Marking Scheme
Strictly Confidential
(For Internal and Restricted use only)
Secondary School Examination, 2025
SUBJECT NAME MATHEMATICS (BASIC) (Q.P. CODE 430/5/1)

General Instructions: -

1	You are aware that evaluation is the most important process in the actual and correct assessment of the candidates. A small mistake in evaluation may lead to serious problems which may affect the future of the candidates, education system and teaching profession. To avoid mistakes, it is requested that before starting evaluation, you must read and understand the spot evaluation guidelines carefully.
2	**"Evaluation policy is a confidential policy as it is related to the confidentiality of the examinations conducted, evaluation done and several other aspects. It's leakage to public in any manner could lead to derailment of the examination system and affect the life and future of millions of candidates. Sharing this policy/document to anyone, publishing in any magazine and printing in News Paper/Website etc. may invite action under various rules of the Board and IPC."**
3	Evaluation is to be done as per instructions provided in the Marking Scheme. It should not be done according to one's own interpretation or any other consideration. Marking Scheme should be strictly adhered to and religiously followed. **However, while evaluating, answers which are based on latest information or knowledge and/or are innovative, they may be assessed for their correctness otherwise and due marks be awarded to them. In class-X, while evaluating 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 (✓) 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 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.

Set 430/5/1

MARKING SCHEME
MATHEMATICS (Basic)

Section – A $20 \times 1 = 20$

(Multiple Choice Questions)

Section-A consists of **20** Multiple Choice Questions of **1** mark each.

1. $(2 - 5\sqrt{3})^2$ is

(A) a negative integer (B) an irrational number

(C) a rational number (D) a positive integer

Ans: (B) an irrational number	1

2. The value of k for which the roots of the quadratic equation $6x^2 + 4kx + k = 0$ are real and equal, is

(A) 0 (B) $\frac{3}{4}$

(C) $\frac{-3}{2}$ (D) $\frac{2}{3}$

Ans: (A) 0	1

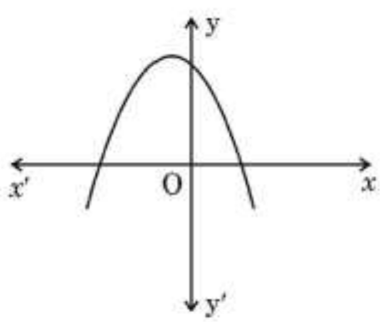
3. The distance between the points (2, 3) and (–2, –3) is

(A) $4\sqrt{13}$ (B) $\sqrt{40}$

(C) $2\sqrt{13}$ (D) 5

Ans: (C) $2\sqrt{13}$	1

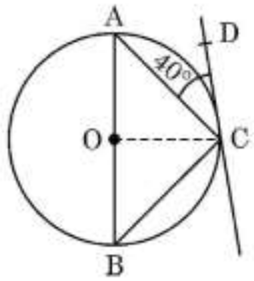
4. Observe the given graph of polynomial p(x). The number of zeroes of p(x) is

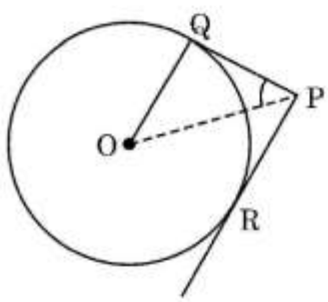


(A) 0 (B) 1

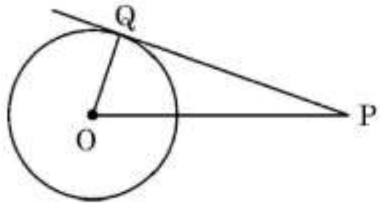
(C) 3 (D) 2

Ans: (D) 2	1

5. In the given figure, AB is diameter of the circle with centre O. CD is tangent to the circle so that $\angle ACD = 40^\circ$. The value of $\angle CBA$ is  (A) 50° (B) 40° (C) 80° (D) 45°	
Ans: (B) 40°	1
6. 10^{th} term of the A.P. : –12, –19, –26, ... is (A) –75 (B) –65 (C) 51 (D) –82	
Ans: (A) – 75	1
7. The roots of the equation $x^2 - 8 = 0$ are (A) rational and distinct (B) irrational and distinct (C) real and equal (D) not real	
Ans: (B) irrational and distinct	1
8. The point $(x, 0)$ divides the line segment joining the points $(-4, 5)$ and $(0, -10)$ in the ratio (A) 1 : 3 (B) 2 : 1 (C) 1 : 1 (D) 1 : 2	
Ans: (D) 1 : 2	1
9. A black card is lost from a deck of 52 playing cards. Rest of the cards are shuffled and one card is drawn at random from the available cards. The probability that drawn card is 'king of hearts', is (A) $\frac{1}{52}$ (B) $\frac{1}{4}$ (C) $\frac{1}{51}$ (D) $\frac{1}{26}$	
Ans: (C) $\frac{1}{51}$	1
10. The largest possible cone is just fitted inside a hollow cube of edge 25 cm. The radius of the base of the cone is (A) 5 cm (B) 12.5 cm (C) 25 cm (D) 10 cm	

Ans: (B) 12·5 cm	1
11. If E is an event such that P(E) = 0.1, then $P(\overline{E})$ is equal to (A) 0.9 (B) $\frac{1}{2}$ (C) 0.99 (D) –1	
Ans: (A) 0·9	1
12. If tan A = 1, then 3 sin A + cos A is equal to (A) $4\sqrt{2}$ (B) 4 (C) $2\sqrt{2}$ (D) $4 \times 45°$	
Ans: (C) $2\sqrt{2}$	1
13. A quadratic polynomial having only zero (–2) is (A) $(x-2)^2$ (B) x^2-2 (C) x^2+2x (D) $(x+2)^2$	
Ans: (D) $(x + 2)^2$	1
14. PQ and PR are tangents to a circle with centre O such that OQ = QP. The value of ∠OPQ is equal to  (A) 45° (B) 30° (C) 60° (D) 90°	
Ans: (A) 45°	1
15. Which of the following depends on all observations of a given data ? (A) Median (B) Mean (C) Range (D) Mode	
Ans: (B) Mean	1

16. PQ is tangent to the circle centred at O. If OQ = 3 cm, PQ = 5 cm, then OP is equal to



(A) 5 cm (B) 4 cm

(C) $\sqrt{15}$ cm (D) $\sqrt{34}$ cm

Ans: (D) $\sqrt{34}$ cm	1

17. Two dice are rolled together. The probability that only one die shows number 4, is

(A) $\frac{11}{36}$ (B) $\frac{1}{3}$

(C) $\frac{5}{18}$ (D) $\frac{1}{4}$

Ans: (C) $\frac{5}{18}$	1

18. An arc of length 22 cm subtends an angle of x^o at the centre of the circle. If radius of circle is 36 cm, the value of x is

(A) 35 (B) 40

(C) 60 (D) 30

Ans: (A) 35	1

(Assertion – Reason based questions)

Directions : Question numbers **19** and **20** are Assertion and Reason based questions. Two statements are given, one 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.

(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).

(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).

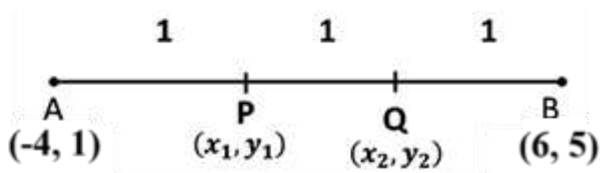
(C) Assertion (A) is true, but Reason (R) is false.

(D) Assertion (A) is false, but Reason (R) is true.

19. **Assertion (A) :** When a hemisphere of same radius (r) is carved out from one side of a solid wooden cylinder, the total surface area of remaining solid is increased by $2\pi r^2$. **Reason (R) :** Curved surface area of hemisphere is $2\pi r^2$.	
Ans: (D) Assertion (A) is false, but Reason (R) is true.	1
20. **Assertion (A) :** In a right angle triangle ABC, $\angle B = 90°$. Therefore the value of cos (A + C) is equal to 0. **Reason (R) :** $A + B + C = 180°$ and $\cos 90° = 0$.	
Ans: (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).	1
Section – B **(Very Short Answer Type Questions)** **5 × 2 = 10** Q. Nos. **21** to **25** are Very Short Answer type questions of **2** marks each. 21. Check whether $15^n \times 2^n$, n being a natural number, ends with the digit zero.	
Solution: $15^n \times 2^n = 5^n \times 3^n \times 2^n$ $\Rightarrow$ 2 and 5 both are the factors of the given number $\therefore$ the given number ends with the digit zero.	1 1
22. (a) Evaluate : $2\tan^2 45° + \cos^2 30° - \sin^2 90°$. **OR** (b) Verify that $\cos 2A = \dfrac{1-\tan^2 A}{1+\tan^2 A}$ for A = 30°.	
Solution: (a) $2(1)^2 + \left(\dfrac{\sqrt{3}}{2}\right)^2 - (1)^2$ $= \dfrac{7}{4}$ **OR** (b) LHS $= \cos 60° = \dfrac{1}{2}$ RHS $= \dfrac{1-\tan^2 30°}{1+\tan^2 30°} = \dfrac{1-\frac{1}{3}}{1+\frac{1}{3}}$ $= \dfrac{1}{2}$ = LHS	1½ ½ ½ 1 ½

23. Find the coordinates of the points of trisection of line segment joining the points (–4, 1) and (6, 5).

Solution:



AP : PB = 1 : 2

$\therefore x_1 = \frac{-8+6}{3} = \frac{-2}{3}, \; y_1 = \frac{5+2}{3} = \frac{7}{3}$

Coordinates of point P are $\left(\frac{-2}{3}, \frac{7}{3}\right)$ — ½ + ½

AQ : QB = 2 : 1

$\therefore x_2 = \frac{12-4}{3} = \frac{8}{3}, \; y_2 = \frac{10+1}{3} = \frac{11}{3}$

Coordinates of point Q are $\left(\frac{8}{3}, \frac{11}{3}\right)$ — ½ + ½

24. (a) A bag contains 40 marbles out of which some are white and others are black. If the probability of drawing a black marble is $\frac{3}{5}$, then find the number of white marbles.

OR

(b) In a pre-primary class, a teacher put cards numbered 20 to 59 in a bowl. A student picked up a card at random and read the number. Find the probability that the number read was (i) a prime number (ii) a perfect square.

Solution: (a) Let the number of black marbles be n.

P (drawing a black marble) $= \frac{n}{40}$ — ½

$\therefore \frac{3}{5} = \frac{n}{40} \Rightarrow n = 24$ — 1

Hence, number of white marbles = 16 — ½

OR

(b) Total number of cards = 40

(i) P (a prime number) $= \frac{9}{40}$ — 1

(ii) P (no. is perfect square) $= \frac{3}{40}$ — 1

25. Using distance formula, prove that the points (1, 5), (2, 3) and (3, 1) are collinear.

Solution: Let A(1, 5), B(2, 3) and C(3, 1) be the points

$AB = \sqrt{1^2 + (-2)^2} = \sqrt{5}$ — ½

$BC = \sqrt{1^2 + (-2)^2} = \sqrt{5}$ $AC = \sqrt{2^2 + (-4)^2} = \sqrt{20}$ or $2\sqrt{5}$ ∴ AB + BC = AC, therefore points A, B and C are collinear.	½ ½ ½

Section – C

(Short Answer Type Questions) **6 × 3 = 18**

Q. Nos. **26** to **31** are Short Answer type questions of **3** marks each.

26. (a) If α, β are zeroes of the polynomial $3x^2 - 8x + 4$, then form a quadratic polynomial in x whose zeroes are $\frac{1}{\alpha}$ and $\frac{1}{\beta}$.

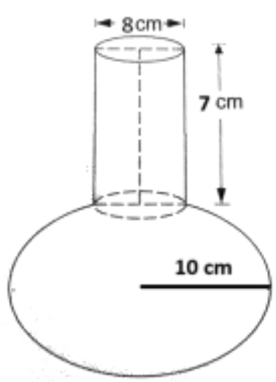
OR

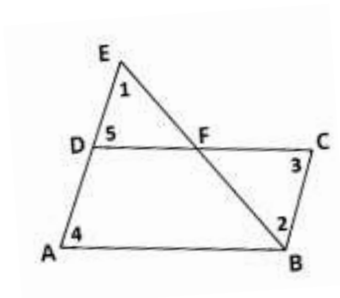
(b) Find zeroes of the polynomial $6x^2 - 7x - 3$ and verify the relationship between zeroes and its coefficients.

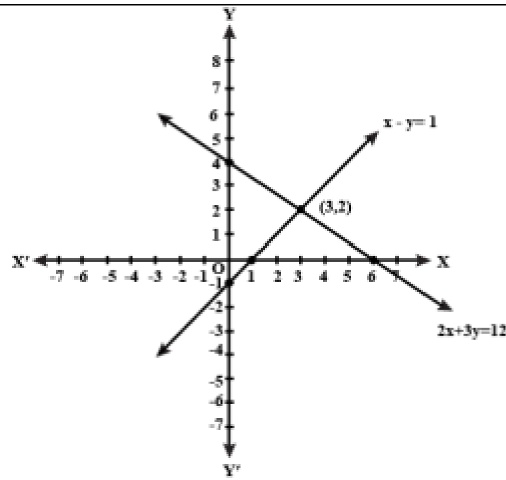
Solution: (a) $p(x) = 3x^2 - 8x + 4$ $\alpha + \beta = \frac{8}{3}, \alpha\beta = \frac{4}{3}$ $\therefore \frac{1}{\alpha} + \frac{1}{\beta} = \frac{\alpha+\beta}{\alpha\beta} = 2$ and $\frac{1}{\alpha\beta} = \frac{3}{4}$ ∴ required polynomial is $x^2 - 2x + \frac{3}{4}$ or $k(4x^2 - 8x + 3)$, where k is a non-zero real number. **OR** (b) $p(x) = 6x^2 - 7x - 3 = (2x - 3)(3x + 1)$ Zeroes of p(x) are $\frac{3}{2}$ and $-\frac{1}{3}$ Sum of zeroes = $\frac{3}{2} - \frac{1}{3} = \frac{7}{6} = -\frac{\text{coefficient of x}}{\text{coeffiecient of } x^2}$ Product of zeroes = $\frac{3}{2} \times \frac{-1}{3} = \frac{-3}{6} = \frac{\text{constant term}}{\text{coeffiecient of } x^2}$	 ½ + ½ ½ ½ 1 1 1 1

27. The sum of the squares of two consecutive even numbers is 452. Find the numbers.

Solution: Let the two consecutive even numbers be x and x + 2. A.T.Q. $x^2 + (x + 2)^2 = 452$ $\Rightarrow x^2 + 2x - 224 = 0$ $\Rightarrow (x + 16)(x - 14) = 0$ $\Rightarrow x = 14$	½ 1 1

Required numbers are 14 and 16.	½
28. Prove that $(\text{cosec } A + \sin A)^2 + (\sec A + \cos A)^2 = 7 + \tan^2 A + \cot^2 A$.	
Solution: $\text{LHS} = \text{cosec}^2 A + \sin^2 A + 2 \text{ cosec } A \sin A + \sec^2 A + \cos^2 A + 2 \cos A \sec A$ $= (\sin^2 A + \cos^2 A) + (1 + \tan^2 A) + (1 + \cot^2 A) + 4$ $= 7 + \tan^2 A + \cot^2 A = \text{RHS}$	1 1 1
29. The traffic lights at three different road crossings change after every 45 seconds, 75 seconds and 60 seconds respectively. If they change together at 5.00 a.m., then at what time they will change together next ?	
Solution: $45 = 3^2 \times 5, 75 = 3 \times 5^2, 60 = 2^2 \times 3 \times 5$ $\text{LCM}(45, 75, 60) = 2^2 \times 3^2 \times 5^2 = 900$ 900 seconds = 15 minutes Lights will change together at 5:15 a.m. again	1½ ½ ½ ½
30. (a) A spherical glass vessel has a cylindrical neck 7 cm long and 8 cm in diameter. The radius of spherical part is 10 cm. Find the volume of the vessel. **OR** (b) From each end of a solid cylinder of height 20 cm and base radius 7 cm, a cone of base radius 2.1 cm and height 5 cm is scooped out. Find the volume of the remaining solid.	
Solution:  (a) Volume of the vessel $= \frac{4}{3} \times \frac{22}{7} \times 10 \times 10 \times 10 + \frac{22}{7} \times 4 \times 4 \times 7$ $= 4190{\cdot}4 + 352 = 4542{\cdot}48$ cu. cm **OR** (b) Volume of cylinder $= \frac{22}{7} \times 7 \times 7 \times 20 = 3080$ cu. cm Volume of cones $= 2 \times \frac{1}{3} \times \frac{22}{7} \times \frac{21}{10} \times \frac{21}{10} \times 5 = 46{\cdot}2$ cu. cm	1 + 1 1 1 1

Volume of remaining solid = 3080 – 46·2 = 3033·8 cu. cm	1
31. Point E lies on the extended side AD of parallelogram ABCD. BE intersects CD at F. Show that (i) $\Delta DFE \sim \Delta CFB$ (ii) $\Delta AEB \sim \Delta CBF$.	
Solution:  (i) In $\triangle DFE$ and $\triangle CFB$ $\angle 5 = \angle 3$ (Alternate Interior Angle) $\angle 1 = \angle 2$ (Alternate Interior Angle) $\therefore$ By AA similarity criterion, $\triangle DFE \sim \triangle CFB$ (ii) In $\triangle AEB$ and $\triangle CBF$ $\angle 1 = \angle 2$ (Alternate Interior Angle) $\angle 4 = \angle 3$ (Opposite angles of a parallelogram) $\therefore$ By AA similarity criterion, $\triangle AEB \sim \triangle CBF$	Correct Figure ½ 1 ½ ½ ½
Section – D **(Long Answer Type Questions)** **4 × 5 = 20** Q. Nos. **32** to **35** are Long Answer type questions of **5** marks each. 32. Determine graphically whether the following pair of linear equations $2x + 3y = 12$ and $x - y = 1$ has unique solution or infinitely many solutions.	
Solution: Correct graph of each equation	2 + 2

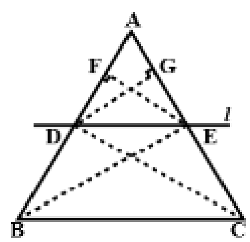
 Since lines are intersecting at a point so, equations have unique solution.	1

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) It is given that sides AB and AC and median AD of ΔABC are respectively proportional to sides PQ and PR and median PM of another ΔPQR. Show that ΔABC ~ ΔPQR.

Solution:



Correct Figure ½

Given: In Δ ABC, DE || BC
To Prove: $\frac{AD}{DB} = \frac{AE}{EC}$
Construction: Join BE, DC, Draw DG ⊥ AC and EF ⊥ AB — 1

Proof: $\frac{ar(\Delta ADE)}{ar(\Delta BDE)} = \frac{\frac{1}{2}\times AD \times EF}{\frac{1}{2}\times DB \times EF} = \frac{AD}{DB}$ ……….(i) — 1

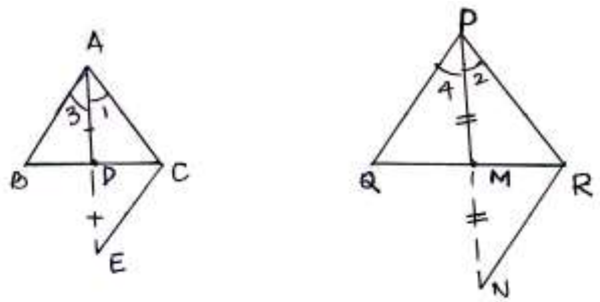
and $\frac{ar(\Delta ADE)}{ar(\Delta CDE)} = \frac{\frac{1}{2}\times AE \times DG}{\frac{1}{2}\times EC \times DG} = \frac{AE}{EC}$ ……….. (ii) — 1

As ΔBDE and ΔCDE are on the same base DE and between the same parallels DE and BC.

$\therefore$ ar(ΔBDE) = ar(ΔCDE) …………..(iii) — 1

From (i), (ii) and (iii), we get $\frac{AD}{DB} = \frac{AE}{EC}$ — ½

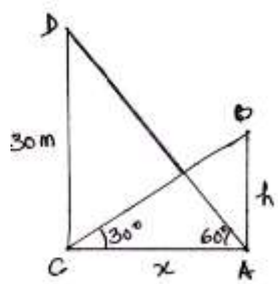
OR



	Correct Figure 1
Extend AD to E and PM to N such that AD = DE and PM = MN.	
Proving Δ DAB ≅ Δ DEC (By SAS congruency criterion)	1
Similarly, Δ MPQ ≅ Δ MNR	
∴ AB = CE and PQ = NR (by cpct)	½
Given $\frac{AB}{PQ} = \frac{AD}{PM} = \frac{AC}{PR}$	
$\Rightarrow \frac{CE}{NR} = \frac{AE/2}{PN/2} = \frac{AC}{PR}$	
$\Rightarrow \frac{CE}{NR} = \frac{AE}{PN} = \frac{AC}{PR}$	1
Hence Δ CAE ~ Δ RPN (By SSS similarity criterion)	½
$\Rightarrow \angle 1 = \angle 2$, similarly $\angle 3 = \angle 4$	
Adding, we get $\angle 1 + \angle 3 = \angle 2 + \angle 4$	½
or $\angle BAC = \angle QPR$	
Hence, Δ ABC ~ Δ PQR (By SAS similarity criterion)	½

34. The angle of elevation of the top of a building from the foot of the tower is 30° and the angle of elevation of the top of the tower from the foot of the building is 60°. If the tower is 30 m high, find the height of the building and distance between the building and the tower. (Use $\sqrt{3}$ = 1.73)

Solution:



	Correct Figure 1
Let AB be the building and CD be the tower.	
In △ACD, $\tan 60° = \frac{30}{x} \Rightarrow x = 10\sqrt{3}$ ……….(i)	1 + ½
In △CAB, $\tan 30° = \frac{h}{x} \Rightarrow x = h\sqrt{3}$ ………. (ii)	1 + ½
Using (i) and (ii) h = 10, x = 10 × 1·73 = 17·3	½ + ½
∴ Height of the building = 10 m and distance between the building and the tower = 17·3 m	

35. (a) Find 'mean' and 'mode' of the following data :	

Class	10-25	25-40	40-55	55-70	70-85	85-100
Number of Students	12	10	15	13	8	12

OR

(b) The following table shows the ages of patients admitted in a hospital during a year :

Age (in years)	5-15	15-25	25-35	35-45	45-55	55-65
Number of Patients	7	10	21	22	15	5

Find 'mode' and 'median' of the above data.

Solution: (a)

CI	x_i	f_i	$u_i = \frac{x_i - 47\cdot5}{15}$	f_iu_i
10 – 25	17·5	12	– 2	– 24
25 – 40	32·5	10	– 1	– 10
40 – 55	47·5	15	0	0
55 – 70	62·5	13	1	13
70 – 85	77·5	8	2	16
85 – 100	92·5	12	3	36
		70		31

Correct Table 1½

$$\text{Mean} = 47\cdot5 + 15 \times \frac{31}{70} = 54\cdot14$$ 1½

Modal class is 40 – 55

$$\text{Mode} = 40 + 15 \times \frac{15 - 10}{30 - 10 - 13}$$ 1½

$$= 50\cdot71$$ ½

OR

(b)

C I	5-15	15-25	25-35	35-45	45-55	55-65
f	7	10	21	22	15	5
cf	7	17	38	60	75	N = 80

Correct Table 1

Median class is 35 – 45

$$\text{Median} = 35 + \frac{10}{22} \times (40 - 38)$$ 1½

$$= 35\cdot91$$ ½

Modal class is 35 – 45

<table>
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$$\text{Mode} = 35 + \frac{22 - 21}{44 - 21 - 15} \times 10$$

$= 36{\cdot}25$

</td><td>1½

½</td></tr>
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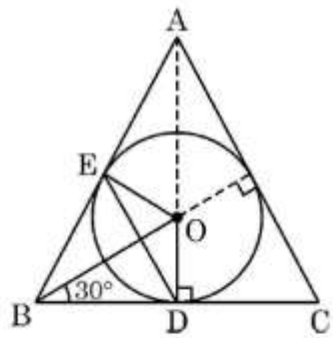
Section – E

(Case-study based Questions) **3 × 4 = 12**

Q. Nos. **36** to **38** are Case-study based Questions of **4** marks each.

36.



In a Fine Arts class, students were asked to design triangular tiles in geometric pattern.

Neelima made a circular design inside an equilateral triangle ABC. The radius of the circle is 4 cm. Observe the diagram and answer the following questions :

(i) Determine the length OB.

(ii) Is DE || CA ? Give reason for your answer.

(iii) (a) Write all angles of quadrilateral OEBD and show that it is a cyclic quadrilateral.

OR

(iii) (b) Find the perimeter of ΔABC. (Use $\sqrt{3} = 1.73$)

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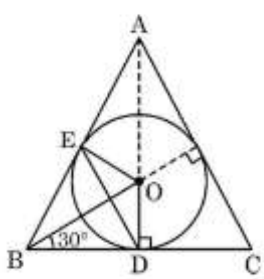
Solution:



(i) In △ODB, $\sin 30° = \frac{4}{OB} \Rightarrow OB = 8$ cm

(ii) Yes, DE || CA

Δ ABC is an equilateral triangle and AD⊥ BC

⇒ D is the mid point of BC

Similarly, E is the mid point of AB, so DE || CA

(iii) (a) ∠ EBD = 60° ⇒ ∠ EOD = 120°

∠ OEB = ∠ ODB = 90°

(radius is perpendicular to the tangent through the point of contact)

</td><td>1

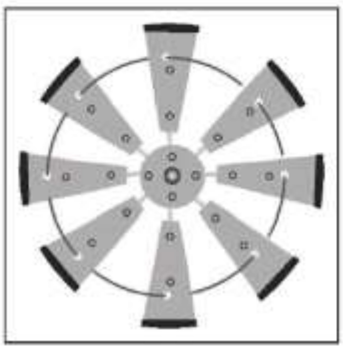
½

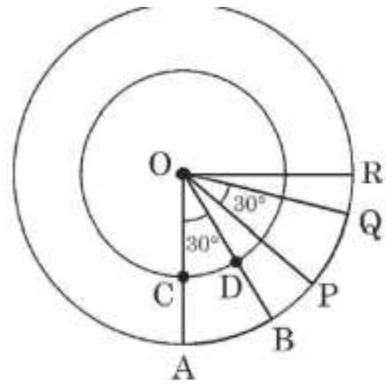
½

½
½</td></tr>
</table>

$\angle$ OEB + $\angle$ ODB = 90° + 90° = 180°	½
∴ quad. OEBD is a cyclic quad.	½
OR	
(iii) (b) In $\triangle$OBD, $\cos 30° = \frac{BD}{8} \Rightarrow BD = 6{\cdot}92$ cm	1
BC = 2 BD = 13.84 cm	
∴ Perimeter of Δ ABC = 41·52 cm	1

37.





A farmer has put up a decorative windmill in his farm in which there are eight blades of equal width and equally placed in a circular arrangement. A circular wire goes through them.

The diagram shows two blades OAB and OPQ in a quarter circle with centre O. ∠AOB = ∠POQ = 30°, OA = 28 cm, OC = 21 cm.

O is the centre of both the circles.

(i) Determine the measure of ∠BOP.

(ii) Find length of arc CD.

(iii) (a) Find the area of region CABD.

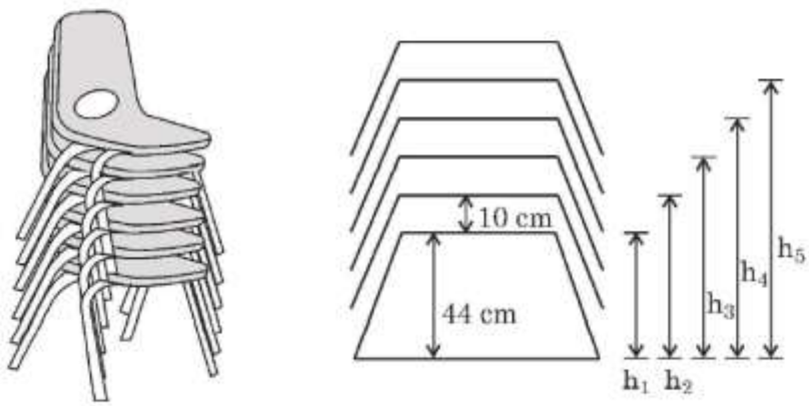
OR

(iii) (b) Find perimeter of region CABD.

Solution: (i) ∠AOC = 90° and blades are equally placed	
$\therefore \angle BOP = \frac{1}{2}(90° - 60°) = 15°$	1
(ii) Length of arc CD = $\frac{30}{360} \times 2 \times \frac{22}{7} \times 21 = 11$ cm	1
(iii) (a) Area CABD = $\frac{30}{360} \times \frac{22}{7} \times (28^2 - 21^2)$	1
= 89.8 sq. cm	1

OR	
(iii) (b) Length of arc AB = $\frac{30}{360} \times 2 \times \frac{22}{7} \times 28 = \frac{44}{3} = 14{\cdot}67$ cm	1
Perimeter of CABD = $14{\cdot}67 + 11 + 2 \times (28 - 21) = 39{\cdot}67$ cm	1

38. A tent house owner provides furniture on rent. He stacks chairs in his shop to save space.



In the diagram, the height of seat of chair from ground is represented by h_1, h_2, h_3, ... The height of first seat is 44 cm from ground level and gap between every two seats is 10 cm.

(i) Write the values of h_1, h_2, h_3, h_4 and h_5 in this order only.

(ii) Show that the above values form an A.P. Write its first term and common difference.

(iii) (a) If chairs can be stacked up to the maximum height of 160 cm, then find the maximum number of chairs in a stack.

OR

(iii) (b) Is it possible to stack 15 chairs if maximum height of the stack can not be more than 180 cm ? Justify your answer.

Solution: (i) $h_1 = 44$, $h_2 = 54$, $h_3 = 64$, $h_4 = 74$, $h_5 = 84$	1
(ii) Since gap between heights of seats of every two adjacent chairs is same	½
∴ h_1, h_2, h_3, ... form an A.P.	
Here, a = 44 and d = 10	½

(iii) (a) $160 = 44 + (n - 1) \times 10$	1
$\Rightarrow n = 12{\cdot}6$	½
$\therefore$ maximum 12 chairs can be stacked up.	½
OR	
(iii) (b) $h_{15} = 44 + 14 \times 10$	1
$= 184$ cm	
$184 \text{ cm} > 180 \text{ cm}$	½
$\therefore$ 15 chairs cannot be stacked up	½