Marking Scheme
Strictly Confidential
(For Internal and Restricted use only)
Secondary School Examination, 2025
MATHEMATICS (Standard) (Q.P. CODE 30/1/1)

General Instructions: -

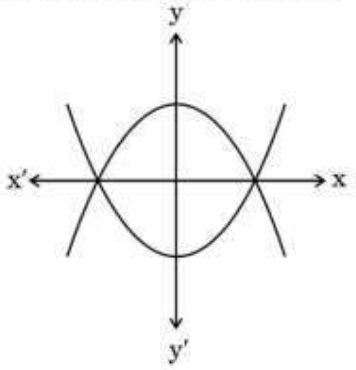
1.	You are aware that evaluation is the most important process in the actual and correct assessment of the candidates. A small mistake in evaluation may lead to serious problems which may affect the future of the candidates, education system and teaching profession. To avoid mistakes, it is requested 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. 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 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 (✓) 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.

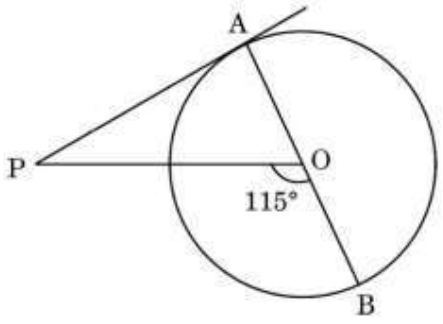
9.	If a student has attempted an extra question, answer of the question deserving more marks should be retained and the other answer scored out with a note "Extra Question".
10.	No marks to be deducted for the cumulative effect of an error. It should be penalized only once.
11.	A full scale of marks 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: 30/1/1)

Q. No.	EXPECTED OUTCOMES/VALUE POINTS	Marks
	SECTION A This section has **20** Multiple Choice Questions (MCQs) carrying **1** mark each.	
1.	If α and β are the zeroes of polynomial $3x^2 + 6x + k$ such that $\alpha + \beta + \alpha\beta = -\frac{2}{3}$, then the value of k is : (A) -8 (B) 8 (C) -4 (D) 4	
Sol.	(D) 4	**1**
2.	If $x = 1$ and $y = 2$ is a solution of the pair of linear equations $2x - 3y + a = 0$ and $2x + 3y - b = 0$, then : (A) $a = 2b$ (B) $2a = b$ (C) $a + 2b = 0$ (D) $2a + b = 0$	
Sol.	(B) $2a = b$	**1**
3.	The mid-point of the line segment joining the points P(– 4, 5) and Q(4, 6) lies on : (A) x-axis (B) y-axis (C) origin (D) neither x-axis nor y-axis	
Sol.	(B) y – axis	**1**
4.	If θ is an acute angle and $7 + 4 \sin\theta = 9$, then the value of θ is : (A) $90°$ (B) $30°$ (C) $45°$ (D) $60°$	
Sol.	(B) 30^0	**1**

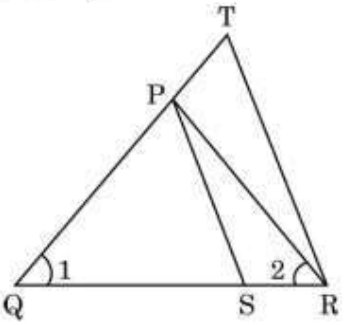
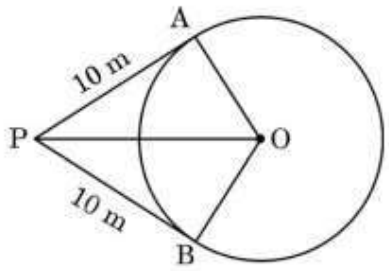
5.	The value of $\tan^2\theta - \left(\frac{1}{\cos\theta} \times \sec\theta\right)$ is : (A) 1 (B) 0 (C) -1 (D) 2	
Sol.	(C) -1	**1**
6.	If HCF(98, 28) = m and LCM(98, 28) = n, then the value of $n - 7m$ is : (A) 0 (B) 28 (C) 98 (D) 198	
Sol.	(C) 98	**1**
7.	The tangents drawn at the extremities of the diameter of a circle are always : (A) parallel (B) perpendicular (C) equal (D) intersecting	
Sol.	(A) parallel	**1**
8.	In triangles ABC and DEF, $\angle B = \angle E$, $\angle F = \angle C$ and AB = 3 DE. Then, the two triangles are : (A) congruent but not similar (B) congruent as well as similar (C) neither congruent nor similar (D) similar but not congruent	
Sol.	(D) similar but not congruent	**1**
9.	If $(-1)^n + (-1)^8 = 0$, then n is : (A) any positive integer (B) any negative integer (C) any odd number (D) any even number	
Sol.	(C) any odd number	**1**

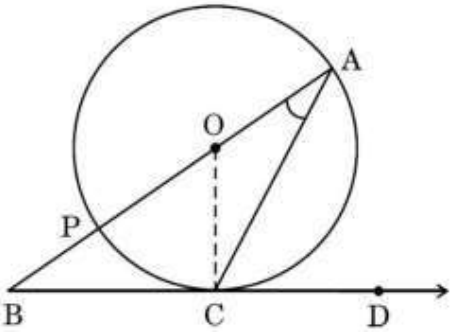
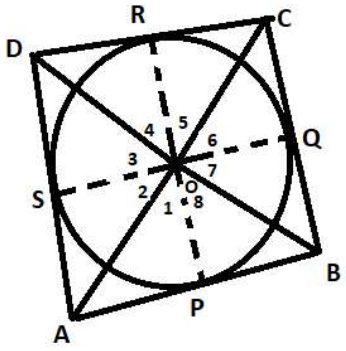
10.	Two polynomials are shown in the graph below. The number of distinct zeroes of both the polynomials is :  (A) 3 (B) 5 (C) 2 (D) 4	
Sol.	(C) 2	**1**
11.	If the sum of first m terms of an AP is $2m^2 + 3m$, then its second term is : (A) 10 (B) 9 (C) 12 (D) 4	
Sol.	(B) 9	**1**
12.	Mode and Mean of a data are 15x and 18x, respectively. Then the median of the data is : (A) x (B) 11x (C) 17x (D) 34x	
Sol.	(C) 17x	**1**
13.	A card is selected at random from a deck of 52 playing cards. The probability of it being a red face card is : (A) $\frac{3}{13}$ (B) $\frac{2}{13}$ (C) $\frac{1}{2}$ (D) $\frac{3}{26}$	
Sol.	(D) $\frac{3}{26}$	**1**

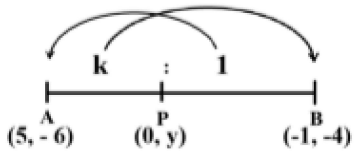
14.	Which of the following is a rational number between $\sqrt{3}$ and $\sqrt{5}$? (A) 1·4142387954012 .... (B) $2{\cdot}32\overline{6}$ (C) π (D) 1·857142	
Sol.	(D) 1.857142	**1**
15.	If a sector of a circle has an area of 40π sq. units and a central angle of 72°, the radius of the circle is : (A) 200 units (B) 100 units (C) 20 units (D) $10\sqrt{2}$ units	
Sol.	(D) $10\sqrt{2}$ units	**1**
16.	In the given figure, PA is a tangent from an external point P to a circle with centre O. If $\angle$ POB = 115°, then $\angle$ APO is equal to :  (A) 25° (B) 65° (C) 90° (D) 35°	
Sol.	(A) 25°	**1**
17.	A kite is flying at a height of 150 m from the ground. It is attached to a string inclined at an angle of 30° to the horizontal. The length of the string is : (A) $100\sqrt{3}$ m (B) 300 m (C) $150\sqrt{2}$ m (D) $150\sqrt{3}$ m	
Sol.	(B) 300 m	**1**

18.	A piece of wire 20 cm long is bent into the form of an arc of a circle of radius $\frac{60}{\pi}$ cm. The angle subtended by the arc at the centre of the circle is : (A) 30° (B) 60° (C) 90° (D) 50°	
Sol.	(B) 60°	**1**
	*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.* (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) :* The probability of selecting a number at random from the numbers 1 to 20 is 1. *Reason (R):* For any event E, if P(E) = 1, then E is called a sure event.	
Sol.	(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).	**1**
20	*Assertion (A) :* If we join two hemispheres of same radius along their bases, then we get a sphere. *Reason (R):* Total Surface Area of a sphere of radius r is $3\pi r^2$.	
Sol.	(C) Assertion (A) is true, but Reason (R) is false.	**1**
	SECTION B This section has **5** Very Short Answer (VSA) type questions carrying **2** marks each.	
21.(a)	If $x \cos 60° + y \cos 0° + \sin 30° - \cot 45° = 5$, then find the value of $x + 2y$.	
Sol.	$x\left(\frac{1}{2}\right) + y\,(1) + \frac{1}{2} - 1 = 5$ $\Rightarrow \quad x + 2y = 11$	**1½** **½**
	OR	

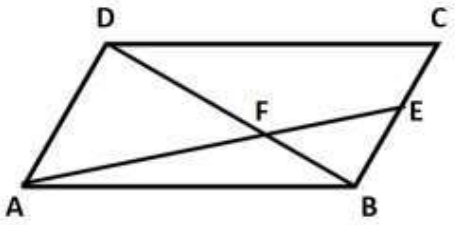
21. (b)	Evaluate : $\dfrac{\tan^2 60°}{\sin^2 60° + \cos^2 30°}$	
Sol.	$\dfrac{(\sqrt{3})^2}{\left(\frac{\sqrt{3}}{2}\right)^2 + \left(\frac{\sqrt{3}}{2}\right)^2}$ $= 2$	**1½** **½**
22.	Find the zeroes of the polynomial $p(x) = x^2 + \frac{4}{3}x - \frac{4}{3}$.	
Sol.	$\frac{1}{3}(3x^2 + 4x - 4)$ $= \frac{1}{3}(3x^2 + 6x - 2x - 4)$ $= \frac{1}{3}(3x - 2)(x + 2)$ Zeroes are $\frac{2}{3}, -2$	**½** **½** **½** **½**
23.	The coordinates of the centre of a circle are (2a, a – 7). Find the value(s) of 'a' if the circle passes through the point (11, – 9) and has diameter $10\sqrt{2}$ units.	
Sol.	radius $= 5\sqrt{2}$ units $(2a - 11)^2 + (a - 7 + 9)^2 = 50$ $\Rightarrow a^2 - 8a + 15 = 0$ $\Rightarrow (a - 5)(a - 3) = 0$ $\Rightarrow a = 5, 3$	**½** **½** **½** **½**
24.(a)	If $\Delta ABC \sim \Delta PQR$ in which AB = 6 cm, BC = 4 cm, AC = 8 cm and PR = 6 cm, then find the length of (PQ + QR).	
Sol.	$\frac{6}{PQ} = \frac{4}{QR} = \frac{8}{6}$ $\Rightarrow PQ = \frac{9}{2}$ cm or 4.5 cm and QR = 3 cm $\therefore$ PQ + QR = 7.5cm	**½** **½** **½** **½**
	OR	

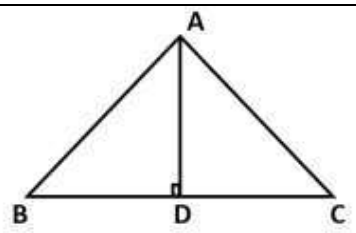
24.(b)	In the given figure, $\frac{QR}{QS} = \frac{QT}{PR}$ and $\angle 1 = \angle 2$, show that $\Delta PQS \sim \Delta TQR$.  	
Sol.	In ΔPQR, $\angle 1 = \angle 2 \therefore PR = PQ$ $\therefore \frac{QR}{QS} = \frac{QT}{PR} \Rightarrow \frac{QR}{QS} = \frac{QT}{PQ}$ Also, $\angle 1 = \angle 1$ $\therefore \Delta PQS \sim \Delta TQR$	½ ½ ½ ½
25.	A person is standing at P outside a circular ground at a distance of 26 m from the centre of the ground. He found that his distances from the points A and B on the ground are 10 m (PA and PB are tangents to the circle). Find the radius of the circular ground.  	
Sol.	$\angle OAP = 90°$ In right ΔOAP, $(26)^2 = OA^2 + (10)^2$ $\Rightarrow OA = \sqrt{576} = 24$ $\therefore$ radius = 24 m	½ **1** ½

	SECTION C This section has **6** Short Answer (SA) type questions carrying **3** marks each.	
26. (a)	In the given figure, O is the centre of the circle and BCD is tangent to it at C. Prove that $\angle BAC + \angle ACD = 90°$.  	
Sol.	In ΔOAC, $OA = OC$ $\Rightarrow \angle OCA = \angle OAC$ Now, $\angle OCD = 90°$ $\Rightarrow \angle OCA + \angle ACD = 90°$ $\Rightarrow \angle OAC + \angle ACD = 90°$ or $\angle BAC + \angle ACD = 90°$	**1** **1** ½ ½
	OR	
26.(b)	Prove that opposite sides of a quadrilateral circumscribing a circle subtend supplementary angles at the centre of the circle.	
Sol.	 Correct Figure $\Delta OAP \cong \Delta OAS$ $\therefore \angle 1 = \angle 2$ Similarly, $\angle 3 = \angle 4$, $\angle 5 = \angle 6$, $\angle 7 = \angle 8$ Also, $\angle 1 + \angle 2 + \angle 3 + \angle 4 + \angle 5 + \angle 6 + \angle 7 + \angle 8 = 360°$ $\Rightarrow 2(\angle 1 + \angle 4 + \angle 5 + \angle 8) = 360°$ $\Rightarrow \angle AOB + \angle COD = 180°$ Similarly, $\angle BOC + \angle AOD = 180°$	½ **1** ½ ½ ½

27. (a)	Prove that : $\frac{\tan\theta}{1-\cot\theta}+\frac{\cot\theta}{1-\tan\theta}=1+\sec\theta\,\text{cosec}\,\theta$	
Sol.	LHS $=\frac{\tan\theta}{1-\cot\theta}+\frac{\cot\theta}{1-\tan\theta}$ $=\frac{\frac{\sin\theta}{\cos\theta}}{1-\frac{\cos\theta}{\sin\theta}}+\frac{\frac{\cos\theta}{\sin\theta}}{1-\frac{\sin\theta}{\cos\theta}}$ $=\frac{\sin^2\theta}{\cos\theta(\sin\theta-\cos\theta)}-\frac{\cos^2\theta}{\sin\theta(\sin\theta-\cos\theta)}$ $=\frac{1}{(\sin\theta-\cos\theta)}\left[\frac{\sin^3\theta-\cos^3\theta}{\sin\theta\cos\theta}\right]$ $=\frac{(\sin\theta-\cos\theta)(\sin^2\theta+\sin\theta\cos\theta+\cos^2\theta)}{(\sin\theta-\cos\theta)\sin\theta\cos\theta}$ $=\frac{(1+\sin\theta\cos\theta)}{\sin\theta\cos\theta}$ $=1+\sec\theta\,\text{cosec}\,\theta$ = RHS	½ **1** ½ ½ ½
	OR	
27.(b)	Prove that : $\frac{\sin A+\cos A}{\sin A-\cos A}+\frac{\sin A-\cos A}{\sin A+\cos A}=\frac{2}{2\sin^2 A-1}$	
Sol.	LHS $=\frac{\sin A+\cos A}{\sin A-\cos A}+\frac{\sin A-\cos A}{\sin A+\cos A}$ $=\frac{(\sin A+\cos A)^2+(\sin A-\cos A)^2}{(\sin A-\cos A)(\sin A+\cos A)}$ $=\frac{\sin^2A+\cos^2A+2\sin A\cos A+\sin^2A+\cos^2A-2\sin A\cos A}{\sin^2A-\cos^2A}$ $=\frac{1+1}{\sin^2A-(1-\sin^2A)}$ $=\frac{2}{2\sin^2A-1}$ = RHS	**1** **1** ½ ½
28.	Find the ratio in which the y-axis divides the line segment joining the points $(5,-6)$ and $(-1,-4)$. Also find the point of intersection.	
Sol.	 Let the ratio be k:1 and point on y- axis be P(0, y) $0=\frac{-k+5}{k+1}$ k = 5 Hence, ratio is 5:1 $y=\frac{-4(5)-6}{5+1}=\frac{-26}{6}=\frac{-13}{3}$ Coordinates of point of intersection are $P\left(0,-\frac{13}{3}\right)$	½ **1** ½ ½ ½

29.	Prove that $\frac{1}{\sqrt{5}}$ is an irrational number.	
Sol.	Let $\frac{1}{\sqrt{5}}$ be a rational number. $\therefore \frac{1}{\sqrt{5}} = \frac{p}{q}$, where $q \neq 0$ and let p & q be the co-primes. $5p^2 = q^2 \Rightarrow q^2$ is divisible by 5. $\Rightarrow$ q is divisible by 5. ----- (i) let $q = 5a$, where 'a' is some integer. $25a^2 = 5p^2 \Rightarrow p^2 = 5a^2 \Rightarrow p^2$ is divisible by 5. $\Rightarrow$ p is divisible by 5 ----- (ii) (i) and (ii) leads to contradiction as p and q are coprimes. $\therefore \frac{1}{\sqrt{5}}$ is an irrational number	½ 1 1 ½
30.	A room is in the form of a cylinder surmounted by a hemispherical dome. The base radius of the hemisphere is half of the height of the cylindrical part. If the room contains $\frac{1408}{21}m^3$ of air, find the height of the cylindrical part. (Use $\pi = \frac{22}{7}$).	
Sol.	Let r is the radius of hemisphere and cylinder and h is the height of cylinder $h = 2r$ Volume of air in room $= \frac{2}{3}\pi r^3 + \pi r^2 h$ $\frac{1408}{21} = \frac{2}{3}\pi r^3 + \pi r^2(2r)$ $\frac{1408}{21} = \frac{8}{3} \times \frac{22}{7} \times r^3$ $r^3 = 8$ $\therefore$ $r = 2$ m and $h = 4$ m	½ ½ **1** ½ ½
31.	Two dice are thrown at the same time. Determine the probability that the difference of the numbers on the two dice is 2.	
Sol.	Total outcomes = 36 Number of Outcomes with difference of the numbers on the two dice is 2 = 8 (1,3) (3,1) (4,2) (2,4) (5,3) (3,5) (4,6) (6,4) P (difference of the numbers on the two dice is 2) = $\frac{8}{36}$ or $\frac{2}{9}$	**1** **1** **1**

	SECTION D This section has **4** Long Answer (LA) type questions carrying **5** marks each.	
32.	Vijay invested certain amounts of money in two schemes A and B, which offer interest at the rate of 8% per annum and 9% per annum, respectively. He received ₹ 1,860 as the total annual interest. However, had he interchanged the amounts of investments in the two schemes, he would have received ₹ 20 more as annual interest. How much money did he invest in each scheme ?	
Sol.	Let Vijay invested ₹ x at 8% rate of interest & ₹ y at 9% rate of interest ATQ, $\frac{8x}{100} + \frac{9y}{100} = 1860$ or $8x + 9y = 186000$ ……..(i) $\frac{9x}{100} + \frac{8y}{100} = 1880$ or $9x + 8y = 188000$ ……..(ii) On solving (i) and (ii), we get $x = 12000$ $y = 10000$ Hence, money invested in scheme A is ₹ 12000 and scheme B is ₹ 10000.	**1½** **1½** **1** **1**
33.(a)	The diagonal BD of a parallelogram ABCD intersects the line segment AE at the point F, where E is any point on the side BC. Prove that DF × EF = FB × FA.	
Sol.	 Correct figure In Δ ADF and Δ EBF, ∠ DFA = ∠ EFB ∠ ADF = ∠ FBE ∴ Δ ADF ~ Δ EBF ∴ $\frac{DF}{FB} = \frac{FA}{EF}$ ⇒ DF ×EF = FB ×FA	**1** **2** **1** **1**
	OR	

33.(b)	In ΔABC, if $AD \perp BC$ and $AD^2 = BD \times DC$, then prove that $\angle BAC = 90°$.	
Sol.	 Correct figure $AD^2 = BD \times DC$ $\frac{AD}{DC} = \frac{BD}{AD}$ Also, $\angle ADB = \angle ADC$ $\therefore \Delta DBA \sim \Delta DAC$ $\angle DBA = \angle DAC$ $\angle BAD = \angle DCA$ Adding both $\angle DBA + \angle DCA = \angle DAC + \angle BAD$ $\therefore \quad \angle BAC = 90°$	**1** **1** **1** **1** **1**
34.(a)	The perimeter of a right triangle is 60 cm and its hypotenuse is 25 cm. Find the lengths of other two sides of the triangle.	
Sol.	Let the other two sides be x cm and y cm ATQ $x + y + 25 = 60$ $y = 35 - x$ Now, $x^2 + y^2 = (25)^2$ $x^2 + (35 - x)^2 = 625$ $x^2 - 35x + 300 = 0$ $(x - 20)(x - 15) = 0$ $\Rightarrow x = 20, 15$ $x = 20 \Rightarrow y = 15$ $x = 15 \Rightarrow y = 20$ Hence sides are 15 cm and 20 cm.	**1** **½** **1** **1** **1** **½**
	OR	
34.(b)	A train travels a distance of 480 km at a uniform speed. If the speed had been 8 km/h less, then it would have taken 3 hours more to cover the same distance. Find the speed of the train.	
Sol.	Let the speed of train be x km/h Reduced speed of train = $(x - 8)$ km/h ATQ $\frac{480}{x-8} - \frac{480}{x} = 3$	**½** **1½**

	$x^2 - 8x - 1280 = 0$ $(x - 40)(x + 32) = 0$ $\Rightarrow x = 40$ $\therefore$ Speed of train = 40 km/h	**1½** **1** **½**
35.	**Find the missing frequency 'f' in the following table, if the mean of the given data is 18. Hence find the mode.** *Daily Allowance* | *Number of Children* 11 – 13 | 7 13 – 15 | 6 15 – 17 | 9 17 – 19 | 13 19 – 21 | f 21 – 23 | 5 23 – 25 | 4	
Sol.	Daily Allowance | x_i | f_i | $f_i x_i$ 11 – 13 | 12 | 7 | 84 13 – 15 | 14 | 6 | 84 15 – 17 | 16 | 9 | 144 17 – 19 | 18 | 13 | 234 19 – 21 | 20 | f | 20f 21 – 23 | 22 | 5 | 110 23 – 25 | 24 | 4 | 96 Total | | 44 + f | 752 + 20f Correct table Mean $= \frac{752+20f}{44+f}$ $\Rightarrow 18 = \frac{752+20f}{44+f}$ $\therefore$ f = 20 modal class is 19 – 21 mode $= 19 + \frac{20-13}{40-13-5} \times 3$ $= 19.95$ approx.	**1½** **1** **½** **½** **1** **½**

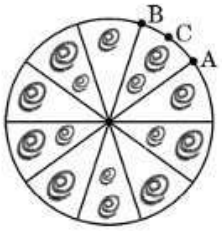
	SECTION E This section has **3** case study based carrying **4** marks each.	
36.	**Case Study – 1** A school is organizing a charity run to raise funds for a local hospital. The run is planned as a series of rounds around a track, with each round being 300 metres. To make the event more challenging and engaging, the organizers decide to increase the distance of each subsequent round by 50 metres. For example, the second round will be 350 metres, the third round will be 400 metres and so on. The total number of rounds planned is 10.  Based on the information given above, answer the following questions : (i) Write the fourth, fifth and sixth term of the Arithmetic Progression so formed. (ii) Determine the distance of the 8^{th} round. (iii) (a) Find the total distance run after completing all 10 rounds. **OR** (iii) (b) If a runner completes only the first 6 rounds, what is the total distance run by the runner ?	
Sol.	A.P formed is 300, 350, 400…… (i) $a_4 = 450$ $a_5 = 500$ $a_6 = 550$ (ii) $a_8 = 300 + 7 \times 50$ $= 650$ m (iii) (a) $S_{10} = \frac{10}{2} \times (2 \times 300 + 9 \times 50)$ $= 5250$ m **OR** (iii) (b) $S_6 = \frac{6}{2} \times (2 \times 300 + 5 \times 50)$ $= 2250$ m	**1** ½ ½ **1** **1** **1** **1**

37.

Case Study – 2

A brooch is a decorative piece often worn on clothing like jackets, blouses or dresses to add elegance. Made from precious metals and decorated with gemstones, brooches come in many shapes and designs.

One such brooch is made with silver wire in the form of a circle with diameter 35 mm. The wire is also used in making 5 diameters which divide the circle into 10 equal sectors as shown in the figure.



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

(i) Find the central angle of each sector.

(ii) Find the length of the arc ACB.

(iii) (a) Find the area of each sector of the brooch.

OR

(iii) (b) Find the total length of the silver wire used.

Sol.

(i) central angle $= \frac{360^0}{10} = 36°$ **1**

(ii) length of arc ACB $= \frac{1}{10} \times 2 \times \frac{22}{7} \times \frac{35}{2} = 11\text{mm}$ **1**

(iii)(a) Area of each sector of the brooch $= \frac{1}{10} \times \frac{22}{7} \times \frac{35}{2} \times \frac{35}{2}$ **1**

$= \frac{385}{4}\ \text{mm}^2$ or $96.25\ \text{mm}^2$ **1**

OR

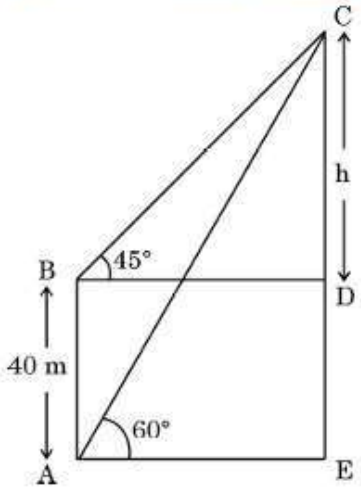
(iii) (b) length of silver wire used $= 2 \times \frac{22}{7} \times \frac{35}{2} + 5 \times 35$ **1**

$= 285$ mm **1**

38.

Case Study – 3

Amrita stood near the base of a lighthouse, gazing up at its towering height. She measured the angle of elevation to the top and found it to be 60°. Then, she climbed a nearby observation deck, 40 metres higher than her original position and noticed the angle of elevation to the top of lighthouse to be 45°.



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

(i) **If CD is h metres, find the distance BD in terms of 'h'.**

(ii) **Find distance BC in terms of 'h'.**

(iii) (a) Find the height CE of the lighthouse [Use $\sqrt{3}$ = 1·73]

OR

(iii) (b) Find distance AE, if AC = 100 m.

Sol.

(i) $\frac{h}{BD} = \tan 45° = 1$ ½

$\Rightarrow$ BD = h m ½

(ii) $\frac{h}{BC} = \sin 45° = \frac{1}{\sqrt{2}}$ ½

$\Rightarrow$ BC = $\sqrt{2}$h m ½

(iii)(a) $\tan 60° = \frac{EC}{AE}$

$\Rightarrow \sqrt{3} = \frac{h+40}{h}$ 1

$\Rightarrow$ h = 20 ($\sqrt{3}$ + 1) = 20 × 2.73 = 54.6 m ½

$\therefore$ CE = 54.6 + 40 = 94.6 m ½

OR

	(iii)(b) $\cos 60° = \frac{AE}{AC}$ $\Rightarrow \quad \frac{1}{2} = \frac{AE}{100}$ $\therefore \quad AE = 50$ m	**1** **1**