

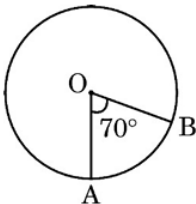
Marking Scheme
Strictly Confidential
(For Internal and Restricted use only)
Secondary School Examination, 2026 (2nd Board Examination)
SUBJECT NAME : Mathematics Basic
(Q.P. CODE / Set No. 241/430-7-3)

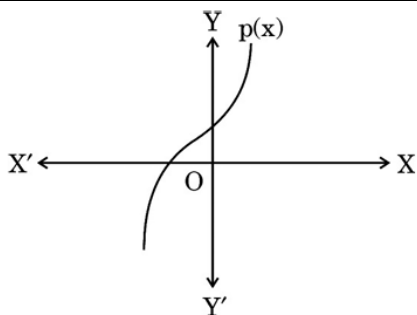
General Instructions: -

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. Its 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 Newspaper/Website, etc. may invite action under various rules of the Board and IPC.”
3	Evaluation is to be done as per instructions provided in the Marking Scheme. It should not be done according to one’s own interpretation or any other consideration. Marking Scheme should be strictly adhered to and religiously followed. However, while evaluating, answers which are based on latest information or knowledge and/or are innovative, they may be assessed for their correctness otherwise and due marks be awarded to them. In Class-X, while evaluating two competency-based questions, please try to understand given answer and even if reply is not from marking scheme but correct competency is enumerated by the candidate, due marks should be awarded.
4	The Marking scheme carries only suggested value points for the answers. These are in the nature of Guidelines only and do not constitute the complete answer. The students can have their own expression and if the expression is correct, the due marks should be awarded accordingly.
5	The Head-Examiner must go through the first five answer books evaluated by each evaluator on the first day, to ensure that evaluation has been carried out as per the instructions given in the Marking Scheme. If there is any variation, the same should be zero after deliberation and discussion. The remaining answer books meant for evaluation shall be given only after ensuring that there is no significant variation in the marking of individual evaluators.
6	Evaluators will mark ($\checkmark$) wherever answer is correct. For wrong answer CROSS ‘X’ be marked. Evaluators will not put right ($\checkmark$) 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 totaled up and written in the left-hand margin and encircled. This may be followed strictly.
8	If a question does not have any parts, marks must be awarded in 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 totaling of marks awarded on an answer. • Wrong transfer of marks from the inside pages of the answer book to the title page. • Wrong question wise totaling on the title page. • Wrong totaling 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 totaled 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.
19	If a candidate attempts both alternatives/options in a question where only one option/alternative is required to be attempted, the Evaluator shall award marks in both the options. The system will take the higher of two scores and disregard the other response.
20	In a question having two options/alternatives, if a candidate has attempted only one, then the evaluator shall mark “NA” (Not attempted) against the option that has not been attempted by the candidate.

MARKING SCHEME
Mathematics Basic (Subject Code - 241)
(PAPER CODE : 430/7/3)

Q. No.	EXPECTED OUTCOMES/VALUE POINTS	Marks
SECTION A <i>This section has 20 Multiple Choice Questions (MCQs) carrying 1 mark each. 20×1=20</i>		
1.	An arc AB subtends an angle of 70° at the centre of the circle with radius 3 cm. Area of the sector OAB is :  (A) $\frac{11}{3} \text{ cm}^2$ (B) 11 cm^2 (C) 6.5 cm^2 (D) 5.5 cm^2	
Ans.	(D) 5.5 cm^2	1
2.	The diameter of a circle passing through $(2, -3)$ and centred at $(1, 1)$ is : (A) $2\sqrt{17}$ (B) $\sqrt{13}$ (C) $2\sqrt{13}$ (D) $\sqrt{17}$	
Ans.	(A) $2\sqrt{17}$	1
3.	The system of linear equations $4x - 12y = k$ and $x = 3y + 4$ is found inconsistent. Which of the following is true for the value of k ? (A) $k = 16$ (B) k can be any real number (C) $k \neq 16$ (D) $k \neq 0$	
Ans.	(C) $k \neq 16$	1
4.	The graph of the polynomial $p(x)$ is shown here. The number of zeroes of $p(x)$ is :	



(A) 3

(B) 0

(C) 2

(D) 1

Ans.

(D) 1

1

5. The n^{th} term of the AP $-18, -2, 14, \dots$ is :

(A) $16n - 2$

(B) $20n - 38$

(C) $16n - 34$

(D) $20n + 2$

Ans.

(C) $16n - 34$

1

6. Prime factorisation of 1232 is :

(A) $2^3 \times 7 \times 14$

(B) 2, 4, 7

(C) $2^4 \times 7 \times 11$

(D) $2^4, 7, 11$

Ans.

(C) $2^4 \times 7 \times 11$

1

7. A line segment joining the points $(-5, -8)$ and $(p, 5)$ is divided by y-axis in the ratio $5 : 8$. The value of p is :

(A) 8

(B) -8

(C) 16

(D) $\frac{64}{5}$

Ans.

(A) 8

1

8. A survey, regarding the weight (in kg) of 35 students of a school, was conducted and the following result was obtained :

Mean = 43 kg and Median = 45 kg

Most of the students are of weight :

(A) 46 kg

(B) 39 kg

(C) 49 kg

(D) 42 kg

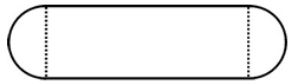
Ans.

(C) 49 kg

1

9.	A card is drawn from a well shuffled deck of 52 playing cards. The probability of getting an ace or a black king is :	
(A)	$\frac{2}{13}$	
(B)	$\frac{1}{13}$	
(C)	$\frac{3}{26}$	
(D)	$\frac{3}{13}$	
Ans.	(C) $\frac{3}{26}$	1
10.	The quadratic equation $4x^2 + 8n = 0$ has real and distinct roots. Which of the following is true for the value of n ?	
(A)	$n = \frac{1}{2}$	
(B)	$n > 4$	
(C)	$n = 2$	
(D)	$n < 0$	
Ans.	(D) $n < 0$	1
11.	Which of the following numbers cannot be the probability of an event ?	
(A)	$\frac{0.9}{8}$	
(B)	$\frac{9}{0.8}$	
(C)	98%	
(D)	$(1 - 0.98)$	
Ans.	(B) $\frac{9}{0.8}$	1
12.	In the given figure, $DE \parallel BC$ and perimeters of ΔABC and ΔADE are 32 cm and 24 cm respectively. $DE : BC$ equals :	
(A)	4 : 3	
(B)	1 : 3	
(C)	3 : 4	
(D)	1 : 4	
Ans.	(C) 3 : 4	1

13. A medicine capsule of length 13 mm is in the shape of a cylinder with two hemispheres of same radii stuck to each of its ends. If the length of the cylindrical part is 8 mm, the diameter of the capsule is :



- (A) 2 mm (B) 5 mm
(C) 2.5 mm (D) 4 mm

Ans. (B) 5 mm

1

14. A quadratic polynomial having sum and product of its zeroes as 2 and -7 respectively, is :

- (A) $x^2 - 2x + 7$ (B) $4(x^2 + 2x - 7)$
(C) $(x - 2)(x + 7)$ (D) $3(x^2 - 2x - 7)$

Ans. (D) $3(x^2 - 2x - 7)$

1

15. If $\sin \theta = \frac{1}{m}$, then $\tan \theta$ equals :

- (A) $\frac{1}{\sqrt{1 - m^2}}$ (B) $\frac{m}{\sqrt{m^2 - 1}}$
(C) $\frac{1}{\sqrt{m^2 - 1}}$ (D) $\frac{1}{\sqrt{m^2 + 1}}$

Ans. (C) $\frac{1}{\sqrt{m^2 - 1}}$

1

16. Raju is wearing a conical birthday cap of diameter 16 cm and height 24 cm. The slant height of the cap is :

- (A) $8\sqrt{10}$ cm (B) 25 cm
(C) $10\sqrt{8}$ cm (D) $\sqrt{80}$ cm

Ans. (A) $8\sqrt{10}$ cm

1

17. Two dice are rolled together. The probability of getting both odd numbers is :

- (A) $\frac{1}{2}$ (B) $\frac{1}{4}$
(C) $\frac{1}{3}$ (D) $\frac{5}{6}$

Ans. (B) $\frac{1}{4}$

1

18. Point P(x, y) is equidistant from the points (0, 5) and (5, 0). Which of the following is true ? (A) $y = x$ (B) $x + y = 0$ (C) $x = 5y$ (D) $x + y = 5$		
Ans.	(A) $y = x$	1
<i>Questions number 19 and 20 are Assertion and Reason based questions. Two statements are given, one is labelled as Assertion (A) and the other is labelled as Reason (R). Select the correct answer to these questions from the codes (A), (B), (C) and (D) as given below.</i> (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. <i>Assertion (A) :</i> The pair of linear equations $y = x$ and $y = 2x$ has infinitely many solutions. <i>Reason (R) :</i> A pair of linear equations represented by coincident lines has infinitely many solutions.		
Ans.	(D) Assertion (A) is false, but Reason (R) is true.	1
20. <i>Assertion (A) :</i> For an acute angle A, the value of $\sec A$ is always greater than 1. <i>Reason (R) :</i> $\sec^2 A = \sqrt{1 + \tan^2 A}$.		
Ans.	(C) Assertion (A) is true, but Reason (R) is false.	1
SECTION B <i>This section has 5 Very Short Answer (VSA) type questions carrying 2 marks each.</i> $5 \times 2 = 10$		
21. Gurpreet goes to a park to play every 6th day, whereas Harpreet comes on every 10th day. They played together on March 1, 2025. From March 1 to June 30, 2025, how many times have they played together ?		
Solution:	LCM (6, 10) = 30 From March 1 to June 30 there are $\therefore 31 + 30 + 31 + 30 = 122$ days. and $30 \times 4 = 120$ $\therefore$ Gurpreet and Harpreet played together 5 times.	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$

22. There are 32 slips numbered from 20 to 51. If one slip is picked up randomly, then find the probability that the number on the picked up slip is :

- (i) a prime number,
- (ii) divisible by 5.

Solution:

(i) Prime numbers are 23, 29, 31, 37, 41, 43, 47

$$P(\text{a prime no.}) = \frac{7}{32}$$

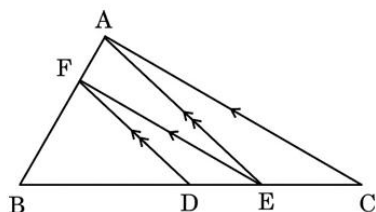
1

(ii) Numbers divisible by 5. 20, 25, 30, 35, 40, 45, 50

$$P(\text{divisible by 5}) = \frac{7}{32}.$$

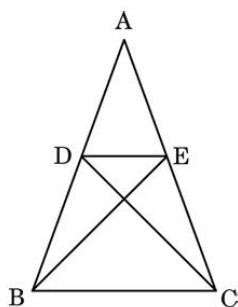
1

23. (a) In the given figure, $EF \parallel CA$ and $DF \parallel EA$. Prove that $\frac{BD}{DE} = \frac{BE}{EC}$.



OR

(b) In the given figure, $\triangle ABE \cong \triangle ACD$. Show that $\triangle ADE \sim \triangle ABC$.



Solution(a):

$$\text{In } \triangle ABC, EF \parallel CA \Rightarrow \frac{BE}{EC} = \frac{BF}{FA} \text{ --- (i)}$$

1

$$\text{In } \triangle ABE, DF \parallel EA \Rightarrow \frac{BD}{DE} = \frac{BF}{FA} \text{ --- (ii)}$$

$\frac{1}{2}$

$$\text{From (i) and (ii), we get, } \frac{BD}{DE} = \frac{BE}{EC}$$

$\frac{1}{2}$

OR

Solution(b):

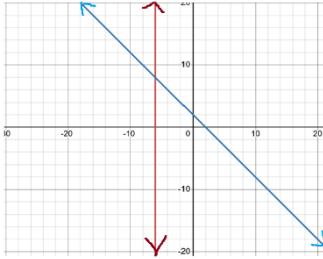
$$\triangle ABE \cong \triangle ACD$$

$$\text{Therefore } AB = AC \text{ and } AE = AD$$

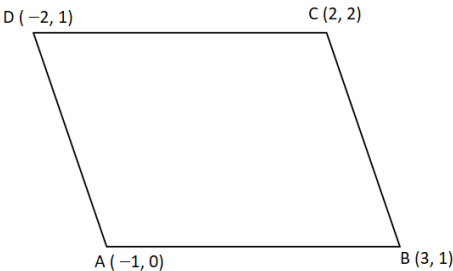
1

$$\Rightarrow \frac{AB}{AD} = \frac{AC}{AE}$$

$\frac{1}{2}$

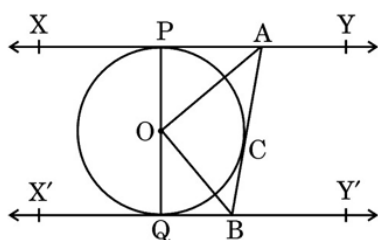
	In $\triangle ADE$ and $\triangle ABC$, $\angle A$ is common $\therefore$ by SAS similarity $\triangle ADE \sim \triangle ABC$	$\frac{1}{2}$
24. Evaluate : $\frac{2 \sin^2 60^\circ - \tan^2 60^\circ}{4 \sec^2 45^\circ}$		
Solution:	Given expression is $= \frac{2 \times \left(\frac{\sqrt{3}}{2}\right)^2 - (\sqrt{3})^2}{4 \times (\sqrt{2})^2}$ $= \frac{-3}{16}$	$1 \frac{1}{2}$ $\frac{1}{2}$
25. (a) Draw the graph of the pair of linear equations $x = -6$ and $x + y = 2$. Hence, find the solution of these equations. OR (b) The cost of one chair and one table together is ₹ 2,000. If the cost of a table is three times the cost of a chair, then find the cost of one table and the cost of one chair.		
Solution(a):	Graph of equations: $x = -6$ and $x + y = 2$.  Solution $x = -6, y = 8$	$1 \frac{1}{2}$ $\frac{1}{2}$
OR		
Solution(b):	Let the cost of one chair be ₹ x and one table be ₹ y. Therefore $x + y = 2000$ ---- (i) $y = 3x$ ----(ii) solving (i) and (ii) $x = 500, y = 1500$.	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$
SECTION C		
<i>This section has 6 Short Answer (SA) type questions carrying 3 marks each. $6 \times 3 = 18$</i>		
26. Prove that $\sqrt{3}$ is an irrational number.		

Solution:	Let $\sqrt{3}$ be a rational number $\therefore \sqrt{3} = \frac{a}{b}$, where a & b are co-prime & $b \neq 0$. $\Rightarrow a^2 = 3b^2$ $\Rightarrow 3$ divides a^2 thus 3 divides a --- (i) Let, for some integer k $a = 3k \Rightarrow b^2 = 3k^2$ $\Rightarrow 3$ divides b^2 thus 3 divides b --- (ii) Using (i) and (ii) a & b both are divisible by 3 which contradicts our assumption $\therefore \sqrt{3}$ is an irrational number.	$\frac{1}{2}$ 1 $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$
27. The perimeter of a sector of a circle with radius 2.1 cm, is 6.4 cm. Find the length of the arc and hence find the angle subtended by the arc at the centre.		
Solution:	Perimeter of the sector = $2r + \text{arc length}$ $6.4 = 2 \times 2.1 + \text{arc length}$ $\Rightarrow \text{arc length} = 2.2 \text{ cm}$ $\therefore \frac{\theta}{360} \times 2 \times \frac{22}{7} \times 2.1 = 2.2$ $\Rightarrow \theta = 60^\circ$	1 $\frac{1}{2}$ 1 $\frac{1}{2}$
28. (a) Prove that : $\frac{\cot A - \cos A}{\cot A + \cos A} = \frac{(\operatorname{cosec} A - 1)^2}{\cot^2 A}$ OR (b) Prove that : $\frac{\cos A}{1 - \tan A} + \frac{\sin A}{1 - \cot A} = \sin A + \cos A$		
Solution(a):	LHS = $\frac{\frac{\cos A}{\sin A} - \cos A}{\frac{\cos A}{\sin A} + \cos A}$ $= \frac{\cos A}{\cos A} \left(\frac{\operatorname{cosec} A - 1}{\operatorname{cosec} A + 1} \right)$ $= \frac{\operatorname{cosec} A - 1}{\operatorname{cosec} A + 1}$	1 1

	$= \frac{(\operatorname{cosec} A - 1)^2}{\operatorname{cosec}^2 A - 1}$ $= \frac{(\operatorname{cosec} A - 1)^2}{\cot^2 A} = \text{RHS}$	1
OR		
Solution(b):	$\text{LHS} = \frac{\cos A}{1 - \frac{\sin A}{\cos A}} + \frac{\sin A}{1 - \frac{\cos A}{\sin A}}$ $= \frac{\cos^2 A}{\cos A - \sin A} + \frac{\sin^2 A}{\sin A - \cos A}$ $= \frac{1}{\cos A - \sin A} (\cos^2 A - \sin^2 A)$ $= \cos A + \sin A = \text{RHS}$	1 1 $\frac{1}{2}$ $\frac{1}{2}$
29. Prove that the points A(-1, 0), B(3, 1), C(2, 2) and D(-2, 1) are the vertices of a parallelogram ABCD. Show that it is not a rectangle.		
Solution:	 Mid point of AC = $\left(\frac{1}{2}, 1\right)$ Mid point of BD = $\left(\frac{1}{2}, 1\right)$ $\therefore$ ABCD is a parallelogram $AC = \sqrt{(2+1)^2 + (2-0)^2} = \sqrt{13}$ $BD = \sqrt{(3+2)^2 + (1-1)^2} = 5$ AC $\neq$ BD therefore ABCD is not a rectangle.	2 $\frac{1}{2}$ $\frac{1}{2}$
30. Find the zeroes of a polynomial $p(x) = 25x^2 + 5x - 6$ and verify the relationship between the zeroes and its coefficients.		
Solution:	$p(x) = 25x^2 + 5x - 6$ $= (5x + 3)(5x - 2)$	

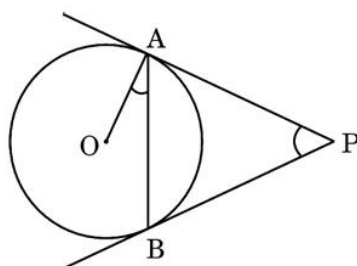
	Zeroes of $p(x) = \frac{-3}{5}, \frac{2}{5}$	1
	Sum of zeroes $= \frac{-3}{5} + \frac{2}{5} = -\frac{1}{5} = -\frac{-5}{25} = -\frac{\text{coefficient of } x}{\text{coefficient of } x^2}$	1
	Product of zeroes $= \frac{-3}{5} \times \frac{2}{5} = \frac{-6}{25} = \frac{\text{constant}}{\text{coefficient of } x^2}$	1

31. (a) In the given figure, XY and X'Y' are two parallel tangents to a circle with centre O. Another tangent AB with point of contact C, intersects XY at A and X'Y' at B. Prove that $\angle AOB = 90^\circ$.



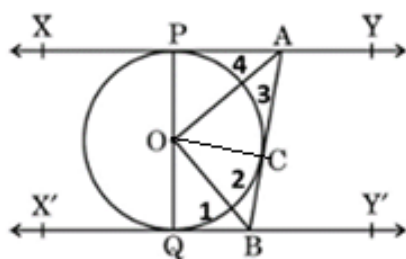
OR

- (b) Two tangents PA and PB are drawn to a circle with centre O, from an external point P. Prove that $\angle APB = 2\angle OAB$.



Solution(a):

Join OC



$$\triangle OQB \cong \triangle OCB$$

$$\Rightarrow \angle 1 = \angle 2$$

$$\triangle OCA \cong \triangle OPA$$

$$\Rightarrow \angle 3 = \angle 4$$

$$\angle QBC + \angle PAC = 180^\circ \text{ (Co-interior angles)}$$

$$\therefore \angle 1 + \angle 2 + \angle 3 + \angle 4 = 180^\circ$$

$$\Rightarrow 2(\angle 2 + \angle 3) = 180^\circ \Rightarrow \angle 2 + \angle 3 = 90^\circ$$

$$\text{Thus in } \triangle AOB, \angle AOB = 90^\circ$$

$\frac{1}{2}$

$\frac{1}{2}$

1

1

OR

Solution(b):	$PA = PB \Rightarrow \angle PAB = \angle PBA$	$\frac{1}{2}$
	$\therefore \angle APB + 2 \angle PAB = 180^\circ \text{ --- (i)}$	1
	Also $OA \perp PA$	
	$\Rightarrow \angle OAB + \angle PAB = 90^\circ \text{ --- (ii)}$	1
	Using (i) and (ii)	
	$2\angle OAB = \angle APB.$	$\frac{1}{2}$

SECTION D

This section has 4 Long Answer (LA) type questions carrying 5 marks each. $4 \times 5 = 20$

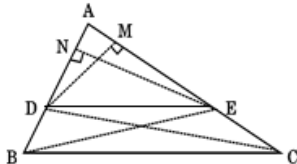
- 32.** The sum of the areas of two squares is 208 cm^2 and the difference in their perimeters is 16 cm. Find the lengths of the sides of the two squares.

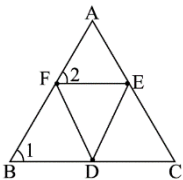
Solution:	Let the sides of two squares be a cm & b cm, $a > b$	
	$\therefore a^2 + b^2 = 208$	1
	and $4a - 4b = 16$	1
	$\therefore (b + 4)^2 + b^2 = 208$	
	$\Rightarrow b^2 + 4b - 96 = 0$	$1\frac{1}{2}$
	$\Rightarrow (b + 12)(b - 8) = 0$	
	$\Rightarrow b \neq -12, b = 8$	1
	$\Rightarrow a = 12$	$\frac{1}{2}$
	$\therefore$ The lengths of the sides of two squares are 12 cm and 8 cm	

- 33.** (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.

OR

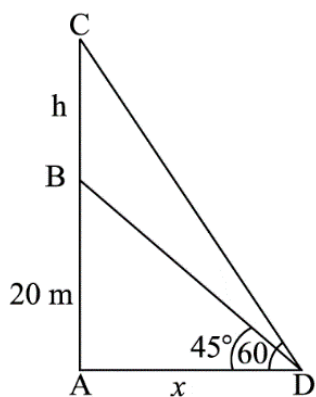
- (b) In a ΔABC , F, D and E are mid-points of sides AB, BC and CA respectively. Prove that :
- (i) $\Delta AFE \sim \Delta ABC$
- (ii) $\Delta DEF \sim \Delta ABC$

Solution(a):		Figure $\frac{1}{2}$
---------------------	--	--------------------------------

	Given: In $\triangle ABC$, $DE \parallel BC$ To Prove: $\frac{AD}{DB} = \frac{AE}{EC}$ Construction: Draw $DM \perp AC$, $EN \perp AB$, join BE and CD Proof: $\frac{\text{ar}(\triangle ADE)}{\text{ar}(\triangle DBE)} = \frac{\frac{1}{2} \times AD \times EN}{\frac{1}{2} \times DB \times EN} = \frac{AD}{DB} \dots\dots\dots(i)$ $\frac{\text{ar}(\triangle ADE)}{\text{ar}(\triangle DCE)} = \frac{\frac{1}{2} \times AE \times DM}{\frac{1}{2} \times EC \times DM} = \frac{AE}{EC} \dots\dots\dots(ii)$ As $\triangle DBE$ and $\triangle DCE$ lie on the same base and between same parallels BC and DE $\therefore \text{ar}(\triangle DBE) = \text{ar}(\triangle DCE)$ or $\frac{\text{ar}(\triangle ADE)}{\text{ar}(\triangle DBE)} = \frac{\text{ar}(\triangle ADE)}{\text{ar}(\triangle DCE)} \dots\dots\dots(iii)$ From (i), (ii) and (iii), we get $\frac{AD}{DB} = \frac{AE}{EC}$	1 1 1 1 $\frac{1}{2}$
OR		
Solution(b):	 (i) E & F are the mid points of AC & AB respectively $\frac{AF}{FB} = \frac{AE}{EC} = 1$ $\therefore EF \parallel BC$ (By converse of BPT) $\Rightarrow \angle 1 = \angle 2$ Also $\angle A$ is common in $\triangle AFE$ and $\triangle ABC$. $\therefore \triangle AFE \sim \triangle ABC$. (ii) $EF \parallel BC$ (proved above) Similarly $DE \parallel AB$ $\therefore BDEF$ is a parallelogram $\angle B = \angle E$ Similarly $AFDE$ and $DCEF$ are parallelograms $\therefore \angle A = \angle D$ and $\angle C = \angle F$ $\therefore \triangle DEF \sim \triangle ABC$.	1 $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ 1 $\frac{1}{2}$ 1

- 34.** From a point on the ground, the angles of elevation of the bottom and the top of a transmission tower fixed at the top of a 20 m high building are 45° and 60° respectively. Find the height of the tower and distance of point of observation from the tower. (Use $\sqrt{3} = 1.73$)

Solution:



Let BC be the tower fixed on building AB.

$$\tan 45^\circ = 1 = \frac{20}{x}$$

$$\Rightarrow x = 20$$

Distance of point of observation from the tower = 20 m

$$\tan 60^\circ = \sqrt{3} = \frac{h+20}{x}$$

$$\Rightarrow h + 20 = x\sqrt{3}$$

$$\Rightarrow h = 20(\sqrt{3} - 1)$$

$$= 20 \times 0.73 = 14.6 \text{ m}$$

Height of the tower = 14.6 m

**For correct
fig: 1**

1

$\frac{1}{2}$

1

1

$\frac{1}{2}$

- 35.** (a) Find mean and mode of the following frequency distribution :

Class	10 – 30	30 – 50	50 – 70	70 – 90	90 – 110	110 – 130
Frequency	8	9	12	14	11	6

OR

- (b) The median of the given frequency distribution is 32.5. Find the missing frequencies f_1 and f_2 , when the sum of all frequencies is 40.

Class	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70
Frequency	3	f_1	9	12	6	f_2	2

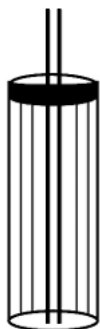
Solution(a):		<table><tr><td>Class</td><td>x_i</td><td>f_i</td><td>u_i</td><td>$f_i u_i$</td></tr><tr><td>10 – 30</td><td>20</td><td>8</td><td>–2</td><td>–16</td></tr><tr><td>30 – 50</td><td>40</td><td>9</td><td>–1</td><td>–9</td></tr><tr><td>50 - 70</td><td>60</td><td>12</td><td>0</td><td>0</td></tr><tr><td>70 - 90</td><td>80</td><td>14</td><td>1</td><td>14</td></tr><tr><td>90 - 110</td><td>100</td><td>11</td><td>2</td><td>22</td></tr><tr><td>110 -130</td><td>120</td><td>6</td><td>3</td><td>18</td></tr><tr><td>Total</td><td></td><td>60</td><td></td><td>29</td></tr></table>	Class	x_i	f_i	u_i	$f_i u_i$	10 – 30	20	8	–2	–16	30 – 50	40	9	–1	–9	50 - 70	60	12	0	0	70 - 90	80	14	1	14	90 - 110	100	11	2	22	110 -130	120	6	3	18	Total		60		29	Correct table – 2
	Class	x_i	f_i	u_i	$f_i u_i$																																						
	10 – 30	20	8	–2	–16																																						
	30 – 50	40	9	–1	–9																																						
	50 - 70	60	12	0	0																																						
	70 - 90	80	14	1	14																																						
	90 - 110	100	11	2	22																																						
	110 -130	120	6	3	18																																						
	Total		60		29																																						
	Mean = $60 + \frac{29}{60} \times 20 = 69.67$	1																																									
Modal class is 70 – 90																																											
Mode = $70 + \frac{14 - 12}{2 \times 14 - 12 - 11} \times 20$	1½																																										
= 78	½																																										
OR																																											
Solution(b):		<table><tr><td>Class</td><td>f_i</td><td>$c_i f_i$</td></tr><tr><td>0 – 10</td><td>3</td><td>3</td></tr><tr><td>10 - 20</td><td>f_1</td><td>$3 + f_1$</td></tr><tr><td>20 - 30</td><td>9</td><td>$12 + f_1$</td></tr><tr><td>30 - 40</td><td>12</td><td>$24 + f_1$</td></tr><tr><td>40 - 50</td><td>6</td><td>$30 + f_1$</td></tr><tr><td>50 - 60</td><td>f_2</td><td>$30 + f_1 + f_2$</td></tr><tr><td>60 - 70</td><td>2</td><td>$32 + f_1 + f_2$</td></tr></table>	Class	f_i	$c_i f_i$	0 – 10	3	3	10 - 20	f_1	$3 + f_1$	20 - 30	9	$12 + f_1$	30 - 40	12	$24 + f_1$	40 - 50	6	$30 + f_1$	50 - 60	f_2	$30 + f_1 + f_2$	60 - 70	2	$32 + f_1 + f_2$	Correct table 1																
	Class	f_i	$c_i f_i$																																								
	0 – 10	3	3																																								
	10 - 20	f_1	$3 + f_1$																																								
	20 - 30	9	$12 + f_1$																																								
	30 - 40	12	$24 + f_1$																																								
	40 - 50	6	$30 + f_1$																																								
	50 - 60	f_2	$30 + f_1 + f_2$																																								
	60 - 70	2	$32 + f_1 + f_2$																																								
	$\Sigma f = 40 \Rightarrow f_1 + f_2 = 8$ -----(i)	½																																									
Median class is 30 – 40																																											
$\therefore 32.5 = 30 + \frac{\frac{40}{2} - (12 + f_1)}{12} \times 10$	2																																										
$\Rightarrow f_1 = 5$	1																																										
$\Rightarrow f_2 = 3$ (from (i))	½																																										

SECTION E

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

3×4=12

36.



Tarini bought a glass tumbler which is cylindrical in shape with inner height 21 cm and inner diameter 7 cm. It has a straw of length 24 cm and inner diameter 1 cm. Tarini filled the tumbler with water leaving 1 cm space from the top.

Based on the above information, answer the following questions :

(i) Find the volume of water filled in the tumbler. 1

(ii) (a) She filled the straw completely 7 times and drank water.
Find the volume of water left in the tumbler. 2

OR

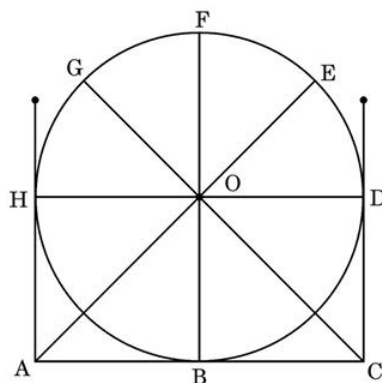
(b) Find the inner total surface area of the tumbler which is open at the top. 2

(iii) Determine the inner curved surface area of the straw. 1

Solution:	(i) Volume of water in tumbler = $\frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} \times (21 - 1)$ $= 770 \text{ cm}^3$	$\frac{1}{2}$
	(ii) (a) Volume of water drank = $7 \times \frac{22}{7} \times \frac{1}{2} \times \frac{1}{2} \times 24$ $= 132 \text{ cm}^3$ Volume of water left in the tumbler = $770 - 132$ $= 638 \text{ cm}^3$	$\frac{1}{2}$ 1 1
	OR	
	(ii) (b) Inner TSA = $2 \times \frac{22}{7} \times 21 \times \frac{7}{2} + \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2}$ $= 462 + 38.5 = 500.5 \text{ cm}^2$	1 1

	(iii) Inner CSA of straw = $2 \times \frac{22}{7} \times \frac{1}{2} \times 24 = \frac{528}{7} \text{ cm}^2$ or 75.43 cm^2	1
--	--	---

37.



The picture given above shows a circular gate fixed in a rectangular frame HACD. Observe the diagram of the same. Four rods are placed evenly along the circumference, intersecting at centre O. The circumference of the circle is 22 feet.

Based on the above information, answer the following questions :

- (i) Find the height of the gate. 1
- (ii) Determine $m \angle HOC$. 1
- (iii) (a) Show that OHAB is a square. 2

OR

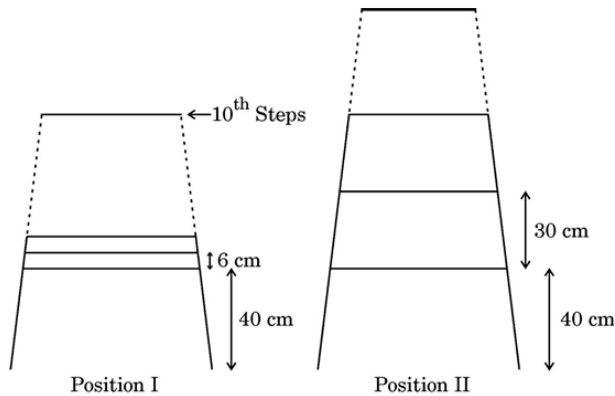
- (b) Find the area of the iron sheet, required to cover the rectangle HACD. 2

Solution:	(i) $2 \times \frac{22}{7} \times r = 22 \Rightarrow 2r = 7$ $\therefore$ height of the gate = 7 feet	1
	(ii) $\angle HOC = 3 \times \frac{360}{8} = 135^\circ$	1
	(iii) (a) Since frame is rectangular Therefore $\angle HAB = 90^\circ$, HA and AB are tangents thus all angles of OHAB are 90° each. This is a rectangle. Also $OH = OB$ (radii) $\therefore$ OHAB is a square.	$\frac{1}{2}$ 1 $\frac{1}{2}$
	OR	
	(b) In rectangle HACD, $AC = HD = 2r$ and $CD = OB = r$ $\therefore$ Area of sheet required = $2r^2 = 2 \times \frac{7}{2} \times \frac{7}{2}$	1

$$= \frac{49}{2} \text{ or } 24.5 \text{ sq. feet}$$

1

38. A foldable ladder has ten steps. In folded position (Position I), the distance between every two consecutive steps is 6 cm, whereas in extended position (Position II) this distance becomes 30 cm. The height of the first step from the ground is 40 cm. When measured, the heights of different steps from the ground, taken in order, form an AP.



Based on the above information, answer the following questions :

- (i) Write the AP when the ladder is standing in Position I. 1
 - (ii) Write the AP when the ladder is standing in Position II. 1
 - (iii) (a) Write the total height of the ladder in both the situations. 2
- OR**
- (b) What would be the height of the ladder when the ladder is opened till the seventh step only ? 2

Solution:

(i) A.P. formed is 40, 46, 52, 58, -----

(ii) A.P. formed is 40, 70, 100, 130, ----

(iii) (a) In position - I

$$\text{Total height} = a_{10} = 40 + 9 \times 6 = 94 \text{ cm.}$$

In position - II

$$\text{Total height} = a_{10} = 40 + 9 \times 30 = 310 \text{ cm}$$

OR

(b) Height of the ladder till 7th step = $40 + 6 \times 30 = 220$

$$\text{Total height} = 220 + 18 = 238 \text{ cm.}$$

1

1

1

1

1½

½