \,\big|\, x^2+x+7}$ $-x^4 \pm x^2$ x^3+7x^2+ax-b $-x^3 \pm x$ $7x^2+(a-1)x-b$ $-7x^2 \pm 7$ $(a-1)\,x-(b+7)$ Remainder $=0$ $(a-1)x-(b+7)=0$ $\Rightarrow$ a $=1$ and b $=-7$	4
24	Sol : $f(x)=x^2-x-2$ $\alpha+\beta=1$ $\alpha\beta=-2$ $-\frac{b}{b}=$ Sum of zeroes $=1+2\,\alpha+1+2\beta$ $=2+2\,(\alpha+\beta)$ $=2+2=4$ $\frac{c}{a}=$ Product of zeroes $=(1+2\,\alpha)\,(1+2\,\beta)$ $=1+2\,(\alpha+\beta)+4\,\alpha\beta$ $=1+2.1+4.\,(-2)$ $=-5$ Require polynomial $g(x)=ax^2+bx+c$ $=a\left(x^2+\frac{b}{a}x+\frac{c}{a}\right)$ $=k\,(x^2-4x-5)$ where k is any non-zero real number. **Values :** generosity, benevolence, promoting literacy, kindness, care.	4
25	Given, To prove, Figure **1**	4

		Construction	½	
		Proof	2½	
	26	$\Delta ADE \sim \Delta ABC$ (AA similarity) $\frac{AD}{AB} = \frac{DE}{BC}$ $\frac{AD}{AE + BE} = \frac{DE}{BC}$ $\frac{7.6}{7.2 + 4.2} = \frac{DE}{8.4}$ $DE = \frac{7.6 \times 8.4}{11.4}$ $= 5{\cdot}6$ cm		4
	27	If $\sec A = \frac{17}{8}$, verify that $\frac{3 - 4\sin^2 A}{4\cos^2 A - 3} = \frac{3 - \tan^2 A}{1 - 3\tan^2 A}$		4
		Using Pythagoras Theorem	½	
		Finding the value of sinA, cosA, tanA	**1.5**	
		Verifying the result	**2**	
	28	$p = \sec A + \tan A$ -------- (i) Using identity $\sec^2 A - \tan^2 A = 1 = (\sec A - \tan A)(\sec A + \tan A)$		4
		$\sec A - \tan A = \frac{1}{p}$ -------- (ii)	1½	
		Adding (i) and (ii) $2\sec A = p + \frac{1}{p}$		

$\text{sec}A = \frac{p^2 + 1}{2p}$ **1**

$\cos A = \frac{2p}{p^2 + 1}$ **½**

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

$\sin A = \frac{p^2 - 1}{p^2 + 1}$ **1**

29 $\frac{\sin A + \cos A}{\sin A - \cos A} + \frac{\sin A - \cos A}{\sin A + \cos A}$ 4

Taking LCM

$\frac{\sin^2 A + \cos^2 A + 2\sin A \cdot \cos A + \cos^2 A + \sin^2 A - 2\sin A \cdot \cos A}{\sin^2 A - \cos^2 A}$ **2**

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

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

30 4

C. I.	f_i	$u_i = \frac{x_i - 87.5}{25}$	$f_i u_i$
0-25	10	-3	-30
25-50	15	-2	-30
50-75	22	-1	-22
75-100	30	0	0
100-125	28	1	28
125-150	27	2	54
150-175	12	3	36
175-200	6	4	24
	$\Sigma f_i = 150$		$\Sigma f_i u_i = 60$

Let a = assumed mean = 87.5

Mean $= 87.5 + \frac{60}{150} \times 25 = 97.5$

Maximum frequency = 30 $\Rightarrow$ Modal class = 75 – 100

		$\text{Mode} = 75 + \frac{30 - 22}{60 - 22 - 28} \times 25 = 95$	
	31	Points Curve Median = 40.5	4
		-o0o0o0o-	