Marking Scheme
Strictly Confidential
(For Internal and Restricted use only)
Secondary School Examination, 2025
MATHEMATICS (Standard) (Q.P. CODE 30/6/1)

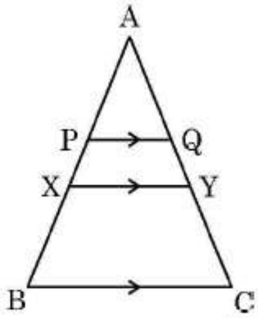
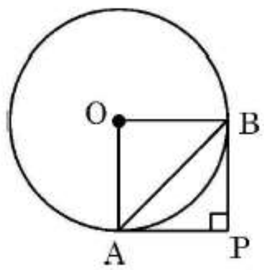
General Instructions: -

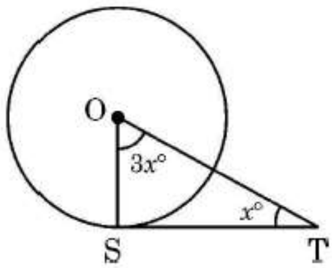
1.	You are aware that evaluation is the most important process in the actual and correct assessment of the candidates. A small mistake in evaluation may lead to serious problems which may affect the future of the candidates, education system and teaching profession. To avoid mistakes, it is requested 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 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: 30/6/1)

Q. No.	EXPECTED OUTCOMES/VALUE POINTS	Marks
	SECTION A **This section consists of 20 multiple choice questions of 1 mark each.**	
1.	$\sqrt{0.4}$ is a/an (A) natural number (B) integer (C) rational number (D) irrational number	
Sol.	(D) irrational number	**1**
2.	Which of the following cannot be the unit digit of 8^n, where n is a natural number ? (A) 4 (B) 2 (C) 0 (D) 6	
Sol.	(C) 0	**1**
3.	Which of the following quadratic equations has real and equal roots ? (A) $(x + 1)^2 = 2x + 1$ (B) $x^2 + x = 0$ (C) $x^2 - 4 = 0$ (D) $x^2 + x + 1 = 0$	
Sol.	(A) $(x + 1)^2 = 2x + 1$	**1**
4.	If the zeroes of the polynomial $ax^2 + bx + \frac{2a}{b}$ are reciprocal of each other, then the value of b is (A) 2 (B) $\frac{1}{2}$ (C) –2 (D) $-\frac{1}{2}$	
Sol.	(A) 2	**1**
5.	The distance of the point A(–3, –4) from x-axis is (A) 3 (B) 4 (C) 5 (D) 7	
Sol.	(B) 4	**1**

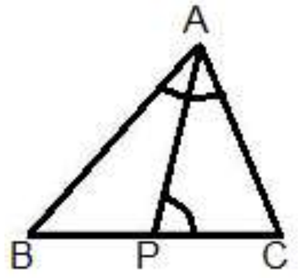
6.	In the adjoining figure, PQ ∥ XY ∥ BC, AP = 2 cm, PX = 1.5 cm and BX = 4 cm. If QY = 0.75 cm, then AQ + CY =  (A) 6 cm (B) 4.5 cm (C) 3 cm (D) 5.25 cm	
Sol.	(C) 3 cm	**1**
7.	Given $\Delta ABC \sim \Delta PQR$, $\angle A = 30°$ and $\angle Q = 90°$. The value of $(\angle R + \angle B)$ is (A) 90° (B) 120° (C) 150° (D) 180°	
Sol.	(C) 150°	**1**
8.	Two coins are tossed simultaneously. The probability of getting atleast one head is (A) $\frac{1}{4}$ (B) $\frac{1}{2}$ (C) $\frac{3}{4}$ (D) 1	
Sol.	(C) $\frac{3}{4}$	**1**
9.	In the adjoining figure, PA and PB are tangents to a circle with centre O such that $\angle P = 90°$. If $AB = 3\sqrt{2}$ cm, then the diameter of the circle is  (A) $3\sqrt{2}$ cm (B) $6\sqrt{2}$ cm (C) 3 cm (D) 6 cm	
Sol.	(D) 6 cm	**1**

10.	For a circle with centre O and radius 5 cm, which of the following statements is true ? **P** : Distance between every pair of parallel tangents is 5 cm. **Q** : Distance between every pair of parallel tangents is 10 cm. **R** : Distance between every pair of parallel tangents must be between 5 cm and 10 cm. **S** : There does not exist a point outside the circle from where length of tangent is 5 cm. (A) P (B) Q (C) R (D) S	
Sol.	(B) Q	**1**
11.	In the adjoining figure, TS is a tangent to a circle with centre O. The value of $2x°$ is  (A) 22.5 (B) 45 (C) 67.5 (D) 90	
Sol.	(B) 45	**1**
12.	If $x\left(\frac{2\tan 30°}{1+\tan^2 30°}\right) = y\left(\frac{2\tan 30°}{1-\tan^2 30°}\right)$, then $x : y =$ (A) 1 : 1 (B) 1 : 2 (C) 2 : 1 (D) 4 : 1	
Sol.	(C) 2:1	**1**
13.	A peacock sitting on the top of a tree of height 10 m observes a snake moving on the ground. If the snake is $10\sqrt{3}$ m away from the base of the tree, then angle of depression of the snake from the eye of the peacock is (A) 30° (B) 45° (C) 60° (D) 90°	
Sol.	(A) 30°	**1**

14.	If a cone of greatest possible volume is hollowed out from a solid wooden cylinder, then the ratio of the volume of remaining wood to the volume of cone hollowed out is (A) 1 : 1 (B) 1 : 3 (C) 2 : 1 (D) 3 : 1	
Sol.	(C) 2:1	**1**
15.	If the mode of some observations is 10 and sum of mean and median is 25, then the mean and median respectively are (A) 12 and 13 (B) 13 and 12 (C) 10 and 15 (D) 15 and 10	
Sol.	(B) 13 and 12	**1**
16.	If the maximum number of students has obtained 52 marks out of 80, then (A) 52 is the mean of the data. (B) 52 is the median of the data. (C) 52 is the mode of the data. (D) 52 is the range of the data.	
Sol.	(C) 52 is the mode of the data.	**1**
17.	The system of equations $2x + 1 = 0$ and $3y - 5 = 0$ has (A) unique solution (B) two solutions (C) no solution (D) infinite number of solutions	
Sol.	(A) unique solution	**1**
18.	In a right triangle ABC, right-angled at A, if $\sin B = \frac{1}{4}$, then the value of sec B is (A) 4 (B) $\frac{\sqrt{15}}{4}$ (C) $\sqrt{15}$ (D) $\frac{4}{\sqrt{15}}$	
Sol.	(D) $\frac{4}{\sqrt{15}}$	**1**

	Directions : In Question Numbers **19** and **20**, a statement of **Assertion (A)** is followed by a statement of **Reason (R)**. Choose the correct option from the following : (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) :** For any two prime numbers p and q, their HCF is 1 and LCM is p + q. **Reason (R) :** For any two natural numbers, HCF × LCM = product of numbers.	
Sol.	(D) Assertion (A) is false, but Reason (R) is true.	**1**
20.	In an experiment of throwing a die, **Assertion (A) :** Event E_1 : getting a number less than 3 and Event E_2 : getting a number greater than 3 are complementary events. **Reason (R) :** If two events E and F are complementary events, then P(E) + P(F) = 1.	
Sol.	(D) Assertion (A) is false, but Reason (R) is true.	**1**
	SECTION B **This section has 5 very short answer type questions of 2 marks each.**	
21. (a)	Solve the following pair of equations algebraically : $101x + 102y = 304$ $102x + 101y = 305$	
Sol.	Adding equations we get $x + y = 3$ Subtracting equations we get $-x + y = -1$ Solving to get $x = 2$ and $y = 1$	 ½ ½ ½ + ½
	OR	

21. (b)	In a pair of supplementary angles, the greater angle exceeds the smaller by 50°. Express the given situation as a system of linear equations in two variables and hence obtain the measure of each angle.	
Sol.	Let smaller angle be x and greater angle be y ATQ, $x + y = 180$ Also $y = x + 50$ Solving we get x = 65° and y = 115°	 ½ ½ ½ + ½
22. (a)	If a sec θ + b tan θ = m and b sec θ + a tan θ = n, prove that $a^2 + n^2 = b^2 + m^2$	
Sol.	$m^2 = a^2 \sec^2\theta + b^2 \tan^2\theta + 2ab \sec\theta \tan\theta$ $n^2 = b^2 \sec^2\theta + a^2 \tan^2\theta + 2ab \sec\theta \tan\theta$ $m^2 - n^2 = a^2(\sec^2\theta - \tan^2\theta) + b^2(\tan^2\theta - \sec^2\theta)$ $\Rightarrow m^2 - n^2 = a^2 - b^2$ or $a^2 + n^2 = m^2 + b^2$	½ ½ ½ ½
	OR	
22. (b)	Use the identity : $\sin^2 A + \cos^2 A = 1$ to prove that $\tan^2 A + 1 = \sec^2 A$. Hence, find the value of tan A, when sec A = $\frac{5}{3}$, where A is an acute angle.	
Sol.	$\sin^2 A + \cos^2 A = 1$ Dividing both sides by $\cos^2 A$, we get $\frac{\sin^2 A}{\cos^2 A} + \frac{\cos^2 A}{\cos^2 A} = \frac{1}{\cos^2 A}$ $\tan^2 A + 1 = \sec^2 A$ $\tan^2 A + 1 = \left(\frac{5}{3}\right)^2$ $\tan A = \frac{4}{3}$	 ½ ½ ½ ½
23.	Prove that abscissa of a point P which is equidistant from points with coordinates A(7, 1) and B(3, 5) is 2 more than its ordinate.	
Sol.	Let P (x, y) be equidistant from A(7, 1) and B(3, 5) PA = PB $\Longrightarrow$ $PA^2 = PB^2$ $(x-7)^2 + (y-1)^2 = (x-3)^2 + (y-5)^2$ $x^2 + 49 - 14x + y^2 + 1 - 2y = x^2 + 9 - 6x + y^2 + 25 - 10y$	 ½ ½ ½

	$x = 2 + y$ Thus, abscissa of the point P is 2 more than its ordinate.	½
24.	P is a point on the side BC of ΔABC such that $\angle APC = \angle BAC$. Prove that $AC^2 = BC \cdot CP$.	
Sol.	 Correct figure $\angle APC = \angle BAC$ $\angle ACP = \angle ACB$ $\therefore \Delta APC \sim \Delta BAC$ $AC^2 = BC.CP$	½ **1** ½
25.	The number of red balls in a bag is three more than the number of black balls. If the probability of drawing a red ball at random from the given bag is $\frac{12}{23}$, find the total number of balls in the given bag.	
Sol.	Let number of black balls = x then number of red balls = $x + 3$ $\therefore$ total number of balls = $2x + 3$ ATQ, $\frac{x+3}{2x+3} = \frac{12}{23}$ $x = 33$ Total number of balls = 69	½ ½ ½ ½
	SECTION C **This section has 6 short answer type questions of 3 marks each.**	
26. (a)	Prove that $\sqrt{5}$ is an irrational number.	
Sol.	Let $\sqrt{5}$ be a rational number. $\therefore \sqrt{5} = \frac{p}{q}$, where $q \neq 0$ and let p & q be the coprimes. $\Rightarrow 5q^2 = p^2$ $\Rightarrow p^2$ is divisible by 5. $\Rightarrow$ p is divisible by 5. ----- (1) Let p = 5a, where 'a' is some integer $\therefore 25a^2 = 5q^2$ $\Rightarrow q^2 = 5a^2$	½ **1**

	$\Rightarrow q^2$ is divisible by 5. $\Rightarrow$ q is divisible by 5. ----- ② $\therefore$ 5 divides both p & q. ① and ② leads to contradiction as p and q are coprimes. Hence, $\sqrt{5}$ is an irrational number.	1 ½
	OR	
26. (b)	Let p, q and r be three distinct prime numbers. Check whether $p \cdot q \cdot r + q$ is a composite number or not. Further, give an example for 3 distinct primes p, q, r such that (i) $p \cdot q \cdot r + 1$ is a composite number. (ii) $p \cdot q \cdot r + 1$ is a prime number.	
Sol.	p. q. r + q = q(pr + 1) Thus, the given number has more than 2 factors. Hence it is composite. (i) Taking p = 3, q = 5 and r = 7 pqr + 1 = 3.5.7 + 1 = 106 is a composite number or any other correct example (ii) Taking p = 2, q = 3 and r = 5 pqr + 1 = 2.3.5 + 1 = 31 is a prime number or any other correct example	½ ½ 1 1
27.	Find the zeroes of the polynomial $p(x) = 3x^2 - 4x - 4$. Hence, write a polynomial whose each of the zeroes is 2 more than zeroes of $p(x)$.	
Sol.	$p(x) = 3x^2 - 4x - 4$ Zeroes are $-\frac{2}{3}$ and 2 New zeroes are $\frac{4}{3}$ and 4 Sum of new zeroes = $\frac{4}{3} + 4 = \frac{16}{3}$ Product of new zeroes = $\frac{4}{3} \times 4 = \frac{16}{3}$ Required polynomial is $x^2 - \frac{16x}{3} + \frac{16}{3}$ or $3x^2 - 16x + 16$	1 ½ ½ ½ ½
28.	Check whether the following pair of equations is consistent or not. If consistent, solve graphically $x + 3y = 6$ $3y - 2x = -12$	
Sol.	$x + 3y = 6$ $-2x + 3y = -12$ $\frac{a_1}{a_2} = \frac{1}{-2}$; $\frac{b_1}{b_2} = \frac{3}{3} = 1$	 ½

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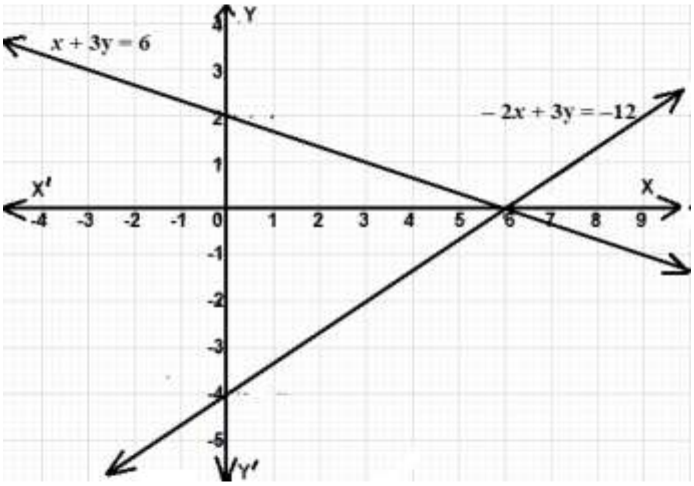
$\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$

Hence the pair of equations is consistent.



Correct graph

Solution is (6, 0) or $x = 6$ and $y = 0$

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1½
½</td></tr>
<tr><td>29.</td><td>If the points A(6, 1), B(p, 2), C(9, 4) and D(7, q) are the vertices of a parallelogram ABCD, then find the values of p and q. Hence, check whether ABCD is a rectangle or not.</td><td></td></tr>
<tr><td>Sol.</td><td>

Diagonals of a parallelogram bisect each other.

∴ Co-ordinates of mid point of diagonal AC = Co-ordinates of mid-point of diagonal BD.

$$\left(\frac{6+9}{2}, \frac{1+4}{2}\right) = \left(\frac{p+7}{2}, \frac{2+q}{2}\right)$$

$$\Rightarrow \frac{p+7}{2} = \frac{15}{2} \text{ and } \frac{2+q}{2} = \frac{5}{2}$$

$$\therefore p = 8 \text{ and } q = 3$$

Diagonal AC = $\sqrt{3^2 + 3^2} = 3\sqrt{2}$

Diagonal BD = $\sqrt{(-1)^2 + 1^2} = \sqrt{2}$

AC ≠ BD ∴ ABCD is not a rectangle

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<tr><td>30.
(a)</td><td>Prove that : $\frac{\cos\theta - 2\cos^3\theta}{\sin\theta - 2\sin^3\theta} + \cot\theta = 0.$</td><td></td></tr>
<tr><td>Sol.</td><td>

LHS $= \frac{\cos\theta - 2\cos^3\theta}{\sin\theta - 2\sin^3\theta} + \cot\theta$

$= \frac{\cos\theta(1 - 2\cos^2\theta)}{\sin\theta(1 - 2\sin^2\theta)} + \cot\theta$

$= \frac{\cos\theta}{\sin\theta}\left[\frac{\sin^2\theta + \cos^2\theta - 2\cos^2\theta}{\sin^2\theta + \cos^2\theta - 2\sin^2\theta}\right] + \cot\theta$

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

$= -\cot\theta + \cot\theta$

$= 0 =$ RHS

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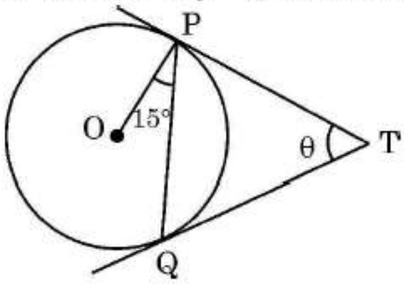
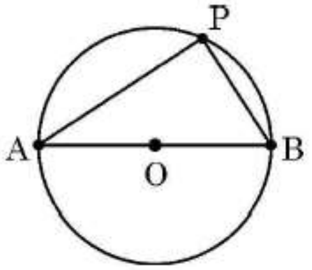
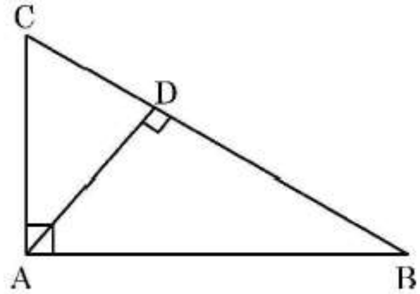
	OR	
30. (b)	Given that $\sin\theta + \cos\theta = x$, prove that $\sin^4\theta + \cos^4\theta = \dfrac{2-(x^2-1)^2}{2}$.	
Sol.	Given: $\sin\theta + \cos\theta = x$ Squaring both sides $\sin^2\theta + \cos^2\theta + 2\cos\theta\sin\theta = x^2$ $2\sin\theta\cos\theta = x^2 - 1$ RHS = $\dfrac{2-(2\sin\theta\cos\theta)^2}{2}$ $= \dfrac{2-4\sin^2\theta\cos^2\theta}{2}$ $= 1 - 2\sin^2\theta\cos^2\theta$ $= (\sin^2\theta + \cos^2\theta)^2 - 2\sin^2\theta\cos^2\theta$ $= (\sin^4\theta + \cos^4\theta)$ = LHS	**1** ½ ½ ½ ½
31.	In the adjoining figure, TP and TQ are tangents drawn to a circle with centre O. If $\angle OPQ = 15°$ and $\angle PTQ = \theta$, then find the value of $\sin 2\theta$. 	
Sol.	$\angle$ QPT = 75° $\angle$ PQT = 75° $\theta = 30°$ $\sin 2\theta = \sin 2(30°)$ $= \sin 60° = \dfrac{\sqrt{3}}{2}$	½ ½ **1** ½ ½

SECTION D **This section has 4 long answer questions of 5 marks each.**		
32. (a)	There is a circular park of diameter 65 m as shown in the following figure, where AB is a diameter.  An entry gate is to be constructed at a point P on the boundary of the park such that distance of P from A is 35 m more than the distance of P from B. Find distance of point P from A and B respectively.	
Sol.	Let distance of gate at P from point B is x m Then distance of gate at P from point A is $(35 + x)$ m In right Δ APB $(x + 35)^2 + x^2 = (65)^2$ $x^2 + 35x - 1500 = 0$ $(x + 60)(x - 25) = 0$ $x = 25$ Hence, $x + 35 = 60$ Distance of P from A = 60 m Distance of P from B = 25 m	 ½ **1** **2** ½ ½ ½
	OR	
32. (b)	Find the smallest value of p for which the quadratic equation $x^2 - 2(p + 1)x + p^2 = 0$ has real roots. Hence, find the roots of the equation so obtained.	
Sol.	For real roots, D ≥ 0 $[-2(p+1)]^2 - 4p^2 \geq 0$ $\Rightarrow p \geq -\frac{1}{2}$ ∴ smallest value of p = $-\frac{1}{2}$ At p = $-\frac{1}{2}$ given equation becomes $x^2 - 2\left(\frac{-1}{2} + 1\right)x + \left(\frac{-1}{2}\right)^2 = 0$ $x^2 - x + \frac{1}{4} = 0$ or $4x^2 - 4x + 1 = 0$ $(2x - 1)(2x - 1) = 0$ ∴ roots are $\frac{1}{2}, \frac{1}{2}$	½ ½ **1** ½ ½ **1** ½ ½

33. (a)	If a line drawn parallel to one side of triangle intersecting the other two sides in distinct points divides the two sides in the same ratio, then it is parallel to third side. State and prove the converse of the above statement.	
Sol.	Correct Statement of BPT Correct figure, Given, To Prove, Construction Correct Proof of BPT **NOTE*** Given statement in English version is not a correct statement. Full marks may be awarded to any attempt in English medium.	**1** **2** **2**
	OR	
33. (b)	In the adjoining figure, ΔCAB is a right triangle, right angled at A and $AD \perp BC$. Prove that $\Delta ADB \sim \Delta CDA$. Further, if BC = 10 cm and CD = 2 cm, find the length of AD.  	
Sol.	$\Delta\ ABC \sim \Delta\ DAC$ ----- ① Similarly, $\Delta\ ABC \sim \Delta\ DBA$ ----- ② From equations ① and ② $\Delta\ DAC \sim \Delta\ DBA$ or $\Delta\ ADB \sim \Delta\ CDA$ $\frac{AD}{CD} = \frac{BD}{AD}$ $AD^2 = BD \times CD$ $= 8 \times 2$ $\therefore$ AD = 4 cm.	**1** ½ **1** ½ ½ **1** ½
34.	From one face of a solid cube of side 14 cm, the largest possible cone is carved out. Find the volume and surface area of the remaining solid. $\left(\text{Use } \pi = \frac{22}{7}, \sqrt{5} = 2.2\right)$	
Sol.	Diameter of cone = 14 cm Radius = 7 cm Height of cone = 14 cm Slant height $l = \sqrt{14^2 + 7^2} = 7\sqrt{5} = 15.4$ cm Volume of remaining solid = Volume of cube – Volume of cone $= (14)^3 - \frac{1}{3} \times \frac{22}{7} \times (7)^2 \times 14$ $= \frac{6076}{3}\ cm^3$	 ½ ½ **1** **1** ½

	Surface area of remaining solid = Surface area of cube – Area of circle + Curved surface area of cone $= 6 \times 14 \times 14 - \frac{22}{7} \times 7 \times 7 + \frac{22}{7} \times 7 \times 15.4$ $= 1360.8 \text{ cm}^2$	**1** ½
35.	Following distribution shows the marks of 230 students in a particular subject. If the median marks are 46, then find the values of x and y. **Marks** | **Number of Students** 10 – 20 | 12 20 – 30 | 30 30 – 40 | x 40 – 50 | 65 50 – 60 | y 60 – 70 | 25 70 – 80 | 18	
Sol.	(see table below)	

Marks	Number of Students	Cf
10 – 20	12	12
20 – 30	30	42
30 – 40	x	$42 + x$
40 – 50	65	$107 + x$
50 – 60	y	$107 + x + y$
60 – 70	25	$132 + x + y$
70 – 80	18	$150 + x + y$
	230	

Correct table **1**

$150 + x + y = 230$

$x + y = 80$ **1**

Median is 46

∴ Median class is 40 – 50 ½

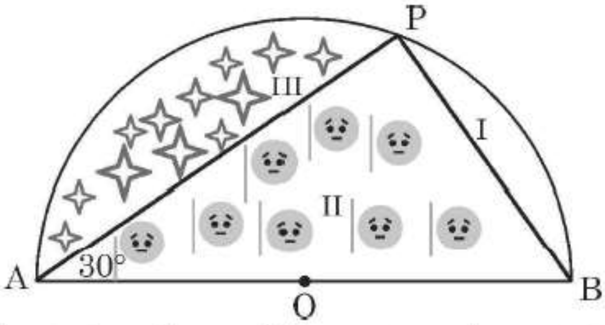
$$46 = 40 + \left[\frac{\frac{230}{2} - (42 + x)}{65}\right] \times 10$$ **1**

On solving, we get $x = 34$ **1**

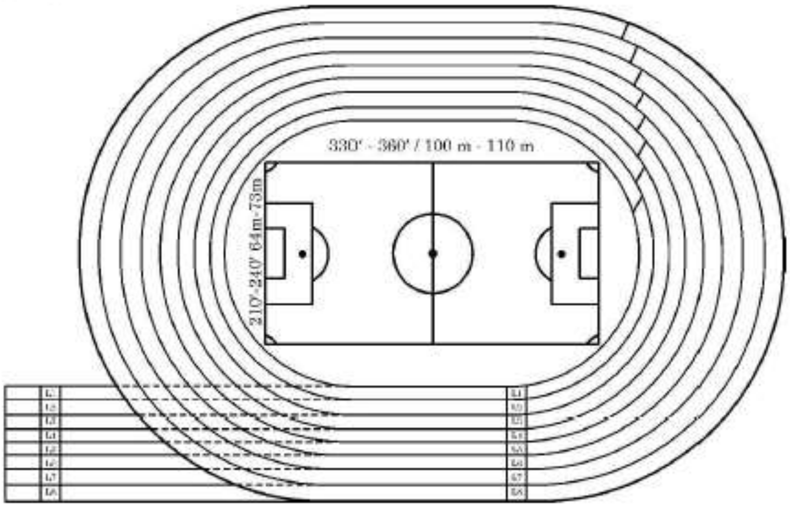
and y = 46 ½

SECTION E

This section has 3 case study-based questions of 4 marks each.

36.	Anurag purchased a farmhouse which is in the form of a semicircle of diameter 70 m. He divides it into three parts by taking a point P on the semicircle in such a way that $\angle PAB = 30°$ as shown in the following figure, where O is the centre of semicircle.  In part I, he planted saplings of Mango tree, in part II, he grew tomatoes and in part III, he grew oranges. Based on given information, answer the following questions. (i) What is the measure of $\angle POA$? (ii) Find the length of wire needed to fence entire piece of land. (iii) (a) Find the area of region in which saplings of Mango tree are planted. **OR** (iii) (b) Find the length of wire needed to fence the region III.	
Sol.	(i) $\angle POA = 120°$	**1**
	(ii) Length of wire needed to fence entire piece of land = $\frac{22}{7} \times 35 + 70 = 180$ m	**1**
	(iii) Required area = $\frac{60}{360} \times \frac{22}{7} \times (35)^2 - \frac{\sqrt{3}}{4} \times (35)^2$	**1**
	$= \left(\frac{1925}{3} - \frac{1225\sqrt{3}}{4}\right)$ m^2 or 111.89 m^2 (approx.)	**1**
	OR	
	(iii) In Δ APB, $\frac{AP}{AB} = \cos 30°$	
	$AP = 35\sqrt{3}$ m	**1**
	Required length of wire = $\frac{120}{360} \times 2 \times \frac{22}{7} \times 35 + 35\sqrt{3}$	½
	$= \left(\frac{220}{3} + 35\sqrt{3}\right)$ m or 133.8 m (approx.)	½

37. In order to organise, Annual Sports Day, a school prepared an eight lane running track with an integrated football field inside the track area as shown below :



The length of innermost lane of the track is 400 m and each subsequent lane is 7.6 m longer than the preceding lane.

Based on given information, answer the following questions, using concept of Arithmetic Progression.

(i) What is the length of the 6^{th} lane ?

(ii) How long is the 8^{th} lane than that of 4^{th} lane ?

(iii) (a) While practicing for a race, a student took one round each in first six lanes. Find the total distance covered by the student.

OR

(iii) (b) A student took one round each in lane 4 to lane 8. Find the total distance covered by the student.

		Marks
Sol.	Here AP is 400, 407.6, 415.2, …	
	(i) a_6 = 400 + 5 (7.6) = 438 m	**1**
	(ii) $a_8 - a_4 = 30.4$ m	**1**
	(iii) $S_6 = \frac{6}{2}(2 \times 400 + 5 \times 7.6)$	**1**
	= 2514 m	**1**
	OR	
	(iii) Total distance covered = $S_8 - S_3$	
	$= \frac{8}{2}(2 \times 400 + 7 \times 7.6) - \frac{3}{2}(2 \times 400 + 2 \times 7.6)$	**1**
	= 2190 m	**1**

38. The Statue of Unity situated in Gujarat is the world's largest Statue which stands over a 58 m high base. As part of the project, a student constructed an inclinometer and wishes to find the height of Statue of Unity using it.

He noted following observations from two places :

Situation – I :

The angle of elevation of the top of Statue from Place A which is $80\sqrt{3}$ m away from the base of the Statue is found to be 60°.

Situation – II :

The angle of elevation of the top of Statue from a Place B which is 40 m above the ground is found to be 30° and entire height of the Statue including the base is found to be 240 m.

Based on given information, answer the following questions :

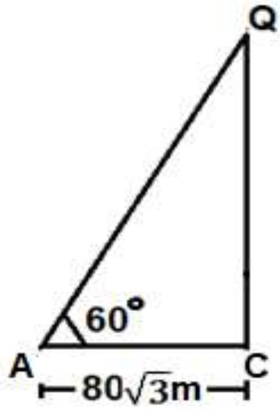
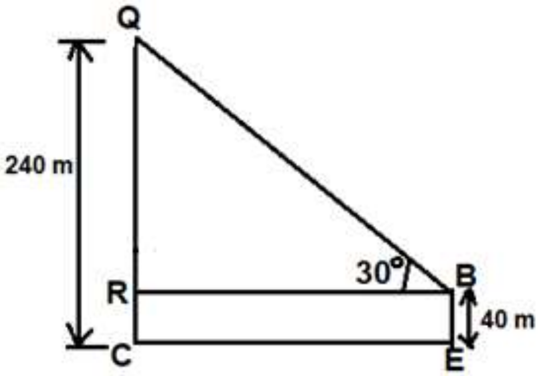
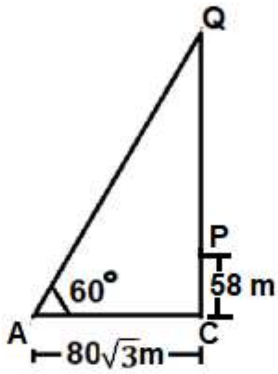
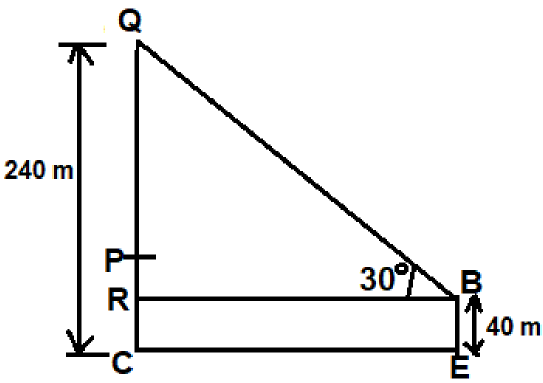
(i) Represent the Situation – I with the help of a diagram.

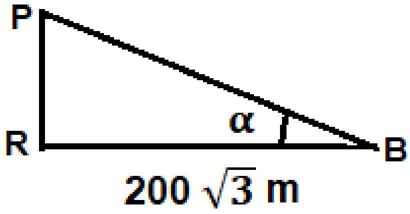
(ii) Represent the Situation – II with the help of a diagram.

(iii) (a) Calculate the height of Statue excluding the base and also find the height including the base with the help of Situation – I.

OR

(iii) (b) Find the horizontal distance of point B (Situation – II) from the Statue and the value of tan α, where α is the angle of elevation of top of base of the Statue from point B.

Sol.	(i)  Correct figure	1
	(ii)  Correct figure	1
	(iii) (a) 	
	In Δ ACQ $\frac{QC}{AC} = \tan 60° = \sqrt{3}$ QC = 240 m	
	Height of statue including base = 240 m	1
	Height of statue excluding base = 240 – 58 = 182 m	1
	OR	
	(iii) (b) 	

	QR = 240 – 40 = 200 m In Δ QRB $\frac{QR}{RB}$ = tan 30° = $\frac{1}{\sqrt{3}}$ Horizontal distance RB = 200 $\sqrt{3}$ m  Correct figure In Δ PRB tan α = $\frac{PR}{BR}$ $= \frac{18}{200\sqrt{3}}$ or $\frac{3\sqrt{3}}{100}$	½ ½ ½ ½