Marking Scheme
Strictly Confidential
(For Internal and Restricted use only)
Secondary School Examination, 2026
MATHEMATICS (STANDARD) (041) PAPER 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 BNS."**
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 **0 to 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 unassessed 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: 30B)

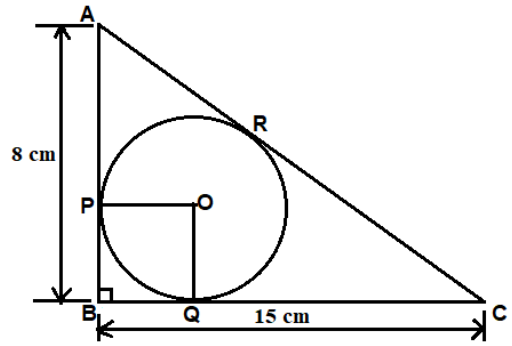
Q. No.	EXPECTED OUTCOMES/VALUE POINTS	Step	Marks
	SECTION A Question Numbers **1** to **18** are Multiple Choice Questions (MCQs) of **1** mark each.		
1.	At which of the following points, the quadratic polynomial $p(x) = -3x + 18x^2 - 1$ intersects the positive x-axis ? (A) $\left(\frac{1}{6},0\right)$ (B) $\left(-\frac{1}{3},0\right)$ (C) $\left(-\frac{1}{6},0\right)$ (D) $\left(\frac{1}{3},0\right)$		
Sol.	(D) $\left(\frac{1}{3},0\right)$		**1**
2.	The graph of a quadratic polynomial $f(x)$ passes through (5,0), (0, –1) and (–2, 0). The two factors of the polynomial are (A) $(x + 2), (x - 5)$ (B) $(x + 5), (x - 2)$ (C) $(x + 1), (x - 5)$ (D) $(x - 1), (x + 2)$		
Sol.	(A) $(x + 2), (x - 5)$		**1**
3.	If pair of linear equations given by $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ has infinitely many solutions, then which of the following is definitely true ? (A) $\frac{a_1}{a_2}=\frac{c_2}{c_1}$ (B) $a_1a_2 \neq b_1b_2$ (C) $\frac{a_1}{a_2}\neq\frac{b_1}{b_2}$ (D) $a_1b_2 = a_2b_1$		
Sol.	(D) $a_1b_2 = a_2b_1$		**1**
4.	The 31st term of the A.P. : $\frac{-5}{6}, \frac{-3}{4}, \frac{-2}{3}, \frac{-7}{12}, \ldots$ is (A) $\frac{-5}{3}$ (B) $\frac{5}{3}$ (C) $\frac{12}{20}$ (D) $\frac{-12}{20}$		
Sol.	(B) $\frac{5}{3}$		**1**

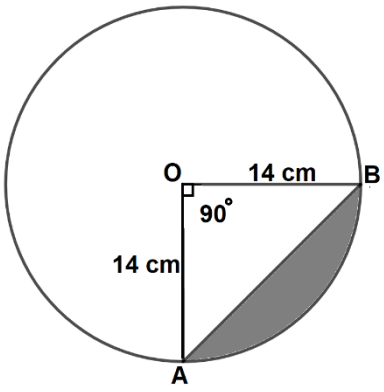
5.	Four tangents drawn to a circle are extended from both the sides to form a quadrilateral. Which of these quadrilateral is not possible ? (A) Trapezium (B) Square (C) Rectangle (D) Rhombus		
Sol.	(C) Rectangle		**1**
6.	ABCD is a trapezium in which AB||DC and E, F are points on AD and BC respectively such that EF||DC. If ED = 36 cm, BF = 70 cm and FC = 30 cm, then the length of AD is : (A) 124 cm (B) 120 cm (C) 110 cm (D) 114 cm		
Sol.	(B) 120 cm		**1**
7.	If $x \cdot \tan 45° \cdot \sin 30° = \cos 30° \cdot \cot 60°$, then x is equal to (A) $\sqrt{3}$ (B) $\frac{1}{\sqrt{3}}$ (C) 1 (D) $\frac{1}{2}$		
Sol.	(C) 1		**1**
8.	If $\Delta DEF \sim \Delta PQR$ such that 3 DE = PQ and EF = 6 cm, then the length of QR is : (A) 12 cm (B) 3 cm (C) 2 cm (D) 18 cm		
Sol.	(D) 18 cm		**1**
9.	If the mean of first n natural numbers is $\frac{6n}{11}$, then n is (A) 11 (B) 6 (C) 12 (D) 22		
Sol.	(A) 11		**1**
10.	If a, b, c and d are consecutive terms of an A.P., then c – b is equal to : (A) d – a (B) d – b (C) d – c (D) c – a		
Sol.	(C) d – c		**1**

11.	If in a ΔABC, AB = 6 cm and DE$\|\|$BC such that AE = $\frac{1}{3}$AC, then the length of BD is (A) 2 cm (B) 3 cm (C) 4 cm (D) 5 cm		
Sol.	(C) 4 cm		**1**
12.	From a point P, tangents PQ and PR are drawn to a circle with centre O and radius 6 cm. If OP = 10 cm, then area of quadrilateral PQOR is : (A) 48 cm^2 (B) 24 cm^2 (C) 96 cm^2 (D) 72 cm^2		
Sol.	(A) 48 cm^2		**1**
13.	The perimeter of sector of a circle of radius 21 cm and central angle 60°, is (A) 22 cm (B) 44 cm (C) 64 cm (D) 273 cm		
Sol.	(C) 64 cm		**1**
14.	The number of conical bottles of radius 2 cm and height 1.2 cm that can be filled from a cylindrical bottle of radius 6 cm and height 8 cm, full of liquid, is (A) 60 (B) 130 (C) 180 (D) 18		
Sol.	(C) 180		**1**
15.	One ticket is drawn at random from a bag containing 50 tickets numbered 1 to 50. The probability that the drawn ticket has a number which is a multiple of 7 is : (A) $\frac{1}{5}$ (B) $\frac{7}{50}$ (C) $\frac{3}{25}$ (D) $\frac{4}{25}$		
Sol.	(B) $\frac{7}{50}$		**1**

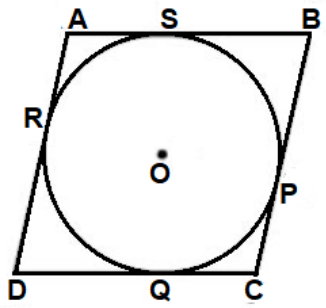
16.	Two dice are thrown simultaneously. The probability of getting a sum of 7 is : (A) $\frac{2}{9}$ (B) $\frac{1}{9}$ (C) $\frac{5}{36}$ (D) $\frac{1}{6}$		
Sol.	(D) $\frac{1}{6}$		**1**
17.	If HCF of 66 and 99 is expressible in the form of 55m – 132, then the value of m is : (A) 4 (B) 2 (C) 1 (D) 3		
Sol.	(D) 3		**1**
18.	sin 2 θ = 2 sin θ is true, when θ is equal to (A) 90° (B) 60° (C) 45° (D) 0°		
Sol.	(D) 0°		**1**
	Directions : In Q. Nos. **19** & **20** a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option from 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 correct explanation for 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) :** In a circle of radius 21 cm, an arc of length 22 cm subtends an angle of 60° at the centre. **Reason (R) :** The length of arc of a sector of a circle of radius r and central angle θ is $\frac{2\pi r\theta}{360}$.		

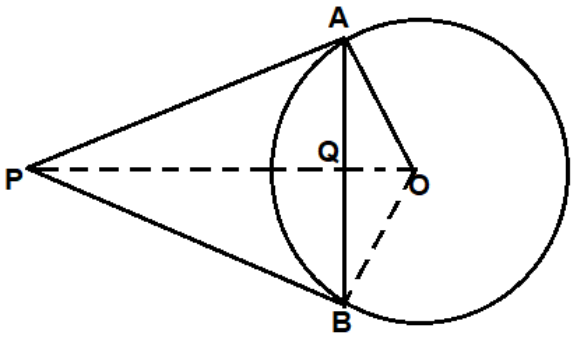
Sol.	(A) Both, Assertion (A) and Reason (R) are true and Reason (R) is correct explanation of Assertion (A).		**1**
20.	**Assertion (A) :** If the Mode and Mean of a data are 12 k and 15 k, then Median of the data is 14 k. **Reason (R) :** The relation between the Mean, Mode and Median of a data is : Mean = 3 Median – 2 Mode.		
Sol.	(C) Assertion (A) is true, but Reason (R) is false.		**1**
	SECTION B Question Numbers **21** to **25** are Very Short Answer (VSA) type of questions of **2** marks each.		
21.	Two numbers are in the ratio 3 : 5 and their LCM is 180. Find the HCF of these two numbers.		
Sol.	Let the numbers be $3x$ and $5x$. HCF = x HCF × LCM = Product of two numbers $x \times 180 = 3x \times 5x$ $x = 12$ HCF of numbers is 12.	**I** **II** **III**	**½** **1** **½**
22.	Find the quadratic polynomial the sum of whose zeroes is 1 and their product is –12. Hence find the zeroes of the polynomial.		
Sol.	Sum of zeroes = 1, Product of zeroes = – 12 Required polynomial = $(x^2 - x - 12)$ $= (x - 4)(x + 3)$ Equating to zero, $x = 4, -3$ ∴ Zeroes are 4 and – 3	**I** **II** **III**	**1** **½** **½**
23.	A circle is inscribed in a right triangle ABC, right angled at B. If the lengths of the two sides containing the right angle are 8 cm and 15 cm, find the radius of the incircle.		

Sol.			
	$AC = \sqrt{(15)^2 + (8)^2} = 17$ cm	**I**	½
	Let 'r' be the radius of the circle.		
	Since, radius is perpendicular to the tangent through the point of contact.		
	∴ OP is perpendicular to AB and OQ is perpendicular to BC.		
	Thus, OPBQ is a square.		
	⇒ OP = PB = BQ = OQ = r		
	Thus, AR = AP = 8 – r and CR = CQ = 15 – r	**II**	½
	Now, AC = AR + CR	**III**	½
	r = 3 cm	**IV**	½
24 (a)	If $7 \sin^2 A + 3 \cos^2 A = 4$, then find the value of tan A.		
Sol.	$7 \sin^2 A + 3 \cos^2 A = 4$		
	$\Rightarrow 7 \sin^2 A + 3(1 - \sin^2 A) = 4$	**I**	½
	$\Rightarrow 4 \sin^2 A = 1$		
	$\Rightarrow \sin A = \frac{1}{2}$	**II**	½
	$\Rightarrow A = 30°$	**III**	½
	$\therefore \tan A = \tan 30° = \frac{1}{\sqrt{3}}$	**IV**	½
	OR		
24 (b)	If $4 \tan A = 3$, then find the value of $\frac{\text{cosec}^2 A + 1}{\text{cosec}^2 A - 1}$.		
Sol.	$4 \tan A = 3$		
	$\tan A = \frac{3}{4}$		
	$\Rightarrow \cot A = \frac{4}{3}$	**I**	½
	$\therefore \text{cosec}^2 A = 1 + \left(\frac{4}{3}\right)^2 = \frac{25}{9}$	**II**	½
	$\frac{\text{cosec}^2 A + 1}{\text{cosec}^2 A - 1} = \frac{\frac{25}{9} + 1}{\frac{25}{9} - 1}$	**III**	½
	$= \frac{34}{16}$ or $\frac{17}{8}$	**IV**	½

25 (a)	A chord AB of a circle of radius 14 cm makes a right angle at the centre of the circle. Find the area of the minor segment.		
Sol.	 Radius of circle = 14 cm Area of minor segment = Area of sector AOB – Area of Δ AOB $= \frac{90}{360} \times \frac{22}{7} \times (14)^2 - \frac{1}{2} \times 14 \times 14$ $= 56 \text{ cm}^2$	**I** **II**	½ + ½ **1**
	OR		
25 (b)	An arc of length 22 cm subtends an angle of 60° at the centre of the circle. Find the area of the sector of the circle made by the arc.		
Sol.	Length of arc = 22 cm Central angle = 60° Length of arc = $\frac{2\pi r\,\theta}{360}$ $22 = \frac{60}{360} \times 2 \times \frac{22}{7} \times r$ r = 21 cm Area of sector = $\frac{60}{360} \times \frac{22}{7} \times (21)^2$ $= 231 \text{ cm}^2$	**I** **II** **III** **IV**	½ ½ ½ ½
	SECTION C Q. Nos. **26** to **31** Short Answer (SA) type questions of **3** marks each.		
26.	Prove that $\frac{2 + 3\sqrt{5}}{7}$ is an irrational number, given that $\sqrt{5}$ is an irrational number.		

Sol.	Let $\frac{2+3\sqrt{5}}{7}$ be a rational number.		
	Then $\frac{2+3\sqrt{5}}{7} = \frac{p}{q}$, where $q \neq 0$ and p and q are integers.	**I**	**½**
	$\Rightarrow 2 + 3\sqrt{5} = \frac{7p}{q}$		
	$\Rightarrow \sqrt{5} = \frac{7p-2q}{3q}$	**II**	**1**
	Since 'p' and 'q' are integers.		
	$\therefore \frac{7p-2q}{3q}$ is rational.	**III**	**½**
	But this contradicts the fact that $\sqrt{5}$ is irrational.	**IV**	**1**
	Hence, $\frac{2+3\sqrt{5}}{7}$ is an irrational number.		
27 (a)	Find the coordinates of the points of trisection of the line segment joining the points P(5, –4) and Q(–4, 2).		
Sol.	Let the points A and B trisect the line segment joining P and Q.		
	P A B Q (5, – 4) (– 4, 2)		
	$\therefore$ PA : AQ = 1:2.		
	Coordinates of A = $\left(\frac{1\times(-4)+2\times5}{1+2}, \frac{1\times2+2\times(-4)}{1+2}\right)$	**I**	**1**
	$= (2, -2)$	**II**	**½**
	Now, B is mid point of the line segment joining A and Q.		
	Coordinates of B = $\left(\frac{2-4}{2}, \frac{-2+2}{2}\right)$	**III**	**1**
	$= (-1, 0)$	**IV**	**½**
	The line segment joining P and Q is trisected at $(2, -2)$ and $(-1, 0)$.		
	OR		
27 (b)	Find the ratio in which the point P (6, k) divides the line segment joining the points M (4, 2) and N (8, –4). Hence find the value of k.		
Sol.	Let the point P divides the line segment joining M and N in the ratio r : 1.		
	r : 1 M P N (4, 2) (6, k) (8, –4)		
	Then, Coordinates of P = $\left(\frac{r\times8+1\times4}{r+1}, \frac{r\times(-4)+1\times2}{r+1}\right) = (6, k)$	**I**	**1**

	$\Rightarrow \frac{8r+4}{r+1} = 6$	II	½
	$\Rightarrow r = 1$		
	Thus, the point P divides the line segment joining M and N in the ratio 1:1.	III	½
	i.e. Coordinates of P = $\left(\frac{4+8}{2}, \frac{2-4}{2}\right) = (6, k)$	IV	½
	The value of k is – 1.	V	½
28.	Find a relation between x and y such that the point P(x, y) is equidistant from the points A(5, 3) and B(1, 7).		
Sol.	Since P (x, y) is equidistant from A(5, 3) and B(1, 7)		
	$\therefore$ PA = PB $\Rightarrow$ $PA^2 = PB^2$	I	½
	$\Rightarrow (x-5)^2 + (y-3)^2 = (x-1)^2 + (y-7)^2$	II	1
	$\Rightarrow x^2 + 25 - 10x + y^2 + 9 - 6y = x^2 + 1 - 2x + y^2 + 49 - 14y$	III	½
	$\Rightarrow x - y = -2$ or $x - y + 2 = 0$	IV	1
29 (a)	Prove that the parallelogram circumscribing a circle is a rhombus.		
Sol.			
	As lengths of tangents drawn from an external point to a circle are equal		
	$\therefore$ AS = AR … (i) BS = BP … (ii) CQ = CP … (iii) DQ = DR … (iv)	I	1
	Adding (i), (ii), (iii) and (iv), we get		
	AS + BS + CQ + DQ = (AR + DR) + (BP + CP)	II	1
	$\Rightarrow$ AB + CD = AD + BC		
	As AB = CD and AD = BC		
	$\Rightarrow$ 2 AB = 2 AD	III	½
	$\Rightarrow$ AB = AD		
	Since adjacent sides of parallelogram ABCD are equal.	IV	½
	Therefore, ABCD is a rhombus.		

	OR		
29 (b)	AB is a chord of length 24 cm of a circle of radius 15 cm. The tangents at A and B intersect at a point P. Find the length PA.		
Sol.	 AB = 24 cm OA = 15 cm Join OP intersecting AB at Q. Also join OB. Δ PAQ ≅ Δ PBQ ∴ ∠ PQA = ∠ PQB = 90° and AQ = QB = 12 cm In right Δ OQA, OQ = 9 cm Now, Δ OAP ~ Δ OQA $\Rightarrow \frac{OA}{OQ} = \frac{AP}{QA}$ $\Rightarrow AP = \frac{OA \times QA}{OQ} = \frac{15 \times 12}{9} = 20$ cm	**I** **II** **III** **IV** **V**	½ **1** ½ ½ ½
30.	If $\cos A + \sin A = \sqrt{2} \cos A$, prove that $\cos A - \sin A = \sqrt{2} \sin A$.		
Sol.	$\cos A + \sin A = \sqrt{2} \cos A$ …. (i) Squaring equation (i) both sides to get $\cos^2 A + \sin^2 A + 2 \sin A \cos A = 2 \cos^2 A$ $\Rightarrow 2 \sin A \cos A = \cos^2 A - \sin^2 A$ $\Rightarrow 2 \sin A \cos A = (\cos A + \sin A)(\cos A - \sin A)$ $\Rightarrow \frac{2 \sin A \cos A}{\cos A + \sin A} = (\cos A - \sin A)$ $\Rightarrow \frac{2 \sin A \cos A}{\sqrt{2} \cos A} = (\cos A - \sin A)$ …. [using (i)] $\Rightarrow (\cos A - \sin A) = \sqrt{2} \sin A$	**I** **II** **III** **IV**	**1** **1** ½ ½

31. Find the mean of the following distribution :

Class	30 – 40	40 – 50	50 – 60	60 – 70	70 – 80
Frequency	6	13	8	12	11

Sol.

Class	Frequency (f_i)	x_i	$f_i x_i$
30 – 40	6	35	210
40 – 50	13	45	585
50 – 60	8	55	440
60 – 70	12	65	780
70 – 80	11	75	825
Total	50		2840

Correct table — **I** — **2**

Mean $= \frac{2840}{50} = 56.8$ — **II** — **1**

SECTION D

Q. Nos. **32** to **35** are Long Answer type questions of **5** marks each.

32 (a) 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 — **I** — **2**

Correct proof — **II** — **3**

OR

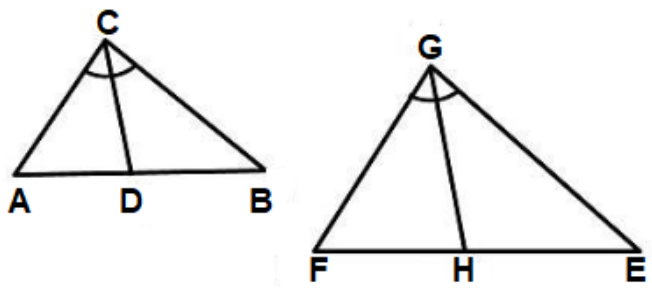
32 (b) CD and GH are respectively the bisectors of $\angle ACB$ and $\angle EGF$ such that D and H lie on sides AB and FE of ΔABC and ΔEFG respectively.

If $\Delta ABC \sim \Delta FEG$, then show that

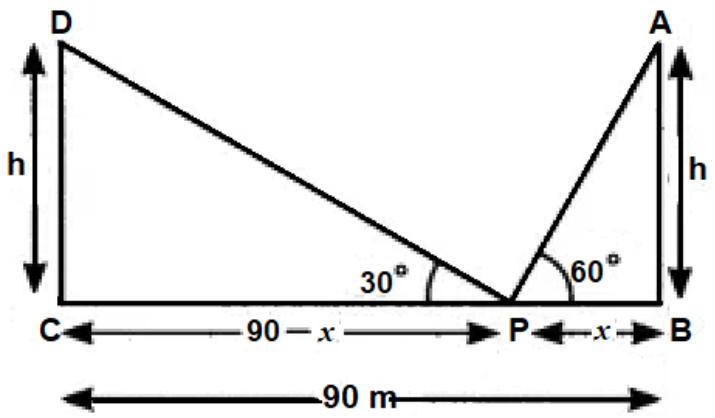
(i) $\frac{CD}{GH} = \frac{AC}{FG}$ and

(ii) $\Delta DCB \sim \Delta HGE$.

Sol.



	(i) Δ ABC ~ Δ FEG (given) ∠ ACB = ∠ FGE $\frac{1}{2}$∠ ACB = $\frac{1}{2}$∠ FGE ⇒ ∠ ACD = ∠ FGH Also, ∠ A = ∠ F ∴ Δ ACD ~ Δ FGH ⇒ $\frac{CD}{GH} = \frac{AC}{FG}$ (ii) In Δ DCB and Δ HGE ∠ DBC = ∠ HEG ∠ DCB = ∠ HGE ∴ Δ DCB ~ Δ HGE	I II III IV V	½ 2 ½ 1 1
33 (a)	The sum of numerator and denominator of a fraction is 4 less than twice the denominator. If each of the numerator and denominator is decreased by 1, the fraction becomes $\frac{1}{3}$. Find the fraction.		
Sol.	Let the fraction be $\frac{x}{y}$ $x + y = 2y - 4$ ⇒ $x - y = -4$ … (i) $\frac{x-1}{y-1} = \frac{1}{3}$ ⇒ $3x - y = 2$ … (ii) Solving equations (i) and (ii) to get $x = 3$ and $y = 7$ Required fraction = $\frac{3}{7}$	I II III IV V VI VII	½ 1 ½ 1 ½ ½ + ½ ½
	OR		
33 (b)	Three consecutive positive integers are such that sum of square of the first and the product of the other two is 67, find the integers.		
Sol.	Let the consecutive integers be x, $(x + 1)$ and $(x + 2)$ $x^2 + (x + 1)(x + 2) = 67$ ⇒ $2x^2 + 3x - 65 = 0$ ⇒ $(x - 5)(2x + 13) = 0$ ⇒ $x = 5$ or $x = \frac{-13}{2}$	I II III IV	1 1 1 1

	neglecting $x = \frac{-13}{2}$, as x is a positive integer.		
	So, $x = 5$	**V**	½
	Thus, integers are 5, 6 and 7	**VI**	½
34.	Two poles of equal heights are standing opposite to each other on either side of the road which is 90 m wide. From a point between them on the road, the angles of elevation of the top of the poles are 30° and 60° respectively. Find the height of the poles and the distances of the point from the poles. [Use $\sqrt{3} = 1.732$]		
Sol.	 Let CB be the road and AB, DC are the poles of equal heights (h). P be the point on the road. ∠ APB = 60° and ∠ DPC = 30° . Let BP be x, then PC = (90 – x) In Δ ABP tan 60° = $\sqrt{3} = \frac{h}{x}$ h = $\sqrt{3}x$ In Δ DCP tan 30° = $\frac{1}{\sqrt{3}} = \frac{h}{90 - x}$ $\Rightarrow \sqrt{3}x = \frac{90 - x}{\sqrt{3}}$ On solving $x = 22.5$ AB = $\sqrt{3}x = 22.5 \times 1.732 = 38.97$ m Height of the poles = 38.97 m Distances of the point P from the poles are 22.5 m and 67.5 m	**I** **II** **III** **IV** **V** **VI** **VII** **VIII**	½ **1** ½ **1** ½ ½ ½ ½

35.	From a solid cylinder whose height is 2.8 cm and radius 2.1 cm, a conical cavity of the same height and same radius is hollowed out. Find the volume and the total surface area of the remaining solid.		
Sol.	Height of cylinder (h) = 2.8 cm Radius of cylinder (r) = 2.1 cm Volume of remaining solid = $\frac{22}{7} \times 2.1 \times 2.1 \times 2.8 - \frac{1}{3} \times \frac{22}{7} \times 2.1 \times 2.1 \times 2.8$ $= 25.872\ cm^3$ Slant height (l) = $\sqrt{(2.1)^2 + (2.8)^2} = 3.5$ cm Total surface area of the remaining solid $= 2 \times \frac{22}{7} \times 2.1 \times 2.8 + \frac{22}{7} \times 2.1 \times 3.5 + \frac{22}{7} \times 2.1 \times 2.1$ $= 73.92\ cm^2$	**I** **II** **III** **IV** **V**	**2** **½** **½** **1 ½** **½**
	SECTION E Q. Nos. **36** to **38** are case study based questions. Each question is of **4** marks.		
36.	While playing badminton Ravi has set the barrier chain hung between two posts at the edge of the walkway of a street. It is hung in the shape of a parabola. Based on the above information answer the following questions : (a) Which type of the polynomial (linear, quadratic, cubic etc.) is graphically represented by a parabola ? (b) If the polynomial represented by a parabola, intersects the x-axis at –2 and 3 and y-axis at –3, then write the zeroes of the parabola. (c) Find the expression for the above polynomial. **OR** (c) If the zeroes of the polynomial are –5 and 3, find its expression.		
Sol.	(a) Quadratic (b) – 2 and 3 (c) $p(x) = k(x + 2)(x - 3)$ $p(x) = k(x^2 - x - 6)$ **OR** (c) $g(x) = (x + 5)(x - 3)$ $g(x) = x^2 + 2x - 15$	**I** **I** **I** **II** **I** **II**	**1** **1** **1** **1** **1** **1**

37.	A friend of you wants to buy an electric car for which he plans to take a loan from a bank and plans to pay the total loan and the interest = ₹ 5,90,000, by paying every month starting with the first instalment of ₹ 5,000. He increases the instalment by ₹ 500 every month. Based on the above, answer the following questions : (a) What are the first three instalments paid by him ? (b) Find the amount to be paid by him in 11th instalment. (c) Find the number of instalments in which he would clear his total loan. **OR** (c) After paying the 31st instalment, find how much money he still has to pay.		
Sol.	Total amount = ₹ 5,90,000 First instalment = ₹ 5,000 and Increase in the instalment = ₹ 500 (a) ₹ 5,000 ; ₹ 5,500 ; ₹ 6,000 (b) 11th instalment (a_{11}) = 5000 + 10 × 500 = 10000 Amount paid in 11th instalment is ₹ 10,000 (c) Let 'n' be the number of instalments to clear the loan. $590000 = \frac{n}{2}[2 \times 5000 + (n-1)500]$ $\Rightarrow n^2 + 19n - 2360 = 0$ $\Rightarrow (n + 59)(n - 40) = 0$ Thus, n = – 59, 40 rejecting n = – 59, $\therefore n = 40$ Thus, the loan will be cleared in 40 instalments. **OR** (c) Amount to be paid upto 31st instalment is S_{31} $S_{31} = \frac{31}{2}[2 \times 5000 + (31-1)500]$ $= \frac{31}{2} \times 25000$ = 387500 Amount still to be paid = 5,90,000 – 3,87,500 = ₹ 2,02,500	**I** **I** **I** **II** **III** **IV** **I** **II** **III**	**1** **1** **½** **½** **½** **½** **1** **½** **½**

38.	Raghav has a collection of balls of different colours. He has a total of 35 balls in his basket out of which seven are black in colour and eight are yellow in colour. Out of remaining balls, some are white and the rest are red. Based on the above, answer the following questions : (a) If the probability of drawing a red ball at random from the basket is three times that of a white ball, then find the number of red balls in the basket. (b) Find the probability of drawing a ball at random from the basket which is either a black or a white ball.		
Sol.	Total number of balls = 35 Number of black balls = 7 Number of yellow balls = 8 (a) Number of white and red balls = 35 – 15 = 20 Let number of white balls = x, then number of red balls = $(20 - x)$ Since, P (a red ball) = 3 × P (a white ball), $\therefore \frac{20-x}{35} = 3 \times \frac{x}{35}$ $\Rightarrow x = 5$ Number of white balls = 5 and number of red balls = 15 (b) P (a black ball) = $\frac{7}{35}$ P (a white ball) = $\frac{5}{35}$ P (either a black or a white ball) = $\frac{7+5}{35} = \frac{12}{35}$	**I** **II** **III** **IV** **I** **II** **III**	½ ½ ½ ½ ½ ½ **1**