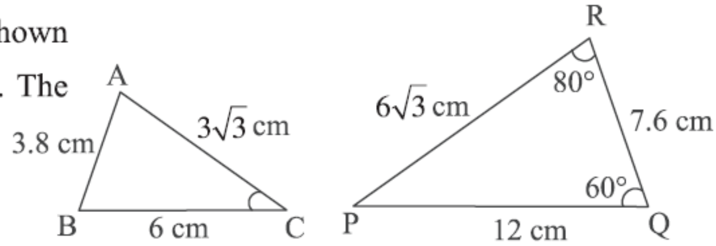
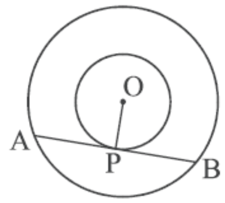
	Marking Scheme **Strictly Confidential** **(For Internal and Restricted use only)** **Secondary School Examination, 2025** **MATHEMATICS (Standard) (Q.P. CODE 30/4/2)**
	<u>General Instructions: -</u>
1.	You are aware that evaluation is the most important process in the actual and correct assessment 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.	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.

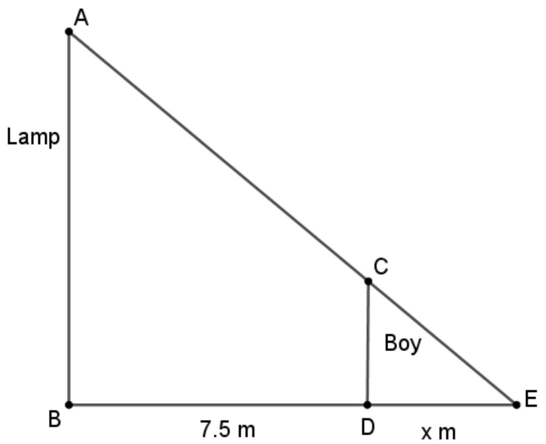
MARKING SCHEME
MATHEMATICS (Subject Code–041)
(PAPER CODE: 30/4/2)

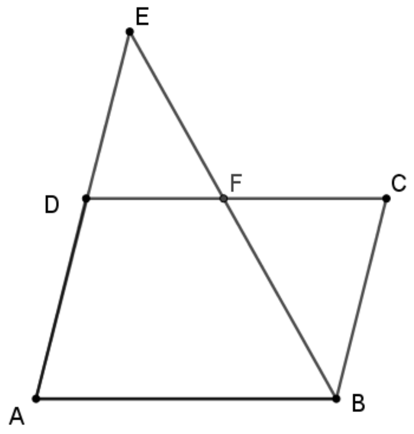
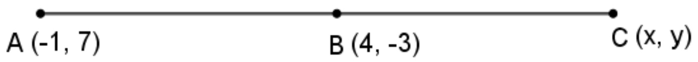
Q. No.	EXPECTED OUTCOMES/VALUE POINTS	Marks
	SECTION - A **This section consists of 20 questions of 1 mark each.**	
1.	Which of the following statements is true for a polynomial $p(x)$ of degree 3? (a) $p(x)$ has at most two distinct zeroes. (b) $p(x)$ has at least two distinct zeroes. (c) $p(x)$ has exactly three distinct zeroes. (d) $p(x)$ has at most three distinct zeroes.	
Sol.	(d) $p(x)$ has at most three distinct zeroes.	**1**
2.	A pair of dice is thrown once. The probability that sum of numbers appearing on top faces is at least 4 is : (a) $\frac{1}{11}$ (b) $\frac{10}{11}$ (c) $\frac{5}{6}$ (d) $\frac{11}{12}$	
Sol.	(d) $\frac{11}{12}$	**1**
3.	If $x = ab^3$ and $y = a^3b$, where a and b are prime numbers, then [HCF (x, y) – LCM (x, y)] is equal to : (a) $1 - a^3b^3$ (b) $ab(1 - ab)$ (c) $ab - a^4b^4$ (d) $ab(1 - ab)(1 + ab)$	
Sol.	(d) $ab(1 - ab)(1 + ab)$	**1**
4.	$\left(1+\sqrt{3}\right)^2 - \left(1-\sqrt{3}\right)^2$ is : (a) a positive rational number. (b) a negative integer. (c) a positive irrational number. (d) a negative irrational number.	
Sol.	(c) a positive irrational number	**1**
5.	The value of 'a' for which $ax^2 + x + a = 0$ has equal and positive roots is : (a) 2 (b) -2 (c) $\frac{1}{2}$ (d) $-\frac{1}{2}$	
Sol.	(d) $-\frac{1}{2}$	**1**
6.	The distance of which of the following points from origin is less than 5 units ? (a) (3, 4) (b) (2, 6) (c) $(-3, -4)$ (d) (1, 4)	
Sol.	(d) (1,4)	**1**

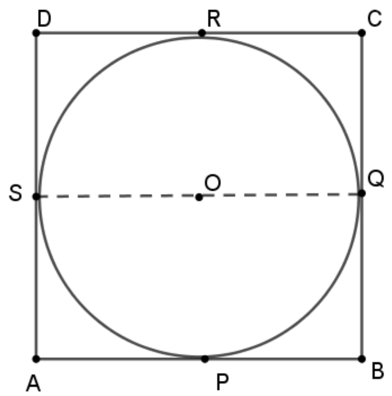
7.	The number of red balls in a bag is 10 more than the number of black balls. If the probability of drawing a red ball at random from this bag is $\frac{3}{5}$, then the total number of balls in the bag is : (a) 50 (b) 60 (c) 80 (d) 40	
Sol.	(a) 50	**1**
8.	The value of 'p' for which the equations $px + 3y = p - 3$, $12x + py = p$ has infinitely many solutions is : (a) -6 only (b) 6 only (c) ± 6 (d) Any real number except ± 6	
Sol.	(b) 6 only	**1**
9.	ΔABC and ΔPQR are shown in the adjoining figures. The measure of $\angle C$ is :  (a) 140° (b) 80° (c) 60° (d) 40°	
Sol.	(d) 40°	**1**
10.	Which of the following is a trigonometric identity ? (a) $\sin^2\theta = 1 + \cos^2\theta$ (b) $\operatorname{cosec}^2\theta + \cot^2\theta = 1$ (c) $\sec^2\theta = 1 + \tan^2\theta$ (d) $\sin 2\theta = 2\sin\theta$	
Sol.	(c) $sec^2\theta = 1 + tan^2\theta$	**1**
11.	Which of the following statements is true ? (a) $\sin 20° > \sin 70°$ (b) $\sin 20° > \cos 20°$ (c) $\cos 20° > \cos 70°$ (d) $\tan 20° > \tan 70°$	
Sol.	(c) $\cos 20° > \cos 70°$	**1**
12.	A 30 m long rope is tightly stretched and tied from the top of pole to the ground. If the rope makes an angle of 60° with the ground, the height of the pole is : (a) $10\sqrt{3}$ m (b) $30\sqrt{3}$ m (c) 15 m (d) $15\sqrt{3}$ m	
Sol.	(d) $15\sqrt{3}$ m	**1**
13.	If mean and mode of given set of observations are 10 and 13 respectively, then the value of median is : (a) 19 (b) 4 (c) 11 (d) 43	
Sol.	(c) 11	**1**

14.	In the adjoining figure, AB is the chord of larger circle which touches the smaller circle at P. If length of AB = diameter of inner circle = 2 r, then the diameter of larger circle is : (a) 2 r (b) 4 r (c) $2\sqrt{2}\,r$ (d) $\sqrt{2}\,r$ 	
Sol.	(c) $2\sqrt{2}\,r$	**1**
15.	On the top face of the wooden cube of side 7 cm, hemispherical depressions of radius 0.35 cm are to be formed by taking out the wood. The maximum number of depressions that can be formed is : (a) 400 (b) 100 (c) 20 (d) 10	
Sol.	(b) 100	**1**
16.	The cumulative frequency for calculating median is obtained by adding the frequencies of all the : (a) classes up to the median class (b) classes following the median class (c) classes preceding the median class (d) all classes	
Sol.	(c) classes preceding the median class	**1**
17.	A parallelogram having one of its sides 5 cm circumscribes a circle. The perimeter of parallelogram is : (a) 20 cm (b) less than 20 cm (c) more than 20 cm but less than 40 cm (d) 40 cm	
Sol.	(a) 20 cm	**1**
18.	E and F are points on the sides AB and AC respectively of a ΔABC such that $\frac{AE}{EB} = \frac{AF}{FC} = \frac{1}{2}$. Which of the following relation is true ? (a) EF = 2BC (b) BC = 2EF (c) EF = 3BC (d) BC = 3 EF	
Sol.	(d) BC = 3 EF	**1**
	Directions : **In question number 19 and 20, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option :** (a) Both, Assertion (A) and Reason (R) are true and Reason (R) is correct explanation of 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) :** A line drawn perpendicular to the tangent at point of contact passes through the centre of the circle. **Reason (R) :** Lengths of tangents drawn from external point to a circle are equal.	

Sol.	(b) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).	**1**
20	**Assertion (A) :** 4^n ends with digit 0 for some natural number n. **Reason (R) :** For a number 'x' having 2 and 5 as its prime factors, x^n always ends with digit 0 for every natural number n.	
Sol.	(d) Assertion (A) is false but Reason (R) is true.	**1**
	SECTION - B **This section consists of 5 questions of 2 marks each.**	
21 (A).	Find the value of x for which $(\sin A + \operatorname{cosec} A)^2 + (\cos A + \sec A)^2 = x + \tan^2 A + \cot^2 A$	
Sol.	$(\sin A + \operatorname{cosec} A)^2 + (\cos A + \sec A)^2 = x + \tan^2 A + \cot^2 A$ $\Rightarrow \sin^2 A + \operatorname{cosec}^2 A + 2 + \cos^2 A + \sec^2 A + 2 = x + \tan^2 A + \cot^2 A$ $\Rightarrow 1 + 2 + 2 + 1 + \cot^2 A + 1 + \tan^2 A = x + \tan^2 A + \cot^2 A$ $\therefore x = 7$	 ½ **1** ½
	OR	
21 (B).	Evaluate the following : $\dfrac{3\sin 30° - 4\sin^3 30°}{2\sin^2 50° + 2\cos^2 50°}$	
Sol.	$\dfrac{3\sin 30° - 4\sin^3 30°}{2\sin^2 50° + 2\cos^2 50°}$ $= \dfrac{3\times\frac{1}{2} - 4\times\frac{1}{8}}{2(\sin^2 50° + \cos^2 50°)}$ $= \dfrac{\frac{3}{2} - \frac{1}{2}}{2\times 1}$ $= \dfrac{1}{2}$	 **1** ½ ½
22.	Saima and Aryaa were born in the month of June in the year 2012. Find the probability that : (i) they have different dates of birth. (ii) they have same date of birth.	
Sol.	Number of days in June 2012 = 30 (i) P (different dates of birth) = $\frac{29}{30}$ (ii) P (same date of birth) = $\frac{1}{30}$	 **1** **1**

23.	Solve the following system of equations algebraically : $37x + 63y = 137$ $63x + 37y = 163$	
Sol.	Adding and subtracting the given equations, we get $x + y = 3$ … (i) and $x - y = 1$ … (ii) Solving (i) and (ii), we get $x = 2, y = 1$	 ½ ½ ½+½
24 (A).	A 1.5 m tall boy is walking away from the base of a lamp post which is 12 m high, at the speed of 2.5 m/sec. Find the length of his shadow after 3 seconds.	
Sol.	Let AB be the lamp post and CD be the boy 1.5 m tall.  For correct figure Let the length of shadow be x m Speed of boy = 2.5 m/sec ∴ Distance covered in 3 seconds = 7.5 m Now, Δ ABE $\sim \Delta$ CDE $\Rightarrow \frac{CD}{AB} = \frac{DE}{BE}$ $\Rightarrow \frac{1.5}{12} = \frac{x}{7.5+x}$ Solving, we get x = $\frac{15}{14}$ or 1.07 approx. Hence length of shadow is 1.07 m	 ½ ½ ½ ½
	OR	

24 (B).	In parallelogram ABCD, side AD is produced to a point E and BE intersects CD at F. Prove that $\Delta ABE \sim \Delta CFB$	
Sol.	 For correct figure In Δ ABE and Δ CFB, $\angle AEB = \angle CBF$ $\angle A = \angle C$ $\therefore\ \Delta ABE \sim \Delta CFB$	½ **1** ½
25.	Find the coordinates of the point C which lies on the line AB produced such that AC = 2BC, where coordinates of points A and B are (– 1, 7) and (4, – 3) respectively.	
Sol.	 Let coordinates of point C be (x, y) $AC = 2\ BC$ $\Rightarrow$ B is mid-point of AC $\Rightarrow \frac{-1+x}{2} = 4 \Rightarrow x = 9$ $\frac{7+y}{2} = -3 \Rightarrow y = -13$ $\therefore$ Coordinates of C are $(9, -13)$	½ ½ ½ ½
	SECTION - C **This section consists of 6 questions of 3 marks each.**	
26.	α and β are zeroes of a quadratic polynomial $x^2 - ax - b$. Obtain a quadratic polynomial whose zeroes are $3\alpha + 1$ and $3\beta + 1$.	
Sol.	$\alpha + \beta = a, \ \alpha\beta = -b$ Sum of zeroes of required polynomial $= (3\alpha + 1) + (3\beta + 1)$	½

	$= 3(\alpha + \beta) + 2$ $= 3a + 2$ Product of zeroes of required polynomial $= (3\alpha + 1)(3\beta + 1)$ $= 9\alpha\beta + 3(\alpha + \beta) + 1$ $= -9b + 3a + 1$ ∴ The required polynomial is $x^2 - (3a + 2)\,x + (3a - 9b + 1)$	**1** **1** ½
27.	Rectangle ABCD circumscribes the circle of radius 10 cm. Prove that ABCD is a square. Hence, find the perimeter of ABCD.	
Sol.	 For correct figure AP = AS BP = BQ CR = CQ DR = DS Adding the above four equations, AP + BP + CR + DR = AS + BQ + CQ + DS ⟹ AB + CD = AD + CB --- (i) Since ABCD is a rectangle ∴ AB = CD and BC = AD ⟹ from (i), 2 AB = 2 AD or AB = AD Hence ABCD is a square Clearly side of square = diameter of circle = 20 cm ∴ Perimeter of square = 4 × 20 cm = 80 cm	½ **1** ½ ½ ½

28 (A).	Prove that $\sqrt{2}$ is an irrational number.	
Sol.	Let $\sqrt{2}$ be a rational number. $\therefore \sqrt{2} = \frac{p}{q}$, where $q \neq 0$ and let p & q be co-primes. $2q^2 = p^2 \implies p^2$ is divisible by 2 $\implies p$ is divisible by 2 ----- (i) $\implies p = 2a$, where 'a' is some integer $4a^2 = 2q^2 \implies q^2 = 2a^2 \implies q^2$ is divisible by 2 $\implies q$ is divisible by 2 ----- (ii) (i) and (ii) leads to contradiction as 'p' and 'q' are co-primes. $\therefore \sqrt{2}$ is an irrational number.	½ 1 1 ½
	OR	
28 (B).	Let x and y be two distinct prime numbers and $p = x^2 y^3$, $q = xy^4$, $r = x^5 y^2$. Find the HCF and LCM of p, q and r. Further check if HCF $(p, q, r) \times$ LCM $(p, q, r) = p \times q \times r$ or not.	
Sol.	$p = x^2y^3, q = xy^4, r = x^5y^2$ HCF $(p,q,r) = xy^2$ LCM $(p,q,r) = x^5y^4$ HCF $\times$ LCM $= x^6y^6$ $p \times q \times r = x^8y^9$ $\implies$ HCF $(p,q,r) \times$ LCM $(p,q,r) \neq p \times q \times r$	1 1 1
29.	The two angles of a right angled triangle other than 90° are in the ratio $2:3$. Express the given situation algebraically as a system of linear equations in two variables and hence solve it.	
Sol.	Let the measures of two angles be x and y ATQ $x + y = 90°$ … (i) and $\frac{x}{y} = \frac{2}{3} \implies 3x - 2y = 0$ … (ii) Solving (i) and (ii), we get $x = 36°, y = 54°$	1 1 ½ + ½
30.	P (x, y), Q $(-2, -3)$ and R $(2, 3)$ are the vertices of a right triangle PQR right angled at P. Find the relationship between x and y. Hence, find all possible values of x for which $y = 2$.	
Sol.	In Δ PQR, $\angle P = 90°$ $PQ^2 + PR^2 = QR^2$	

	$\Rightarrow (x+2)^2 + (y+3)^2 + (x-2)^2 + (y-3)^2 = 4^2 + 6^2$ $\Rightarrow x^2 + 4x + 4 + y^2 + 6y + 9 + x^2 - 4x + 4 + y^2 - 6y + 9 = 52$ gives, $x^2 + y^2 = 13$ Now for $y = 2, x = \pm 3$	**1** **1** **1**
31 (A).	Prove that $\frac{\cos A + \sin A - 1}{\cos A - \sin A + 1} = \operatorname{cosec} A - \cot A$	
Sol.	LHS $= \frac{\cos A + \sin A - 1}{\cos A - \sin A + 1}$ $= \frac{\cot A + 1 - \operatorname{cosec} A}{\cot A - 1 + \operatorname{cosec} A}$ $= \frac{\cot A - \operatorname{cosec} A + \operatorname{cosec}^2 A - \cot^2 A}{\cot A - 1 + \operatorname{cosec} A}$ $= \frac{(\operatorname{cosec} A - \cot A)(-1 + \operatorname{cosec} A + \cot A)}{\cot A - 1 + \operatorname{cosec} A}$ $= \operatorname{cosec} A - \cot A =$ RHS	 **1** **1** ½ ½
	OR	
31 (B).	If $\cot\theta + \cos\theta = p$ and $\cot\theta - \cos\theta = q$, prove that $p^2 - q^2 = 4\sqrt{pq}$	
Sol.	LHS $= p^2 - q^2$ $= (\cot\theta + \cos\theta)^2 - (\cot\theta - \cos\theta)^2$ $= [(\cot\theta + \cos\theta) + (\cot\theta - \cos\theta)][(\cot\theta + \cos\theta) - (\cot\theta - \cos\theta)]$ $= 2\cot\theta \times 2\cos\theta = 4\cot\theta\cos\theta$ RHS $= 4\sqrt{pq}$ $= 4\sqrt{(\cot\theta + \cos\theta)(\cot\theta - \cos\theta)}$ $= 4\sqrt{cot^2\theta - cos^2\theta}$ $= 4\sqrt{cos^2\theta(cosec^2\theta - 1)}$ $= 4\sqrt{cos^2\theta \times cot^2\theta}$ $= 4\cot\theta\cos\theta$ $\therefore$ LHS = RHS	 **1** ½ ½ ½ ½

	SECTION - D **This section consists of 4 questions of 5 marks each.**	
32.	The following table shows the number of traffic challans issued in the month of April by the traffic police : **Number of Challans** / **Number of Days**: 0-10 / 3; 10-20 / 5; 20-30 / 10; 30-40 / 9; 40-50 / 2; 50-60 / 1; **Total** / **30** Find the 'mean' and 'mode' of the above data.	
Sol.	(table below)	**1½ marks for correct table**

Number of Challans	Number of days (f_i)	Class Mark (x_i)	$f_i\ x_i$
0-10	3	5	15
10-20	5	15	75
20-30	10	25	250
30-40	9	35	315
40-50	2	45	90
50-60	1	55	55
Total	$\sum f_i$ =30		$\sum f_i x_i$ =800

Mean $= \frac{800}{30}$ **1**

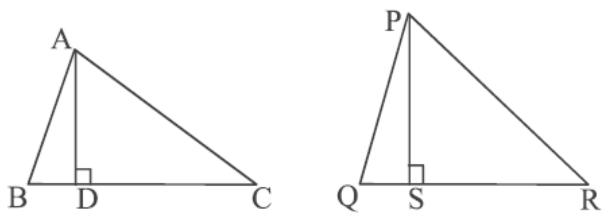
$= \frac{80}{3}$ or 26.67 or 27 (approx.) **½**

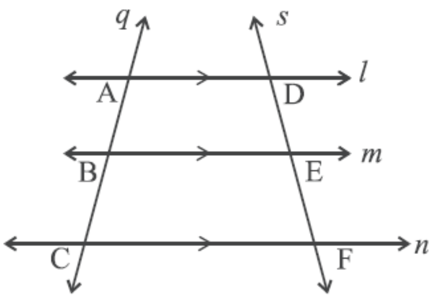
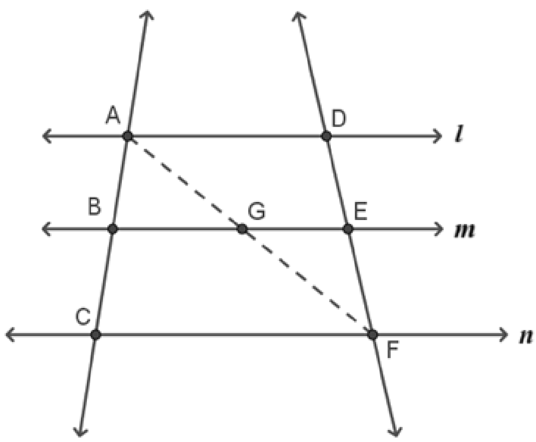
Modal class is 20-30 **½**

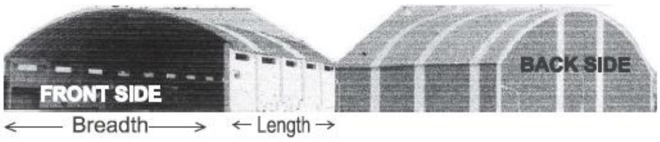
Mode $= 20 + \frac{10-5}{2\times10-5-9} \times 10$ **1**

$= \frac{85}{3}$ or 28.3 or 28 (approx.) **½**

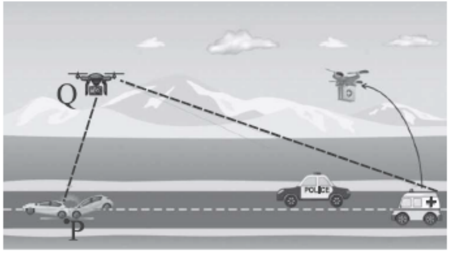
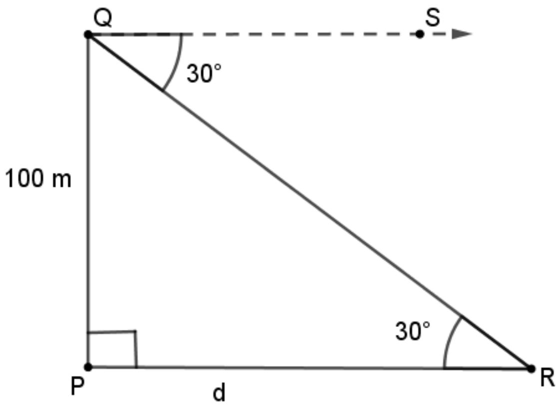
33 (A).	The sides of a right triangle are such that the longest side is 4 m more than the shortest side and the third side is 2 m less than the longest side. Find the length of each side of the triangle. Also, find the difference between the numerical values of the area and the perimeter of the given triangle.	
Sol.	Let the length of shortest side be x m	

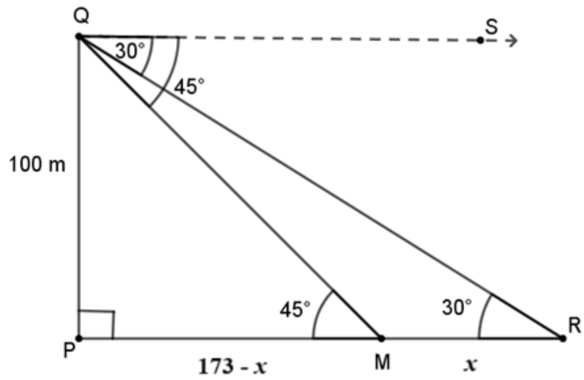
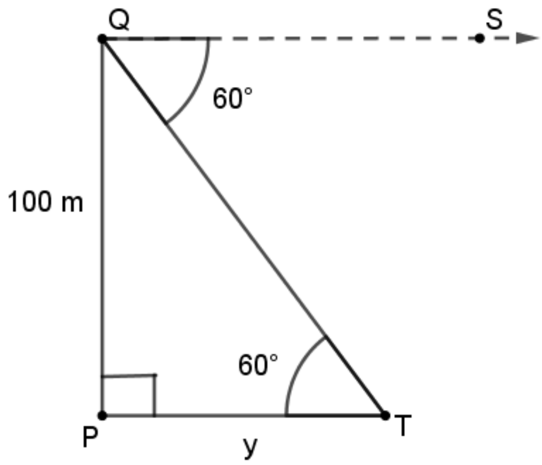
	$\therefore$ length of longest side $= (x+4)$ m and length of third side $= (x+2)$ m	1
	Now, $(x+4)^2 = x^2 + (x+2)^2$	1
	$\Rightarrow x^2 - 4x - 12 = 0$	
	$\Rightarrow (x-6)(x+2) = 0$	
	$\Rightarrow x = 6$	1
	$\therefore$ sides are 6 m, 8 m and 10 m	½
	Area $= \frac{1}{2} \times 6 \times 8 = 24\text{ m}^2$	½
	Perimeter $= 6 + 8 + 10 = 24$ m	½
	Difference $= 0$	½
	OR	
33 (B).	Express the equation $\frac{x-2}{x-3} + \frac{x-4}{x-5} = \frac{10}{3}$; $(x \neq 3, 5)$ as a quadratic equation in standard form. Hence, find the roots of the equation so formed.	
Sol.	$\frac{x-2}{x-3} + \frac{x-4}{x-5} = \frac{10}{3}$	
	$\Rightarrow \frac{(x-2)(x-5)+(x-4)(x-3)}{(x-3)(x-5)} = \frac{10}{3}$	1½
	Simplifying, we get $2x^2 - 19x + 42 = 0$	1½
	$\Rightarrow (x-6)(2x-7) = 0$	1
	$\Rightarrow x = 6$ or $x = \frac{7}{2}$	1
34 (A).	The corresponding sides of ΔABC and ΔPQR are in the ratio 3 : 5. $AD \perp BC$ and $PS \perp QR$ as shown in the following figures :  (i) Prove that $\Delta ADC \sim \Delta PSR$ (ii) If AD = 4 cm, find the length of PS. (iii) Using (ii) find ar (ΔABC) : ar (ΔPQR)	
Sol.	As, $\frac{AB}{PQ} = \frac{BC}{QR} = \frac{AC}{PR} = \frac{3}{5}$	

	$\Rightarrow\ \Delta\,ABC \sim \Delta\,PQR$	½
	$\Rightarrow\ \angle C = \angle R$	
	(i) In $\Delta\,ADC$ and $\Delta\,PSR$,	
	$\angle ADC = \angle PSR = 90°$ and $\angle C = \angle R$	1
	$\therefore\ \Delta\,ADC \sim \Delta\,PSR$	½
	(ii) $\frac{AD}{PS} = \frac{AC}{PR} = \frac{3}{5}$	½
	$\Rightarrow \frac{4}{PS} = \frac{3}{5}$	½
	$\Rightarrow PS = \frac{20}{3}$ cm	½
	(iii) $\frac{ar\,(\Delta\,ABC)}{ar\,(\Delta\,PQR)} = \frac{\frac{1}{2}\times BC \times AD}{\frac{1}{2}\times QR \times PS}$	1
	$= \frac{3}{5} \times \frac{3}{5} = \frac{9}{25}$	½
	$\therefore\ ar\,(\Delta\,ABC) : ar\,(\Delta\,PQR) = 9 : 25$	
	OR	
34 (B).	State basic proportionality theorem. Use it to prove the following : If three parallel lines l, m, n are intersected by transversals q and s as shown in the adjoining figure, then $\frac{AB}{BC} = \frac{DE}{EF}$.  	
Sol.	Correct statement  	1

	Join AF intersecting line m at G In Δ ACF, BG $\parallel$ CF $\Rightarrow \frac{AB}{BC} = \frac{AG}{GF}$ … (i) In Δ FDA, GE $\parallel$ AD $\Rightarrow \frac{EF}{DE} = \frac{GF}{AG}$ or $\frac{DE}{EF} = \frac{AG}{GF}$ … (ii) From, (i) and (ii), we get $\frac{AB}{BC} = \frac{DE}{EF}$	**1** **1** **1** **1**
35.	In order to provide shelter to flood victims, a shed was constructed using tin sheets which is in the form of cuboid surmounted by a half cylinder as shown below :  The length, breadth and height of cuboidal portion are 10 m, 7 m and 3 m respectively. The diameter of the cylindrical portion is 7 m. Find the cost of tin sheets required to make the shed at the rate of ₹ 70 per square metre, given that the shed is open from the front side and closed from the back side.	
Sol.	Area of the sheet required for the shed = (lateral surface area of the cuboid – front area) $+\frac{1}{2}$ CSA of cylinder + area of semicircle $= [2 \times (10+7) \times 3 - 7 \times 3] + \frac{1}{2} \times 2 \times \frac{22}{7} \times \frac{7}{2} \times 10 + \frac{1}{2} \times \frac{22}{7} \times \left(\frac{7}{2}\right)^2$ $= \frac{841}{4}\ m^2$ Cost of sheet $= \frac{841}{4} \times 70 = ₹\ 14717.50$	 **1+1+1** **1** **1**

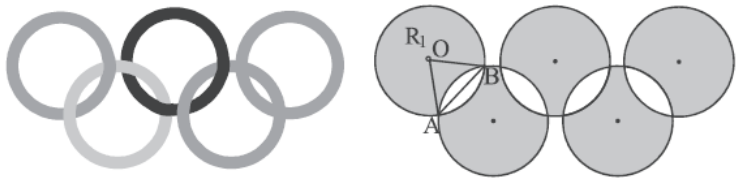
	SECTION - E **This section consists of 3 case-study based questions of 4 marks each.**	
36.	Cable cars at hill stations are one of the major tourist attractions. On a hill station, the length of cable car ride from base point to top most point on the hill is 5000 m. Poles are installed at equal intervals on the way to provide support to the cables on which car moves.  The distance of first pole from base point is 200 m and subsequent poles are installed at equal interval of 150 m. Further, the distance of last pole from the top is 300 m. Based on above information, answer the following questions using Arithmetic Progression : (i) Find the distance of 10^{th} pole from the base. (ii) Find the distance between 15^{th} pole and 25^{th} pole. (iii) (a) Find the time taken by cable car to reach 15^{th} pole from the top if it is moving at the speed of 5m/sec and coming from top. **OR** (iii) (b) Find the total number of poles installed along the entire journey.	
Sol.	AP formed is $200, 350, 500, ...$ (i) Distance of 10^{th} pole from base $= a_{10}$ $= 200 + 9 \times 150$ $= 1550$ m	**1**
	(ii) Distance between 15^{th} pole and 25^{th} pole $= a_{25} - a_{15}$ $= 10 \times 150 = 1500$ m	**1**
	(iii) (a) Distance of 15^{th} pole from the top $= 300 + 14 \times 150$ $= 2400$ m	**1**
	Time taken by cable car $= \frac{2400}{5} = 480$ seconds or 8 minutes	**1**
	OR	
	(iii) (b) Distance of last pole from the base $= (5000 - 300)$ m $= 4700$ m	**½**
	$\therefore\ a_n = 4700$ $\Rightarrow 200 + (n-1)150 = 4700$	**1**
	Solving, we get $n = 31$	**½**

37.	A drone was used to facilitate movement of an ambulance on the straight highway to a point P on the ground where there was an accident. The ambulance was travelling at the speed of 60 km/h. The drone stopped at a point Q, 100 m vertically above the point P. The angle of depression of the ambulance was found to be 30° at a particular instant.  Based on above information, answer the following questions : (i) Represent the above situation with the help of a diagram. (ii) Find the distance between the ambulance and the site of accident (P) at the particular instant. (Use $\sqrt{3} = 1.73$) (iii) (a) Find the time (in seconds) in which the angle of depression changes from 30° to 45°. **OR** (iii) (b) How long (in seconds) will the ambulance take to reach point P from a point T on the highway such that angle of depression of the ambulance at T is 60° from the drone ?	
Sol.	(i)  For correct figure	**1**
	(ii) In Δ PQR, $\frac{100}{d} = \tan 30° = \frac{1}{\sqrt{3}}$	½
	$\Rightarrow d = 100\sqrt{3} = 173$ m	½

	(iii) (a)	
	 For correct figure	½
	In Δ PQM, $\frac{100}{173-x}$ = tan 45° = 1	½
	$\Rightarrow x = 73$ m	½
	Time taken $= \frac{73\times18}{60\times5} = \frac{219}{50}$ or 4.4 seconds (approx.)	½
	OR	
	(iii) (b)	
	 For correct figure	½
	In Δ PQT, $\frac{100}{y}$ = tan 60° $= \sqrt{3}$	½
	$\Rightarrow$ y = $\frac{100}{\sqrt{3}} = \frac{100\sqrt{3}}{3}$ or $\frac{173}{3}$ m	½
	Time taken $= \frac{100\sqrt{3}\times 18}{3\times 60\times 5} = 2\sqrt{3}$ or 3.5 seconds (approx.)	½

38. The Olympic symbol comprising five interlocking rings represents the union of the five continents of the world and the meeting of athletes from all over the world at the Olympic games. In order to spread awareness about Olympic games, students of Class-X took part in various activities organised by the school. One such group of students made 5 circular rings in the school lawn with the help of ropes. Each circular ring required 44 m of rope.

Also, in the shaded regions as shown in the figure, students made rangoli showcasing various sports and games. It is given that ΔOAB is an equilateral triangle and all unshaded regions are congruent.



Based on above information, answer the following questions :

(i) Find the radius of each circular ring.

(ii) What is the measure of $\angle AOB$?

(iii) (a) Find the area of shaded region R_1.

OR

(iii) (b) Find the length of rope around the unshaded regions.

Sol.

(i) $2 \times \frac{22}{7} \times r = 44$ ½

$\Rightarrow r = 7$ m ½

(ii) $\angle AOB = 60°$ **1**

(iii) (a) Area of shaded region R_1 = area of circle − area of 2 segments

$= \frac{22}{7} \times 7 \times 7 - 2 \times \left(\frac{60}{360} \times \frac{22}{7} \times 7 \times 7 - \frac{\sqrt{3}}{4} \times 7 \times 7\right)$ **1**

$= \left(\frac{308}{3} + \frac{49\sqrt{3}}{2}\right) m^2$ or $145.05\ m^2$ (approx.) **1**

OR

(iii) (b) Length of rope around unshaded regions

$= 8 \times$ length of arc ½

$= 8 \times 2 \times \frac{60}{360} \times \frac{22}{7} \times 7$ **1**

$= \frac{176}{3}$ m or 58.66 m (approx.) ½