Marking Scheme
Strictly Confidential
(For Internal and Restricted use only)
Secondary School Examination, 2025
SUBJECT NAME MATHEMATICS (BASIC) (Q.P. CODE 430/6/2)

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 430/6/2

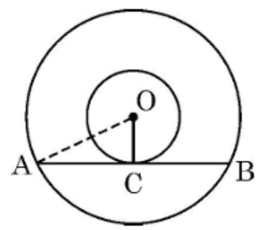
MARKING SCHEME
MATHEMATICS (BASIC)

Section – A **20 × 1 = 20**

(Multiple Choice Questions)

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

1. In two concentric circles centred at O, a chord AB of the larger circle touches the smaller circle at C. If OA = 3.5 cm, OC = 2.1 cm, then AB is equal to



(A) 5.6 cm (B) 2.8 cm
(C) 3.5 cm (D) 4.2 cm

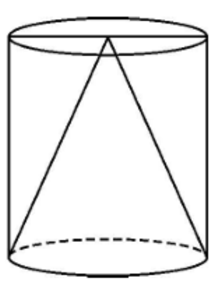
Ans: (A) 5.6 cm	1

2. Three coins are tossed together. The probability that exactly one coin shows head, is

(A) $\frac{1}{8}$ (B) $\frac{1}{4}$
(C) 1 (D) $\frac{3}{8}$

Ans: (D) $\frac{3}{8}$	1

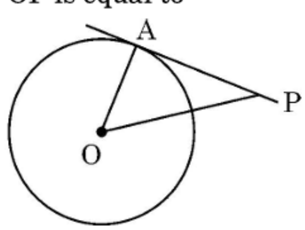
3. The volume of air in a hollow cylinder is 450 cm^3. A cone of same height and radius as that of cylinder is kept inside it. The volume of empty space in the cylinder is

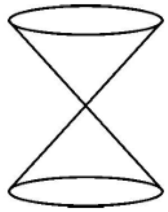
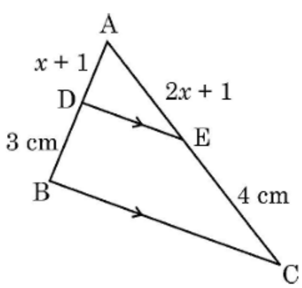


(A) 225 cm^3 (B) 150 cm^3
(C) 250 cm^3 (D) 300 cm^3

Ans: (D) 300 cm^3	

4. In ΔABC, $\angle B = 90°$. If $\frac{AB}{AC} = \frac{1}{2}$, then cos C is equal to (A) $\frac{3}{2}$ (B) $\frac{1}{2}$ (C) $\frac{\sqrt{3}}{2}$ (D) $\frac{1}{\sqrt{3}}$	
Ans: (C) $\frac{\sqrt{3}}{2}$	1
5. 15^{th} term of the A.P. $\frac{13}{3}, \frac{9}{3}, \frac{5}{3}$, ... is (A) 23 (B) $\frac{-53}{3}$ (C) -11 (D) $\frac{-43}{3}$	
Ans: (D) $\frac{-43}{3}$	1
6. If probability of happening of an event is 57%, then probability of non-happening of the event is (A) 0.43 (B) 0.57 (C) 53% (D) $\frac{1}{57}$	
Ans: (A) 0.43	1
7. A quadratic polynomial having zeroes 0 and -2, is (A) $x(x-2)$ (B) $4x(x+2)$ (C) $x^2 + 2$ (D) $2x^2 + 2x$	
Ans: (B) 4x(x+2)	1
8. OAB is sector of a circle with centre O and radius 7 cm. If length of arc $\widehat{AB} = \frac{22}{3}$ cm, then $\angle AOB$ is equal to (A) $\left(\frac{120}{7}\right)^{\circ}$ (B) 45° (C) 60° (D) 30°	
Ans: (C) 60°	1

9. To calculate mean of a grouped data, Rahul used assumed mean method. He used $d = (x - A)$, where A is assumed mean. Then $\overline{x}$ is equal to (A) $A + \overline{d}$ (B) $A + h\overline{d}$ (C) $h(A + \overline{d})$ (D) $A - h\overline{d}$	
Ans: (A) $A + \overline{d}$	1
10. If the sum of first n terms of an A.P. is given by $S_n = \frac{n}{2}(3n + 1)$, then the first term of the A.P. is (A) 2 (B) $\frac{3}{2}$ (C) 4 (D) $\frac{5}{2}$	
Ans: (A) 2	1
11. ABCD is a rectangle with its vertices at (2, –2), (8, 4), (4, 8) and (– 2, 2) taken in order. Length of its diagonal is (A) $4\sqrt{2}$ (B) $6\sqrt{2}$ (C) $4\sqrt{26}$ (D) $2\sqrt{26}$	
Ans: (D) $2\sqrt{26}$	1
12. In the given figure, PA is tangent to a circle with centre O. If $\angle APO = 30°$ and OA = 2.5 cm, then OP is equal to  (A) 2.5 cm (B) 5 cm (C) $\frac{5}{\sqrt{3}}$ cm (D) 2 cm	
Ans: (B) 5 cm	1
13. Two dice are rolled together. The probability of getting an outcome (a, b) such that b = 2a, is (A) $\frac{1}{6}$ (B) $\frac{1}{12}$ (C) $\frac{1}{36}$ (D) $\frac{1}{9}$	
Ans: (B) $\frac{1}{12}$	1

14. Two identical cones are joined as shown in the figure. If radius of base is 4 cm and slant height of the cone is 6 cm, then height of the solid is  (A) 8 cm (B) $4\sqrt{5}$ cm (C) $2\sqrt{5}$ cm (D) 12 cm	
Ans: (B) $4\sqrt{5}$ cm	1
15. If $\sin\theta = \frac{1}{9}$, then $\tan\theta$ is equal to (A) $\frac{1}{4\sqrt{5}}$ (B) $\frac{4\sqrt{5}}{9}$ (C) $\frac{1}{8}$ (D) $4\sqrt{5}$	
Ans: (A) $\frac{1}{4\sqrt{5}}$	1
16. In ΔABC, $DE \parallel BC$. If $AE = (2x + 1)$ cm, $EC = 4$ cm, $AD = (x + 1)$ cm and $DB = 3$ cm, then value of x is  (A) 1 (B) $\frac{1}{2}$ (C) -1 (D) $\frac{1}{3}$	
Ans: (B) $\frac{1}{2}$	1

17. The value of k for which the system of equations $3x - 7y = 1$ and $kx + 14y = 6$ is inconsistent, is (A) -6 (B) $\frac{2}{3}$ (C) 6 (D) $\frac{-3}{2}$	
Ans: (A) -6	1
18. The line $2x - 3y = 6$ intersects $x-$ axis at (A) $(0, -2)$ (B) $(0, 3)$ (C) $(-2, 0)$ (D) $(3, 0)$	
Ans: (D) (3,0)	1
(Assertion – Reason based questions) **Directions :** In question numbers **19** and **20**, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option : (A) Both Assertion (A) and Reason (R) are true and Reason (R) is correct explanation of Assertion (A). (B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not correct explanation for Assertion (A). (C) Assertion (A) is true, but Reason (R) is false. (D) Assertion (A) is false, but Reason (R) is true. 19. **Assertion (A) :** $\Delta ABC \sim \Delta PQR$ such that $\angle A = 65°$, $\angle C = 60°$. Hence $\angle Q = 55°$. **Reason (R) :** Sum of all angles of a triangle is 180°.	
Ans: (B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not correct explanation of Assertion (A).	1
20. **Assertion (A) :** $(a + \sqrt{b}) \cdot (a - \sqrt{b})$ is a rational number, where a and b are positive integers. **Reason (R) :** Product of two irrationals is always rational.	
Ans: (C) Assertion (A) is true, but Reason (R) is false.	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. (a) Evaluate : $\dfrac{\cos 45°}{\tan 30° + \sin 60°}$ **OR** (b) Verify that $\sin 2A = \dfrac{2 \tan A}{1 + \tan^2 A}$, for A = 30°.	
Solution: (a) $\dfrac{\frac{1}{\sqrt{2}}}{\frac{1}{\sqrt{3}}+\frac{\sqrt{3}}{2}}$ $= \dfrac{2\sqrt{3}}{5\sqrt{2}}$ or $\dfrac{\sqrt{6}}{5}$ **OR** (b) LHS = $\sin 60° = \dfrac{\sqrt{3}}{2}$ RHS = $\dfrac{2 \tan 30°}{1 + \tan^2 30°} = \dfrac{\frac{2}{\sqrt{3}}}{1 + \frac{1}{3}}$ $= \dfrac{\sqrt{3}}{2}$ = LHS	 1½ ½ ½ 1 ½
22. A box contains 120 discs, which are numbered from 1 to 120. If one disc is drawn at random from the box, find the probability that (i) it bears a 2– digit number (ii) the number is a perfect square.	
Solution : (i) P(2 - digit number) = $\dfrac{90}{120}$ or $\dfrac{3}{4}$ (ii) P(the number is a perfect square) = $\dfrac{10}{120}$ or $\dfrac{1}{12}$	1 1
23. Using prime factorisation, find the HCF of 144, 180 and 192.	

Solution : $144 = 2^4 \times 3^2$, $180 = 2^2 \times 3^2 \times 5$, $192 = 2^6 \times 3$ HCF (144, 180, 192) = $2^2 \times 3 = 12$	1½ ½

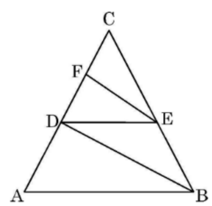
24. (a) Solve the equation $4x^2 - 9x + 3 = 0$, using quadratic formula.

OR

(b) Find the nature of roots of the equation $3x^2 - 4\sqrt{3}x + 4 = 0$.

Solution: (a) Discriminant = 33 $\Rightarrow x = \frac{9 \pm \sqrt{33}}{8}$ **OR** (b) Discriminant = $(-4\sqrt{3})^2 - 4 \times 4 \times 3 = 0$ $\Rightarrow$ The given equation has real and equal roots	 1 1 1 1

25. In the given figure, AB ∥ DE and BD ∥ EF. Prove that $DC^2 = CF \times AC$.



Solution : EF ∥ BD $\Rightarrow \frac{CF}{DC} = \frac{CE}{CB}$ (i) DE ∥ AB $\Rightarrow \frac{DC}{AC} = \frac{CE}{CB}$ (ii) Using (i) & (ii), $\frac{CF}{DC} = \frac{DC}{AC}$ $\Rightarrow DC^2 = CF \times AC$	 1 ½ ½

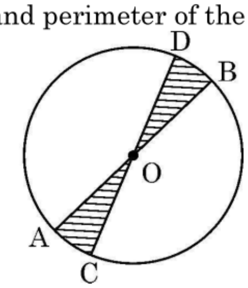
Section – C

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

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

26. Three friends plan to go for a morning walk. They step off together and their steps measures 48 cm, 52 cm and 56 cm respectively. What is the minimum distance each should walk so that each can cover the same distance in complete steps ten times ?

Solution : $48 = 2^4 \times 3$, $52 = 2^2 \times 13$, $56 = 2^3 \times 7$ LCM = $2^4 \times 3 \times 13 \times 7 = 4368$ $\Rightarrow$ Minimum distance each walked in complete steps ten times = 43680 cm	1½ 1 ½

27. Prove that $\left(1+\frac{1}{\tan^2\theta}\right)\left(1+\frac{1}{\cot^2\theta}\right)=\frac{1}{\sin^2\theta-\sin^4\theta}$	
Solution : LHS $=\frac{1+\tan^2\theta}{\tan^2\theta}+\frac{1+\cot^2\theta}{\cot^2\theta}$ $=\frac{\sec^2\theta}{\tan^2\theta}+\frac{\text{cosec}^2\theta}{\cot^2\theta}$ $=\frac{1}{\sin^2\theta}+\frac{1}{\cos^2\theta}$ $=\frac{1}{\sin^2\theta(1-\sin^2\theta)}$ $=\frac{1}{\sin^2\theta-\sin^4\theta}$ = RHS	 1 1 1
28. AB and CD are diameters of a circle with centre O and radius 7 cm. If ∠BOD = 30°, then find the area and perimeter of the shaded region.  	
Solution: Area of the shaded region = $2\left(\frac{30}{360}\times\frac{22}{7}\times7\times7\right)$ $=\frac{77}{3}$ sq. cm or 25.67 sq. cm Perimeter of the shaded region = $2\left(14+\frac{30}{360}\times2\times\frac{22}{7}\times7\right)$ $=\frac{106}{3}$ cm or 35.33 cm	 1 ½ 1 ½
29. (a) Find the A.P. whose third term is 16 and seventh term exceeds the fifth term by 12. Also, find the sum of first 29 terms of the A.P. **OR** (b) Find the sum of first 20 terms of an A.P. whose n^{th} term is given by $a_n = 5 + 2n$. Can 52 be a term of this A.P. ?	

Solution:	
(a) $a + 2d = 16$ … (i)	½
$a + 6d = 12 + a + 4d$ …(ii)	½
Solving (i) and (ii) to get $d = 6$, $a = 4$	½
∴ A.P. is 4, 10, 16, ...	½
$S_{29} = \frac{29}{2}[8 + 28 \times 6]$	½
$= 2552$	½
OR	
(b) $a_n = 5 + 2n$	
getting $a = 7$ and $d = 2$	1
$S_{20} = \frac{20}{2}[14 + 19 \times 2]$	
$= 520$	1
$52 = 7 + (n - 1) \times 2$	½
$\Rightarrow n = \frac{47}{2}$, which is not a natural number.	
Therefore, 52 cannot be a term of this A.P.	½

30. (a) If α, β are zeroes of the polynomial $8x^2 - 5x - 1$, then form a quadratic polynomial in x whose zeroes are $\frac{2}{\alpha}$ and $\frac{2}{\beta}$.

OR

(b) Find the zeroes of the polynomial $p(x) = 3x^2 + x - 10$ and verify the relationship between zeroes and its coefficients.

Solution:	
(a) $p(x) = 8x^2 - 5x - 1$	
$\alpha + \beta = \frac{5}{8}$, $\alpha\beta = \frac{-1}{8}$	½ + ½
∴ sum of zeroes $= \frac{2}{\alpha} + \frac{2}{\beta} = -10$	½
and product of zeroes $= \frac{2}{\alpha} \times \frac{2}{\beta} = -32$	½
Required polynomial $= x^2 + 10x - 32$	1
or $k(x^2 + 10x - 32)$ where k is any non-zero real number.	
OR	

(b)	$p(x) = 3x^2 + x - 10 = (x + 2)(3x - 5)$ Zeroes of p(x) are -2 and $\frac{5}{3}$ Sum of zeroes = $-2 + \frac{5}{3} = \frac{-1}{3} = -\frac{\text{coefficient of x}}{\text{coefficient of } x^2}$ Product of zeroes = $-2 \times \frac{5}{3} = \frac{-10}{3} = \frac{\text{constant term}}{\text{coefficient of } x^2}$	1 1 1
31. The sum of a number and its reciprocal is $\frac{13}{6}$. Find the number.		
Solution:	Let the number be x A.T.Q. $x + \frac{1}{x} = \frac{13}{6}$ $\Rightarrow 6x^2 - 13x + 6 = 0$ $\Rightarrow (2x-3)(3x-2) = 0$ $\Rightarrow x = \frac{3}{2}$ or $\frac{2}{3}$ $\therefore$ The required number is $\frac{3}{2}$ or $\frac{2}{3}$	1 1 1

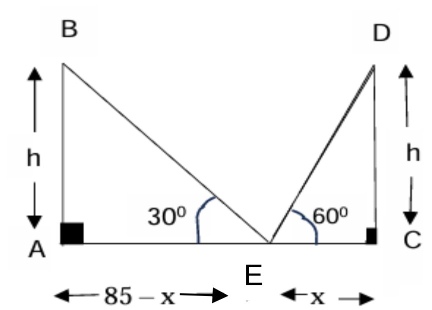
Section – D

(Long Answer Type Questions) **4 × 5 = 20**

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

32. Two poles of equal heights are standing opposite each other on either side of the road which is 85 m wide. From a point between them on the road, the angles of elevation of the top of the poles are 60° and 30° respectively. Find the height of the poles and the distances of the point from the poles. (Use $\sqrt{3} = 1.73$)

Solution:



Correct figure 1

Let AB and CD be the equal poles of height h metres

In Δ BAE, $\tan 30° = \frac{h}{85 - x} \Rightarrow 85 – x = h\sqrt{3}$ … (i) In Δ DCE, $\tan 60° = \frac{h}{x} \Rightarrow h = x\sqrt{3}$ … (ii) Using (i) & (ii) x = 21·25, 85 – x = 63.75 and h = 36·76 ∴ The height of the poles are 36.76 m and the distances of the points from the poles are 21.25 m and 63.75 m	1½ 1½ 1

33. (a) Solve the following pair of linear equations by graphical method :

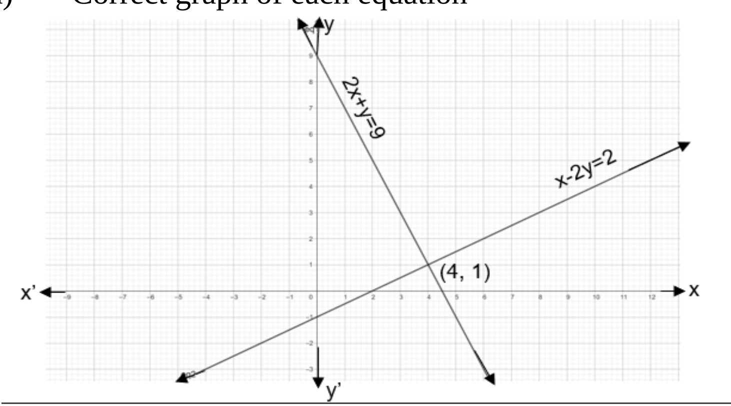
$2x + y = 9$ and $x – 2y = 2$

OR

(b) Nidhi received simple interest of ₹ 1,200 when invested ₹ x at 6% p.a. and ₹ y at 5% p.a. for 1 year. Had she invested ₹ x at 3% p.a. and ₹ y at 8% p.a. for that year, she would have received simple interest of ₹ 1,260. Find the values of x and y.

Solution:

(a) Correct graph of each equation — 2 + 2



Solution x = 4, y = 1 or (4, 1) — 1

OR

(b) A.T.Q.

$\frac{6}{100}x + \frac{5}{100}y = 1200 \Rightarrow 6x + 5y = 120000$ …(i) — 1½

$\frac{3}{100}x + \frac{8}{100}y = 1260 \Rightarrow 3x + 8y = 126000$ …(ii) — 1½

Solving (i) and (ii) we get, x = 10000 and y = 12000 — 1 + 1

34. Find 'mean' and 'mode' of the following data :

Class	0 – 15	15 – 30	30 – 45	45 – 60	60 – 75	75 – 90
Frequency	11	8	15	7	10	9

Solution:

Class	x_i	f_i	$u_i = \frac{x_i - 37.5}{15}$	$f_i u_i$
0 – 15	7.5	11	– 2	– 22
15 – 30	22.5	8	– 1	– 8
30 – 45	37.5	15	0	0
45 – 60	52.5	7	1	7
60 – 75	67.5	10	2	20
75 - 90	82.5	9	3	27
		$\sum f_i = 60$		$\sum f_i u_i = 24$

Correct table 1½

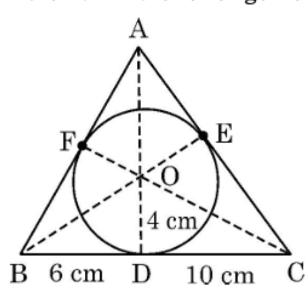
Mean = $37{\cdot}5 + 15 \times \frac{24}{60} = 43.5$ 1½

Modal class is 30 – 45

Mode = $30 + 15 \times \frac{15-8}{30-8-7}$ 1 ½

= 37 ½

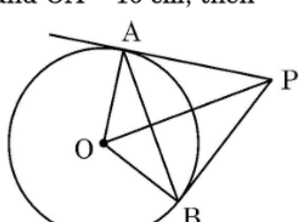
35. (a) The given figure shows a circle with centre O and radius 4 cm circumscribed by ΔABC. BC touches the circle at D such that BD = 6 cm, DC = 10 cm. Find the length of AE.



OR

(b) PA and PB are tangents drawn to a circle with centre O.

If $\angle$AOB = 120° and OA = 10 cm, then



(i) Find $\angle$OPA. **1**

(ii) Find the perimeter of ΔOAP. **3**

(iii) Find the length of chord AB. **1**

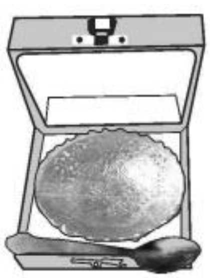
Solution:	Marks
(a) Let AE = x $\Rightarrow$ AF = x and CE = 10 cm, BF = 6 cm (Lengths of tangents drawn from an external point to a circle are equal)	1
$s = \frac{16 + 10 + x + 6 + x}{2} = 16 + x$	½
$\therefore$ Area of Δ ABC = $\sqrt{(16 + x)(x)(6)(10)}$ …(i)	1
Also, area of Δ ABC = $\frac{1}{2}[16 \times 4 + (10 + x)4 + (6 + x)4]$ …(ii)	1
Equating (i) & (ii), we get x = $\frac{64}{11}$ or 5·8 x = – 16 (Rejected) Length of AE = $\frac{64}{11}$ cm or 5.8 cm	1½
OR	
(b) (i) $\angle$ OPA = 30°	1
(ii) In Δ OAP, $\sin 30° = \frac{10}{OP} \Rightarrow$ OP = 20 cm	1
$\tan 30° = \frac{10}{PA} \Rightarrow$ PA = $10\sqrt{3}$ cm	1
$\therefore$ Perimeter of Δ OPA = $(30 + 10\sqrt{3})$ cm	1
(iii) PA = PB and $\angle$ APB = 60°	½
Δ APB is an equilateral triangle $\therefore$ PA = AB = $10\sqrt{3}$ cm	½

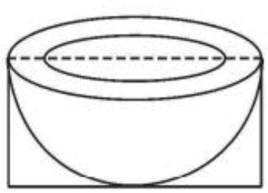
Section – E

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

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

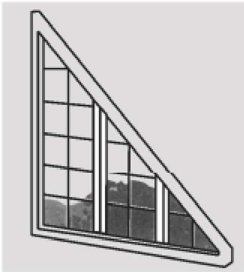
36.

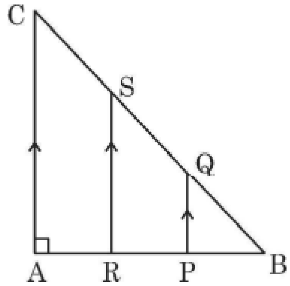




A hemispherical bowl is packed in a cuboidal box. The bowl just fits in the box. Inner radius of the bowl is 10 cm. Outer radius of the bowl is 10.5 cm. Based on the above, answer the following questions : (i) Find the dimensions of the cuboidal box. **1** (ii) Find the total outer surface area of the box. **1** (iii) (a) Find the difference between the capacity of the bowl and the volume of the box. (use $\pi = 3.14$) **2** **OR** (iii) (b) The inner surface of the bowl and the thickness is to be painted. Find the area to be painted.	
Solution: (i) Diameter of bowl = 21 cm Dimensions of the box are 21 cm × 21 cm × 10·5 cm	 1
(ii) Total surface area of the box = $2\left(441 + \frac{441}{2} + \frac{441}{2}\right)$ = 1764 sq. cm	½ + ½
(iii) (a) Capacity of bowl = $\frac{2}{3} \times 3{\cdot}14 \times 10^3$	½
$= \frac{6280}{3}$ cu. cm or 2093·33 cu. cm	½
Volume of box = $21 \times 21 \times \frac{21}{2} = \frac{9261}{2}$ cu. cm. or 4630·5 cu. cm	½
Required difference = $\frac{15223}{6}$ cu. cm or 2537·17 cu. cm	½
(NOTE: Here capacity is considered as volume to compute the difference.) **OR**	
(b) Required area = $2 \times \frac{22}{7} \times 10^2 + \frac{22}{7} \times (10{\cdot}5^2 - 10^2)$	1
$= \frac{4400}{7} + \frac{451}{14}$ $= \frac{9251}{14}$ sq. cm or 660·79 sq. cm	 1

37.





A triangular window of a building is shown above. Its diagram represents a ΔABC with $\angle A = 90°$ and AB = AC. Points P and R trisect AB and $PQ \parallel RS \parallel AC$.

Based on the above, answer the following questions :

(i) Show that $\Delta BPQ \sim \Delta BAC$. **1**

(ii) Prove that $PQ = \frac{1}{3} AC$. **1**

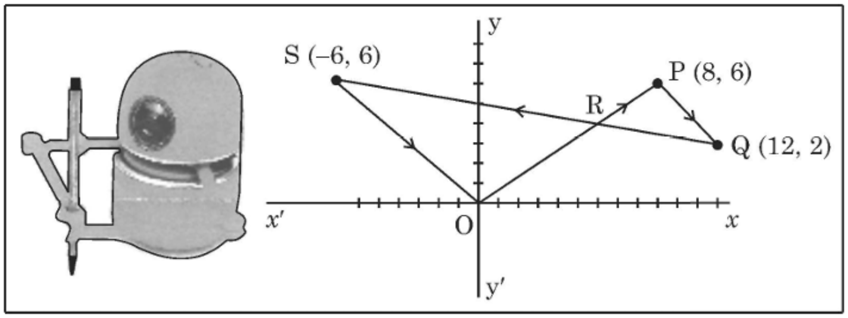
(iii) (a) If AB = 3 m, find length BQ and BS. Verify that $BQ = \frac{1}{2} BS$. **2**

OR

(iii) (b) Prove that $BR^2 + RS^2 = \frac{4}{9} BC^2$.

Solution:	
(i) In Δ BAC and Δ BPQ, $PQ \parallel AC$	
$\therefore \angle BQP = \angle BCA$ and $\angle B$ is common	
$\therefore \Delta BPQ \sim \Delta BAC$ (By AA similarity criterion)	1
(ii) Since, $\Delta BPQ \sim \Delta BAC \Rightarrow \frac{PQ}{AC} = \frac{BP}{BA} = \frac{1}{3}$	½
$\Rightarrow \frac{PQ}{AC} = \frac{1}{3} \Rightarrow PQ = \frac{1}{3} AC$	½
(iii) (a) $\frac{BP}{BA} = \frac{PQ}{AC}$ (corresponding sides of similar triangles)	
$\Rightarrow$ BP = PQ (as BA = AC)	
$\therefore PQ = \frac{1}{3} \times 3 = 1$ m	
Hence, $BQ = \sqrt{2}$ m	1
getting $BS = 2\sqrt{2}$ m	½
$\Rightarrow \frac{1}{2}BS = BQ$ (Hence verified)	½
OR	
(b) $BR^2 + RS^2 = \left(\frac{2}{3}AB\right)^2 + \left(\frac{2}{3}AC\right)^2$	½ + ½
$= \frac{4}{9}(AB^2 + AC^2)$	½
$= \frac{4}{9} BC^2$	½

38. Gurveer and Arushi built a robot that can paint a path as it moves on a graph paper. Some co-ordinate of points are marked on it. It starts from (0, 0), moves to the points listed in order (in straight lines) and ends at (0, 0).



Arushi entered the points P(8, 6), Q(12, 2) and S(– 6, 6) in order. The path drawn by robot is shown in the figure.

Based on the above, answer the following questions :

(i) Determine the distance OP. **1**

(ii) QS is represented by equation $2x + 9y = 42$. Find the co-ordinates of the point where it intersects y – axis. **1**

(iii) (a) Point R(4.8, y) divides the line segment OP in a certain ratio, find the ratio. Hence, find the value of y. **2**

OR

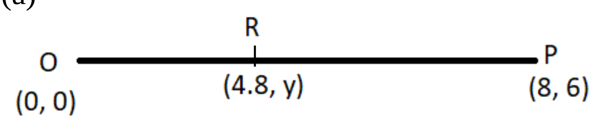
(iii) (b) Using distance formula, show that $\frac{PQ}{OS} = \frac{2}{3}$.

Solution:

(i) The distance OP = $\sqrt{64 + 36} = 10$ — 1

(ii) $2x + 9y = 42$ intersects y-axis at $\left(0, \frac{14}{3}\right)$ — 1

(iii) (a)



Let OR : RP = k : 1, therefore $4 \cdot 8 = \frac{8k}{k+1} \Rightarrow k = \frac{3}{2}$ — 1½

$\Rightarrow$ OR : RP = 3 : 2

$y = \frac{18}{5}$ — ½

OR

(b) PQ = $\sqrt{4^2 + (-4)^2} = \sqrt{32}$ or $4\sqrt{2}$ — ½

OS = $\sqrt{(-6)^2 + 6^2} = \sqrt{72}$ or $6\sqrt{2}$ — ½

$\therefore \frac{PQ}{OS} = \sqrt{\frac{32}{72}} = \sqrt{\frac{4}{9}} = \frac{2}{3}$ — 1