Marking Scheme
Strictly Confidential
(For Internal and Restricted use only)
Secondary School Examination, 2023
MATHEMATICS PAPER CODE 30/2/1

General Instructions: -

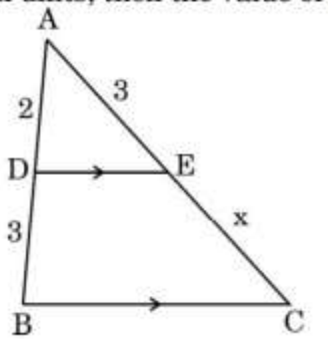
1	You are aware that evaluation is the most important process in the actual and correct assessment of the candidates. A small mistake in evaluation may lead to serious problems which may affect the future of the candidates, education system and teaching profession. To avoid mistakes, it is requested that before starting evaluation, you must read and understand the spot evaluation guidelines carefully.
2	**"Evaluation policy is a confidential policy as it is related to the confidentiality of the examinations conducted, Evaluation done and several other aspects. Its' leakage to public in any manner could lead to derailment of the examination system and affect the life and future of millions of candidates. Sharing this policy/document to anyone, publishing in any magazine and printing in News Paper/Website etc may invite action under various rules of the Board and IPC."**
3	Evaluation is to be done as per instructions provided in the Marking Scheme. It should not be done according to one's own interpretation or any other consideration. Marking Scheme should be strictly adhered to and religiously followed. **However, while evaluating, answers which are based on latest information or knowledge and/or are innovative, they may be assessed for their correctness otherwise and due marks be awarded to them.**
4	The Marking scheme carries only suggested value points for the answers. These are in the nature of Guidelines only and do not constitute the complete answer. The students can have their own expression and if the expression is correct, the due marks should be awarded accordingly.
5	The Head-Examiner must go through the first five answer books evaluated by each evaluator on the first day, to ensure that evaluation has been carried out as per the instructions given in the Marking Scheme. If there is any variation, the same should be zero after deliberation and discussion. The remaining answer books meant for evaluation shall be given only after ensuring that there is no significant variation in the marking of individual evaluators.
6	Evaluators will mark (✓) wherever answer is correct. For wrong answer CROSS 'X" be marked. Evaluators will not put right (✓) while evaluating which gives an impression that answer is correct and no marks are awarded. **This is most common mistake which evaluators are committing.**
7	If a question has parts, please award marks on the right-hand side for each part. Marks awarded for different parts of the question should then be totaled up and written in the left-hand margin and encircled. This may be followed strictly.
8	If a question does not have any parts, marks must be awarded in the left-hand margin and encircled. This may also be followed strictly.

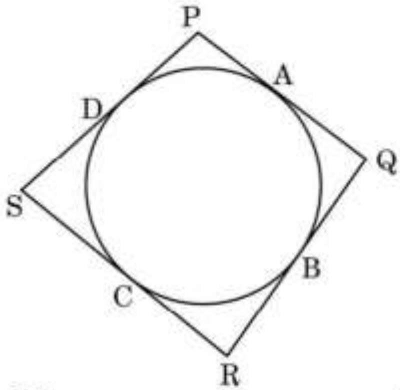
9	**In Q1-Q20, if a candidate attempts the question more than once (without canceling the previous attempt), marks shall be awarded for the first attempt only and the other answer scored out with a note "Extra Question".**
10	**In Q21-Q38, if a student has attempted an extra question, answer of the question deserving more marks should be retained and the other answer scored out with a note "Extra Question".**
11	No marks to be deducted for the cumulative effect of an error. It should be penalized only once.
12	A full scale of marks ___________(example 0 to 80/70/60/50/40/30 marks as given in Question Paper) has to be used. Please do not hesitate to award full marks if the answer deserves it.
13	Every examiner has to necessarily do evaluation work for full working hours i.e., 8 hours every day and evaluate 20 answer books per day in main subjects and 25 answer books per day in other subjects (Details are given in Spot Guidelines). This is in view of the reduced syllabus and number of questions in question paper.
14	Ensure that you do not make the following common types of errors committed by the Examiner in the past:- ● Leaving answer or part thereof unassessed in an answer book. ● Giving more marks for an answer than assigned to it. ● Wrong totaling of marks awarded on an answer. ● Wrong transfer of marks from the inside pages of the answer book to the title page. ● Wrong question wise totaling on the title page. ● Wrong totaling of marks of the two columns on the title page. ● Wrong grand total. ● Marks in words and figures not tallying/not same. ● Wrong transfer of marks from the answer book to online award list. ● Answers marked as correct, but marks not awarded. (Ensure that the right tick mark is correctly and clearly indicated. It should merely be a line. Same is with the X for incorrect answer.) ● Half or a part of answer marked correct and the rest as wrong, but no marks awarded.
15	While evaluating the answer books if the answer is found to be totally incorrect, it should be marked as cross (X) and awarded zero (0) Marks.
16	Any unassessed portion, non-carrying over of marks to the title page, or totaling error detected by the candidate shall damage the prestige of all the personnel engaged in the evaluation work as also of the Board. Hence, in order to uphold the prestige of all concerned, it is again reiterated that the instructions be followed meticulously and judiciously.
17	The Examiners should acquaint themselves with the guidelines given in the "**Guidelines for spot Evaluation**" before starting the actual evaluation.
18	Every Examiner shall also ensure that all the answers are evaluated, marks carried over to the title page, correctly totaled and written in figures and words.
19	The candidates are entitled to obtain photocopy of the Answer Book on request on payment of the prescribed processing fee. All Examiners/Additional Head Examiners/Head Examiners are once again reminded that they must ensure that evaluation is carried out strictly as per value points for each answer as given in the Marking Scheme.

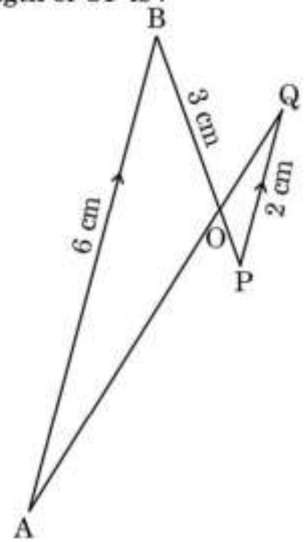
MARKING SCHEME
MATHEMATICS (Subject Code–041)
(PAPER CODE: 30/2/1)

Q. No.	EXPECTED OUTCOMES/VALUE POINTS	Marks
	SECTION A Questions no. 1 to 18 are multiple choice questions (MCQs) and questions number 19 and 20 are Assertion-Reason based questions of 1 mark each	
1.	Which of the following quadratic equations has sum of its roots as 4 ? (a) $2x^2 - 4x + 8 = 0$ (b) $-x^2 + 4x + 4 = 0$ (c) $\sqrt{2}x^2 - \frac{4}{\sqrt{2}}x + 1 = 0$ (d) $4x^2 - 4x + 4 = 0$	
Sol.	(b) $-x^2 + 4x + 4 = 0$	1
2.	What is the length of the arc of the sector of a circle with radius 14 cm and of central angle 90° ? (a) 22 cm (b) 44 cm (c) 88 cm (d) 11 cm	
Sol.	(a) 22 cm	1
3.	If Δ ABC ~ Δ PQR with ∠ A = 32° and ∠ R = 65°, then the measure of ∠ B is : (a) 32° (b) 65° (c) 83° (d) 97°	
Sol.	(c) 83°	1
4.	If 'p' and 'q' are natural numbers and 'p' is the multiple of 'q', then what is the HCF of 'p' and 'q' ? (a) pq (b) p (c) q (d) p + q	
Sol.	(c) q	1
5.	The coordinates of the vertex A of a rectangle ABCD whose three vertices are given as B(0, 0), C(3, 0) and D(0, 4) are : (a) (4, 0) (b) (0, 3) (c) (3, 4) (d) (4, 3)	
Sol.	(c) (3, 4)	1

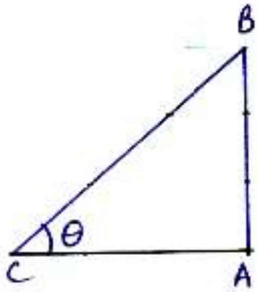
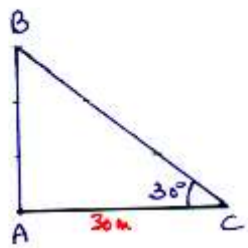
6.	If the pair of equations $3x - y + 8 = 0$ and $6x - ry + 16 = 0$ represent coincident lines, then the value of 'r' is : (a) $-\frac{1}{2}$ (b) $\frac{1}{2}$ (c) -2 (d) 2	
Sol.	(d) 2	1
7.	A bag contains 100 cards numbered 1 to 100. A card is drawn at random from the bag. What is the probability that the number on the card is a perfect cube ? (a) $\frac{1}{20}$ (b) $\frac{3}{50}$ (c) $\frac{1}{25}$ (d) $\frac{7}{100}$	
Sol.	(c) $\frac{1}{25}$	1
8.	The pair of equations $x = a$ and $y = b$ graphically represents lines which are : (a) parallel (b) intersecting at (b, a) (c) coincident (d) intersecting at (a, b)	
Sol.	(d) intersecting at (a, b)	1
9.	If one zero of the polynomial $6x^2 + 37x - (k - 2)$ is reciprocal of the other, then what is the value of k ? (a) -4 (b) -6 (c) 6 (d) 4	
Sol.	(a) – 4	1
10.	What is the total surface area of a solid hemisphere of diameter 'd' ? (a) $3\pi d^2$ (b) $2\pi d^2$ (c) $\frac{1}{2}\pi d^2$ (d) $\frac{3}{4}\pi d^2$	
Sol.	(d) $\frac{3}{4}\pi d^2$	1

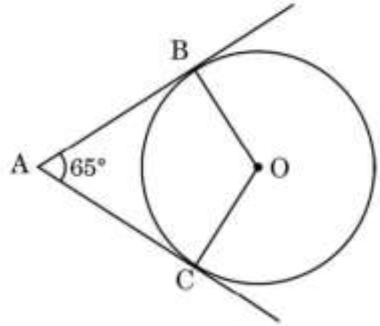
11.	If three coins are tossed simultaneously, what is the probability of getting at most one tail ? (a) $\frac{3}{8}$ (b) $\frac{4}{8}$ (c) $\frac{5}{8}$ (d) $\frac{7}{8}$	
Sol.	(b) $\frac{4}{8}$	1
12.	In the given figure, DE ∥ BC. If AD = 2 units, DB = AE = 3 units and EC = x units, then the value of x is :  (a) 2 (b) 3 (c) 5 (d) $\frac{9}{2}$	
Sol.	(d) $\frac{9}{2}$	1
13.	The hour-hand of a clock is 6 cm long. The angle swept by it between 7:20 a.m. and 7:55 a.m. is : (a) $\left(\frac{35}{4}\right)^\circ$ (b) $\left(\frac{35}{2}\right)^\circ$ (c) 35° (d) 70°	
Sol.	(b) $\left(\frac{35}{2}\right)^\circ$	1
14.	The zeroes of the polynomial $p(x) = x^2 + 4x + 3$ are given by : (a) 1, 3 (b) −1, 3 (c) 1, −3 (d) −1, −3	
Sol.	(d) −1, −3	1

15.	In the given figure, the quadrilateral PQRS circumscribes a circle. Here PA + CS is equal to :  (a) QR (b) PR (c) PS (d) PQ	
Sol.	(c) PS	1
16.	If α and β are the zeroes of the quadratic polynomial $p(x) = x^2 - ax - b$, then the value of $\alpha^2 + \beta^2$ is : (a) $a^2 - 2b$ (b) $a^2 + 2b$ (c) $b^2 - 2a$ (d) $b^2 + 2a$	
Sol.	(b) $a^2 + 2b$	1
17.	The area of the triangle formed by the line $\frac{x}{a} + \frac{y}{b} = 1$ with the coordinate axes is : (a) ab (b) $\frac{1}{2}ab$ (c) $\frac{1}{4}ab$ (d) 2ab	
Sol.	(b) $\frac{1}{2}$ ab	1

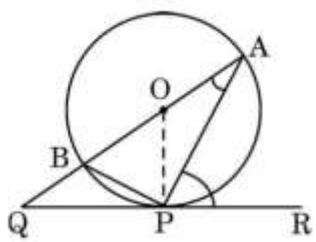
18.	In the given figure, AB ∥ PQ. If AB = 6 cm, PQ = 2 cm and OB = 3 cm, then the length of OP is :  (a) 9 cm (b) 3 cm (c) 4 cm (d) 1 cm	
Sol.	(d) 1 cm	1
	*Questions number **19** and **20** are Assertion and Reason based questions carrying 1 mark each. Two statements are given, one labelled as Assertion (A) and the other is labelled as Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below.* (a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A). (b) Both Assertion (A) and Reason (R) are true, but Reason (R) is ***not*** the correct explanation of the Assertion (A). (c) Assertion (A) is true, but Reason (R) is false. (d) Assertion (A) is false, but Reason (R) is true.	
19.	*Assertion (A) :* A tangent to a circle is perpendicular to the radius through the point of contact. *Reason (R) :* The lengths of tangents drawn from an external point to a circle are equal.	
Sol.	(b) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).	1
20.	*Assertion (A) :* The polynomial $p(x) = x^2 + 3x + 3$ has two real zeroes. *Reason (R):* A quadratic polynomial can have at most two real zeroes.	
Sol.	(d) Assertion (A) is false, but Reason (R) is true.	1

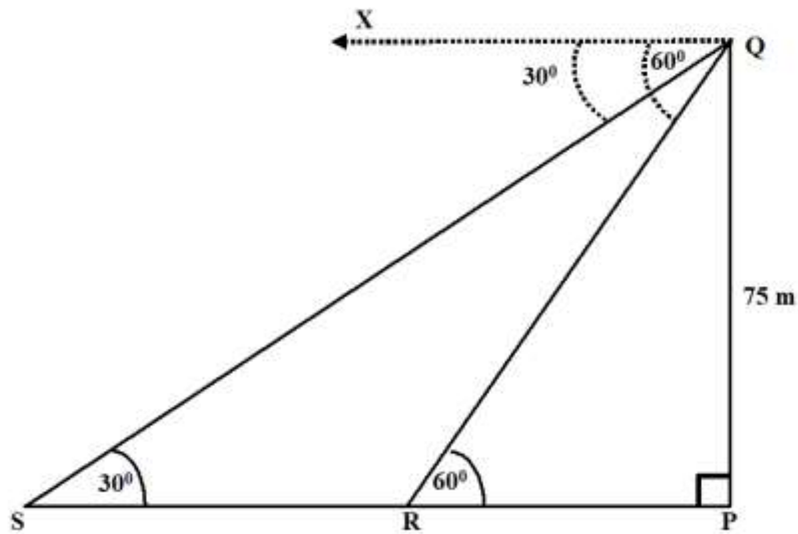
	SECTION B This section comprises of Very Short Answer (VSA) type questions of 2 marks each.	
21.	**Prove that $2 + \sqrt{3}$ is an irrational number, given that $\sqrt{3}$ is an irrational number.**	
Sol.	Let us assume that $2 + \sqrt{3}$ is rational Let $2 + \sqrt{3} = \frac{p}{q}$; $q \neq 0$ and p, q are integers $\Rightarrow \sqrt{3} = \frac{p - 2q}{q}$ p and q are integers, $\therefore$ p – 2q is an integer $\Rightarrow \frac{p - 2q}{q}$ is a rational number $\Rightarrow \sqrt{3}$ is a rational number which contradicts our assumption that $\sqrt{3}$ is an irrational number. $\Rightarrow 2 + \sqrt{3}$ is an irrational number	½ ½ ½ ½
22(a).	**If $4\cot^2 45° - \sec^2 60° + \sin^2 60° + p = \frac{3}{4}$, then find the value of p.**	
Sol.	$4\cot^2 45° - \sec^2 60° + \sin^2 60° + p = \frac{3}{4}$ $\Rightarrow 4(1)^2 - (2)^2 + \left(\frac{\sqrt{3}}{2}\right)^2 + p = \frac{3}{4}$ $\Rightarrow 4 - 4 + \frac{3}{4} + p = \frac{3}{4}$ $\Rightarrow p = 0$	1 ½ ½
	OR	
22(b).	**If $\cos A + \cos^2 A = 1$, then find the value of $\sin^2 A + \sin^4 A$.**	
Sol.	$\cos A + \cos^2 A = 1 \Rightarrow \cos A = 1 - \cos^2 A = \sin^2 A$ $\therefore \sin^2 A + \sin^4 A = \cos A + \cos^2 A$ ($\because \sin^2 A = \cos A$) $= 1$	1 1
23.	**Show that the points (– 2, 3), (8, 3) and (6, 7) are the vertices of a right-angled triangle.**	
Sol.	Let the given points be A (– 2, 3), B (8, 3) and C (6, 7) Then, AB = 10, BC = $\sqrt{4 + 16} = \sqrt{20}$, AC = $\sqrt{64 + 16} = \sqrt{80}$	1 ½

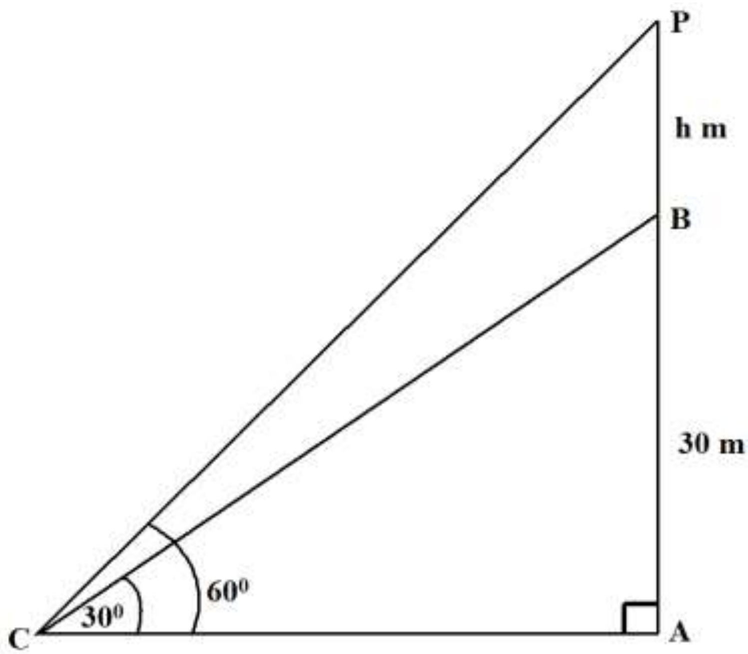
	$\therefore$ $AB^2 = BC^2 + AC^2$ $\therefore$ the given points are the vertices of a right angled triangle.	½
24(a).	The length of the shadow of a tower on the plane ground is $\sqrt{3}$ times the height of the tower. Find the angle of elevation of the sun.	
Sol.	 Let AB be the tower of height 'h'. $\therefore$ AC = $\sqrt{3}$ h In Δ ABC, $\tan\theta = \frac{AB}{AC} = \frac{h}{\sqrt{3}\ h}$ $\Rightarrow \tan\theta = \frac{1}{\sqrt{3}}$ $\Rightarrow \theta = 30°$	1 ½ ½
	OR	
24(b).	The angle of elevation of the top of a tower from a point on the ground which is 30 m away from the foot of the tower, is 30°. Find the height of the tower.	
Sol.	 Height of tower = AB In Δ ABC, $\tan 30° = \frac{AB}{30}$ $\Rightarrow$ AB = $\frac{30}{\sqrt{3}} = 10\sqrt{3}$ $\therefore$ Height of Tower is $10\sqrt{3}$ m	 1 1

25.	In the given figure, O is the centre of the circle. AB and AC are tangents drawn to the circle from point A. If $\angle BAC = 65°$, then find the measure of $\angle BOC$. 	
Sol.	$\angle BAC + \angle BOC = 180°$ $\Rightarrow \angle BOC = 180° - 65°$ $\Rightarrow \angle BOC = 115°$	1 1
	SECTION C This section comprises of Short Answer (SA) type questions of 3 marks each.	
26(a).	Find by prime factorisation the LCM of the numbers 18180 and 7575. Also, find the HCF of the two numbers.	
Sol.	$18180 = 2^2 \times 3^2 \times 5 \times 101$ $7575 = 3 \times 5^2 \times 101$ $LCM = 2^2 \times 3^2 \times 5^2 \times 101 = 90900$ $HCF = 3 \times 5 \times 101 = 1515$	½ ½ 1 1
	OR	
26(b).	Three bells ring at intervals of 6, 12 and 18 minutes. If all the three bells rang at 6 a.m., when will they ring together again ?	
Sol.	LCM of 6, 12, 18 = 36 So, all the three bells ring together after 36 minutes at 6 : 36 AM	2 1
27.	Prove that : $$\left(\frac{1}{\cos\theta} - \cos\theta\right)\left(\frac{1}{\sin\theta} - \sin\theta\right) = \frac{1}{\tan\theta + \cot\theta}.$$	
Sol.	LHS = $\left(\frac{1}{cos\ \theta} - cos\ \theta\right)\left(\frac{1}{sin\ \theta} - sin\ \theta\right)$	

	$= \left(\frac{1-\cos^2\theta}{\cos\theta}\right)\left(\frac{1-\sin^2\theta}{\sin\theta}\right)$ $= \frac{\sin^2\theta}{\cos\theta} \times \frac{\cos^2\theta}{\sin\theta}$ $= \sin\theta\cos\theta$ RHS $= \frac{1}{\tan\theta + \cot\theta} = \frac{1}{\frac{\sin\theta}{\cos\theta} + \frac{\cos\theta}{\sin\theta}}$ $= \frac{\cos\theta\sin\theta}{\sin^2\theta + \cos^2\theta}$ $= \sin\theta\cos\theta$ ∴ LHS = RHS	½ 1 ½ 1
28.	**If Q(0, 1) is equidistant from P(5, – 3) and R(x, 6), find the values of x.**	
Sol.	PQ = QR ⇒ $PQ^2 = QR^2$ $(5-0)^2 + (-3-1)^2 = (x-0)^2 + (6-1)^2$ ⇒ $25 + 16 = x^2 + 25$ ⇒ $x^2 = 16$ ⇒ x = 4, x = – 4	 1 1 ½ + ½
29.	**A car has two wipers which do not overlap. Each wiper has a blade of length 21 cm sweeping through an angle of 120°. Find the total area cleaned at each sweep of the two blades.**	
Sol.	Area cleaned by 1 blade = $\frac{22}{7} \times 21 \times 21 \times \frac{120°}{360°}$ = 462 ⇒ Total area cleaned = 2 × 462 = 924 ∴ Total area cleaned is 924 cm^2	1½ 1 ½
30 (a).	**If the system of linear equations** **2x + 3y = 7 and 2ax + (a + b)y = 28** **have infinite number of solutions, then find the values of 'a' and 'b'.**	
Sol.	system has infinite number of solutions ∴ $\frac{2}{2a} = \frac{3}{a+b} = \frac{7}{28}$ ⇒ $\frac{1}{a} = \frac{1}{4}$ ⇒ a = 4 and a + b = 12 ⇒ b = 8	 1 1 1
	OR	

30(b).	If $217x + 131y = 913$ and $131x + 217y = 827$, then solve the equations for the values of x and y.	
Sol.	$\left.\begin{array}{l}217x + 131y = 913\\131x + 217y = 827\end{array}\right]$ Adding $348(x + y) = 1740$ $x + y = 5$ Subtracting, $86(x - y) = 86$ $x - y = 1$ $\Rightarrow x = 3, y = 2$	 1 1 ½ + ½
31.	In the given figure, O is the centre of the circle and QPR is a tangent to it at P. Prove that $\angle QAP + \angle APR = 90°$. 	
Sol.	OA = OP $\therefore$ In Δ OAP, $\angle OPA = \angle OAP$ ... (i) $\Rightarrow \angle OPA + \angle APR = 90°$ $\Rightarrow \angle OAP + \angle APR = 90°$ Using (i) $\Rightarrow \angle QAP + \angle APR = 90°$	 1 1 ½ ½
	SECTION D This section comprises of Long Answer (LA) type questions of 5 marks each.	
32.	How many terms of the arithmetic progression 45, 39, 33, ... must be taken so that their sum is 180 ? Explain the double answer.	
Sol.	45, 39, 33, ... $a = 45, d = -6$ $S_n = 180$ $180 = \frac{n}{2}[2 \times 45 + (n - 1)(-6)]$ $\Rightarrow 180 = \frac{n}{2}[90 - 6n + 6]$	 ½ 1

	$\Rightarrow 360 = 96n - 6n^2$ $\Rightarrow 6n^2 - 96n + 360 = 0$ $\Rightarrow n^2 - 16n + 60 = 0 \Rightarrow (n-10)(n-6) = 0$ $n - 10 = 0, n - 6 = 0 \Rightarrow n = 10, 6$ We get two values of 'n' as sum of 7^{th} term to 10^{th} term is zero as some terms are negative and some are positive.	 1 1 1 ½
33(a).	As observed from the top of a 75 m high lighthouse from the sea-level, the angles of depression of two ships are 30° and 60°. If one ship is exactly behind the other on the same side of the lighthouse, find the distance between the two ships. (Use $\sqrt{3} = 1{\cdot}73$)	
Sol.	 PQ = Height of Light house = 75 m $\angle XQS = \angle QSP = 30°$ $\angle XQR = \angle QRP = 60°$ R and S are position of ships. In Δ PQR, $\frac{75}{PR} = \tan 60° = \sqrt{3} \Rightarrow PR = \frac{75}{\sqrt{3}} = 25\sqrt{3}$ In Δ PQS, $\frac{75}{PS} = \tan 30°$ $\Rightarrow PS = 75\sqrt{3}$	1 for correct figure 1½ 1

	∴ Distance between the ships, RS = PS – PR $= 75\sqrt{3} - 25\sqrt{3} = 50\sqrt{3}$ $= 50 \times 1{\cdot}73 = 86{\cdot}5$ ∴ Distance between the ships is 86.5 m	1 ½
	OR	
33(b).	From a point on the ground, the angle of elevation of the bottom and top of a transmission tower fixed at the top of 30 m high building are 30° and 60°, respectively. Find the height of the transmission tower. (Use $\sqrt{3} = 1{\cdot}73$)	
Sol.	 Height of building AB = 30 m BP = transmission tower = h(say) ∠ ACB = 30°, ∠ ACP = 60° In Δ ABC, $\tan 30^\circ = \frac{AB}{AC}$ $\Rightarrow \frac{1}{\sqrt{3}} = \frac{30}{AC} \Rightarrow AC = 30\sqrt{3}$ In Δ APC, $\tan 60^\circ = \frac{AP}{AC}$	1 for correct figure 1½

	$\sqrt{3} = \frac{30 + h}{30\sqrt{3}} \Rightarrow 30\sqrt{3} \times \sqrt{3} = 30 + h$	1½
	$\Rightarrow h = 30\ (3 - 1)$ $\Rightarrow h = 60$ $\therefore$ Height of transmission tower = 60 m	1
34.	A student noted the number of cars passing through a spot on a road for 100 periods each of 3 minutes and summarised it in the table given below. Find the mean and median of the following data.	

Number of cars	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70	70 – 80
Frequency (periods)	7	14	13	12	20	11	15	8

Sol.

Number of cars	x_i	f_i	$x_i f_i$	c.f.
0 – 10	5	7	35	7
10 – 20	15	14	210	21
20 – 30	25	13	325	34
30 – 40	35	12	420	46
40 – 50	45	20	900	66
50 – 60	55	11	605	77
60 – 70	65	15	975	92
70 – 80	75	8	600	100
Total		100	4070	

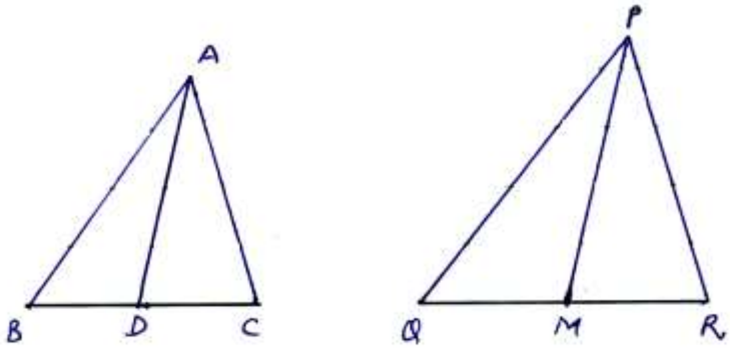
Correct table — 2

Mean = $\frac{\sum x_i f_i}{\sum f_i} = \frac{4070}{100} = 40{\cdot}7$ — 1

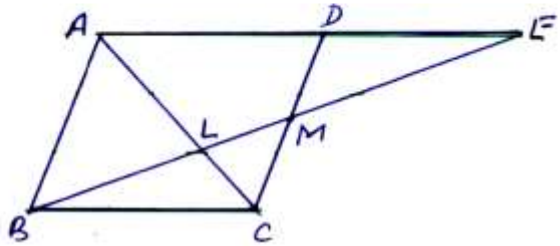
Median class : 40 – 50 — ½

Median = $40 + \frac{50 - 46}{20} \times 10 = 42$ — 1½

35(a). Sides AB and BC and median AD of a triangle ABC are respectively proportional to sides PQ and QR and median PM of Δ PQR. Show that Δ ABC ~ Δ PQR.

Sol.	 In Δ ABC and Δ PQR $\frac{AB}{PQ} = \frac{BC}{QR} = \frac{AD}{PM}$ $\frac{AB}{PQ} = \frac{2\,BD}{2\,QM} = \frac{AD}{PM}$ (∵ D is midpoint of BC and M is midpoint of QR) $\frac{AB}{PQ} = \frac{BD}{QM} = \frac{AD}{PM} \Rightarrow \Delta ABD \sim \Delta PQM$ $\Rightarrow \angle B = \angle Q$ — (i) Now, In Δ ABC and Δ PQR $\frac{AB}{PQ} = \frac{BC}{QR}$ (given) $\angle B = \angle Q$ from (i) ∴ Δ ABC ~ Δ PQR	1 for correct figure 1 1 ½ ½ 1
	OR	
35(b).	Through the mid-point M of the side CD of a parallelogram ABCD, the line BM is drawn intersecting AC in L and AD (produced) in E. Prove that EL = 2BL.	

16

<table>
<tr><td>Sol.</td><td>

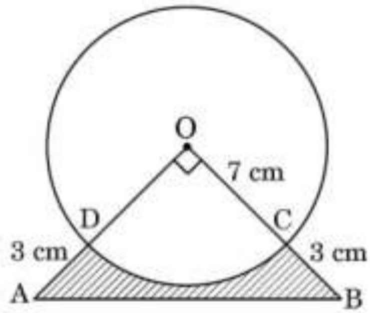
In Δ BMC and Δ EMD
MC = MD
∠ CMB = ∠ EMD
∠ MBC = ∠ MED
∴ Δ BMC ≅ Δ EMD
⇒ BC = DE
But AD = BC
∴ AD = DE
⇒ AE = 2 BC
Δ AEL ~ Δ CBL
$\therefore \frac{EL}{BL} = \frac{AE}{BC}$
$\Rightarrow \frac{EL}{BL} = \frac{2BC}{BC}$
$\Rightarrow \frac{EL}{BL} = 2$
⇒ EL = 2 BL</td><td>1 for correct figure

1

1
½

½

1</td></tr>
</table>

	SECTION E This section comprises of 3 case-study based questions of 4 marks each.	
36.	**Case Study – 1** In an annual day function of a school, the organizers wanted to give a cash prize along with a memento to their best students. Each memento is made as shown in the figure and its base ABCD is shown from the front side. The rate of silver plating is ₹ 20 per cm^2.  Based on the above, answer the following questions : (i) What is the area of the quadrant ODCO ? (ii) Find the area of Δ AOB. (iii) (a) What is the total cost of silver plating the shaded part ABCD ? **OR** (iii) (b) What is the length of arc CD ?	
Sol.	(i)Area of sector ODCO $= \frac{22}{7} \times 7 \times 7 \times \frac{90}{360} = \frac{77}{2}$ or 38·5 ∴ Area of sector ODCO is $\frac{77}{2}$ or 38·5 cm^2 (ii) ar (Δ AOB) = $\frac{1}{2} \times 10 \times 10 = 50$ ∴ ar (Δ AOB) is 50 cm^2 (iii) (a) Required cost = (50 – 38·5) × 20 = 230 ∴ required cost is ₹ 230. OR (iii) (b) Length of arc CD = $\frac{90}{360} \times 2 \times \frac{22}{7} \times 7$ = 11 ∴ Length of arc CD is 11 cm.	½ + ½ 1 1 1 1 1

37.	**Case Study – 2** In a coffee shop, coffee is served in two types of cups. One is cylindrical i shape with diameter 7 cm and height 14 cm and the other i hemispherical with diameter 21 cm.   Based on the above, answer the following questions : (i) Find the area of the base of the cylindrical cup. (ii) (a) What is the capacity of the hemispherical cup ? **OR** (ii) (b) Find the capacity of the cylindrical cup. (iii) What is the curved surface area of the cylindrical cup ?	
Sol.	(i) Area of base of the cylindrical cup = $\frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} = \frac{77}{2}$ or 38.5 $\therefore$ Area of base of the cylindrical cup is $\frac{77}{2}$ or 38.5 cm^2 (ii) (a) Capacity of hemispherical cup = $\frac{2}{3} \times \frac{22}{7} \times \frac{21}{2} \times \frac{21}{2} \times \frac{21}{2}$ $= \frac{4851}{2}$ or 2425.5 $\therefore$ Capacity of hemispherical cup is $\frac{4851}{2}$ cm^3 or 2425.5 cm^3 OR (ii) (b) Capacity of cylindrical cup = $\frac{22}{7} \times (7)^2 \times 14$ = 539 $\therefore$ Capacity of cylindrical cup is 539 cm^3 (iii) External Curved surface area of cylindrical cup = $2 \times \frac{22}{7} \times \frac{7}{2} \times 14 = 308$ $\therefore$ External Curved surface area of cylindrical cup is 308 cm^2	1 1 1 1 1 1

38.

Case Study – 3

Computer-based learning (CBL) refers to any teaching methodology that makes use of computers for information transmission. At an elementary school level, computer applications can be used to display multimedia lesson plans. A survey was done on 1000 elementary and secondary schools of Assam and they were classified by the number of computers they had.

Number of Computers	1 – 10	11 – 20	21 – 50	51 – 100	101 and more
Number of Schools	250	200	290	180	80

One school is chosen at random. Then :

(i) Find the probability that the school chosen at random has more than 100 computers.

(ii) (a) Find the probability that the school chosen at random has 50 or fewer computers.

OR

(ii) (b) Find the probability that the school chosen at random has no more than 20 computers.

(iii) Find the probability that the school chosen at random has 10 or less than 10 computers.

Sol.

(i) P (more than 100 computers) = $\frac{80}{1000}$ or 0·08 — 1

(ii)(a) 50 or fewer computers = 250 + 200 + 290 = 740 — 1

Required probability = $\frac{740}{1000}$ or 0·74 — 1

OR

(ii)(b) No more than 20 computers = 250 + 200 = 450 — 1

Required probability = $\frac{450}{1000}$ or 0·45 — 1

(iii) P (10 or less than 10 computer) = $\frac{250}{1000}$ or 0·25 — 1