Marking Scheme

SUMMATIVE ASSESSMENT – I (2014-15)
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.

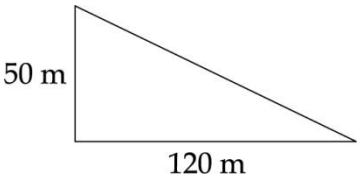
खण्ड–अ / SECTION-A

प्रश्न संख्या 1 से 4 में प्रत्येक का 1 अंक है।

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

1	Δ AOP ~Δ BOQ (AA similarity) $\frac{AO}{AP} = \frac{BO}{BQ} \Rightarrow \frac{6}{4} = \frac{4.5}{BQ}$ $\Rightarrow$ BQ = 3	1
2	$\sec^2 60° + \sec 0°$ $= (2)^2 + 1 = 5$	1

	3	$10 . \frac{1 - \cot^2 45^\circ}{1 + \sin^2 90^\circ}$ $= 10 . \frac{1 - 1}{1 + 1^2}$ $= 0$	1
	4	New median $= 21$	1
		खण्ड–ब / SECTION-B **प्रश्न संख्या 5 से 10 में प्रत्येक का 2 अंक है।** Question numbers **5** to **10** carry two marks each.	
	5	Since $64 = 2^6$ which is of the form $2^m 5^n$, for non negative integers m and n Hence $\frac{13}{64}$ is a terminating decimal $\frac{13}{64} = \frac{13}{2^6} \times \frac{5^6}{5^6} = \frac{13 \times 5^6}{10^6}$ Hence it has 6 decimal places.	2
	6	LCM of m, 2m, 3m, 4m, and 5m is $1. 2^2. 3. 5$ m $= 60$ m	2

	7	Writing condition $\frac{2}{4} \neq \frac{k}{6}$ $k \neq 3$ $\therefore$ For all real values of k, except 3 the given pair of equations will have a unique solution.	2
	8	distance $= \sqrt{(50)^2 + (120)^2}$ $= 130$ m  	2
	9	$1 \div \frac{1}{\sqrt{3}} \left[\sqrt{3}.\ 1\right] = 1$	2
	10	Arranging in ascending order according to height : Height (in cm) | frequency (f) | Cumulative frequency (c.f.) 148 | 2 | 3 149 | 14 | 17 150 | 12 | 29	2

152	8	37
154	7	44
155	4	48
160	2	50

$\Sigma f = 50$

$\Sigma f = n = 50$, which is even

Average of $\frac{50}{2}$ and $\frac{50}{2} + 1$, i.e., 25^{th} and 26^{th} observation $= 150$

median $= 150$ cm.

खण्ड–स / SECTION-C

प्रश्न संख्या 11 से 20 में प्रत्येक का 3 अंक है।

Question numbers **11** to **20** carry three marks each.

11 HCF of 72 and 96 3

$$72\overline{)96}(1$$
$$\underline{72}$$
$$24\overline{)72}(3$$
$$\underline{72}$$
$$0$$

$HCF = 24$

$96m + 72n = 24$

for $m = 1$ and $n = -1$

12 $(x - \sqrt{2})$ is a factor 3

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

other zero $= -3$

13 3

$y = \frac{2x - 8}{3}$ $\qquad 4x - 6y = 16$

$\Rightarrow \quad 2x - 3y = 8$

x	1	4
y	-2	0

x	1	4
y	-2	0

Graphs

Coincident lines

Infinitely many solutions

14 Dividing by xy 3

$\frac{1}{y} + \frac{4}{x} = 27$ $\qquad \frac{1}{y} + \frac{2}{x} = 21$

Put $\frac{1}{y} = v$, $\qquad \frac{1}{x} = u$

$4u + v = 27$

$2u + v = 21$

$u = 3, \qquad v = 15$

$x = \frac{1}{3}, \qquad y = \frac{1}{15}$

15 3

16 3

17 3

$$\text{LHS} = \left(\frac{\sin\theta + \cos\theta - 1}{\sin\theta}\right)\left(\frac{\cos\theta + \sin\theta + 1}{\cos\theta}\right)$$

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

$$= \frac{2\sin\theta\cos\theta}{\sin\theta\cos\theta} = 2$$

18 3

$\sin 2x = \sin 30° \cos(90° - 30°) + \sin(90° - 30°)\cos 30°$

$= \sin^2 30° + \cos^2 30° = 1$

$= \sin 90°$

$\therefore 2x = 90° \Rightarrow x = 45°$

19 3

C.I	f	u_i	$f_i u_i$
$0 - 20$	14	-2	-28
$20 - 40$	p	-1	$-p$
$40 - 60$	24	0	0
$60 - 80$	32	1	32
$80 - 100$	10	2	20
$100 - 120$	2	3	6
	$82 + p$		$30 - p$

a = assumed mean = 50

formula of mean

$$\text{Mean} = 52.4 = 50 + \frac{30 - p}{82 + p} \times 20$$

$$2.4(82 + p) = (30 - p)20$$

$$p = 18$$

20

Daily wage (in ₹)	200 – 250	250 – 300	300 – 350	350 – 400	400 – 450	450 – 500	500 – 550
f	3	4	8	7	6	6	7
cf	3	7	15	22	28	34	41

$n = \Sigma f = 41 \Rightarrow \frac{n}{2} = 20.5 \Rightarrow$ median class $= 350 - 400$

$l = 350, f = 7, cf = 15$

Median formula

$$\text{Median} = 350 + \frac{20.5 - 15}{7} \times 50$$

$$= 389.28$$

3

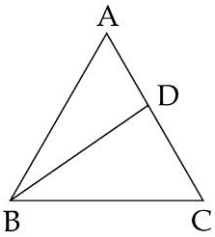
खण्ड–द / SECTION-D

प्रश्न संख्या 21 से 31 में प्रत्येक का 4 अंक है।

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

	21	HCF = 18 LCM = 378 $\frac{LCM}{HCF} = \frac{378}{18} = 21$ Thus HCF divides LCM exactly $\therefore$ two numbers with HCF and LCM as 18 and 378 are possible.	4
	22	Sol : Let full fare of one ticket = x Let reservation charges = y Then $2x + 2y = 1700$ $x + y = 850$ _____ (I) $3x + 4y = 2700$ _____ (II) On solving the both equations $x =$ ₹ 700 and $y =$ ₹ 150 **Value :** Mr. Sharma is honest, respect for Nation.	4
	23	Let units and tens place are x and y Number $= 10y + x$ Number obtained on reversing the digits $= 10x + y$	4

	$10x+y=(10y+x)+9 \quad \Rightarrow \quad 9x-9y=9$ $\Rightarrow \quad x-y=1$ $(10x+y)+(10y+x)=99 \quad \Rightarrow \quad x+y=9$ $x=5,\ y=4$ number = 45		
24	Quotient $=x^2-2x-3$ Remainder $=x-1$ Verification		4
25	In ΔABC, $DP \| \| BC$, so by B.P.T. $\frac{AD}{DB}=\frac{AP}{PC}$ _____ (1) In ΔABC, $EQ \| \| AC$, so by B.P.T. $\frac{BE}{EA}=\frac{BQ}{QC}=\frac{AD}{EA}$ _____ (2) ($\because AD=BE$) from (1) and (2) $AD=\frac{AP\times DB}{PC}=\frac{BQ\times EA}{CQ}$ $\frac{AP}{PC}=\frac{BQ}{QC}$ ($\because DB=AB-AD=AB-BE=AE$) So, by converse of B.P.T. $PQ \| \| AB$		4

	26	 $AB = AC \Rightarrow \angle B = \angle C$ _____ (1) $BC^2 = AC \times CD$ $\frac{BC}{AC} = \frac{CD}{BC}$ _____ (2) (1) and (2) give $\Delta BCA \sim \Delta DCB$ (SAS similarity) $\frac{BC}{DC} = \frac{CA}{CB} = \frac{BA}{DB}$ $\Rightarrow \frac{BA}{CA} = \frac{DB}{CB}$ Using (1) $DB = CB$	4
	27		4
	28	$(\text{cosec}\theta + \cot\theta)^2 = \left(\frac{1 + \cos\theta}{\sin\theta}\right)^2 = \frac{(1 + \cos\theta)^2}{1 - \cos^2\theta}$ $= \frac{1 + \cos\theta}{1 - \cos\theta}$ $= \frac{\sec\theta + 1}{\sec\theta - 1}$	4
	29	$\tan\theta = \frac{n}{m}$	4

$$\frac{\tan\theta + \cot\theta}{\tan\theta - \cot\theta} = \frac{\frac{n}{m} + \frac{m}{n}}{\frac{n}{m} - \frac{m}{n}} = \frac{n^2 + m^2}{n^2 - m^2}$$

Also, $\frac{n\sin\theta + m\cos\theta}{n\sin\theta - m\cos\theta} = \frac{n\tan\theta + m}{n\tan\theta - m} = \frac{n^2 + m^2}{n^2 - m^2}$

30

C. I.	f_i	u_i	f_iu_i
10-14	8	-3	-24
14-18	7	-2	-14
18-22	4	-1	-4
22-26	x	0	0
26-30	6	1	6
30-34	y	2	$2y$
34-38	3	3	9
	$\Sigma f_i = 28 + x + y$ $= 40$		$\Sigma f_iu_i = 2y - 27$

Let a = assumed mean = 24

Formula of mean

$$\text{Mean} = 21.7 = 24 + \frac{2y - 27}{40} \times 4$$

$$2.3 = 27 - 2y \Rightarrow \quad y = 2$$

$\Rightarrow \quad 28 + x + y = 40$ and $y = 2 \quad \Rightarrow \quad x = 10$

$x = 10, y = 2$

4

31 | Points for more than type ogive | 4

Drawing of curve, median from ogive ≈ '45 years'

C. I.	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
f	9	11	17	26	13	8	11	4	1
c.f	9	20	37	63	76	84	95	99	100

$\frac{\sum f}{2} = 50 \quad \Rightarrow \quad$ Median class $= 40 - 50$

$$\text{Median} = 40 + \frac{50 - 37}{26} \times 10 = 45 \text{ years}$$

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