	Marking Scheme **Strictly Confidential** **(For Internal and Restricted use only)** **Secondary School Examination, 2025** **MATHEMATICS (Standard) (Q.P. Code 30(B))**

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.

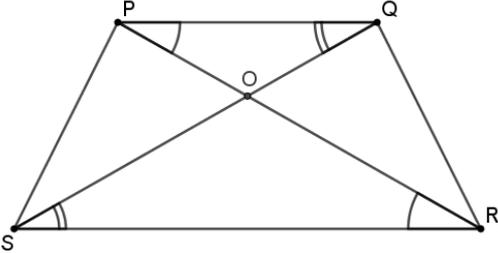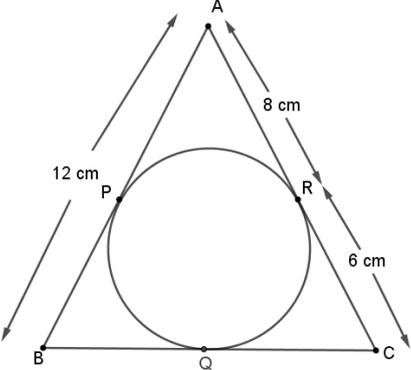| 9.	If a student has attempted an extra question, answer of the question deserving more marks should be retained and the other answer scored out with a note "Extra Question".
10.	No marks to be deducted for the cumulative effect of an error. It should be penalized only once.
11.	A full scale of marks ___80___ (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.	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 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.) Half or a part of answer marked correct and the rest as wrong, but no marks awarded.
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.

MARKING SCHEME
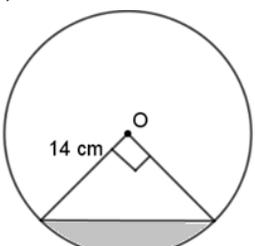## MATHEMATICS (Subject Code–041)
(PAPER CODE: 30(B))

Q. No.	EXPECTED OUTCOMES/VALUE POINTS	Marks
	SECTION A **This section comprises Multiple Choice Questions (MCQs) of 1 mark each.**	
1.	The HCF and the LCM of 14, 21 and 77 respectively are (A) 7, 77 (B) 14, 462 (C) 7, 462 (D) 21, 77	
Sol.	(C) 7, 462	1
2.	The value of x, for which the polynomials $9 - x^2$ and $6x + x^2 + 9$ vanish simultaneously, is (A) 3 (B) 2 (C) -2 (D) -3	
Sol.	(D) -3	1
3.	If the square of the difference of the zeroes of the quadratic polynomial $y^2 + py + 36$ is equal to 81, then the values of p are (A) ±5 (B) ±15 (C) ±18 (D) ±12	
Sol.	(B) ±15	1
4.	If the first term of an A.P. is -12 and the common difference is 4, then the sum of its first 7 terms is (A) -24 (B) -48 (C) 0 (D) 48	
Sol.	(C) 0	1

5.	If the system of equations
	    $3x + 2y = 4$
	    $4ax + (a + b)y = 16$
	has infinitely many solutions, then
	(A) $5a = 3b$ (B) $3a = 5b$
	(C) $a + b = 15$ (D) $a - b = 2$	

Sol.	(A) $5a = 3b$	1
6.	The distance between the points $(4 \cos \theta + 3 \sin \theta, 0)$ and $(0, 4 \sin \theta - 3 \cos \theta)$ is (A) 25 (B) 7 (C) 5 (D) $\sqrt{7}$	
Sol.	(C) 5	1

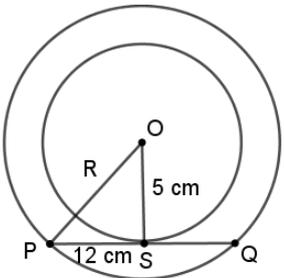|		
7.	The point on y-axis equidistant from the points A(1, 3) and B(4, 4) is (A) (0, 11) (B) (11, 0) (C) (0, 13) (D) (0, 12)	
Sol.	(A) (0, 11)	**1**
8.	If a regular hexagon is inscribed in a circle of radius 3 cm, then its perimeter is (A) 9 cm (B) 18 cm (C) 27 cm (D) 36 cm	
Sol.	(B) 18 cm	**1**
9.	Two circles of radii 10 cm and 17 cm intersect at P and Q. If A and B are their centres and PQ = 16 cm, then the distance AB is equal to (A) 30 cm (B) 12 cm (C) 21 cm (D) 16 cm	
Sol.	(C) 21 cm	**1**
10.	If $\triangle ABC \sim \triangle PQR$ such that AB = 6 cm, AC = 7 cm, QR = 15 cm and PQ = 12 cm, then the sum of lengths of BC and PR is (A) 44 cm (B) 21.5 cm (C) 21 cm (D) 29.5 cm	
Sol.	(B) 21.5 cm	**1**
11.	If $\sin \theta - \cos \theta = 0$, then the value of $\sin^6 \theta + \cos^6 \theta$ is (A) 1 (B) $\dfrac{1}{8}$ (C) $\dfrac{3}{4}$ (D) $\dfrac{1}{4}$	
Sol.	(D) $\dfrac{1}{4}$	**1**
12.	If $\sin \theta + \cos \theta = \sqrt{2} \cos \theta$, $(\theta \neq 90°)$, then $\tan \theta$ is equal to (A) $\sqrt{2} + 1$ (B) $\sqrt{2} - 1$ (C) $-\sqrt{2}$ (D) $\sqrt{2}$	
Sol.	(B) $\sqrt{2} - 1$	**1**

13.	A 8 m high tree casts a 6 m long shadow on the ground. At the same time, a flag pole casts a shadow 30 m long on the ground. The height of the flag pole is (A) 40 m (B) 22.5 m (C) 44 m (D) 22 m	
Sol.	(A) 40 m	1
14.	In a circle of radius 14 cm, the area of the sector made by an arc of length 11 cm with the centre, is (A) 154 cm^2 (B) 102.67 cm^2 (C) 205.33 cm^2 (D) 77 cm^2	
Sol.	(D) 77 cm^2	1
15.	A sector is cut from a circular sheet of radius 50 cm, the central angle of the sector being 90°. If another circle of the same area as the sector is formed, then the radius of the new circle is (A) 25 cm (B) 50 cm (C) 12.5 cm (D) 20 cm	
Sol.	(A) 25 cm	1
16.	The median of a set of 15 distinct observations is 30.5. If each of the largest 7 observations of the set is increased by 3, then the median of the new set. (A) is increased by 3. (B) is decreased by 3. (C) is three times the original median. (D) remains the same as that of the original Set.	
Sol.	(D) remains the same as that of the original Set.	1
17.	The probability that a 2– digit number less than 20, selected at random will be a multiple of 2 and not a multiple of 3, is (A) $\frac{1}{2}$ (B) $\frac{1}{5}$ (C) $\frac{3}{10}$ (D) $\frac{3}{11}$	
Sol.	(C) $\frac{3}{10}$	1

18.	A card is drawn at random from a deck of 52 playing cards. The probability that the drawn card is not a red face card, is (A) $\dfrac{3}{26}$ (B) $\dfrac{23}{26}$ (C) $\dfrac{7}{52}$ (D) $\dfrac{23}{52}$	
Sol.	(B) $\dfrac{23}{26}$	**1**
	Questions number **19** to **20** are Assertion (A) and Reason (R) 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 options (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 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) :** The point (–2, 4) divides the line segment joining the points (–4, 8) and (5, –10) in the ratio 2 : 7 internally. **Reason (R) :** If three points P, Q and R are collinear, then PQ + QR = PR.	
Sol.	(B) Both Assertion(A) and Reason(R) are true, but Reason(R) is not the correct explanation of Assertion(A).	**1**
20	**Assertion (A) :** If the total surface area of a solid hemisphere is 462 cm^2, then its radius is 7 cm. **Reason (R) :** The total surface area of a solid hemisphere of radius r is $3\pi r^2$.	
Sol.	(A) Both Assertion(A) and Reason(R) are true and Reason(R) is the correct explanation of Assertion(A).	**1**
	SECTION B This section comprises 5 Very Short Answer (VSA) type questions of 2 marks each.	
21	Find HCF and LCM of 35 and 55 and verify your answer.	
Sol.	$35 = 5 \times 7$ $55 = 5 \times 11$ HCF $= 5$	½ ½

	LCM = 5 × 7 × 11 = 385	½
	HCF × LCM = 5 × 385 = 1925	
	Product of two numbers = 35 × 55 = 1925	½
	Hence HCF × LCM = Product of two numbers	
22	PQRS is a trapezium in which PQ ∥ SR and its diagonals intersect each other at the point O. Show that $\dfrac{PO}{QO} = \dfrac{RO}{SO}$.	
Sol.	 In Δ POQ and Δ ROS ∠P = ∠R and ∠Q = ∠S ⟹ Δ POQ ~ Δ ROS ∴ $\dfrac{PO}{RO} = \dfrac{QO}{OS} \Longrightarrow \dfrac{PO}{QO} = \dfrac{RO}{SO}$	1 1
23	A circle is inscribed in a ΔABC touching AB, BC and AC at P, Q and R respectively. If AB = 12 cm, AR = 8 cm and CR = 6 cm, then find the length of BC.	
Sol.	 AR = AP = 8 cm ∴ BP = 12 – 8 = 4 cm = BQ	½ ½

	Also CR = CQ = 6 cm		½
	∴ BC = BQ + CQ = 4 + 6 = 10 cm		½
24	(a) Prove that (cosec θ + sin θ) (cosec θ − sin θ) = cot² θ + cos² θ. **OR** (b) Evaluate : $\dfrac{5 \tan^2 30° + 3 \cos^2 45° - 4 \sin^2 30°}{\sqrt{3} \sin 60° \cos 60° + \cot^2 45°}$		
Sol.	**(a)** LHS = (cosecθ + sinθ) (cosecθ − sinθ)		
	$= \dfrac{(1 + \sin^2\theta)(1 - \sin^2\theta)}{\sin^2\theta}$		1
	$= (1 + \sin^2\theta)\left(\dfrac{\cos^2\theta}{\sin^2\theta}\right)$		½
	$= (\cot^2\theta + \cos^2\theta)$		½
	OR		
	(b) $\dfrac{5\tan^2 30° + 3\cos^2 45° - 4\sin^2 30°}{\sqrt{3}\sin 60°\cos 60° + \cot^2 45°}$		
	$= \dfrac{5\left(\frac{1}{\sqrt{3}}\right)^2 + 3\left(\frac{1}{\sqrt{2}}\right)^2 - 4\left(\frac{1}{2}\right)^2}{\sqrt{3}\cdot\left(\frac{\sqrt{3}}{2}\right)\cdot\frac{1}{2} + (1)^2}$		1½
	$= \dfrac{26}{21}$		½
25	(a) A chord of a circle of radius 14 cm subtends a right angle at the centre. Find the area of the minor segment. **OR** (b) The perimeter of a sector of a circle of radius 21 cm is 75 cm. Find the area of the sector.		
Sol.	**(a)** Area of segment $= \dfrac{90}{360} \times \dfrac{22}{7} \times 14 \times 14 - \dfrac{1}{2} \times 14 \times 14$ $= 154 - 98 = 56 \, cm^2$ **OR** **(b)** $\dfrac{\theta}{360} \times 2 \times \dfrac{22}{7} \times 21 + 42 = 75$ $\Rightarrow \dfrac{\theta}{360} = \dfrac{1}{4}$		1 1 1

	Area of sector $= \frac{1}{4} \times \frac{22}{7} \times 21 \times 21$		½
	$= \frac{693}{2}$ or 346.5 cm²		½

<table>
<tr><td colspan="3">SECTION C
This section comprises 6 Short Answer (SA) type questions of 3 marks each.</td></tr>
<tr><td>26</td><td>Prove that $\sqrt{5}$ is an irrational number.</td><td></td></tr>
<tr><td>Sol.</td><td>

Let $\sqrt{5}$ be a rational number.

$\therefore \sqrt{5} = \frac{p}{q}$, where $q \neq 0$ and let p & q be co-primes.

$5q^2 = p^2 \implies p^2$ is divisible by $5 \implies p$ is divisible by 5 ----- (i)

$\implies p = 5a$, where 'a' is some integer

$25a^2 = 5 q^2 \implies q^2 = 5 a^2 \implies q^2$ is divisible by $5 \implies q$ is divisible by 5 ----- (ii)

(i) and (ii) leads to contradiction as 'p' and 'q' are co-primes.

$\therefore \sqrt{5}$ is an irrational number.

</td><td>

½

1

1

½

</td></tr>
<tr><td>27</td><td>

(a) For what values of m and n, does the following pair of linear equations have infinitely many solutions ?
$2x + 3y = 7$; $m(x + 2y) + n(x - y) = 21$

OR

(b) The sum of the numerator and the denominator of a fraction is 4 more than twice the numerator. If the numerator and denominator are increased by 3, they are in the ratio 2 : 3. Determine the fraction.

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

(a) For infinitely many solutions, we have

$\frac{2}{m+n} = \frac{3}{2m-n} = \frac{7}{21} = \frac{1}{3}$

$\Rightarrow m + n = 6$

$2m - n = 9$

Solving the above two equations, we get $m = 5$, $n = 1$

OR

(b) Let the fraction be $\frac{x}{y}$, $y \neq 0$

$\therefore x + y = 4 + 2x \implies y = x + 4$ ----- (i)

And $\frac{x+3}{y+3} = \frac{2}{3}$

$\Rightarrow 3x - 2y + 3 = 0$ ------- (ii)

Solving (i) and (ii), we get $x = 5$, $y = 9$

$\therefore$ Fraction is $\frac{5}{9}$

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1

½

½

½+½

1

1

½

½

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28	Find the value of p for which the quadratic equation $(2p + 1)x^2 - (7p + 2)x + (7p - 3) = 0$ has equal roots. Also, find these roots.	
Sol.	For equal roots, $D = 0$	
	$[-(7p + 2)^2] - 4(2p + 1)(7p - 3) = 0$	1
	$\Rightarrow 7p^2 - 24p - 16 = 0$	
	$\Rightarrow (7p + 4)(p - 4) = 0$	
	$\Rightarrow p = 4, p = -\dfrac{4}{7}$	1
	For $p = 4$, the equation is $9x^2 - 30x + 25 = 0$ whose roots are $\dfrac{5}{3}, \dfrac{5}{3}$	½
	For $p = -\dfrac{4}{7}$, the equation is $x^2 - 14x + 49 = 0$ whose roots are $7, 7$	½
29	(a) In two concentric circles, a chord of length 24 cm of the larger circle is a tangent to the smaller circle whose radius is 5 cm. Find the radius of the larger circle. **OR** (b) Prove that the intercept of a tangent between two parallel tangents to a circle subtends right angle at the centre.	
Sol.	**(a)** Let the radius of larger circle be R	
	$\angle S = 90°$	½
	$PS = \dfrac{24}{2} = 12$ cm	½
	$12^2 + 5^2 = R^2$	1
	$\Rightarrow R = 13$ cm	1
	OR	
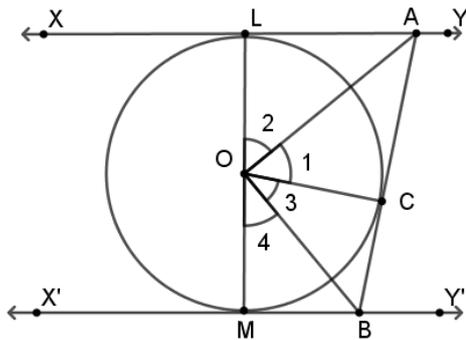
	(b)	
	Let XY || X′Y′ be two parallel tangents with LM as diameter	
	Δ OAL ≅ Δ OAC	
	∠1 = ∠2	**1**
	Similarly, ∠3 = ∠ 4	½
	But ∠1 + ∠2 + ∠3 + ∠4 = 180°	½
	∴ 2 ∠1 + 2 ∠3 = 180° or ∠1 + ∠3 = 90°	½
	⟹AB subtends right angle at the centre.	½
30	Prove that $2(\sin^6 \theta + \cos^6 \theta) - 3(\sin^4 \theta + \cos^4 \theta) + 1 = 0$	
Sol.	LHS $= 2[(\sin^2 \theta + \cos^2 \theta)^3 - 3\sin^2 \theta \cos^2 \theta(\sin^2 \theta + \cos^2 \theta)] - 3[(\sin^2 \theta + \cos^2 \theta)^2 - 2\sin^2 \theta \cos^2 \theta] + 1$	**1½**
	$= 2[1 - 3\sin^2 \theta \cos^2 \theta] - 3[1 - 2\sin^2 \theta \cos^2 \theta] + 1$	½
	$= 2 - 6\sin^2 \theta \cos^2 \theta - 3 + 6\sin^2 \theta \cos^2 \theta + 1$	
	$= 0 = $ RHS	**1**

31	If the mean of the following distribution is 54, find the value of p :	

Class	0 – 20	20 – 40	40 – 60	60 – 80	80 – 100
Frequency	7	p	10	9	13

Sol.					
	Class	x_i	f_i	$f_i x_i$	**1½ for correct table**
	0-20	10	7	70	
	20-40	30	p	30 p	
	40-60	50	10	500	
	60-80	70	9	630	
	80-100	90	13	1170	
			39 + p	2370 + 30p	

	Mean $= \dfrac{2370 + 30\,p}{39 + p} = 54$		**1**
	$\Rightarrow p = 11$		½

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SECTION D

This section consists of 4 Long Answer type questions of 5 marks each.

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32	(a) Solve the following equation for x : $\dfrac{1}{x-2} + \dfrac{2}{x-1} = \dfrac{6}{x}, \; x \neq 0, 1, 2$ **OR** (b) Find two consecutive odd numbers, sum of whose squares is 650.	

Sol.	**(a)** $\dfrac{1}{x-2} + \dfrac{2}{x-1} = \dfrac{6}{x}$	
	$\Rightarrow \; x[x - 1 + 2(x - 2)] = 6(x - 1)(x - 2)$	**1½**
	$\Rightarrow \; 3x^2 - 13x + 12 = 0$	**1½**
	$\Rightarrow \; (3x - 4)(x - 3) = 0$	**1**
	$\Rightarrow \; x = 3, x = \dfrac{4}{3}$	**1**
	OR	
	(b) Let the consecutive odd numbers be x and $x + 2$	**1**
	$\Rightarrow x^2 + (x + 2)^2 = 650$	**1**
	$\Rightarrow 2x^2 + 4x - 646 = 0$ or $x^2 + 2x - 323 = 0$	**1**
	$\Rightarrow (x + 19)(x - 17) = 0$	**1**
	$\Rightarrow x = 17$	½
	$\therefore$ Odd numbers are 17 , 19	½

33	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 and construction Correct proof	**2** **3**

34	(a) A 16 m deep well with diameter 3.5 m is dug up and the earth from it is spread evenly to form a platform 27.5 m × 7 m. Find the height of the platform. **OR** (b) A tent is of the shape of a right circular cylinder up to a height of 3 metres surmounted by a right circular cone of same radius such that the total height of the tent is 13.5 metres above the ground. Calculate the cost of painting the inner side of the tent at the rate of ₹ 2 per square metre, if the radius of the base is 14 metres.	
Sol.	**(a)** Volume of the earth dug up $= \frac{22}{7} \times \frac{7}{4} \times \frac{7}{4} \times 16$ $\qquad\qquad\qquad = 154 \text{ m}^3$ Area of platform $= 27.5 \times 7 = 192.5 \text{ m}^2$ Height of platform $= \frac{154}{192.5}$ $\qquad\qquad\qquad = \frac{4}{5}$ m or 80 cm **OR** **(b)** $l = \sqrt{14^2 + (10.5)^2} = 17.5$ m Total Surface Area (inside) $= 2 \times \frac{22}{7} \times 14 \times 3 + \frac{22}{7} \times 14 \times 17.5$ $= 1034 \text{ m}^2$ Cost $= 1034 \times 2 = ₹ 2068$	**1** **½** **1½** **1** **1** **1½** **1½** **1** **1**
35	Calculate the mode and the median for the following distribution : 	Class	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45
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Frequency	5	6	15	10	5	4	2	2		
Sol.	<table><tr><th>Class</th><th>Frequency(f)</th><th>(c.f.)</th></tr><tr><td>5 -10</td><td>5</td><td>5</td></tr><tr><td>10-15</td><td>6</td><td>11</td></tr><tr><td>15-20</td><td>15</td><td>26</td></tr><tr><td>20-25</td><td>10</td><td>36</td></tr><tr><td>25-30</td><td>5</td><td>41</td></tr></table>	**1 mark for correct table**

30-35	4	45	
35-40	2	47	
40-45	2	49	
	49		

Median Class is 15 - 20 $\qquad$ ½

Median $= 15 + \dfrac{\dfrac{49}{2} - 11}{15} \times 5$ $\qquad$ 1

$= \dfrac{39}{2}$ or 19.5 $\qquad$ ½

Modal Class is 15 - 20 $\qquad$ ½

Mode $= 15 + \dfrac{15 - 6}{30 - 6 - 10} \times 5$ $\qquad$ 1

$= \dfrac{255}{14}$ or 18.21 $\qquad$ ½

SECTION E
This section consists of 3 case-study based questions of 4 marks each.

36

To inculcate the good habit of savings in her children, Reema brought a piggy bank and after putting a ₹ 10 coin in it, she handed it over to her daughter Amisha and asked as to put money in it from her pocket money at the beginning of every week. Amisha put two ten rupee coins at the beginning of next (second) week and in this way increases her savings by one ₹ 10 coin every week.

Based on the above, answer the following questions :

(a) How many coins were added in the piggy bank at the beginning of 5th week ?

(b) How many ₹ 10 coins will be there in the piggy bank after the end of 7 weeks ?

(c) (i) If the piggy bank can hold a maximum of 300 ₹ 10 coins, after how many weeks it would be full ?

OR

(c) (ii) Find the total amount of money in the piggy bank at the end of 20 weeks.

Sol.

(a) $a_5 = 1 + 4(1) = 5$ $\qquad$ 1

(b) $S_7 = \dfrac{7}{2} [2 + 6 \times 1] = 28$ coins $\qquad$ 1

(c) (i) $S_n = \dfrac{n}{2} [2 + (n - 1) \times 1] = 300$ $\qquad$ 1

	$n = 24$ weeks	**1**
	OR	
	(c) (ii) $S_{20} = 10[20 + 19 \times 10]$	**1**
	$\qquad = ₹\, 2100$	**1**
37	To make the teaching-learning process easier, creative and innovative, a teacher brings clay in the classroom to teach the topic of mensuration. She forms a cylinder of radius 2.1 cm and height 5 cm with the clay and put a hemisphere of same radius on its top in such a way that the base of hemisphere covers the top of cylinder.	
	Using the above information, and $\pi = \dfrac{22}{7}$, find :	
	(a) The volume of cylinder so formed.	
	(b) The volume of hemispherical part.	
	(c) (i) The surface area of the complete solid.	
	OR	
	(c) (ii) The surface area of the cylindrical part, if hemisphere is not put on it.	
Sol.	(a) Volume of cylinder $= \dfrac{22}{7} \times \dfrac{21}{10} \times \dfrac{21}{10} \times 5 = 69.3 \text{ cm}^3$	**1**
	(b) Volume of hemispherical part $= \dfrac{2}{3} \times \dfrac{22}{7} \times \dfrac{21}{10} \times \dfrac{21}{10} \times \dfrac{21}{10} = 19.404 \text{ cm}^3$	**1**
	(c) (i) Surface area of the complete solid $= 2 \times \dfrac{22}{7} \times \dfrac{21}{10} \times 5 + 3 \times \dfrac{22}{7} \times \dfrac{21}{10} \times \dfrac{21}{10}$	**1½**
	$\qquad = 107.58 \text{ cm}^2$	**½**
	OR	
	(c) (ii) Required surface area $= 2 \times \dfrac{22}{7} \times \dfrac{21}{10} \times 5 + 2 \times \dfrac{22}{7} \times \dfrac{21}{10} \times \dfrac{21}{10}$	**1½**
	$\qquad = 93.72 \text{ cm}^2$	**½**

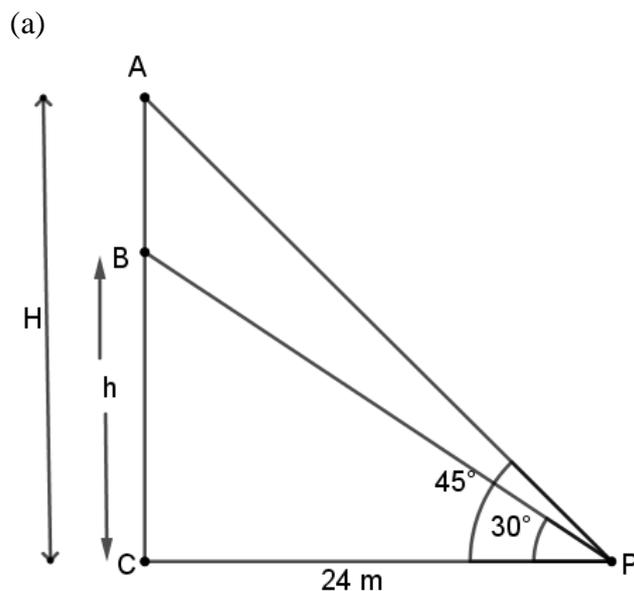| 38	Clinometer is a tool that is used to measure the angle of elevation. We can use the clinometer to measure the height of tall things that you can't possibly reach. With the help of a clinometer, Harish measured the angle of elevation of the roof of a building from a point P on the ground as 45°. On the same wall, at some height below the top, there was a society logo, whose angle of elevation from the same point P was measured as 30°. The point P is at a distance of 24 m from the base of the building. Based on the above information, answer the following questions : (a) (i) What is the height of the building logo from the ground ? **OR** (ii) What is the height of the building from the ground ? (b) What is the aerial (slant) distance of point P from the top of the building ? (c) If θ is the angle of elevation of the top of building when the point P is moved 9 m towards the base of the building, then, find tan θ.	
Sol.	(a) (i) $\frac{h}{24} = \tan 30° = \frac{1}{\sqrt{3}}$ $h = \frac{24}{\sqrt{3}}$ or $8\sqrt{3}$ m **OR** (ii) $\frac{H}{24} = \tan 45° = 1$ $\Rightarrow H = 24$ m	1 1 1 1

(b) Slant distance = AP = $\sqrt{24^2 + 24^2}$ $\qquad\qquad\qquad = 24\sqrt{2}$ m	1	
(c) CP = $(24 - 9) = 15$ m $\tan\theta = \dfrac{24}{15}$ or $\dfrac{8}{5}$	1	