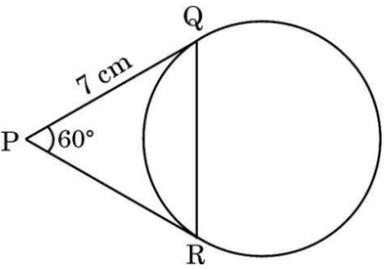


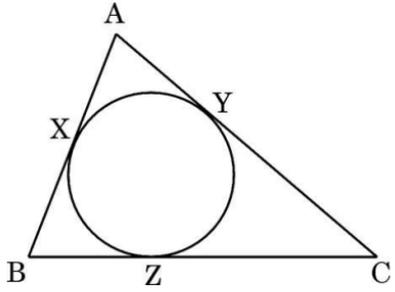
Marking Scheme
Strictly Confidential
(For Internal and Restricted use only)
Secondary School Supplementary Examination, 2025
MATHEMATICS (Standard) (Q.P. CODE 30/S/3)

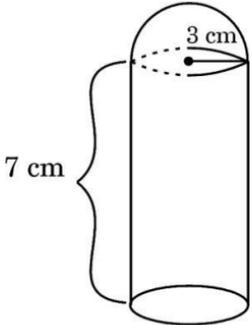
General Instructions: -

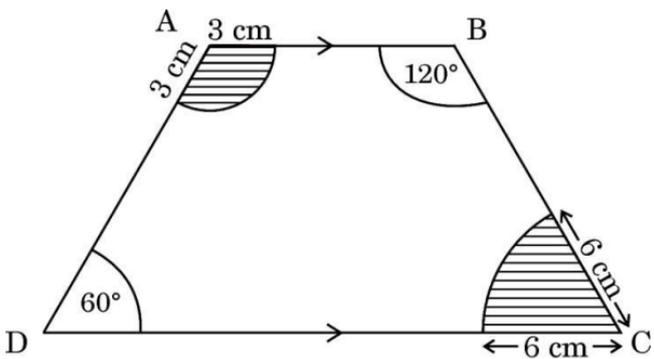
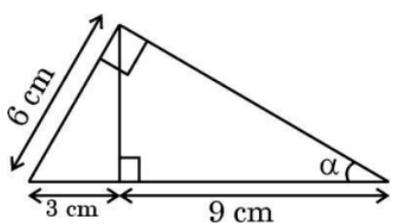
1.	You are aware that evaluation is the most important process in the actual and correct assessment of the candidates. A small mistake in evaluation may lead to serious problems which may affect the future of the candidates, education system and teaching profession. To avoid mistakes, it is requested 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. It’s 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 the 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 (✓) 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 totalled up and written on the left-hand margin and encircled. This may be followed strictly.
8.	If a question does not have any parts, marks must be awarded on the left-hand margin and encircled. This may also be followed strictly.

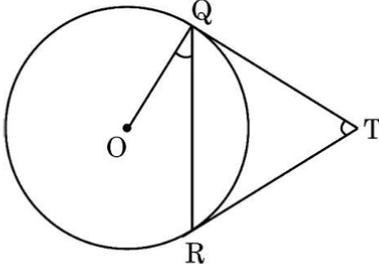
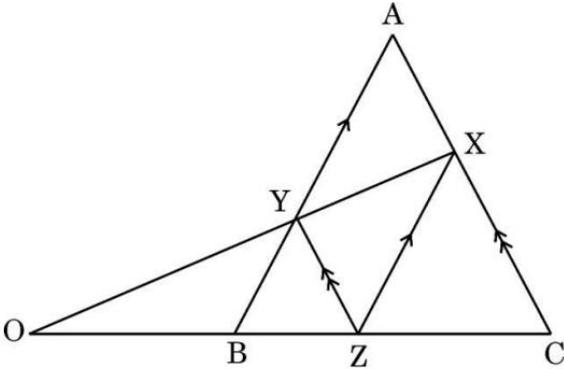
9.	If a student has attempted an extra question, answer of the question deserving more marks should be retained and the other answer scored out with a note “Extra Question”.
10.	No marks to be deducted for the cumulative effect of an error. It should be penalized only once.
11.	A full scale of marks _____ (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.
12.	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.
13.	<p>Ensure that you do not make the following common types of errors committed by the Examiner in the past:-</p> <ul style="list-style-type: none"> ● 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 to 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.) <p>Half or a part of answer marked correct and the rest as wrong, but no marks awarded.</p>
14.	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.
15.	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.
16.	The Examiners should acquaint themselves with the guidelines given in the “ Guidelines for spot Evaluation ” before starting the actual evaluation.
17.	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.
18.	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.

9.	<p>The 6th term of the AP $\sqrt{27}, \sqrt{75}, \sqrt{147}, \dots$ is :</p> <p>(A) $\sqrt{243}$ (B) $\sqrt{363}$ (C) $\sqrt{300}$ (D) $\sqrt{507}$</p>	
Sol.	(D) $\sqrt{507}$	1
10.	<p>The numerical value of the area of a circle is equal to that of the perimeter of a semicircular disc, both having equal radius. The radius is :</p> <p>(A) 1 unit (B) 2 units (C) $\frac{\pi+2}{\pi}$ units (D) $\frac{2\pi+2}{\pi}$ units</p>	
Sol.	(C) $\frac{\pi+2}{\pi}$ units	1
11.	<p>If the 23rd term of an AP exceeds its 16th term by 21, then the common difference is :</p> <p>(A) 1 (B) 2 (C) 3 (D) 7</p>	
Sol.	(C) 3	1
12.	<p>Two dice are thrown simultaneously and the product of the numbers appearing on the tops is noted. The probability of the product to be less than 6 is :</p> <p>(A) $\frac{1}{6}$ (B) $\frac{1}{4}$ (C) $\frac{5}{18}$ (D) $\frac{7}{18}$</p>	
Sol.	(C) $\frac{5}{18}$	1
13.	<p>In the given figure, PQ and PR are tangents to the circle such that PQ = 7 cm and $\angle RPQ = 60^\circ$.</p>  <p>The length of chord QR is :</p> <p>(A) 5 cm (B) 7 cm (C) 9 cm (D) 14 cm</p>	
Sol.	(B) 7 cm	1

14.	<p>If $\cot \theta = \frac{p}{q}$ ($q \neq 0$), then $\sin \theta$ is equal to :</p> <p>(A) $\frac{p}{\sqrt{p^2 + q^2}}$ (B) $\frac{\sqrt{p^2 + q^2}}{p}$</p> <p>(C) $\frac{q}{\sqrt{p^2 + q^2}}$ (D) $\frac{q}{\sqrt{p^2 - q^2}}$</p>	
Sol.	(C) $\frac{q}{\sqrt{p^2 + q^2}}$	1
15.	<p>Cards numbered 10, 11, 12, ..., 30 are kept in a box and shuffled thoroughly. Rohit draws a card at random from the box. The probability that the number on the card is a multiple of 4 or 5 is :</p> <p>(A) $\frac{9}{20}$ (B) $\frac{9}{21}$</p> <p>(C) $\frac{10}{20}$ (D) $\frac{10}{21}$</p>	
Sol.	(B) $\frac{9}{21}$	1
16.	<p>A and B are sectors of two different circles. Radius of sector A is double of that of sector B whereas central angle of sector B is double the central angle of sector A. The ratio of the area of sector A to the area of sector B is :</p> <p>(A) 1 : 1 (B) 1 : 2</p> <p>(C) 2 : 1 (D) 4 : 1</p>	
Sol.	(C) 2 : 1	1
17.	<p>If $x = p \cos^3 \alpha$ and $y = q \sin^3 \alpha$, then the value of $\left(\frac{x}{p}\right)^{2/3} + \left(\frac{y}{q}\right)^{2/3}$ is :</p> <p>(A) 1 (B) 2</p> <p>(C) p (D) q</p>	
Sol.	(A) 1	1
18.	<p>In the given figure, a circle inscribed in ΔABC, touches AB, BC and CA at X, Z and Y, respectively.</p>  <p>If $AB = 12$ cm, $AY = 8$ cm and $CY = 6$ cm, then the length of BC is :</p> <p>(A) 14 cm (B) 12 cm</p> <p>(C) 10 cm (D) 8 cm</p>	
Sol.	(C) 10 cm	1

	<p>Questions number 19 and 20 are Assertion and Reason based questions. 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.</p> <p>(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).</p> <p>(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).</p> <p>(C) Assertion (A) is true, but Reason (R) is false.</p> <p>(D) Assertion (A) is false, but Reason (R) is true.</p>	
19.	<p>Assertion (A) : In the given figure, a toy is in the form of a cylinder surmounted by a hemisphere of the same radius. If the radius of the cylinder is 3 cm and its height is 7 cm, then the volume of toy is $81\pi\text{ cm}^3$.</p>  <p>Reason (R): Volume of the given solid is the sum of the volume of the cylinder and the volume of the hemisphere.</p>	19.
Sol.	(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).	1
20.	<p>Assertion (A) : The quadratic equation $x^2 + 4x + 5 = 0$ has real roots.</p> <p>Reason (R): The quadratic equation $ax^2 + bx + c = 0$, $a \neq 0$ has real roots if $b^2 - 4ac \geq 0$.</p>	
Sol.	(D) Assertion (A) is false, but Reason (R) is true.	1
	SECTION B	
	This section has 5 Very Short Answer (VSA) type questions carrying 2 marks each.	
21 (a)	The perimeter of a sector of a circle of radius 15 cm is 80 cm. Find the area of the sector.	
Sol.	<p>Perimeter of sector = $30 + l = 80$ $\Rightarrow l = 50\text{ cm}$ \therefore Area of the sector = $\frac{1}{2} \times 15 \times 50$ $= 375\text{ cm}^2$</p>	1 1
	OR	

21 (b)	<p>In the given figure, ABCD is a trapezium with $AB \parallel DC$. Find the area of the shaded region. (Keep the answer in terms of π).</p> 	
Sol.	<p>ABCD is a trapezium. $\therefore \angle A = 120^\circ$ and $\angle C = 60^\circ$ Area of shaded region = $\frac{120}{360} \times \pi \times (3)^2 + \frac{60}{360} \times \pi \times (6)^2$ $= 9\pi \text{ cm}^2$</p>	$\frac{1}{2}$ 1 $\frac{1}{2}$
22.	<p>Show that 14^n cannot end with the digit 0 or 5 for any natural number n.</p>	
Sol.	<p>$14^n = 2^n \times 7^n$ To end with a digit 0 or 5, 14^n must have at least one prime factor 5, which is not there. $\therefore 14^n$ can not end with digit 0 or 5.</p>	1 $\frac{1}{2}$ $\frac{1}{2}$
23 (a)	<p>If $\sin(2A + 3B) = 1$ and $\cos(2A - 3B) = \frac{\sqrt{3}}{2}$, $0^\circ < 2A + 3B \leq 90^\circ$, $A > B$, then find A and B.</p>	
Sol.	<p>$\sin(2A + 3B) = 1 \Rightarrow 2A + 3B = 90^\circ$ --- (1) $\cos(2A - 3B) = \frac{\sqrt{3}}{2} \Rightarrow 2A - 3B = 30^\circ$ --- (2) Solving (1) and (2), we get $A = 30^\circ$ and $B = 10^\circ$</p>	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$
OR		
23 (b)	<p>From the given figure, find the value of $\sin \alpha$.</p> 	
Sol.	<p>$\sin \alpha = \frac{\text{Perpendicular}}{\text{Hypotenuse}}$ $\sin \alpha = \frac{6}{3+9} = \frac{1}{2}$</p>	2

24.	<p>In the given figure, TQ and TR are tangents to the circle with centre O. Prove that $\angle QTR = 2 \angle OQR$.</p> 	
Sol.	<p>Since $TQ = TR$ $\therefore \angle TQR = \angle TRQ$ Also, $\angle QTR = 180^\circ - (\angle TQR + \angle TRQ)$ $\Rightarrow \angle QTR = 180^\circ - 2 \angle TQR$ --- (1) Now $TQ \perp OQ$ $\therefore \angle OQR = 90^\circ - \angle TQR$ Using (1), we get $2 \angle OQR = 180^\circ - 2 \angle TQR = \angle QTR$</p>	<p>$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$</p>
25.	<p>In the given figure, Z is a point on the side BC of $\triangle ABC$ such that $XZ \parallel AB$ and $YZ \parallel AC$. If XY and CB produced meet at O, then prove that $ZO^2 = OB \times OC$.</p> 	
Sol.	<p>In $\triangle OZX$, $ZX \parallel BY$ (As $XZ \parallel AB$) $\therefore \frac{OB}{OZ} = \frac{OY}{OX}$ --- (1) In $\triangle OCX$, $ZY \parallel CX$ (As $YZ \parallel AC$) $\therefore \frac{OZ}{OC} = \frac{OY}{OX}$ --- (2) Using (1) and (2), we get $\frac{OB}{OZ} = \frac{OZ}{OC}$ $\Rightarrow OZ^2 = OB \times OC$</p>	<p>1 $\frac{1}{2}$ $\frac{1}{2}$</p>

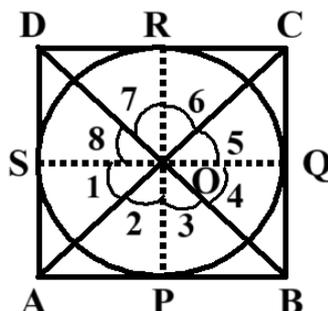
SECTION C

This section has 6 Short Answer (SA) type questions carrying 3 marks each.

26.

A quadrilateral circumscribes a circle. Prove that the opposite sides of the quadrilateral subtend supplementary angles at the centre of the circle.

Correct figure

 $\frac{1}{2}$ 

$$\Delta OPA \cong \Delta OSA$$

$$\Rightarrow \angle 1 = \angle 2$$

Similarly, $\angle 3 = \angle 4$, $\angle 5 = \angle 6$, $\angle 7 = \angle 8$

$$\text{Now, } \angle 1 + \angle 2 + \angle 3 + \angle 4 + \angle 5 + \angle 6 + \angle 7 + \angle 8 = 360^\circ$$

$$\Rightarrow 2(\angle 1 + \angle 4 + \angle 5 + \angle 8) = 360^\circ$$

$$\Rightarrow (\angle 1 + \angle 8) + (\angle 4 + \angle 5) = 180^\circ$$

$$\Rightarrow \angle AOD + \angle BOC = 180^\circ$$

1

 $\frac{1}{2}$

1

27.

Prove that :

$$\frac{\tan^3 \theta}{1 + \tan^2 \theta} + \frac{\cot^3 \theta}{1 + \cot^2 \theta} = \sec \theta \operatorname{cosec} \theta - 2 \sin \theta \cos \theta$$

Sol.

$$\text{LHS} = \frac{\tan^3 \theta}{\sec^2 \theta} + \frac{\cot^3 \theta}{\operatorname{cosec}^2 \theta}$$

$$= \frac{\sin^3 \theta}{\cos \theta} + \frac{\cos^3 \theta}{\sin \theta}$$

$$= \frac{\sin^4 \theta + \cos^4 \theta}{\sin \theta \cos \theta}$$

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

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

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

 $\frac{1}{2}$ $\frac{1}{2}$

1

 $\frac{1}{2}$ $\frac{1}{2}$

28 (a)	One healthcare center working for the welfare of the patients suffering from 'Dengue', recorded the following information :															
		<table border="1"> <thead> <tr> <th>Age of Patients</th> <th>Number of Patients</th> </tr> </thead> <tbody> <tr> <td>0 – 15</td> <td>8</td> </tr> <tr> <td>15 – 30</td> <td>5</td> </tr> <tr> <td>30 – 45</td> <td>x</td> </tr> <tr> <td>45 – 60</td> <td>16</td> </tr> <tr> <td>60 – 75</td> <td>12</td> </tr> <tr> <td>75 – 90</td> <td>9</td> </tr> </tbody> </table>	Age of Patients	Number of Patients	0 – 15	8	15 – 30	5	30 – 45	x	45 – 60	16	60 – 75	12	75 – 90	9
	Age of Patients	Number of Patients														
	0 – 15	8														
	15 – 30	5														
	30 – 45	x														
	45 – 60	16														
	60 – 75	12														
75 – 90	9															
	If the modal age of the patients is 54, then find the value of x.															

Sol.	Modal class is 45 – 60 Mode = 54 $\therefore 45 + \left(\frac{16-x}{2 \times 16-x-12}\right) \times 15 = 54$ $\Rightarrow x = 10$	$\frac{1}{2}$ 1½ 1
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OR

28 (b)	Weekly expenditure on Ayurvedic medicines of few households in a locality is recorded below.													
		<table border="1"> <thead> <tr> <th>Weekly Expenditure (in ₹)</th> <th>Number of Households</th> </tr> </thead> <tbody> <tr> <td>100 – 150</td> <td>4</td> </tr> <tr> <td>150 – 200</td> <td>5</td> </tr> <tr> <td>200 – 250</td> <td>y</td> </tr> <tr> <td>250 – 300</td> <td>2</td> </tr> <tr> <td>300 – 350</td> <td>2</td> </tr> </tbody> </table>	Weekly Expenditure (in ₹)	Number of Households	100 – 150	4	150 – 200	5	200 – 250	y	250 – 300	2	300 – 350	2
	Weekly Expenditure (in ₹)	Number of Households												
	100 – 150	4												
	150 – 200	5												
	200 – 250	y												
	250 – 300	2												
	300 – 350	2												
	If the mean expenditure for this is ₹ 211, then find the value of the missing frequency 'y'.													

Sol.	Class Interval	x_i	f_i	$u_i = \frac{x_i - 225}{50}$	$f_i u_i$	
	100 – 150	125	4	-2	-8	
	150 – 200	175	5	-1	-5	
	200 – 250	225	y	0	0	
	250 – 300	275	2	1	2	
	300 – 350	325	2	2	4	
			13 + y			-7

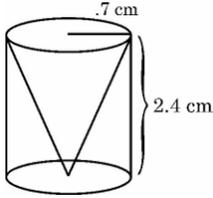
Correct table

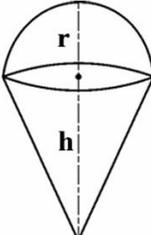
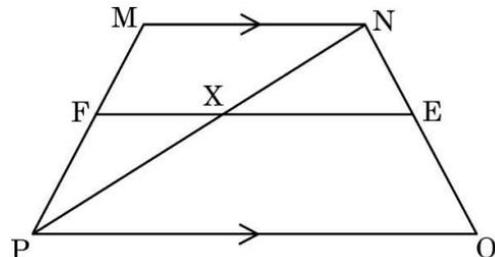
Mean = 211
 $\Rightarrow 225 + \frac{(-7)}{13+y} \times 50 = 211$
 $\Rightarrow y = 12$

29.	If α, β are the zeroes of the polynomial $p(x) = x^2 - 2x - 3$, then find a polynomial where zeroes are $(2\alpha + 3\beta)$ and $(3\alpha + 2\beta)$.	
Sol.	$p(x) = x^2 - 2x - 3$ Here $\alpha + \beta = 2$ and $\alpha\beta = -3$ Let the required polynomial be $x^2 - Sx + P$ $S = (2\alpha + 3\beta) + (3\alpha + 2\beta) = 5(\alpha + \beta)$ $= 5 \times 2 = 10$ $P = (2\alpha + 3\beta) \times (3\alpha + 2\beta)$ $= 6(\alpha^2 + \beta^2) + 13\alpha\beta$ $= 6[(\alpha + \beta)^2 - 2\alpha\beta] + 13\alpha\beta$ $= 6(\alpha + \beta)^2 + \alpha\beta$ $= 6(2)^2 + (-3)$ $= 21$ So, required polynomial is $x^2 - 10x + 21$	 $\frac{1}{2}$ $\frac{1}{2}$ $1\frac{1}{2}$ $\frac{1}{2}$
30.	Ranjita, Neha and Salma start weaving sweaters at the same time for the children of an orphan home. They need 15, 18 and 20 days, respectively, to complete a sweater. After how many days will all of them start making a new sweater again ? By that time how many sweaters will have been completed by them ?	
Sol.	LCM (15, 18, 20) = 180 They will start new sweater again after 180 days. Total number of sweaters completed in 180 days = $\frac{180}{15} + \frac{180}{18} + \frac{180}{20}$ $= 31$	 1 $1\frac{1}{2}$ $\frac{1}{2}$

31 (a)	Check graphically whether the pair of linear equations $2x + 3y = 12$; $5x - 3y = 9$ is consistent. If so, solve it graphically.	
Sol.	<p>Correct graph of $2x + 3y = 12$ Correct graph of $5x - 3y = 9$</p> <p>As lines are intersecting, therefore given system of linear equations is consistent. Solution is $x = 3$, $y = 2$</p>	<p>1 1</p> <p>$\frac{1}{2}$ $\frac{1}{2}$</p>
OR		
31 (b)	A 2-digit number is obtained by either multiplying the sum of the digits by 7 and then adding 3 or by multiplying the difference of the digits by 19 and then subtracting 1. It is given that the digit at ten's place is greater than that of unit's place. Find the 2-digit number.	
Sol.	<p>Let the unit's place digit be y and ten's digit be x. So, number be $10x + y$ Therefore, $10x + y = 7(x + y) + 3$ $\Rightarrow x - 2y = 1$ --- ① Also, $10x + y = 19(x - y) - 1$ $\Rightarrow -9x + 20y = -1$ --- ② Solving ① and ②, we get $x = 9$, $y = 4$ \therefore the required number is 94.</p>	<p>1 1</p> <p>$\frac{1}{2}$ $\frac{1}{2}$</p>

SECTION D		
	This section has 4 Long Answer (LA) type questions carrying 5 marks each.	
32 (a)	The denominator of a fraction is 2 more than the numerator. If 2 is added to both its numerator and denominator, then the sum of the new fraction and the original fraction is $\frac{46}{35}$. Find the original fraction.	
Sol.	<p>Let the fraction be $\frac{x}{x+2}$</p> <p>Therefore, $\frac{x}{x+2} + \frac{x+2}{x+4} = \frac{46}{35}$</p> $\Rightarrow 24x^2 + 4x - 228 = 0 \text{ or } 6x^2 + x - 57 = 0$ $\Rightarrow (6x + 19)(x - 3) = 0$ $x \neq -\frac{19}{6}$ $\therefore x = 3$ <p>So, the required fraction is $\frac{3}{5}$</p>	<p>$\frac{1}{2}$</p> <p>2</p> <p>1</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p>
OR		
32 (b)	At present, Sourav's age is 3 years more than the square of his son Ravi's age. When Ravi grows to his father's present age, Sourav's age would be 6 years less than 13 times the present age of Ravi. Find present ages of Ravi and Sourav.	
Sol.	<p>Let the present age of Ravi be 'r' years and the present age of Sourav be 's' years</p> <p>Therefore, $s = 3 + r^2$ --- (1)</p> <p>Ravi grows to father's present age in (s - r) years.</p> <p>\therefore father's age after (s - r) years = (2s - r) years and Ravi's age after (s - r) years = 's' years</p> <p>Therefore, $2s - r = 13r - 6$ or $s = 7r - 3$ --- (2)</p> <p>Using (1) and (2),</p> $r^2 - 7r + 6 = 0$ $\Rightarrow (r - 6)(r - 1) = 0$ $\Rightarrow r = 6, 1$ <p>Ignoring $r = 1$ as $s \neq 4$</p> <p>$r = 6$</p> <p>Hence $s = 39$</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p>

33.	<p>Find the values of the missing frequencies p and q in the following distribution of 100 observations. The median of the distribution is given as 47.</p> <table border="1" data-bbox="245 255 1222 392"> <tr> <td><i>Class</i></td> <td>30 – 35</td> <td>35 – 40</td> <td>40 – 45</td> <td>45 – 50</td> <td>50 – 55</td> <td>55 – 60</td> <td>60 – 65</td> </tr> <tr> <td><i>Frequency</i></td> <td>12</td> <td>p</td> <td>17</td> <td>20</td> <td>q</td> <td>12</td> <td>8</td> </tr> </table>	<i>Class</i>	30 – 35	35 – 40	40 – 45	45 – 50	50 – 55	55 – 60	60 – 65	<i>Frequency</i>	12	p	17	20	q	12	8									
<i>Class</i>	30 – 35	35 – 40	40 – 45	45 – 50	50 – 55	55 – 60	60 – 65																			
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Sol.	<table border="1" data-bbox="226 454 954 804"> <thead> <tr> <th>C.I.</th> <th>f_i</th> <th>u_i</th> </tr> </thead> <tbody> <tr> <td>30 – 35</td> <td>12</td> <td>12</td> </tr> <tr> <td>35 – 40</td> <td>p</td> <td>12 + p</td> </tr> <tr> <td>40 – 45</td> <td>17</td> <td>29 + p</td> </tr> <tr> <td>45 – 50</td> <td>20</td> <td>49 + p</td> </tr> <tr> <td>50 – 55</td> <td>q</td> <td>49 + p + q</td> </tr> <tr> <td>55 – 60</td> <td>12</td> <td>61 + p + q</td> </tr> <tr> <td>60 – 65</td> <td>8</td> <td>69 + p + q</td> </tr> </tbody> </table> <p style="text-align: right;">Correct table</p> <p>$\therefore 69 + p + q = 100$ $\Rightarrow p + q = 31$ Median class is 45 – 50 Median = 47 $\therefore 45 + \left(\frac{\frac{100}{2} - (29+p)}{20} \right) \times 5 = 47$ $\Rightarrow p = 13$ and q = 18</p>	C.I.	f_i	u_i	30 – 35	12	12	35 – 40	p	12 + p	40 – 45	17	29 + p	45 – 50	20	49 + p	50 – 55	q	49 + p + q	55 – 60	12	61 + p + q	60 – 65	8	69 + p + q	<p>1</p> <p>1</p> <p>$\frac{1}{2}$</p> <p>1</p> <p>1</p> <p>$\frac{1}{2}$</p>
C.I.	f_i	u_i																								
30 – 35	12	12																								
35 – 40	p	12 + p																								
40 – 45	17	29 + p																								
45 – 50	20	49 + p																								
50 – 55	q	49 + p + q																								
55 – 60	12	61 + p + q																								
60 – 65	8	69 + p + q																								
34 (a)	<p>From a solid cylinder of height 2.4 cm and radius 0.7 cm, a conical cavity of the same height and same radius is hollowed out. Find the volume and total surface area of the remaining solid.</p>																									
Sol.	 <p>Volume of the remaining solid = Volume of cylinder – volume of cone $= \frac{22}{7} \times (0.7)^2 \times 2.4 - \frac{1}{3} \times \frac{22}{7} \times (0.7)^2 \times 2.4$ $= 2.464 \text{ cm}^3$</p> <p>Slant height of cone = $\sqrt{(0.7)^2 + (2.4)^2} = 2.5 \text{ cm}$ Total Surface area = CSA of cylinder + CSA of cone + Area of base $= 2 \times \frac{22}{7} \times 0.7 \times 2.4 + \frac{22}{7} \times 0.7 \times 2.5 + \frac{22}{7} \times (0.7)^2$ $= 17.6 \text{ cm}^2$</p>	<p>$\frac{1}{2} + \frac{1}{2}$</p> <p>1</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2} + \frac{1}{2} + \frac{1}{2}$</p> <p>1</p>																								
	OR																									

34 (b)	<p>A carpenter is making a wooden toy (lattu) which is conical in shape and surmounted by a hemisphere. The ratio of the height of the hemisphere and the cone is 3 : 4. If the radius of the cone and the hemisphere is 2.1 cm, find the volume of wood required to make this toy. Also, find the area to be painted after making the toy.</p>	
Sol.	<div style="text-align: center;">  </div> <p>Given $r : h = 3 : 4$ Let $r = 3x$, $h = 4x$ $\therefore r = 3x = 2.1 \Rightarrow x = 0.7$ Hence $h = 2.8$ cm</p> <p>Volume of wood required to make the toy = Volume of cone + Volume of hemisphere</p> $= \frac{1}{3} \times \frac{22}{7} \times (2.1)^2 \times 2.8 + \frac{2}{3} \times \frac{22}{7} \times (2.1)^3$ $= 32.34 \text{ cm}^3$ <p>Slant height of cone = $\sqrt{(2.1)^2 + (2.8)^2} = 3.5$ cm</p> <p>Total Surface Area = CSA of cone + CSA of hemisphere</p> $= \frac{22}{7} \times 2.1 \times 3.5 + 2 \times \frac{22}{7} \times (2.1)^2$ $= 50.82 \text{ cm}^2$	<p style="text-align: right;">$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$ 1 $\frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2}$</p>
35.	<p>In the figure, MNOP is a trapezium with, $MN \parallel PO$ and $PO = 2 MN$.</p> <p>A line segment FE drawn parallel to MN intersects MP at F and NO at E such that $\frac{NE}{EO} = \frac{3}{4}$. Diagonal PN intersects FE at X. Prove that $7 FE = 10 MN$.</p> <div style="text-align: center;">  </div>	
Sol.	$\frac{NE}{EO} = \frac{3}{4} \Rightarrow \frac{NE}{NO} = \frac{3}{7}$ <p>$XE \parallel PO$</p> <p>Therefore, $\frac{NX}{NP} = \frac{NE}{NO} = \frac{XE}{PO} = \frac{3}{7}$</p> <p>$\therefore PO = 2 MN$</p> <p>$\therefore \frac{XE}{MN} = \frac{6}{7} \dots \textcircled{1}$</p>	<p style="text-align: right;">$\frac{1}{2}$ 1 $\frac{1}{2}$</p>

	<p>Also, $\frac{NX}{NP} = \frac{3}{7} \Rightarrow \frac{XP}{NP} = \frac{4}{7}$</p> <p>Now, $FX \parallel MN$</p> <p>$\therefore \frac{XP}{NP} = \frac{FX}{MN} = \frac{4}{7}$ --- (2)</p> <p>Using (1) and (2),</p> $\frac{XE}{MN} + \frac{XF}{MN} = \frac{6}{7} + \frac{4}{7} = \frac{10}{7}$ $\Rightarrow \frac{EF}{MN} = \frac{10}{7} \text{ or } 7 FE = 10 MN$	<p>$\frac{1}{2}$</p> <p>1</p> <p>1</p> <p>$\frac{1}{2}$</p>
	<p>SECTION E</p> <p>This section has 3 case study based questions carrying 4 marks each.</p>	
<p>36.</p>	<p style="text-align: center;">Case Study - 1</p> <p>In the month of September, villagers of Ankurhut were falling ill with high temperature. Paracetamol was one of the highest sold medicines during that phase. A survey was conducted to estimate the overall sale of Paracetamol of each pharmacy during the last 7 days. It was observed that the number of Paracetamol sold in different shops were all 3-digit numbers, divisible by 13, taken in order.</p>  <p>Based on the information given above, answer the following questions :</p> <p>(i) How many Paracetamols were sold by the 7th pharmacy ?</p> <p>(ii) What was the difference between the number of Paracetamols sold by the 14th and the 9th pharmacy ?</p> <p>(iii) (a) How many Paracetamols were sold by the 9th pharmacy from the last ?</p> <p style="text-align: center;">OR</p> <p>(iii) (b) What was the total number of Paracetamols sold in that week ?</p>	
<p>Sol.</p>	<p>(i) A.P. formed is 104, 117, 130, ... with $a = 104$ and $d = 13$ $a_7 = 104 + 6 \times 13 = 182$</p> <p>(ii) $a_{14} - a_9 = 5 \times 13 = 65$</p>	<p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>1</p>

(iii) (a) Last term of A.P. is 988 and $d = -13$

$$a_9 = 988 + 8 \times (-13) = 884$$

OR

(b) Last term of A.P. is 988 and $d = -13$

$$988 = 104 + (n - 1) \times 13$$

$$\Rightarrow n = 69$$

$$S_{69} = \frac{69}{2} \times (104 + 988)$$

$$= 37674$$

1

1

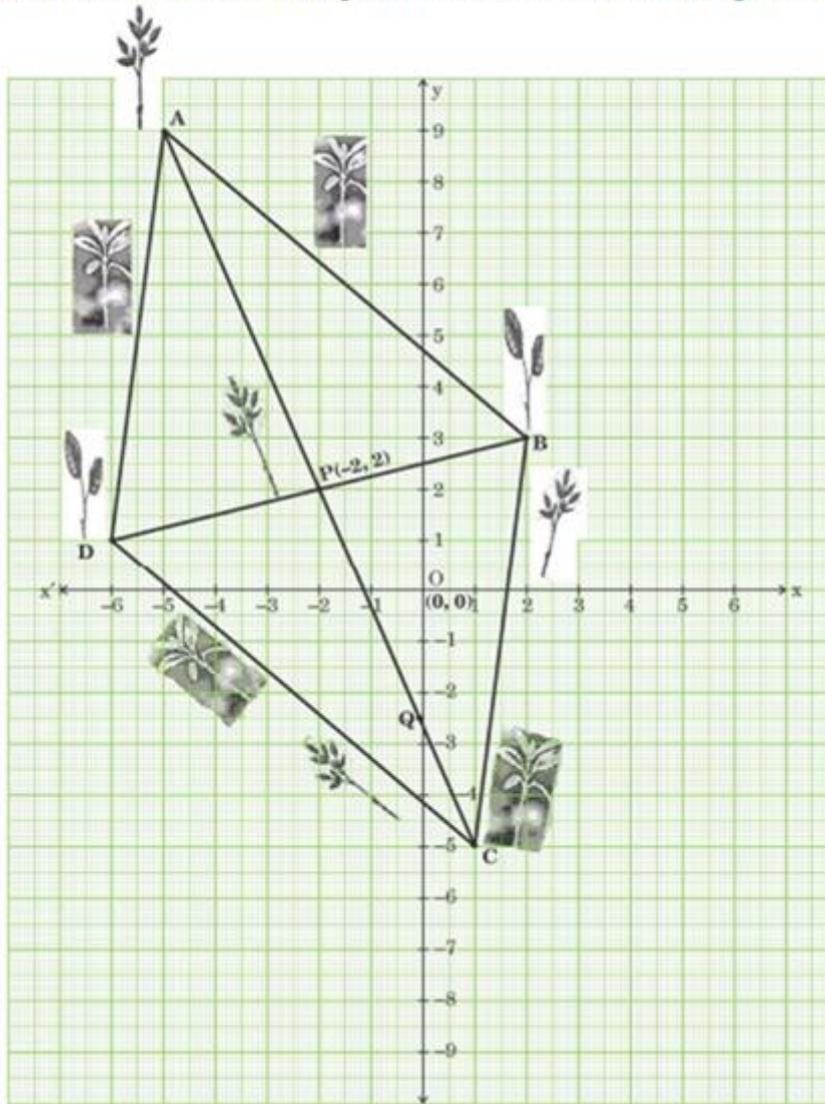
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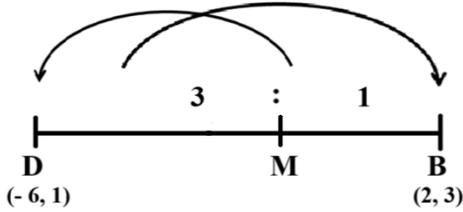
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37.

Case Study - 2

Trees act the natural filters. By planting trees in and around school premises, we create cleaner and healthier air for students and local residents, reducing respiratory problems. A school in Noida has proposed and organised a community drive on tree plantation under the title "Save Earth, Plant Trees". Students of that school have planted saplings in the field such that it formed a quadrilateral as shown in the figure ABCD.

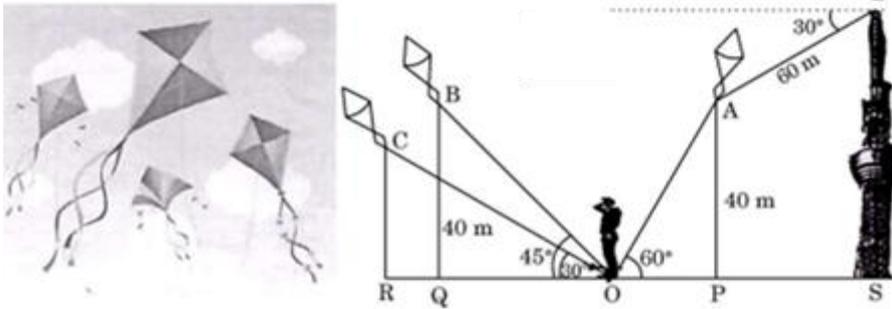


	<p>Based on the information given above, answer the following questions :</p> <p>(i) Find the distance between the two saplings at A and D.</p> <p>(ii) (a) One student plants one sapling at the mid-point of AD. Then he moves along a straight line parallel to DB and sows another sapling on AB. What are the coordinates of the positions of these two new saplings ?</p> <p style="text-align: center;">OR</p> <p>(ii) (b) A new sapling is kept at a point M on DB such that $DM : MB = 3 : 1$. Find the coordinates of M.</p> <p>(iii) The line segments AC and BD bisect each other at $P(-2, 2)$. Find the coordinates of C.</p>	
<p>Sol.</p>	<p>(i) Observing the graph, coordinators of points are A $(-5, 9)$ and D $(-6, 1)$ $AD = \sqrt{(-6 + 5)^2 + (1 - 9)^2} = \sqrt{65}$</p> <p>(ii) (a) Mid point of AD = $\left(\frac{-6-5}{2}, \frac{1+9}{2}\right)$ i.e. $\left(\frac{-11}{2}, 5\right)$ Student will sow another sapling at mid point of AB. Point B is $(2, 3)$ Mid point of AB = $\left(\frac{2-5}{2}, \frac{3+9}{2}\right)$ i.e. $\left(\frac{-3}{2}, 6\right)$</p> <p style="text-align: center;">OR</p> <p>(b)</p>  <p style="text-align: center;">Coordinates of M = $\left(\frac{6-6}{4}, \frac{9+1}{4}\right)$ i.e. $\left(0, \frac{5}{2}\right)$</p> <p>(iii) Coordinates of C are $(1, -5)$</p>	<p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>

38.

Case Study - 3

The International Kite Festival takes place every year on 14th January. The main attractions of the festival include national and international Kite Flyers' Parade, kite flying, traditional stalls etc. On this day, few kite flyers, had assembled at a point 'O' on the ground. The position of 3 kites A, B, C was such that A and B were at the same vertical height of 40 m from the ground level. The angles of elevation of A, B and C from O were 60°, 45° and 30° respectively. A vertical tower, SD has been erected at point S and a camera is set at the top of the tower for photography.



Based on the information given above, answer the following questions :

- (i) What is the length of the string of the kite at A ?
- (ii) If the length of the string of kite at C is 40 m, then find the height of that kite C from the ground.
- (iii) (a) What is the horizontal distance between the kites at A and B ?

OR

- (iii) (b) If the angle of depression of the kite at A is 30° from the camera at D and the distance between A and D is 60 m, then find the height of the tower.

Sol.

$$(i) \quad \sin 60^\circ = \frac{\sqrt{3}}{2} = \frac{40}{OA}$$

$$\Rightarrow OA = \frac{80}{\sqrt{3}} \text{ m or } \frac{80\sqrt{3}}{3} \text{ m}$$

$$(ii) \quad \sin 30^\circ = \frac{1}{2} = \frac{RC}{40}$$

$$\Rightarrow RC = 20 \text{ m}$$

$$(iii) \quad (a) \quad \tan 45^\circ = 1 = \frac{40}{OQ}$$

$$\Rightarrow OQ = 40 \text{ m}$$

$$\text{Also, } \tan 60^\circ = \sqrt{3} = \frac{40}{OP}$$

$$\Rightarrow OP = \frac{40}{\sqrt{3}} \text{ m or } \frac{40\sqrt{3}}{3} \text{ m}$$

$$AB = PQ = \left(40 + \frac{40}{\sqrt{3}}\right) \text{ m or } \left(40 + \frac{40\sqrt{3}}{3}\right) \text{ m}$$

OR

1/2

1/2

1/2

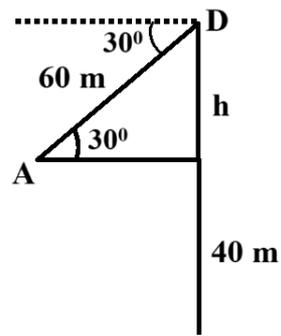
1/2

1/2

1

1/2

(b)



$$\sin 30^\circ = \frac{1}{2} = \frac{h}{60}$$

$$\Rightarrow h = 30 \text{ m}$$

$$\text{Height of the tower} = 40 + 30 = 70 \text{ m}$$

1

$\frac{1}{2}$

$\frac{1}{2}$