SI0V3M7

Marking Scheme

SUMMATIVE ASSESSMENT – I (2016-17)

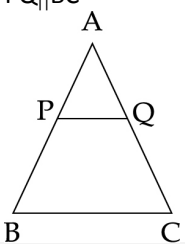
Mathematics (Class – X)

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	AP = PB and AQ = QC $\Rightarrow \frac{AP}{PB} = \frac{AQ}{QC} = 1$ By converse of B.P.T PQ‖BC  	1
2	$\tan^2 10° - \cot^2 80°$ $= \tan^2 10° - \tan^2(90° - 80°)$ $= \tan^2 10° - \tan^2 10°$ $= 0$	1
3	0	1
4	Mode = 3 median − 2mean = 3(mean + 3) − 2mean = mean + 9 Mode increases by 9	1

/ SECTION-B

5102

Question numbers **5** to **10** carry two marks each.

5	231 = 3.7.11 $546 = 13^1.7.2.3$ Because prime factorization of 231 and 546 contains 3 and 7 as common factor therefore, 231 and 546 are not co-prime numbers.	2
6	$\frac{320}{455} = \frac{64}{91}$ Q denominator 91 is not a product of the type 2^m5^n. $\therefore$ the number does not terminates.	2
7	Writing condition	2

$\frac{-1}{3k} \neq \frac{1}{2}$

$k \neq -\frac{2}{3}$

$\therefore$ For all real values of k except $-\frac{2}{3}$, the given pair of equation will have a unique solution.

8 — 2

AD = median $= \sqrt{3}$ cm

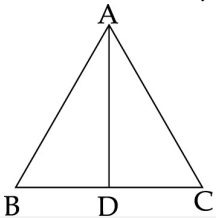
Let AB = 2*x*, BD = *x* } ½

In Δ ABD

$(2x)^2 = x^2 + \left(\sqrt{3}\right)^2 \Rightarrow x^2 = 1$ ½

$\Rightarrow$ $x = 1$ Q $x = -1$ is not possible.

Side of equilateral triangle = 2cm ½



} ½

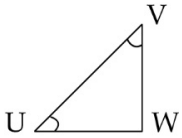
9 — 2

$\sin U = \frac{VW}{UV}, \sin V = \frac{UW}{UV}$

Q $\sin U = \sin V$

$\therefore \frac{VW}{UV} = \frac{UW}{UV} \Rightarrow VW = UW$

$\therefore \angle U = \angle V$ (angles opp. to equal sides of a triangle are equal)



10 — 2

C. I.	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70	70 – 80
f	6	16	8	5	8	7

/ SECTION-C

11203

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

11 — 3

Q $657 > 306$

$\Rightarrow 657 = 306 \times 2 + 45$

$\Rightarrow 306 = 45 \times 6 + 36$

$\Rightarrow 45 = 36 \times 1 + 9$

$\Rightarrow 36 = 9 \times 4 + 0$

Q remainder $= 0$

$\therefore$ HCF $= 9$

$\text{LCM} = \frac{306 \times 657}{9} = 22338.$

12 — 3

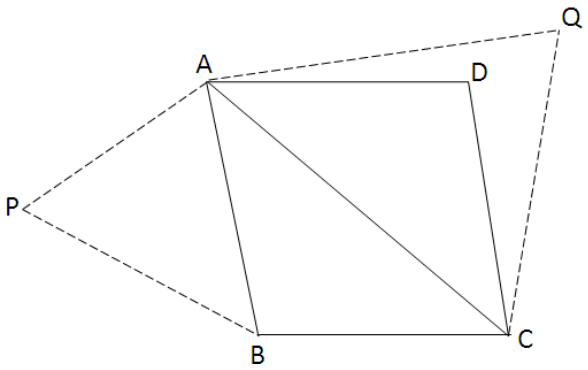
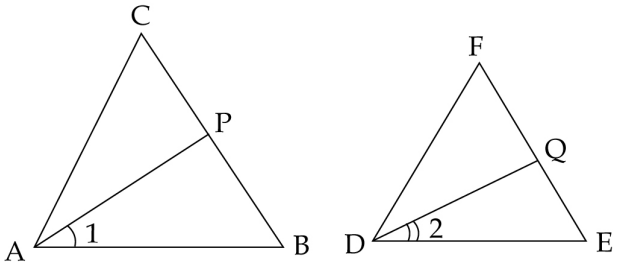
Division

Quotient $= 3x - 5$, Remainder $= 10x^2 - 2$

Verification

13 — 3

$\alpha\beta = \frac{6}{a} = 1$ ½

		$\alpha = 1/\beta$ $\Rightarrow \quad a = 6$ 1 $k + \frac{1}{k} = -\frac{15}{6}$ polynomial = $6x^2 + 15x + 6$ $=(6x + 3)(x + 2)$ 1 Zeros are -2 and $-\frac{1}{2}$ ½	
	14	Q Eqns. $x - 2y = 8$ and $5x - 10y = c$ have unique solution if $\left(\text{Q } \frac{a_1}{a_2} \neq \frac{b_1}{b_2}\right)$ But $\frac{1}{5} = \frac{1}{5}$ i.e. $\frac{1}{5} \neq \frac{1}{5}$ which is incorrect $\therefore$ the above equations cannot have a unique solution $\therefore$ the statement is False.	3
	15	 ABCD is a square Let AB = a $\Rightarrow$ AC = $\sqrt{a^2 + a^2}$ $= \sqrt{2}\,a$ $\Delta PAB \sim \Delta QAC$ (equilateral triangle) $\therefore \frac{Ar\Delta PAB}{Ar\Delta QAC} = \frac{AB^2}{AC^2} = \frac{a^2}{2a^2} = \frac{1}{2}$ $\therefore$ 2 Ar (ΔPAB)= Ar(ΔQAC)	3
	16	 (a) $\Delta ABC \sim \Delta DEF$ $\therefore \angle A = \angle D$ (corresponding angles) $2\angle 1 = 2\angle 2$ $\Rightarrow \quad \angle 1 = \angle 2$	3

also $\angle B = \angle E$ (corresponding angles)

$\Delta APB \sim \Delta DQE \Rightarrow \frac{AP}{DQ} = \frac{AB}{DE}$ similarly

(b) $\because \Delta ABC \sim \Delta DEF$

$\therefore \angle C = \angle F$

$\therefore \angle A = \angle D$

$\Rightarrow 2\angle 3 = 2\angle 4 \Rightarrow \angle 3 = \angle 4$

$\therefore \Delta CAP \sim \Delta FDQ$ (By AA similarly rule)

17 Expression $= \sec^2 37° - \cot^2 53° \cdot \tan 21° \cdot \cot 21°$ 3

$- \cos^2 49° - \sin^2 49°$

$= \sec^2 37° - \tan^2 37° - 1$

$= 1 - 1 = 0$

18 Getting LHS $= \frac{\cos A (1 - \sin A) . \sin A}{\sin A . \cos A . (1 + \sin A)}$ 3

$= \frac{1 - \sin A}{1 + \sin A}$

Getting RHS $= \frac{(1 - \sin A) \sin A}{\sin A (1 + \sin A)} = \frac{1 - \sin A}{1 + \sin A}$

Writing $\therefore$ LHS = RHS

19 3

Class interval	x_i	f_i	$u_i = \frac{x_i - a}{h}$	$f_i u_i$
$-0.5 - 9.5$	4.5	12	-2	-24
$9.5 - 19.5$	14.5	25	-1	-25
$19.5 - 29.5$	24.5	13	0	0
$29.5 - 39.5$	34.5	10	1	10
$39.5 - 49.5$	44.5	5	2	10
		$\Sigma f_i = 65$		$\Sigma f_i u_i = -29$

Let a = assumed mean = 24.5

formula of mean

Mean $= 24.5 + \frac{-29}{65} \times 10$

$= 20.04$

20 Mode = 154 3

Modal class = 150 − 160

Mode $= l + \frac{a_1 - a_0}{2a_1 - a_0 - a_2} \times h$

$\Rightarrow 154 = 150 + \frac{a - 12}{2a - 20} \times 10$

$\Rightarrow 4 = \frac{a - 12}{2(a - 10)} \times 10^5$

$\Rightarrow 4a - 40 = 5a - 60$

$\Rightarrow a = 20$

/ SECTION-D

21314

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

21 (4)

Let the no. of eggs be a

Q $a-1$ is multiple of 3 and 4

$\therefore\ a-1=12q$

$a=12q+1$ where q is $+$ve integer

Now various possible values of a are

$a=13, 25, 37, 49, 61, 73, 85, 97$

Q a is divisible by 7 and only value which is divisible by 7 is 49

$\therefore\ a=49$ eggs.

22 (4)

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

$$\frac{2x^4+3x^3-5x^2-9x-3}{x^2-3}=2x^2+3x+1$$

$2x^2+3x+1=(2x+1)(x+1)$

Other zeroes are $-\frac{1}{2}$ and -1.

23 (4)

$y=2(x-1)$

x	0	1
y	-2	0

$y=4-4x$

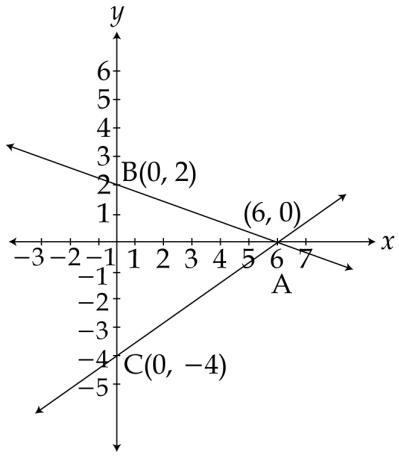
x	1	2	0
y	0	-4	4

Graphs

$y=2(x-1)$ meets axes at (1, 0) and (0, -2)

$4x+y=4$ meets axes at (1, 0) and (0, 4)

24 (4)



$x+3y=6,$ _____ (i)

$2x-3y=12$ _____ (ii)

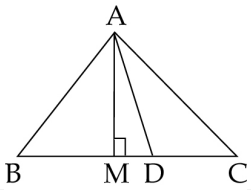
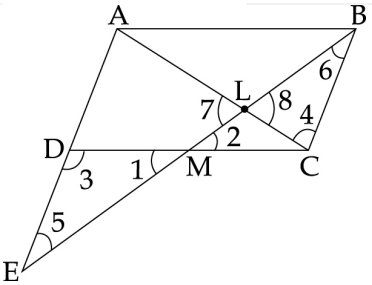
for equation (i) $y=\frac{6-x}{3}$

x	6	0
y	0	2
Point	A	B

A(6,0), B(0,2)

Equation (ii) $y=\frac{2x-12}{3}$

x	6	0
y	0	-4
Point	A	C

		A(6,0) , C(0,-4) 1 mark for each equation AB and AC represent the equations $x+3y=6$ and $2x-3y=12$. Vertices C $(0,-4)$, B (0, 2), A (6, 0) Area of triangular park $=\frac{1}{2}\times BC\times AO=\frac{1}{2}\times 6\times 6=18\ km^2$ Public should : Use dustbin and avoid use of plastic bags. They should not pluck flowers and plants. Environment friendly behaviour is expected.	
	25	In ΔABM $AB^2=AM^2+BM^2$ $=AD^2-MD^2+\left(\frac{BC}{2}-MD\right)^2$ $=AD^2+\frac{BC^2}{4}-BC\times MD$  	4
	26	 $\Delta MDE\cong\Delta MCB$ (ASA) $\Rightarrow$ DE = BC Also BC = AD $\Rightarrow$ AD = DE Now AE = 2AD Now $\Delta BLC\sim\Delta ELA$ $\frac{BL}{EL}=\frac{LC}{LA}=\frac{BC}{AE}$ $\Rightarrow\frac{BL}{EL}=\frac{BC}{AE}$ $\Rightarrow\frac{BL}{EL}=\frac{BC}{2AD}$ $\Rightarrow\frac{BL}{EL}=\frac{1}{2}$ (Q BC = AD) $\Rightarrow$ EL = 2 BL.	4
	27	(i) $\sin 2\theta=\sin 90°=1$ $2\sin 45°\cos 45°=2\cdot\frac{1}{\sqrt{2}}\cdot\frac{1}{\sqrt{2}}=1$ (ii) $\cos 2\theta=\cos 90°=0$	4

$\text{Cos}^2 45° - \sin^2 45° = \frac{1}{2} - \frac{1}{2} = 0$

28 $\cos\theta - \sin\theta = \sqrt{2}\sin\theta$ 4

$\cos\theta = (\sqrt{2}+1)\sin\theta$

$= \frac{\sin\theta}{\sqrt{2}-1}$

$\sqrt{2}\cos\theta - \cos\theta = \sin\theta$

$\Rightarrow \quad \cos\theta + \sin\theta = \sqrt{2}\cos\theta$

29 4

$\text{LHS} = \frac{\tan^3\theta}{1+\tan^2\theta} + \frac{\cot^3\theta}{1+\cot^2\theta}$

$= \frac{\frac{\sin^3\theta}{\cos^3\theta}}{\sec^2\theta} + \frac{\frac{\cos^3\theta}{\sin^3\theta}}{\text{cosec}^2\theta} = \frac{\sin^3\theta}{\cos\theta} + \frac{\cos^3\theta}{\sin\theta}$

$= \frac{\cos^4\theta + \sin^4\theta}{\sin\theta\ \cos\theta} = \frac{\left(\sin^2\theta + \cos^2\theta\right)^2 - 2\sin^2\theta\cos^2\theta}{\sin\theta\cos\theta}$

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

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

$= \text{cosec}\theta\sec\theta - 2\sin\theta\cos\theta = \text{RHS}$

30 4

Points for more than type ogive

Drawing of ogive, median from ogive $= 396$

C. I.	240-280	280-320	320-360	360-400	400-440	440-480	480-520
f	5	8	10	30	25	12	10
c.f.	5	13	23	53	78	90	100

$\frac{\sum f}{2} = 50 \quad \Rightarrow \quad \text{Median class} = 360 - 400$

$\text{Median} = 360 + \frac{50 - 23}{30} \times 40 = 396$

31 4

Values and formula of mode

$\text{Mode} = 139 = 130 + \frac{40 - y}{80 - y - 18} \times 20$

$9(62 - y) = 800 - 20y$

$y = 22$ _____(1)

$\Sigma f_i = 122 = 88 + x + y$

$x = 12$

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