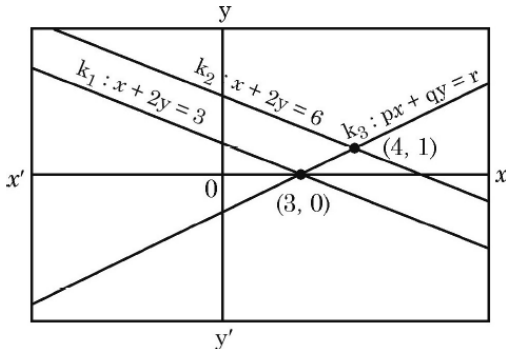
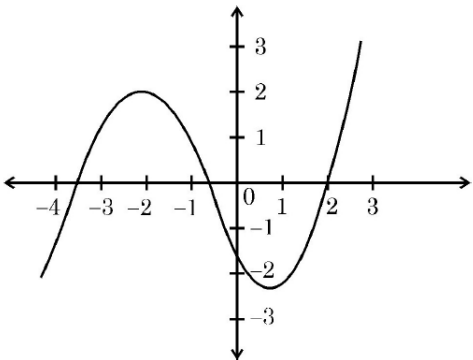
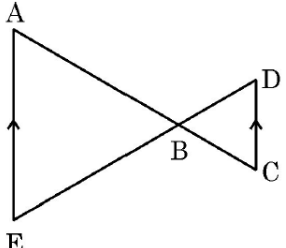
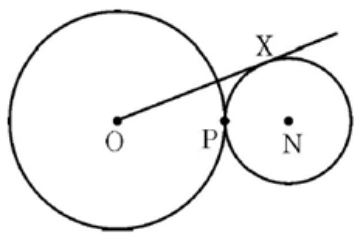


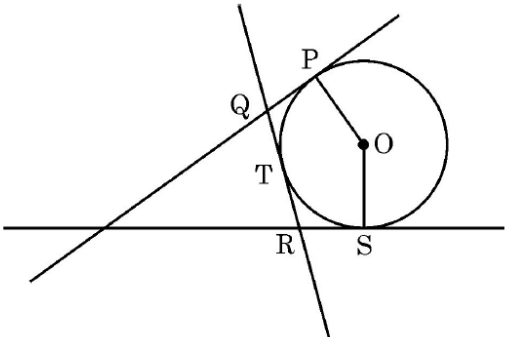
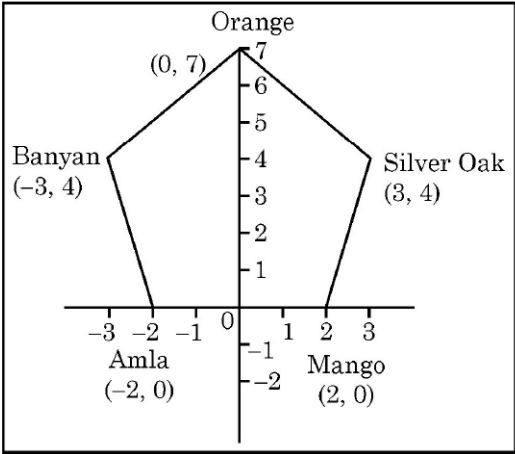
Marking Scheme Strictly Confidential (For Internal and Restricted use only) Secondary School Examination, 2026 (2nd Board Examination) MATHEMATICS (STANDARD) (041) (PAPER CODE 30/8/1)	
<u>General Instructions: -</u>	
1.	You are aware that evaluation is the most important process in the actual and correct 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 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.

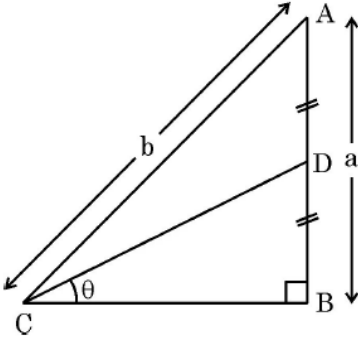
9.	If a student has attempted an extra question, answer of the question deserving more marks should be retained and the other answer scored out with a note “Extra Question” .
10.	No marks to be deducted for the cumulative effect of an error. It should be penalized only once.
11.	A full scale of marks (0 to 80 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.

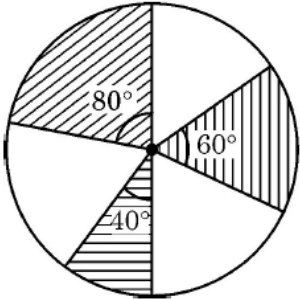
MARKING SCHEME
MATHEMATICS (Subject Code–041)
(PAPER CODE: 30/8/1)

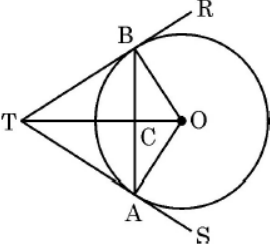
Q. No.	EXPECTED OUTCOMES/VALUE POINTS	Marks
	SECTION – A This section consists of multiple choice questions of 1 mark each.	
1.	If the roots of a quadratic equation $ax^2 + bx + c = 0$ are equal but opposite in sign, then : (A) $a = 0$ (B) $b = 0$ (C) $b \neq 0$ (D) $a < b$	
Sol.	(B) $b = 0$	1
2.	Three lines k_1, k_2, k_3 represent three different equations as shown in the figure below. Solution of the equations represented by lines k_1 and k_3 is $x = 3, y = 0$, while solution of equations represented by lines k_2 and k_3 is $x = 4, y = 1$. Which of the following is the equation of line k_3 ?  (A) $x - y = 3$ (B) $x - y = -3$ (C) $x + y = 3$ (D) $x + y = 1$	
Sol.	(A) $x - y = 3$	1
3.	 Here is the geometrical representation of a polynomial. How many zeroes does it have ? (A) 3 (B) 1 (C) 2 (D) 4	
Sol.	(A) 3	1

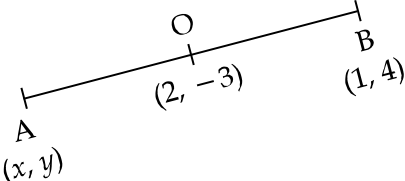
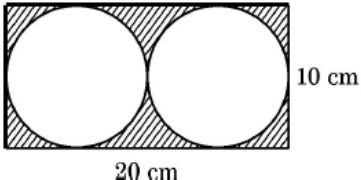
4.	The pair of linear equations $5kx + 3y = 7$ and $4x - 3y = k$ has unique solution, if : (A) $k = 0$ (B) $k \neq \frac{-4}{5}$ (C) $k \neq \frac{-5}{4}$ (D) $k = \frac{-4}{5}$	
Sol.	(A) $k = 0$ or (B) $k \neq \frac{-4}{5}$	1
5.	The sum of ages of Sania and Yogesh is 50 years. If now Sania is twice as old as Yogesh was 5 years ago, then present age of Sania is : (A) 40 years (B) 35 years (C) 20 years (D) 30 years	
Sol.	(D) 30 years	1
6.	Which term of A.P. 21, 18, 15, is zero ? (A) 9th (B) 5th (C) 8th (D) 10th	
Sol.	(C) 8 th	1
7.	In the given figure, $AE \parallel DC$. If $BE = 1400$ cm, $BD = 700$ cm, $AB = 1800$ cm and $CD = 800$ cm, then the length of AE is :  (A) 300 cm (B) 700 cm (C) 100 cm (D) 1600 cm	
Sol.	(D) 1600 cm	1
8.	 Two circles with centres O and N touch each other at the point P as shown in the figure. O, P and N are collinear. Radius of the circle with centre O is twice that of the circle with centre N. OX is tangent to the circle with centre N and $OX = 18$ cm. The radius of the circle with centre N is :	

	(A) $\frac{18}{\sqrt{2}}$ cm (C) $\frac{9}{\sqrt{2}}$ cm	(B) 9 cm (D) $\frac{18}{\sqrt{10}}$ cm	
Sol.	(C) $\frac{9}{\sqrt{2}}$ cm		1
9.	 In the given figure, there is a circle with centre 'O' having three tangents at points P, T and S. If QR = 12 cm and radius of a circle is 7 cm, then perimeter of polygon PQRSTO is : (A) 26 cm (B) 31 cm (C) 38 cm (D) 33 cm		
Sol.	(C) 38 cm		1
10.	 5 trees Banyan, Silver Oak, Orange, Amla and Mango were planted in the garden as shown in the figure. If 1 unit = 1 m in the figure, which of the following trees are at a distance of 4 metres ? (A) Amla and Mango (B) Mango and Silver Oak (C) Silver Oak and Orange (D) Orange and Mango		
Sol.	(A) Amla and Mango		1

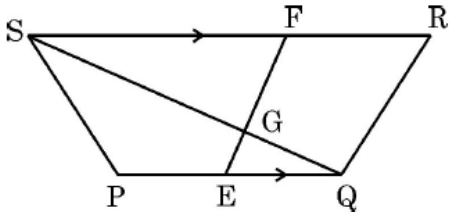
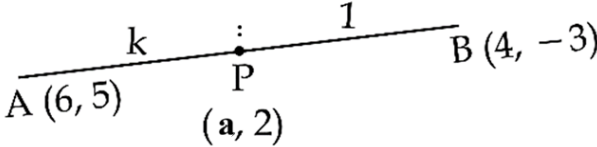
11.	 In the figure, $AD = DB$, $\angle B$ is a right angle and $\angle BCD = \theta$, $AC = b$ and $AB = a$. Then, $\tan \theta$ is equal to (A) $\frac{2a}{\sqrt{b^2 - a^2}}$ (B) $\frac{a}{2\sqrt{b^2 - a^2}}$ (C) $\frac{a}{2\sqrt{b^2 + a^2}}$ (D) $\frac{a}{2(b^2 - a^2)}$													
Sol.	(B) $\frac{a}{2\sqrt{b^2 - a^2}}$	1												
12.	At some time of the day, the length of shadow of a tower on earth is equal to its height. Then the Sun's altitude is (A) 45° (B) 0° (C) 90° (D) 30°													
Sol.	(A) 45°	1												
13.	<table border="1" data-bbox="277 1068 1080 1151"><tr><td>Class-Interval</td><td>0 – 5</td><td>5 – 10</td><td>10 – 15</td><td>15 – 20</td><td>20 – 25</td></tr><tr><td>Frequency</td><td>2</td><td>10</td><td>4</td><td>8</td><td>6</td></tr></table> Sum of upper limits of median class and modal class of above data is (A) 20 (B) 15 (C) 25 (D) 30	Class-Interval	0 – 5	5 – 10	10 – 15	15 – 20	20 – 25	Frequency	2	10	4	8	6	
Class-Interval	0 – 5	5 – 10	10 – 15	15 – 20	20 – 25									
Frequency	2	10	4	8	6									
Sol.	(C) 25	1												
14.	Two unbiased coins are tossed simultaneously. What is the probability of getting atmost one head ? (A) $\frac{3}{4}$ (B) $\frac{1}{3}$ (C) $\frac{1}{2}$ (D) $\frac{1}{6}$													
Sol.	(A) $\frac{3}{4}$	1												
15.	A jar contains some red, black and green marbles. If probability of getting a red marble is $\frac{1}{5}$ and probability of getting a black marble is $\frac{1}{4}$ and jar contains total 11 green marbles, then total number of marbles that were there in the jar is (A) 20 (B) 40 (C) 11 (D) 9													
Sol.	(A) 20	1												

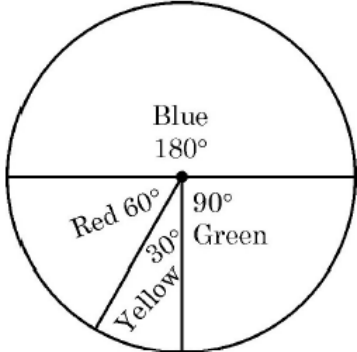
16.	 In the figure, three sectors of a circle of radius 7 cm making central angles 60°, 80° and 40° are shown. The area of the shaded region is : (A) 77 cm^2 (B) 22 cm^2 (C) 154 cm^2 (D) 0 cm^2	
Sol.	(A) 77 cm^2	1
17.	If the base radius of a cone and a cylinder are equal and their curved surface areas are also equal, then ratio of the slant height of cone to that of the height of cylinder is : (A) 2 : 1 (B) 1 : 3 (C) 1 : 2 (D) 3 : 1	
Sol.	(A) 2 : 1	1
18.	If the area of a semi-circular field is 15400 sq. m, then the perimeter of the field is (A) $460\sqrt{2} \text{ m}$ (B) $360\sqrt{2} \text{ m}$ (C) $160\sqrt{2} \text{ m}$ (D) $220\sqrt{2} \text{ m}$	
Sol.	(B) $360\sqrt{2} \text{ m}$	1
(Assertion and Reason based Questions) Direction : Question Numbers 19 and 20 are Assertion (A) and Reason (R) based questions. Two statements are given, one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer to these questions from the options (A), (B), (C) and (D) as given below : (A) Both Assertion (A) and Reason (R) are true, and Reason (R) is the correct explanation of Assertion (A). (B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A). (C) Assertion (A) is true, but Reason (R) is false. (D) Assertion (A) is false, but Reason (R) is true.		
19.	Assertion (A) : The number 12^n ends with digit 0 where 'n' is a natural number. Reason (R) : Any number ends with digit 0 if its prime factor is of the form $2^m \times 5^n$, where 'm' and 'n' are natural numbers.	
Sol.	(D) Assertion (A) is false, but Reason (R) is true.	1

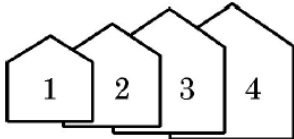
20.	Assertion (A) : If values of Mode and Mean of a data are 60 and 66 respectively, then the value of Median is 64. Reason (R) : For any data, $2 \text{ Mean} = \text{Mode} + 3 \text{ Median}$.	
Sol.	(C) Assertion (A) is true, but Reason (R) is false.	1
	SECTION – B This section consists of Very Short Answer (VSA) type questions of 2 marks each.	
21 (a)	Find the greatest number which divides 37, 66, 89, leaving remainder 2, 3, 5 respectively.	
Sol.	$37 - 2 = 35 = 5 \times 7$ $66 - 3 = 63 = 3^2 \times 7$ $89 - 5 = 84 = 2^2 \times 3 \times 7$ $\text{HCF}(35, 63, 84) = 7$ $\therefore$ required number is 7.	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$
	OR	
21 (b)	Sum and difference of two numbers is 256 and 224 respectively. Find their HCF and LCM.	
Sol.	Let two numbers be 'x' and 'y' where $x > y$ According to Question $\begin{aligned} x + y &= 256 \quad \text{--- (i)} \\ x - y &= 224 \quad \text{--- (ii)} \end{aligned}$ Solving (i) and (ii), we get $x = 240$ and $y = 16$ $\text{HCF}(240, 16) = 16$ and $\text{LCM}(240, 16) = 240$	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$
22.	If ' α ' and ' β ' are the roots of quadratic equation $x^2 + (k^2 - 1)x - 20 = 0$ such that $\alpha^2 - \beta^2 - \alpha\beta = 29$ and $\alpha - \beta = 9$, then find the value of k.	
Sol.	Here, $(\alpha + \beta) = -k^2 + 1$ and $\alpha\beta = -20$ $(\alpha - \beta)(\alpha + \beta) - \alpha\beta = 29$ $\Rightarrow 9 \times (-k^2 + 1) + 20 = 29$ $\Rightarrow k^2 = 0 \Rightarrow k = 0$	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$
23.	In the given figure, two radii OA and OB of a circle with centre 'O' are perpendicular to each other. If two tangents drawn at points A and B intersect each other at point T, prove that $AB = OT$ and they bisect each other. 	

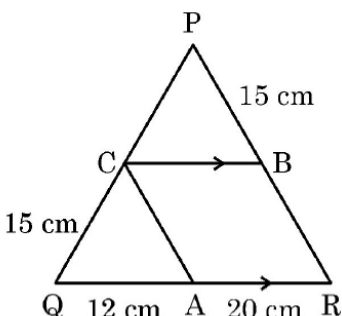
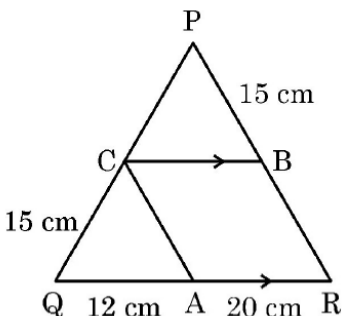
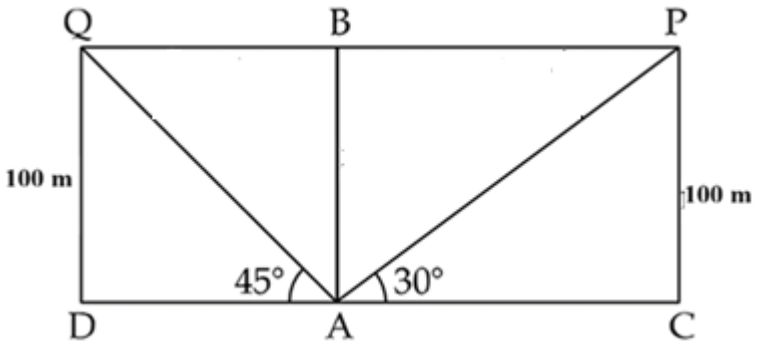
Sol.	Given $\angle AOB = 90^\circ$ Radius is perpendicular to tangent, $\therefore \angle OAT = \angle OBT = 90^\circ$ and $TB = TA$ & $OA = OB$ $\therefore$ AOBT is a square. As diagonals of a square are equal and bisect each other, $\therefore AB = OT$ & they bisect each other.	1 1
24.	Find the co-ordinates of point A, where AB is diameter of the circle whose centre is $(2, -3)$ and B is $(1, 4)$.	
Sol.	 Let the co-ordinates of point A be (x, y) As centre of a circle bisect the diameter co-ordinates of the mid point of AB = co-ordinates of the centre i.e. $\left(\frac{x+1}{2}, \frac{y+4}{2}\right) = (2, -3)$ so, $\frac{x+1}{2} = 2 \Rightarrow x = 3$ and $\frac{y+4}{2} = -3 \Rightarrow y = -10$ $\therefore$ co-ordinates of point A are $(3, -10)$.	$\frac{1}{2}$ 1 $\frac{1}{2}$
25 (a)	In the figure, find the area of the shaded region.  (Take $\pi = 3.14$)	
Sol.	Radius of the circle = 5 cm Area of shaded region = Area of rectangle – 2 $\times$ area of circle $= 20 \times 10 - 2 \times 3.14 \times (5)^2 = 43 \text{ cm}^2$	$\frac{1}{2}$ $\frac{1}{2}$ 1
	OR	
25 (b)	Find the radius of the circle whose one sector has area of 66 sq. cm. and the length of its arc is 22 cm.	
Sol.	Let the radius of the circle be 'r' cm Area of sector = $\frac{\theta}{360} \times \pi r^2 = 66$ --- (i) Length of arc = $\frac{\theta}{360} \times 2\pi r = 22$ --- (ii)	$\frac{1}{2}$ $\frac{1}{2}$

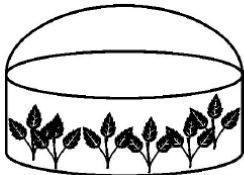
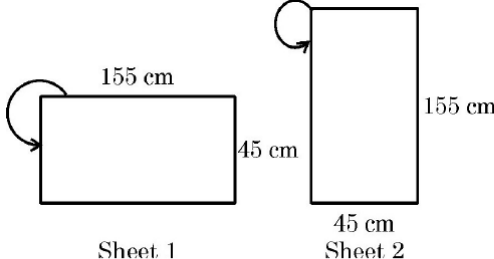
	Dividing (i) by (ii), we get $r = 6$ So, the radius of the circle is 6 cm.	1
	SECTION – C This section consists of Short Answer (SA) type questions of 3 marks each.	
26 (a)	Show that $\frac{3+\sqrt{3}}{5}$ is an irrational number, given $\sqrt{3}$ is an irrational number. Also, find an irrational number whose sum with given number is an irrational number.	
Sol.	Let us assume that $\frac{3+\sqrt{3}}{5}$ be a rational number. $\therefore \frac{3+\sqrt{3}}{5} = \frac{p}{q}$, where p and q are integers and $q \neq 0$ $\Rightarrow \sqrt{3} = \frac{5p-3q}{q}$ RHS is a rational number. So, LHS is also a rational number i.e. $\sqrt{3}$ is a rational number but this contradicts the fact that $\sqrt{3}$ is an irrational number. $\therefore$ our assumption is wrong. Hence, $\frac{3+\sqrt{3}}{5}$ be an irrational number. Any number except $\frac{-\sqrt{3}}{5}$	$\frac{1}{2}$ 1 1 $\frac{1}{2}$
	OR	
26 (b)	Sandhya has two pieces of cloth – one 144 cm wide and the other 96 cm wide. She wants to cut both the cloth pieces into equal sized strips such that one is as wide as possible with none left over. What is the width she can cut ? How many pieces will she get in all ?	
Sol.	$144 = 2^4 \times 3^2$ $96 = 2^5 \times 3$ $\therefore \text{HCF} = 2^4 \times 3 = 48$ $\therefore$ required width of cloth piece is 48 cm Number of pieces = $\frac{144}{48} + \frac{96}{48} = 5$	$\frac{1}{2}$ $\frac{1}{2}$ 1 1
27.	Solve for x : $\frac{4}{x} - 3 = \frac{5}{2x+3}, x \neq 0, \frac{-3}{2}$.	
Sol.	$\frac{4}{x} - \frac{5}{2x+3} = 3$ $\Rightarrow 6x^2 + 6x - 12 = 0$ or $x^2 + x - 2 = 0$ $\Rightarrow (x+2)(x-1) = 0$ $\therefore x = -2, 1$	1 1 1

28.	In the figure, PQRS is a trapezium in which PQ is parallel to SR. There are points E and F respectively such that EF intersects SQ at G. Prove that $EQ \times GS = GQ \times FS$. 	
Sol.	$\Delta EQG \sim \Delta FSG$ $\therefore \frac{EQ}{FS} = \frac{GQ}{GS}$ $\Rightarrow EQ \times GS = GQ \times FS$	$1\frac{1}{2}$ 1 $\frac{1}{2}$
29.	Calculate the ratio in which the line segment joining the points A(6, 5) and B(4, -3) is divided by the line $y = 2$. Also, find the point of intersection.	
Sol.	 Let point P (a, 2) divides the line segment AB in the ratio k : 1. $\frac{-3k+5}{k+1} = 2 \Rightarrow k = \frac{3}{5}$ $\therefore$ required ratio is 3 : 5 $a = \frac{4 \times 3 + 6 \times 5}{3 + 5} = \frac{21}{4}$ $\therefore$ coordinates of point of intersection are $\left(\frac{21}{4}, 2\right)$	$\frac{1}{2}$ 1 $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$
30.	Prove that : $(\operatorname{cosec} A - \sin A)(\sec A - \cos A) = \frac{1}{\tan A + \cot A}$	
Sol.	$\text{LHS} = \left(\frac{1}{\sin A} - \sin A\right) \left(\frac{1}{\cos A} - \cos A\right)$ $= \left(\frac{1 - \sin^2 A}{\sin A}\right) \left(\frac{1 - \cos^2 A}{\cos A}\right) = \sin A \cos A$ $\text{RHS} = \frac{1}{\frac{\sin A}{\cos A} + \frac{\cos A}{\sin A}}$ $= \frac{\sin A \cos A}{\sin^2 A + \cos^2 A} = \sin A \cos A$ $\therefore \text{LHS} = \text{RHS}$	$1\frac{1}{2}$ $1\frac{1}{2}$

31 (a)	In a Carton, there were blue, red, green and yellow balls. There were 240 balls. The number of balls of each colour is represented in the following pie chart. If Shreya picked a ball at random, then what is the probability that she picked a yellow ball ? If 20 more yellow balls were added to the carton, what is the probability that now she picked a ball which is yellow or green ? 	
Sol.	Total balls = 240 $P(\text{yellow ball}) = \frac{30}{360}$ or $\frac{1}{12}$ Number of yellow balls = $\frac{30}{360} \times 240 = 20$ Number of green balls = $\frac{90}{360} \times 240 = 60$ Number of yellow balls after adding 20 more yellow balls = 40 Total number of balls after adding 20 more yellow balls = 260 $P(\text{yellow or green ball}) = \frac{40+60}{260} = \frac{100}{260}$ or $\frac{5}{13}$	1 $\frac{1}{2}$ $\frac{1}{2}$ 1
	OR	
31 (b)	Offices in Delhi are open for 5 days a week Monday to Friday. Two employees of an office remain absent for one day in the same particular week. Find the probability that they remain absent on the same day. Also, find the probability that it was a Friday.	
Sol.	Possible outcomes are: (Mon, Mon), (Mon, Tue), (Mon, Wed), (Mon, Thu), (Mon, Fri) (Tue, Mon), (Tue, Tue), (Tue, Wed), (Tue, Thu), (Tue, Fri) (Wed, Mon), (Wed, Tue), (Wed, Wed), (Wed, Thu), (Wed, Fri) (Thu, Mon), (Thu, Tue), (Thu, Wed), (Thu, Thu), (Thu, Fri) (Fri, Mon), (Fri, Tue), (Fri, Wed), (Fri, Thu), (Fri, Fri) $\therefore$ Total number of outcomes = 25 $P(\text{Absent on the same day}) = \frac{5}{25}$ or $\frac{1}{5}$ $P(\text{Absent on Friday}) = \frac{1}{25}$	1 1 1

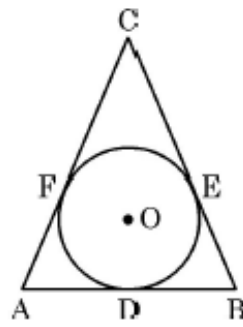
	SECTION – D	
	This section consists of Long Answer (LA) type questions of 5 marks each.	
32 (a)	The houses in a row are numbered consecutively 1 to 49. Show that there exist a value of x such that sum of numbers of houses preceding the house numbered x is equal to the sum of numbers of houses following x. Find the value of x. 	
Sol.	Here $a = 1$, $d = 1$ and $n = 49$ $S_{x-1} = S_{49} - S_x$ $\frac{x-1}{2} [2 \times 1 + (x-1-1) \times 1] = \frac{49}{2} [2 \times 1 + 48 \times 1] - \frac{x}{2} [2 \times 1 + (x-1) \times 1]$ $\Rightarrow x^2 = 1225$ $x \neq -35$ $\therefore x = 35$	1 2 1½ ½
	OR	
32 (b)	If x, y, z are $p^{\text{th}}, q^{\text{th}}, r^{\text{th}}$ terms respectively of an A.P., then prove that $p(y-z) + q(z-x) + r(x-y) = 0$.	
Sol.	$x = a + (p-1) \times d \quad \text{--- (i)}$ $y = a + (q-1) \times d \quad \text{--- (ii)}$ $z = a + (r-1) \times d \quad \text{--- (iii)}$ Subtract (ii) from (i), we get $x - y = (p - q) \times d$ Subtract (iii) from (ii), we get $y - z = (q - r) \times d$ Subtract (i) from (iii), we get $z - x = (r - p) \times d$ $\text{LHS} = p(y - z) + q(z - x) + r(x - y)$ $= p[(q - r) \times d] + q[(r - p) \times d] + r[(p - q) \times d]$ $= (pq - pr + qr - qp + rp - rq) \times d$ $= 0 = \text{RHS}$	½ ½ ½ ½ ½ ½ 1 1
33.	Prove that if a line is drawn parallel to one side of a triangle intersecting the other two sides at distinct points, then the other two sides are divided in the same ratio.	

	 If $CB \parallel QR$, $CA \parallel PR$, $AQ = 12$ cm, $AR = 20$ cm and $PB = CQ = 15$ cm, calculate the lengths PC and BR.	
Sol.	Correct figure, given, to prove, construction Correct proof  $CA \parallel PR \Rightarrow \frac{12}{20} = \frac{15}{PC} \Rightarrow PC = 25$ cm $CB \parallel QR \Rightarrow \frac{25}{15} = \frac{15}{BR} \Rightarrow BR = 9$ cm	2 2 $\frac{1}{2}$ $\frac{1}{2}$
34.	A bird was flying parallel to the ground in east–west direction with a constant speed at a height of 100 m from the ground. Sunita standing in the middle of the park, first observed the bird in the east at an angle of elevation of 30°. After 2 minutes, she observed the bird in the west from the same position making an angle of elevation of 45°. Find the speed of the bird. (Take $\sqrt{3} = 1.73$)	
Sol.	 Correct figure $\angle PAC = 30^\circ$ and $\angle DAQ = 45^\circ$ In $\triangle ACP$, $\frac{100}{AC} = \tan 30^\circ = \frac{1}{\sqrt{3}}$ $\Rightarrow AC = 100\sqrt{3} = 100 \times 1.73 = 173$ m	1 1 $\frac{1}{2}$

	In $\triangle ADQ$, $\frac{100}{AD} = \tan 45^\circ = 1$ $\Rightarrow AD = 100$ m Total distance travelled in 2 minutes, $QP = QB + BP = DA + AC$ $= 173 + 100 = 273$ m Speed of the bird $= \frac{273}{2} = 136.5$ m/min	$\frac{1}{2}$ $\frac{1}{2}$ 1 $\frac{1}{2}$
35 (a)	Saransh is building a green house in his farm as shown. The base of the green house is circular having a diameter of 12 m and it has a hemispherical dome on the top of a cylindrical base of height 2 m. How much will it cost him to cover the green house with transparent plastic both the cylindrical and hemispherical part if the plastic sheet costs ₹ 70 per sq. metre ? Also, find the volume of air inside. 	
Sol.	Radius = 6 m Area of plastic sheet required = CSA of cylinder + CSA of hemisphere $= 2 \times \frac{22}{7} \times 6 \times 2 + 2 \times \frac{22}{7} \times (6)^2$ $= \frac{2112}{7} \text{ m}^2$ Cost of plastic sheet @ ₹ 70/m² $= \frac{2112}{7} \times 70 = ₹ 21120$ Volume of air $= \frac{22}{7} \times (6)^2 \times 2 + \frac{2}{3} \times \frac{22}{7} \times (6)^3$ $= \frac{4752}{7} \text{ m}^3$ or 678.85 m³	$\frac{1}{2}$ 1 $\frac{1}{2}$ 1 1 1
	OR	
35 (b)	 Two equal rectangular sheets of dimensions 155 cm × 45 cm as shown in the figure are folded to make hollow right circular cylinders in such a way that there is exactly 1 cm overlap when sticking the ends of the sheet. Sheet 1 is folded to form a cylinder of height 45 cm while sheet 2 is folded to get a cylinder of height 155 cm. Find the difference in the radii of the two cylinders and hence find the ratio of their volumes.	

Sol.	Circumference of sheet 1 = $155 - 1 = 154$ cm $2 \times \frac{22}{7} \times r_1 = 154 \Rightarrow r_1 = \frac{49}{2} = 24.5 \text{ cm}$ Circumference of sheet 2 = $45 - 1 = 44$ cm $2 \times \frac{22}{7} \times r_2 = 44 \Rightarrow r_2 = 7 \text{ cm}$ Difference in radii = $24.5 - 7 = 17.5$ cm Ratio of volumes = $\frac{\pi \times (7)^2 \times 155}{\pi \times (24.5)^2 \times 45}$ $= \frac{124}{441} \text{ or } 124 : 441 \text{ or } 441 : 124$	$\frac{1}{2}$ 1 $\frac{1}{2}$ 1 $\frac{1}{2}$ 1 $\frac{1}{2}$
	SECTION - E This section consists of Case Study based questions of 4 marks each.	
36.	Ramesh was fond of spinning/revolving a ball tied with a rope of length 2 m. While playing, the ball slipped from the rope and hit his brother Suresh lightly. Suresh threw the ball back to Ramesh that made an angle of 60° with AX along the path XYZ which is a tangent to the imaginary circle as shown in fig. 1. i.e. $\angle AXZ = 60^\circ$. Based on the above, answer the following questions : (i) If the length of rope used by Ramesh is 2 m, what is the diameter of the circle ? (ii) Find the length XY shown in figure. (Fig. 1) (iii) (a) Ramesh made the same circle on the ground using the rope he had and placed 4 sticks around it as shown in the figure with $AB = 3$ m, $AD = BC = 5$ m. Find length of CD. Justify your answer. (Fig. 2) OR	

- (b) Suresh made another circle with radius 4 m and placed 3 sticks as shown in the figure. If $AD = 6$ m, $BD = 8$ m and area of triangle ABC is 84 sq. m., find the lengths of AC and BC.

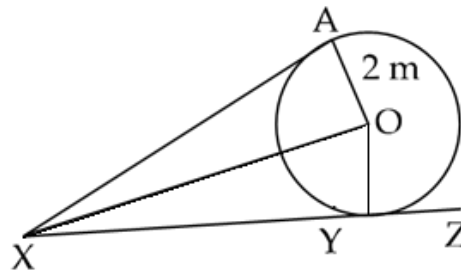


(Fig. 3)

Sol.

(i) 4 m

(ii)



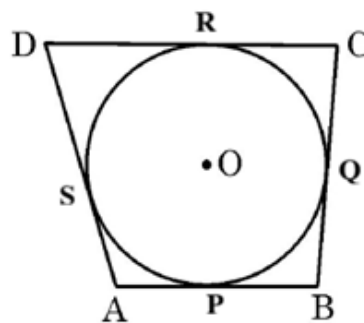
Join OY and OX.

$\Delta OAX \cong \Delta OYX \therefore \angle OXY = 30^\circ$

In ΔOYX , $\frac{2}{XY} = \tan 30^\circ = \frac{1}{\sqrt{3}}$

$$\Rightarrow XY = 2\sqrt{3} \text{ m}$$

(iii) (a)



$AS = AP$ --- (i)

$BQ = BP$ --- (ii)

$CQ = CR$ --- (iii)

$DR = DS$ --- (iv)

Adding and rearranging (i), (ii), (iii) and (iv), we get

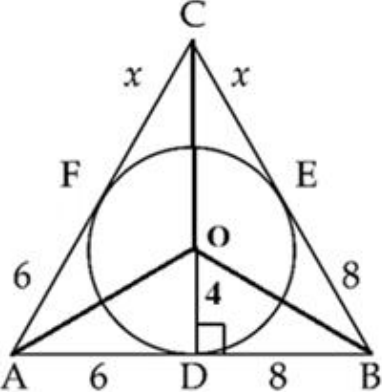
$$AB + CD = AD + BC$$

1

$\frac{1}{2}$

$\frac{1}{2}$

1

	$3 + CD = 5 + 5$ $CD = 10 - 3 = 7 \text{ m}$ OR (iii) (b)  Let $CF = CE = x \text{ m}$ $AD = AF = 6 \text{ m}$ $BD = BE = 8 \text{ m}$ Area of triangle $= 84 = \frac{1}{2} \times (6 + 8) \times 4 + \frac{1}{2} \times (6 + x) \times 4 + \frac{1}{2} \times (8 + x) \times 4$ $\Rightarrow x = 7$ So, $AC = 6 + 7 = 13 \text{ cm}$ and $BC = 8 + 7 = 15 \text{ cm}$	1
37.	 Essel World is one of India's largest amusement park that offers a diverse range of thrilling rides and water attractions for visitors of all ages. The entry ticket charges for the park is ₹ 150 per child and ₹ 250 per adult. On a day cashier of park found that 300 tickets were sold and an amount of ₹ 55,000 was collected.	

	Based on the above, answer the following questions : (i) If number of children visited be x, the number of adults visited be y, write the given situation algebraically. (ii) How many children visited the park that day ? (iii) (a) How many adults visited the park that day ? If there were 50 more adults that day, how much money would have been collected from adults ? OR (b) How many adults visited the park that day ? If a special show was arranged and hence the per ticket rate for adults was increased by ₹ 100, totally how much money will be collected ?															
Sol.	(i) $x + y = 300$ --- (I) $150x + 250y = 55000$ --- (II) (ii) Solving (I) & (II), we get $x = 200$ (iii) (a) from (I), $y = 100$ Money collected from adults = $(100 + 50) \times 250 = ₹ 37500$ OR (iii) (b) from (I), $y = 100$ Total money collected = $100 \times (250 + 100) + 200 \times 150$ $= ₹ 65000$	$\frac{1}{2}$ $\frac{1}{2}$ 1 1 1 1 1														
38.	Sulphur dioxide (SO_2) is a major air pollutant, and has significant impact upon human health. It influences the plants communities as well as animal life. To find out concentration of SO_2 in the air (in parts per million i.e. ppm), the data was collected from 30 localities in Delhi and is presented below : <table><tr><th>Concentration of SO_2 (in ppm)</th><th>Frequency</th></tr><tr><td>0.00 – 0.04</td><td>4</td></tr><tr><td>0.04 – 0.08</td><td>8</td></tr><tr><td>0.08 – 0.12</td><td>10</td></tr><tr><td>0.12 – 0.16</td><td>2</td></tr><tr><td>0.16 – 0.20</td><td>4</td></tr><tr><td>0.20 – 0.24</td><td>2</td></tr></table> Based on the above, answer the following questions : (i) What is the lower limit of median class ?	Concentration of SO_2 (in ppm)	Frequency	0.00 – 0.04	4	0.04 – 0.08	8	0.08 – 0.12	10	0.12 – 0.16	2	0.16 – 0.20	4	0.20 – 0.24	2	
Concentration of SO_2 (in ppm)	Frequency															
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0.04 – 0.08	8															
0.08 – 0.12	10															
0.12 – 0.16	2															
0.16 – 0.20	4															
0.20 – 0.24	2															

	(ii) What is the modal class of the above data ? (iii) (a) What is the mean concentration of SO₂ in air ? OR (b) Find the median of the above data.																																																																																			
Sol.	(i) <table><tr><th>Concentration of SO₂ (in ppm)</th><th>Frequency</th><th>cf</th></tr><tr><td>0.00 – 0.04</td><td>4</td><td>4</td></tr><tr><td>0.04 – 0.08</td><td>8</td><td>12</td></tr><tr><td>0.08 – 0.12</td><td>10</td><td>22</td></tr><tr><td>0.12 – 0.16</td><td>2</td><td>24</td></tr><tr><td>0.16 – 0.20</td><td>4</td><td>28</td></tr><tr><td>0.20 – 0.24</td><td>2</td><td>30</td></tr></table> Median class is 0.08 – 0.12 ∴ lower limit of median class is 0.08 (ii) Modal class is 0.08 – 0.12 (iii) (a) <table><tr><th>Concentration of SO₂ (in ppm)</th><th>f_i</th><th>x_i</th><th>u_i = $\frac{x_i - 0.10}{0.04}$</th><th>f_i u_i</th></tr><tr><td>0.00 – 0.04</td><td>4</td><td>0.02</td><td>– 2</td><td>– 8</td></tr><tr><td>0.04 – 0.08</td><td>8</td><td>0.06</td><td>– 1</td><td>– 8</td></tr><tr><td>0.08 – 0.12</td><td>10</td><td>0.10</td><td>0</td><td>0</td></tr><tr><td>0.12 – 0.16</td><td>2</td><td>0.14</td><td>1</td><td>2</td></tr><tr><td>0.16 – 0.20</td><td>4</td><td>0.18</td><td>2</td><td>8</td></tr><tr><td>0.20 – 0.24</td><td>2</td><td>0.22</td><td>3</td><td>6</td></tr><tr><td>Total</td><td>30</td><td></td><td></td><td>0</td></tr></table> Correct table Mean = $0.10 + \frac{0}{30} \times 0.04 = 0.10$ Therefore, mean concentration of SO₂ in air is 0.10 ppm OR (iii) (b) <table><tr><th>Concentration of SO₂ (in ppm)</th><th>Frequency</th><th>cf</th></tr><tr><td>0.00 – 0.04</td><td>4</td><td>4</td></tr><tr><td>0.04 – 0.08</td><td>8</td><td>12</td></tr><tr><td>0.08 – 0.12</td><td>10</td><td>22</td></tr><tr><td>0.12 – 0.16</td><td>2</td><td>24</td></tr><tr><td>0.16 – 0.20</td><td>4</td><td>28</td></tr><tr><td>0.20 – 0.24</td><td>2</td><td>30</td></tr></table> Correct table Median class is 0.08 – 0.12 Median = $0.08 + \frac{15-12}{10} \times 0.04$ = 0.092 Therefore, median concentration of SO₂ in air is 0.092 ppm	Concentration of SO ₂ (in ppm)	Frequency	cf	0.00 – 0.04	4	4	0.04 – 0.08	8	12	0.08 – 0.12	10	22	0.12 – 0.16	2	24	0.16 – 0.20	4	28	0.20 – 0.24	2	30	Concentration of SO ₂ (in ppm)	f _i	x _i	u _i = $\frac{x_i - 0.10}{0.04}$	f _i u _i	0.00 – 0.04	4	0.02	– 2	– 8	0.04 – 0.08	8	0.06	– 1	– 8	0.08 – 0.12	10	0.10	0	0	0.12 – 0.16	2	0.14	1	2	0.16 – 0.20	4	0.18	2	8	0.20 – 0.24	2	0.22	3	6	Total	30			0	Concentration of SO ₂ (in ppm)	Frequency	cf	0.00 – 0.04	4	4	0.04 – 0.08	8	12	0.08 – 0.12	10	22	0.12 – 0.16	2	24	0.16 – 0.20	4	28	0.20 – 0.24	2	30	1 1 1 1 1 ½ ½ ½ ½
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