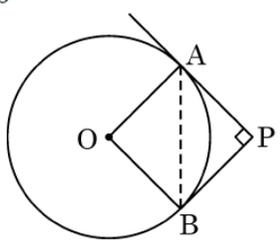## Marking Scheme
Strictly Confidential
(For Internal and Restricted use only)
Secondary School Examination, 2024
MATHEMATICS PAPER CODE 30/2/3

General Instructions: -

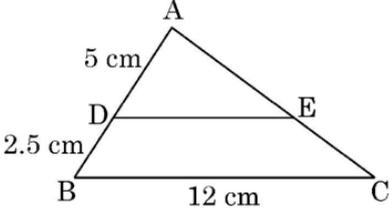|	
1	You are aware that evaluation is the most important process in the actual and correct assessment of the candidates. A small mistake in evaluation may lead to serious problems which may affect the future of the candidates, education system and teaching profession. To avoid mistakes, it is requested 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. In class- X, while evaluating two competency-based questions, please try to understand given answer and even if reply is not from marking scheme but correct competency is enumerated by the candidate, due marks should be awarded.**
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 ($\sqrt{}$) wherever answer is correct. For wrong answer CROSS 'X" be marked. Evaluators will not put right ($\checkmark$) 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 totalled 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 totalling 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 totalling on the title page. ● Wrong totalling 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 un assessed 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 totalled 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.

MS_X_ Mathematics_041_30/2/3_2023-24

MARKING SCHEME
MATHEMATICS (Subject Code–041)
(PAPER CODE: 30/2/3)

Q. No.	EXPECTED OUTCOMES/VALUE POINTS	Marks
	SECTION A **This section consists of 20 questions of 1 mark each.**	
1.	The distance between the points $(a \cos \theta, -a \sin \theta)$ and $(a \sin \theta, a \cos \theta)$ is (A) a (B) $a\sqrt{2}$ (C) 0 (D) 2a	
Sol.	(B) $a\sqrt{2}$	1
2.	In the given figure, tangents PA and PB to the circle centred at O, from point P are perpendicular to each other. If PA = 5 cm, then length of AB is equal to (A) 5 cm (B) $5\sqrt{2}$ cm (C) $2\sqrt{5}$ cm (D) 10 cm	
Sol.	(B) $5\sqrt{2}$ cm	1
3.	Which term of the A.P. –29, –26, –23, ..., 61 is 16 ? (A) 11th (B) 16th (C) 10th (D) 31st	
Sol.	(B) 16th	1

4.	A box contains cards numbered 6 to 55. A card is drawn at random from the box. The probability that the drawn card has a number which is a perfect square, is	
	(A) $\frac{7}{50}$ (B) $\frac{7}{55}$	
	(C) $\frac{1}{10}$ (D) $\frac{5}{49}$	
Sol.	(C) $\frac{1}{10}$	1
5.	AB and CD are two chords of a circle intersecting at P. Choose the correct statement from the following : (A) ΔADP ~ ΔCBA (B) ΔADP ~ ΔBPC (C) ΔADP ~ ΔBCP (D) ΔADP ~ ΔCBP	
Sol.	(D) ΔADP~ΔCBP	1
6.	Two dice are rolled together. The probability of getting the sum of the two numbers to be more than 10, is	
	(A) $\frac{1}{9}$ (B) $\frac{1}{6}$	
	(C) $\frac{7}{12}$ (D) $\frac{1}{12}$	
Sol.	(D) $\frac{1}{12}$	1

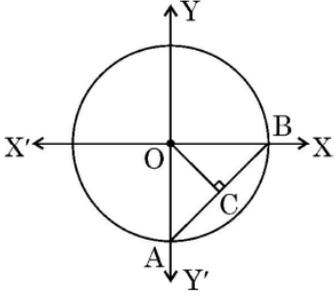MS_X_ Mathematics_041_30/2/3_2023-24

7.	After an examination, a teacher wants to know the marks obtained by maximum number of the students in her class. She requires to calculate _____ of marks. (A) median (B) mode (C) mean (D) range	
Sol.	(B) mode	1
8.	The roots of the quadratic equation $4x^2 - 5x + 4 = 0$ are (A) irrational (B) rational and distinct (C) not real (D) rational and equal	
Sol.	(C) not real	1
9.	The common difference of an A.P. in which $a_{20} - a_{15} = 20$, is (A) 4 (B) 5 (C) 4d (D) 5d	
Sol.	(A) 4	1
10.	If value of each observation in a data is increased by 2, then median of the new data (A) increases by 2 (B) increases by 2n (C) remains same (D) decreases by 2	
Sol.	(A) increases by 2	1

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11.	The perimeters of two similar triangles ABC and PQR are 56 cm and 48 cm respectively. PQ/AB is equal to (A) $\dfrac{7}{8}$ (B) $\dfrac{6}{7}$ (C) $\dfrac{7}{6}$ (D) $\dfrac{8}{7}$	
Sol.	(B) $\dfrac{6}{7}$	1
12.	If α and β ($\alpha > \beta$) are the zeroes of the polynomial $-x^2 + 8x + 9$, then $(\alpha - \beta)$ is equal to (A) −10 (B) 10 (C) ±10 (D) 8	
Sol.	(B) 10	1
13.	The value of k for which the system of equations $3x - y + 8 = 0$ and $6x - ky + 16 = 0$ has infinitely many solutions, is (A) −2 (B) 2 (C) $\dfrac{1}{2}$ (D) $-\dfrac{1}{2}$	
Sol.	(B) 2	1
14.	If $\sin \theta = \cos \theta$, $(0° < \theta < 90°)$, then value of $(\sec \theta \cdot \sin \theta)$ is : (A) $\dfrac{1}{\sqrt{2}}$ (B) $\sqrt{2}$ (C) 1 (D) 0	
Sol.	(C) 1	1

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15.	Point P divides the line segment joining the points A(4, −5) and B(1, 2) in the ratio 5:2. Co-ordinates of point P are (A) $\left(\dfrac{5}{2}, \dfrac{-3}{2}\right)$ (B) $\left(\dfrac{11}{7}, 0\right)$ (C) $\left(\dfrac{13}{7}, 0\right)$ (D) $\left(0, \dfrac{13}{7}\right)$	
Sol.	(C) $\left(\dfrac{13}{7}, \mathbf{0}\right)$	1
16.	In the given figure ∆ABC is shown. DE is parallel to BC. If AD = 5 cm, DB = 2.5 cm and BC = 12 cm, then DE is equal to (A) 10 cm (B) 6 cm (C) 8 cm (D) 7.5 cm	
Sol.	(C) 8 cm	1
17.	If the HCF (2520, 6600) = 40 and LCM (2520, 6600) = 252 × k, then the value of k is (A) 1650 (B) 1600 (C) 165 (D) 1625	
Sol.	(A) 1650	1

18.	In the given figure, AT is tangent to a circle centred at O. If $\angle CAT = 40°$, then $\angle CBA$ is equal to	
	(A) 70° (B) 50°	
	(C) 65° (D) 40°	
Sol.	(D) **40°**	**1**
	Directions : In Question **19** and **20**, **Assertion (A)** and **Reason (R)** are given. Select the correct option from the following : (A) Both Assertion (A) and Reason (R) are true. Reason (R) is the correct explanation of Assertion (A). (B) Both Assertion (A) and Reason (R) are true. Reason (R) does not give correct explanation of (A). (C) Assertion (A) is true but Reason (R) is not true. (D) Assertion (A) is not true but Reason (R) is true.	
19.	**Assertion (A) :** If $\sin A = \dfrac{1}{3}$ $(0° < A < 90°)$, then the value of $\cos A$ is $\dfrac{2\sqrt{2}}{3}$ **Reason (R) :** For every angle θ, $\sin^2 \theta + \cos^2 \theta = 1$.	
Sol.	(A) Both Assertion (A) and (R) are true. Reason (R) is the correct explanation of Assertion (A)	**1**

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20.	**Assertion (A) :** Two cubes each of edge length 10 cm are joined together. The total surface area of newly formed cuboid is 1200 cm². **Reason (R) :** Area of each surface of a cube of side 10 cm is 100 cm².	
Sol.	(D) Assertion (A) is not true but Reason (R) is true.	1

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SECTION B

In this section, there are 5 questions of 2 marks each.

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21(a).	In what ratio is the line segment joining the points (3, −5) and (−1, 6) divided by the line $y = x$?	
Sol.	 Let the required ratio be K:1 Coordinates of point P are $\left(\dfrac{-K + 3}{K + 1}, \dfrac{6K - 5}{K + 1}\right)$ Point P lies on line $y = x \Rightarrow \dfrac{-K + 3}{K + 1} = \dfrac{6K - 5}{K + 1}$ Solving, we get $K = \dfrac{8}{7}$ ∴ Required ratio is 8: 7	1 ½ ½
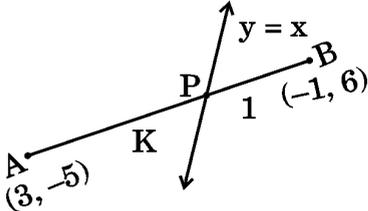
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OR

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21(b).	A(3, 0), B(6, 4) and C(−1, 3) are vertices of a triangle ABC. Find length of its median BE.	
Sol.	Mid-point of AC is $E\left(1, \dfrac{3}{2}\right)$	1

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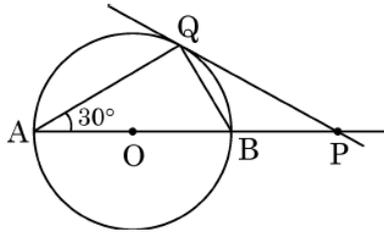|	Length of median BE $$= \sqrt{(6-1)^2 + (4-\frac{3}{2})^2} = \sqrt{\frac{125}{4}} \text{ or } \frac{5\sqrt{5}}{2}$$	1
22.	In the given figure, AB and CD are tangents to a circle centred at O. Is ∠BAC = ∠DCA ? Justify your answer.	
Sol.	Join OA and OC OA = OC ∠OAC = ∠OCA Also, ∠OAB = ∠OCD ⟹ ∠OAC + ∠OAB = ∠OCA + ∠OCD ⟹ ∠BAC = ∠DCA	½ ½ ½ ½
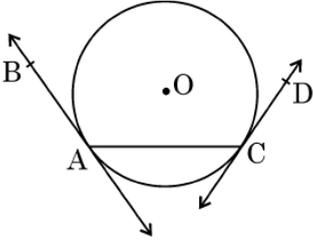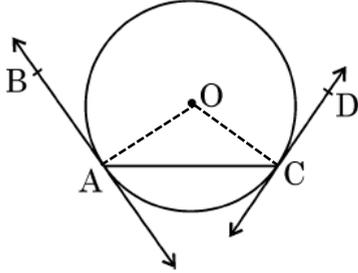
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23.	In the given figure, a circle centred at origin O has radius 7 cm, OC is median of $\triangle OAB$. Find the length of median OC.	
Sol.	$\angle AOB = 90°$	
	$\therefore\ AB^2 = 7^2 + 7^2$	½
	$\Rightarrow\ AB = 7\sqrt{2}$ cm	
	$\Rightarrow\ AC = \dfrac{7\sqrt{2}}{2}$ cm	½
	Now In $\triangle$ AOC,	
	$\Rightarrow\ OC^2 = 7^2 - \left(\dfrac{7\sqrt{2}}{2}\right)^2$	½
	$\therefore\ OC = \dfrac{7\sqrt{2}}{2}$ cm	½
24(a).	Evaluate : $2\sin^2 30° \sec 60° + \tan^2 60°$.	
Sol.	$2\sin^2 30° \sec 60° + \tan^2 60°$	
	$= 2 \times \left(\dfrac{1}{2}\right)^2 \times 2 + \left(\sqrt{3}\right)^2$	1½
	$= 4$	½
	OR	
24(b).	If $2 \sin (A + B) = \sqrt{3}$ and $\cos (A - B) = 1$, then find the measures of angles A and B. $0 \leq A, B, (A + B) \leq 90°$.	
Sol.	$\sin(A + B) = \dfrac{\sqrt{3}}{2} \Rightarrow A + B = 60° \ldots (1)$	½

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	$\cos(A - B) = 1 \Longrightarrow A - B = 0°$ … (2)	½
	Solving (1) and (2), we get $A = B = 30°$	1
25.	Can the number 8^n, n being a natural number, end with the digit 0 ? Give reasons.	
Sol.	$8^n = (2 \times 2 \times 2)^n$ or 2^{3n}	1
	A number ends with digit 0 if it has two prime factors 2 and 5 both.	
	Since 8^n does not have 5 as a prime factor, so it can't end with digit 0.	1

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SECTION C

This section consists of 6 questions of 3 marks each.

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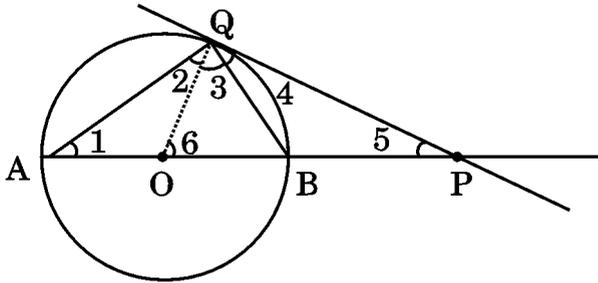|		
26.	Prove that $\dfrac{\csc^2 \theta - \sec^2 \theta}{\csc^2 \theta + \sec^2 \theta} = \dfrac{3}{4}$, if $\tan \theta = \dfrac{1}{\sqrt{7}}$	
Sol.	$\tan \theta = \dfrac{1}{\sqrt{7}}$	
	$\Rightarrow \sec^2\theta = \dfrac{8}{7}$ and $\csc^2\theta = 8$	1+1
	$\therefore$ LHS $= \dfrac{8 - \dfrac{8}{7}}{8 + \dfrac{8}{7}} = \dfrac{3}{4} =$ RHS	1
27(a).	If the sum of first m terms of an A.P. is same as sum of its first n terms (m ≠ n), then show that the sum of its first (m + n) terms is zero.	
Sol.	$S_m = S_n$	
	$\Rightarrow \dfrac{m}{2}[2a + (m - 1)d] = \dfrac{n}{2}[2a + (n - 1)d]$	1
	$\Rightarrow 2a(m - n) = d(n^2 - m^2) - d(n - m)$	1
	$\Rightarrow 2a = -d(m + n - 1)$	

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	or $2a + (m + n - 1)d = 0$	½
	i.e., $S_{m+n} = \frac{m+n}{2}[2a + (m + n - 1)d] = 0$	½
	OR	
27(b).	In an A.P., the sum of three consecutive terms is 24 and the sum of their squares is 194. Find the numbers.	
Sol.	Let the numbers be $a - d, a, a + d$	½
	$\therefore a - d + a + a + d = 24$	½
	$\Rightarrow a = 8$	
	Also, $(a - d)^2 + a^2 + (a + d)^2 = 194$	
	$\Rightarrow (8 - d)^2 + 8^2 + (8 + d)^2 = 194$	1
	$\Rightarrow d^2 = 1 \Rightarrow d = \pm 1$	½
	$\therefore$ Numbers are 7, 8, 9 or 9, 8, 7	½
28.	Prove that $\sqrt{5}$ is an irrational number.	
Sol.	Let $\sqrt{5}$ be a rational number.	
	$\therefore \sqrt{5} = \frac{p}{q}$, where $q \neq 0$ and let p & q be co-prime.	½
	$5q^2 = p^2 \Rightarrow p^2$ is divisible by 5 $\Rightarrow$ p is divisible by 5 ----- (i)	1
	$\Rightarrow p = 5a$, where 'a' is some integer	
	$25a^2 = 5q^2 \Rightarrow q^2 = 5a^2 \Rightarrow q^2$ is divisible by 5 $\Rightarrow$ q is divisible by 5 ----- (ii)	1
	(i) and (ii) leads to contradiction as 'p' and 'q' are co-prime.	½
	$\therefore \sqrt{5}$ is an irrational number.	

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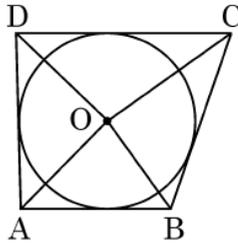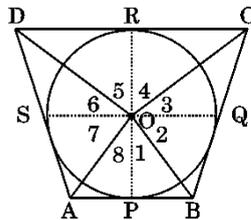| 29(a).	In the given figure, PQ is tangent to a circle centred at O and $\angle BAQ = 30°$; show that BP = BQ.	
Sol.		
	Join OQ	½
	OQ=OA	
	$\Rightarrow \angle 2 = 30^0$	½
	$\angle 3 = 90^0 - 30^0 = 60^0$	½
	$\angle 4 = 90^0 - 60^0 = 30^0$	½
	$\angle 6 = \angle 1 + \angle 2 = 60^0$	½
	Hence $\angle 5 = 90^0 - 60^0 = 30^0 = \angle 4$	½
	$\therefore$ BP=BQ	
	OR	

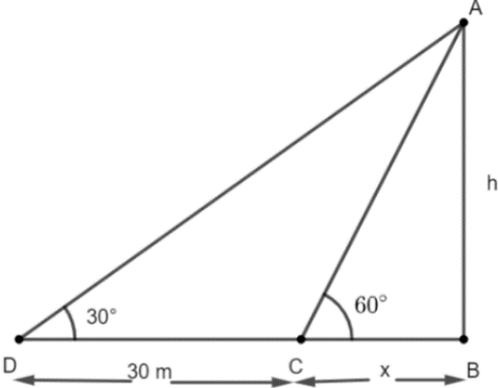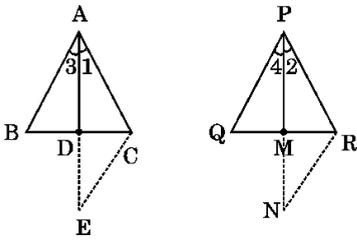|		
29(b).	In the given figure, AB, BC, CD and DA are tangents to the circle with centre O forming a quadrilateral ABCD. Show that $\angle AOB + \angle COD = 180°$ 	
Sol.	 Join OP, OQ, OR and OS $\Delta POB \cong \Delta QOB$ $\Rightarrow \angle 1 = \angle 2$ Similarly $\angle 3 = \angle 4, \angle 5 = \angle 6, \angle 7 = \angle 8$ **Now,** $\angle 1 + \angle 2 + \angle 3 + \angle 4 + \angle 5 + \angle 6 + \angle 7 + \angle 8 = 360°$ $\Rightarrow 2(\angle 1 + \angle 8 + \angle 4 + \angle 5) = 360°$ $\therefore \angle AOB + \angle COD = 180°$	½ **1** ½ ½ ½
30.	A dealer sells an article for ₹ 75 and gains as much percent as the cost price of the article. Find the cost price of the article.	
Sol.	Let the cost price of the article be ₹ x	

	$\therefore$ Gain % = x		½
	$\Rightarrow \ x = \frac{75-x}{x} \times 100$		1
	$\Rightarrow \ x^2 + 100x - 7500 = 0$		½
	$\Rightarrow \ (x-50)(x+150) = 0$		½
	$x \neq -150 \ \therefore \ x = 50$		½
	So, the cost price of the article is ₹ 50		

31.	In a test, the marks obtained by 100 students (out of 50) are given below :	

Marks obtained :	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
Number of students :	12	23	34	25	6

Find the mean marks of the students.

Sol.		

Marks Obtained	Number of students (f_i)	x_i	$f_i x_i$
0 – 10	12	5	60
10 – 20	23	15	345
20 – 30	34	25	850
30 – 40	25	35	875
40 – 50	6	45	270
Total	100		2400

1½ marks for correct table

$$\text{Mean} = \frac{2400}{100}$$
$$= 24$$

1

½

SECTION D

This section consists of 4 questions of 5 marks each.

32.	A person standing on the bank of a river observes that the angle of elevation of the top of a tower on the opposite bank is 60°. When he moves 30 m away from the bank, he finds the angle of elevation to be 30°. Find the height of the tower and width of the river. (Take $\sqrt{3} = 1.732$)	
Sol.	Let the height of tower BA be h m and the width of river BC be x m $\tan 60° = \sqrt{3} = \dfrac{h}{x}$ $\Rightarrow h = \sqrt{3}x$ --- (i) $\tan 30° = \dfrac{1}{\sqrt{3}} = \dfrac{h}{30 + x}$ $\Rightarrow h\sqrt{3} = 30 + x$ --- (ii) Solving (i) and (ii), we get x = 15 and h = $15\sqrt{3} = 15 \times 1.732 = 25.98$ m ∴Height of tower = 25.98 m and width of river = 15 m	**1 mark for correct figure** 1 ½ 1 ½ ½ ½

33.	The perimeter of a certain sector of a circle of radius 5.6 m is 20.0 m. Find the area of the sector.	
Sol.	$2r + \dfrac{2\pi r\theta}{360} = 20$ $\Rightarrow\ 11.2 + 2 \times \dfrac{22}{7} \times 5.6 \times \dfrac{\theta}{360} = 20$ Solving, we get $\theta = 90°$ $\therefore$ Area of sector $= \dfrac{22}{7} \times 5.6 \times 5.6 \times \dfrac{90}{360}$ $= 24.64 \text{ m}^2$	**2** **1** **1** **1**
34(a).	If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, then prove that the other two sides are divided in the same ratio.	
Sol.	Correct Given, to prove, figure, construction Correct proof	**½ ×4=2** **3**
	OR	
34(b).	Sides AB and AC and median AD to ΔABC are respectively proportional to sides PQ and PR and median PM of another triangle PQR. Show that ΔABC ~ ΔPQR.	
Sol.		

		Correct figure	**1**

Produce AD to E such that AD = DE and join EC ½
Produce PM to N such that PM = MN and join NR
$\Delta ADB \cong \Delta EDC$

$\therefore AB = EC$ **1**

Similarly, PQ=NR

Since, $\dfrac{AB}{PQ} = \dfrac{AC}{PR} = \dfrac{AD}{PM}$

$\Rightarrow \dfrac{EC}{NR} = \dfrac{AC}{PR} = \dfrac{\frac{AE}{2}}{\frac{PN}{2}}$

$\therefore \Delta AEC \sim \Delta PNR$ **1**

$\Rightarrow \angle 1 = \angle 2$ ½

Similarly, $\angle 3 = \angle 4$

Hence $\angle 1 + \angle 3 = \angle 2 + \angle 4$ or $\angle A = \angle P$ ½

Also, $\dfrac{AB}{PQ} = \dfrac{AC}{PR}$

$\therefore \Delta ABC \sim \Delta PQR$ ½

35(a).	Using graphical method, solve the following system of equations : $3x - 2y = 10$ and $5x + 3y = 4$	
Sol.	Solution is $x = 2, y = -2$	**2 marks for each correct line** **1**
	OR	
35(b).	If three times the greater of two numbers is divided by the smaller one, we get 4 as the quotient and 3 as the remainder. Also, if seven times the smaller number is divided by greater one, we get 5 as the quotient and 1 as the remainder. Find the numbers.	
Sol.	Let the smaller number be x and the greater number be y $3y = 4x + 3$ ... (i) $7x = 5y + 1$ ... (ii) Solving (i) and (ii), we get	**1½** **1½**
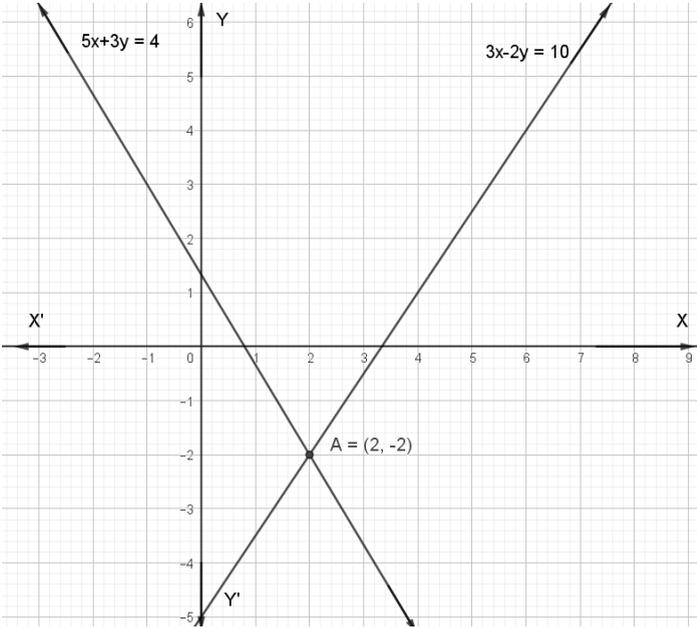
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	$x = 18, y = 25$ ∴ Smaller number is 18 and greater number is 25	1+1

<div align="center">

SECTION E

This section consists of 3 case based questions of 4 marks each.

</div>

| **36.** | In a survey on holidays, 120 people were asked to state which type of transport they used on their last holiday. The following pie chart shows the results of the survey.

Observe the pie chart and answer the following questions :

(i)   If one person is selected at random, find the probability that he/she travelled by bus or ship.   1

(ii)   Which is most favourite mode of transport and how many people used it ?   1

(iii) (a) A person is selected at random. If the probability that he did not use train is 4/5, find the number of people who used train.   2

<div align="center">**OR**</div>
(iii) (b) The probability that randomly selected person used aeroplane is 7/60. Find the revenue collected by air company at the rate of ₹ 5,000 per person.   2 | |
| **Sol.** | (i)   P (travelling by bus or ship) $= \frac{36+33}{360} = \frac{69}{360}$ or $\frac{23}{120}$

(ii)   Car
        Number of people who used car $= \frac{177}{360} \times 120 = 59$

(iii)   (a) P (person used train) $= 1 - \frac{4}{5} = \frac{1}{5}$

       ∴ Number of people who used train $= \frac{120}{5} = 24$
<div align="center">**OR**</div> | 1

½
½

1

1 |

	(iii)	(b) Number of people who used aeroplane $= \frac{7}{60} \times 120 = 14$	**1**
		$\therefore$ Revenue generated$= 14 \times 5000 = ₹\,70{,}000$	**1**

37.	The word 'circus' has the same root as 'circle'. In a closed circular area, various entertainment acts including human skill and animal training are presented before the crowd.
	    A circus tent is cylindrical upto a height of 8 m and conical above it. The diameter of the base is 28 m and total height of tent is 18.5 m.
	
	Based on the above, answer the following questions :
	(i) Find slant height of the conical part. 1
	(ii) Determine the floor area of the tent. 1
	(iii) (a) Find area of the cloth used for making tent. 2
	                      OR
	(iii) (b) Find total volume of air inside an empty tent. 2		

Sol.	(i)	Height of conical part $= 18.5 - 8 = 10.5$ m	½
		Radius of conical part $= 14$ m	
		Slant height $= \sqrt{(10.5)^2 + (14)^2} = 17.5$ m	½
	(ii)	Floor area $= \frac{22}{7} \times 14 \times 14 = 616$ m^2	**1**
	(iii)	(a) Area of cloth used	
		$= 2 \times \frac{22}{7} \times 14 \times 8 + \frac{22}{7} \times 14 \times 17.5$	**1**
		$= 1474$ m^2	**1**
		OR	
	(iii)	(b) Volume of air inside the tent	
		$= \frac{22}{7} \times 14 \times 14 \times 8 + \frac{1}{3} \times \frac{22}{7} \times 14 \times 14 \times 10.5$	**1**
		$= 7084$ m^3	**1**

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38.	A ball is thrown in the air so that t seconds after it is thrown, its height h metre above its starting point is given by the polynomial $h = 25t - 5t^2$.	
	Observe the graph of the polynomial and answer the following questions :	
	(i) Write zeroes of the given polynomial.	1
	(ii) Find the maximum height achieved by ball.	1
	(iii) (a) After throwing upward, how much time did the ball take to reach to the height of 30 m ?	2
	OR	
	(iii) (b) Find the two different values of t when the height of the ball was 20 m.	2
Sol.	(i) Zeroes of the polynomial are 0 and 5	**1**
	(ii) Maximum height achieved by ball	
	$= 25 \times \frac{5}{2} - 5 \times \left(\frac{5}{2}\right)^2$	½
	$= \frac{125}{4}$ or 31.25 m	½
	(iii) (a) $-5t^2 + 25t = 30$	½
	$\Rightarrow t^2 - 5t + 6 = 0$	½
	$\Rightarrow (t-2)(t-3) = 0$	½
	$t \neq 3, \therefore \ t = 2$	½
	OR	
	(iii) (b) $-5t^2 + 25t = 20$	½
	$\Rightarrow t^2 - 5t + 4 = 0$	½
	$\Rightarrow (t-4)(t-1) = 0$	½
	$\Rightarrow t = 4, 1$	½