Marking Scheme
Strictly Confidential
(For Internal and Restricted use only)
Secondary School Examination, 2026 (X^{th})
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. 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 (√) 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.

430/5/1

MARKING SCHEME
MATHEMATICS (BASIC)

Section – A

(Multiple Choice Questions) **$20 \times 1 = 20$**

Q. Nos. **1** to **20** are Multiple Choice Questions of **1** mark each.

1. $7 \times 11 \times 13 + 5$ is

(A) a prime number. (B) an odd number.

(C) a composite number. (D) a multiple of 5.

Answer	(C) a composite number.	1

2. The roots of the quadratic equation $x^2 + 9 = 0$ are

(A) real and equal (B) not real

(C) real and negative of each other (D) rational numbers

Answer	(B) not real	1

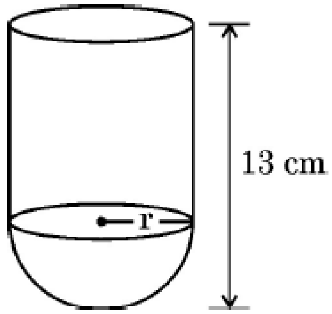
3. The distance between the points (–2, 5) and (5, –2) is

(A) $7\sqrt{2}$ (B) 14

(C) $2\sqrt{7}$ (D) 7

Answer	(A) $7\sqrt{2}$	1

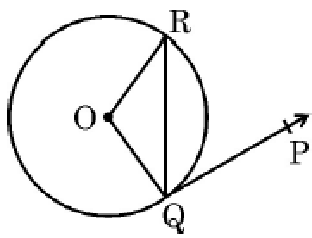
4. A cylinder of radius r is surmounted on a hemisphere of same radius. If total height of the object is 13 cm, then its inner surface area is

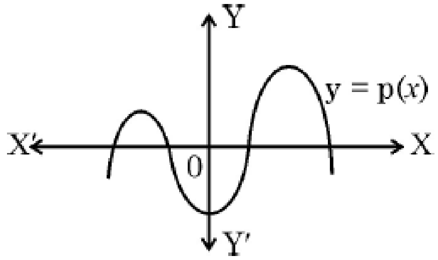
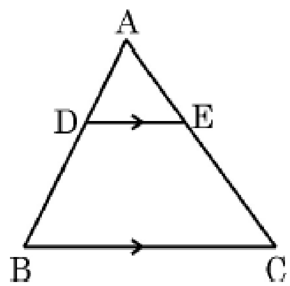


(A) $2\pi r(r + 13)$ (B) $13\pi r$

(C) $2\pi(13 + r)^2$ (D) $26\pi r$

Answer	(D) $26\ \pi r$	1

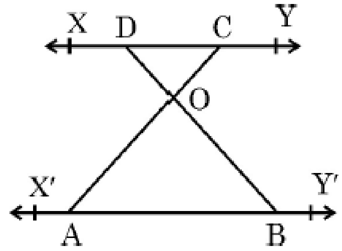
5. Which of the following statements is not always true ? (A) Two circles are similar. (B) Two isosceles right triangles are similar. (C) Two rectangles are similar. (D) Two equilateral triangles are similar.		
Answer	(C) Two rectangles are similar.	1
6. If value of cot θ is $\sqrt{5}$, then sin θ equals (A) $\frac{1}{\sqrt{6}}$ (B) $\sqrt{6}$ (C) $\frac{\sqrt{5}}{6}$ (D) $\frac{1}{2}$		
Answer	(A) $\frac{1}{\sqrt{6}}$	1
7. A chord QR subtends an angle of 105° at the centre O of the circle. The measure of ∠RQP is  (A) $\frac{75°}{2}$ (B) $\frac{105°}{2}$ (C) 75° (D) 15°		
Answer	(B) $\frac{105°}{2}$	1
8. The probability of getting sum greater than 10, when two dice are rolled together, is (A) $\frac{1}{9}$ (B) $\frac{1}{18}$ (C) $\frac{1}{12}$ (D) 1		
Answer	(C) $\frac{1}{12}$	1

9. The graph of a polynomial p(x) is shown here. The number of zeroes of the polynomial p(x) is  (A) 5 (B) 1 (C) 0 (D) 4		
Answer	(D) 4	1
10. n^{th} term of the A.P. : $\frac{-1}{3}, \frac{4}{3}, 3, \ldots$ is (A) $\frac{5n-9}{3}$ (B) $\frac{5n-6}{3}$ (C) $\frac{3n-4}{3}$ (D) $\frac{3n+2}{3}$		
Answer	(B) $\frac{5n-6}{3}$	1
11. In the given figure, DE || BC. If AD : AB = 1 : 3 and AE = 2.5 cm, then AC equals  (A) 7.5 cm (B) 5 cm (C) 10 cm (D) 2.5 cm		
Answer	(A) 7.5 cm	1
12. The value of k for which sum of the zeroes of the polynomial $p(x) = 3x^2 - kx + 6$ is 2, is (A) 2 (B) –6 (C) –2 (D) 6		
Answer	(D) 6	1

13. A bag contains some red and some white balls. A ball is drawn at random from the bag. If the probability of getting a red ball is $\frac{2}{7}$, then the probability of getting a white ball is (A) $\frac{1}{14}$ (B) $\frac{5}{7}$ (C) $\frac{1}{7}$ (D) $\frac{2}{7}$		
Answer	(B) $\frac{5}{7}$	1
14. If -26, x, 2 are in A.P., then the value of x is (A) 14 (B) -13 (C) -12 (D) -14		
Answer	(C) -12	1
15. PQ is tangent to a circle at a point P on the circle. The number of tangents which can be drawn to the circle parallel to PQ, is (A) 2 (B) 1 (C) many (D) zero		
Answer	(B) 1	1
16. A card is drawn from a well-shuffled deck of 52 playing cards. The probability of getting a queen of spade is (A) $\frac{1}{26}$ (B) $\frac{1}{52}$ (C) 0 (D) $\frac{1}{4}$		
Answer	(B) $\frac{1}{52}$	1
17. The length of a pendulum is 70 cm and it describes an arc of length 88 cm when swings. The angle subtended by the arc at the centre is (A) 36° (B) 70° (C) 72° (D) 80°		
Answer	(C) 72°	1

18. The total surface area of a solid cone of radius 7 cm and slant height 25 cm, is (A) 724 cm^2 (B) 704 cm^2 (C) 550 cm^2 (D) 616 cm^2		
Answer	(B) 704 cm^2	1
(Assertion – Reason based questions) **Directions :** In Q. No. **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 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) :** For an acute angle θ, cos θ is always less than 1. **Reason (R) :** In a right-angled triangle, hypotenuse is the longest side and $\cos\theta = \frac{\text{Base}}{\text{Hypotenuse}}$.		
Answer	(A) Both, Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).	1
20. **Assertion (A) :** Median of a data is the value of $\frac{N}{2}$, where N represents sum of all frequencies. **Reason (R) :** Median divides the whole distribution in two equal parts.		
Answer	(D) Assertion (A) is false, but Reason (R) is true.	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) If sec A = $\sqrt{2}$ and tan B = $\sqrt{3}$, then find the value of 2 sin A cos B. **OR** (b) Evaluate : $\frac{4\cos^3 60° + \text{cosec } 30°}{\tan^2 30°}$		
Solution: (a) $\sec A = \sqrt{2} \Rightarrow A = 45°$, $\tan B = \sqrt{3} \Rightarrow B = 60°$		½ + ½

$2 \sin A \cos B = 2 \sin 45° \cos 60° = 2 \times \frac{1}{\sqrt{2}} \times \frac{1}{2} = \frac{1}{\sqrt{2}}$ or $\frac{\sqrt{2}}{2}$	1
OR	
(b) $\frac{4\cos^3 60° + \text{cosec } 30°}{\tan^2 30°} = \frac{4 \times \left(\frac{1}{2}\right)^3 + 2}{\left(\frac{1}{\sqrt{3}}\right)^2}$	1½
$= \frac{15}{2}$	½
22. Find the H.C.F. and L.C.M. of 1530 and 2040.	
Solution: $1530 = 2 \times 3^2 \times 5 \times 17$; $2040 = 2^3 \times 3 \times 5 \times 17$	½+ ½
$HCF(1530, 2040) = 2 \times 3 \times 5 \times 17 = 510$	½
$LCM(1530, 2040) = 2^3 \times 3^2 \times 5 \times 17 = 6120$	½
23. If A(a, 0), B(1, 1) and C(0, b) form a triangle, right angled at B when joined, then establish a relation between a and b.	
Solution: $AC^2 = AB^2 + BC^2$	
$\Rightarrow a^2 + b^2 = (a-1)^2 + 1 + 1 + (b-1)^2$	1
$\Rightarrow 2a + 2b = 4$ or $a + b = 2$	1
24. (a) Find the probability that a number selected at random from the numbers 30, 31, 32, 33, ..., 60 is (i) a prime number (ii) a multiple of 6.	
OR	
(b) Slips of letters of the word 'BACKGROUND' are put in a bowl and thoroughly mixed. One slip is picked up at random. Find the probability that picked up slip's letter is (i) a vowel (ii) present in the word 'BALL'.	
Solution:(a) (i) Prime numbers are 31, 37, 41, 43, 47, 53, 59	
P (a prime number) = $\frac{7}{31}$	1
(ii) Multiples of 6 are 30, 36, 42, 48, 54, 60	
P (a multiple of 6) = $\frac{6}{31}$	1
OR	
(b) (i) P (a vowel) = $\frac{3}{10}$	1
(ii) P (present in the word 'BALL') = $\frac{2}{10}$ or $\frac{1}{5}$	1

25. In the given figure, AB || DC. If OB = 3OD and CD = 1.8 cm, then find the length AB. 	
Solution: DC || AB	
$\Delta OCD \sim \Delta OAB$ (by AA similarity)	½
$\Rightarrow \dfrac{OD}{OB} = \dfrac{CD}{AB}$	½
$\Rightarrow \dfrac{1}{3} = \dfrac{1.8}{AB}$	½
$\Rightarrow$ AB = 5.4 cm	½

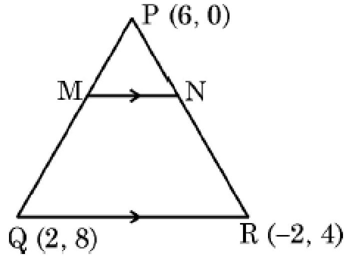
Section – C

(Short Answer Type Questions) **$6 \times 3 = 18$**

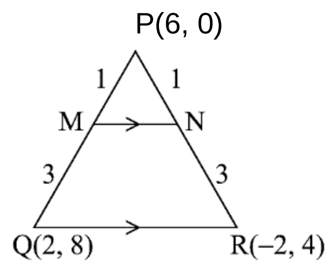
Q. Nos. **26** to **31** are Short Answer type questions of **3** marks each.

26. Prove that $\sqrt{2}$ is an irrational number.	
Solution: Let $\sqrt{2}$ be a rational number such that $\sqrt{2} = \dfrac{a}{b}$, where a and b are coprime numbers and $b \neq 0$	½
$\left.\begin{array}{l} \sqrt{2}b = a \\ 2b^2 = a^2 \\ \text{2 divides } a^2 \\ \text{2 divides a as well} \end{array}\right\}$	1
$a = 2p$, for some integer p $\left.\begin{array}{l} a^2 = 4p^2 \\ 2b^2 = 4p^2 \\ b^2 = 2p^2 \\ \text{2 divides } b^2 \\ \text{2 divides b as well} \end{array}\right\}$	1
$\therefore$ 2 is a common factor of a and b which is a contradiction as a and b are coprime numbers. $\therefore$ Our assumption is wrong. Hence $\sqrt{2}$ is an irrational number.	½

27. Points P(6, 0), Q(2, 8) and R(–2, 4) are vertices of ΔPQR. It is given that MN || QR such that $\frac{PM}{MQ}=\frac{1}{3}$. Using distance formula and ratio formula, show that $\frac{MN}{QR}=\frac{1}{4}$.



Solution:



Solution	Marks
MN || QR $\therefore$ $\frac{PM}{MQ}=\frac{PN}{NR}=\frac{1}{3}$	½
Coordinates of M are $\left(\frac{3\times6+1\times2}{3+1},\frac{3\times0+1\times8}{3+1}\right)=\left(\frac{18+2}{4},\frac{8}{4}\right)$ = (5, 2)	½
Coordinates of N are $\left(\frac{3\times6+1\times(-2)}{3+1},\frac{3\times0+1\times4}{3+1}\right)=\left(\frac{18-2}{4},\ \frac{4}{4}\right)=(4,\ 1)$	½
$\therefore$ $MN=\sqrt{(5-4)^2+(2-1)^2}=\sqrt{2}$	½
$QR=\sqrt{(2+2)^2+(8-4)^2}=4\sqrt{2}$	½
Therefore $\frac{MN}{QR}=\frac{1}{4}$	½

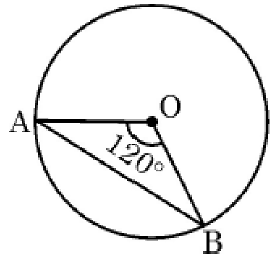
28. (a) In an A.P., it is given that a = 2, d = 8 and S_n = 90. Find the value of n.

OR

(b) How many 4-digit numbers are divisible by 7 ?

Solution	Marks
Solution: (a) $S_n=\frac{n}{2}[4+(n-1)8]=90$	1
$\Rightarrow$ $2n^2-n-45=0$	1
$\Rightarrow$ $n=5,-\frac{9}{2}$(rejected)	½+½
$\Rightarrow$ $n=5$	
OR	
(b) 4-digit numbers, divisible by 7 are	

1001, 1008, 1015, ……….. , 9996 It is an AP with $a = 1001, d = 7, a_n = 9996$ $9996 = 1001 + (n-1)(7)$ $\Rightarrow \quad n = 1286$	1½ 1 ½
29. Prove that $\sqrt{\dfrac{1-\sin A}{1+\sin A}} = \dfrac{1}{\sec A + \tan A}$.	
Solution: LHS $= \sqrt{\dfrac{1-\sin A}{1+\sin A} \times \dfrac{1-\sin A}{1-\sin A}} = \dfrac{1-\sin A}{\cos A}$ $= \sec A - \tan A$ $= (\sec A - \tan A)\left(\dfrac{\sec A + \tan A}{\sec A + \tan A}\right)$ $= \dfrac{\sec^2 A - \tan^2 A}{\sec A + \tan A}$ $= \dfrac{1}{\sec A + \tan A} = \text{RHS}$	1 ½ ½ ½ ½
30. (a) If α, β are zeroes of the polynomial $p(x) = 5x^2 - 7x - 3$, then form a quadratic polynomial whose zeroes are $\dfrac{2}{\alpha}$ and $\dfrac{2}{\beta}$. **OR** (b) Find the zeroes of the polynomial $p(x) = 3x^2 + 7x - 20$ and verify the relationship between its zeroes and the coefficients.	
Solution: (a) $\alpha + \beta = \frac{7}{5}$, $\quad \alpha\beta = -\frac{3}{5}$ Sum of zeroes of required polynomial $= \dfrac{2}{\alpha} + \dfrac{2}{\beta} = \dfrac{-14}{3}$ Product of zeroes of the required polynomial $= \dfrac{2}{\alpha} \times \dfrac{2}{\beta} = \dfrac{-20}{3}$ Required polynomial is $x^2 + \frac{14}{3}x - \frac{20}{3} \quad or \quad k(3x^2 + 14x - 20)$ where k is any non-zero real number. **OR** (b) $p(x) = 3x^2 + 7x - 20$ Zeroes are $-4, \dfrac{5}{3}$ Sum of the zeroes $= -4 + \dfrac{5}{3} = \dfrac{-7}{3} = -\dfrac{\text{coefficient of } x}{\text{coefficient of } x^2}$ Product of zeroes $= -4 \times \dfrac{5}{3} = \dfrac{-20}{3} = \dfrac{\text{constant term}}{\text{coefficient of } x^2}$	½ + ½ ½ ½ 1 1 1 1

31. Chord AB of a circle subtends an angle of 120° at the centre O of the circle. Find the length of arc AB, if radius of the circle is 21 cm. 		
Solution:	Length of arc AB $= \frac{120}{360} \times 2 \times \frac{22}{7} \times 21$ $= 44$ cm	2 1

Section – D

(Long Answer Type Questions) **$4 \times 5 = 20$**

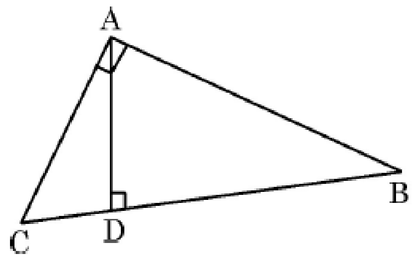
32. (a) In the given figure, ΔABC is right angled triangle with $\angle A = 90°$. AD is perpendicular to BC.

Prove that :

(i) $\Delta DBA \sim \Delta DAC$

(ii) $DA^2 = DB \times DC$

(iii) Find the area of ΔABC when DB = 9 cm and DC = 16 cm.

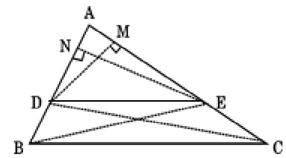


OR

(b) 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.

Solution:	(a) (i) In Δ DBA and Δ DAC $\angle BDA = \angle CDA = 90°$ $\angle BAD = 90° - \angle B = \angle ACB$ Δ DBA ~ Δ DAC (by AA similarity)	1 1
	(ii) As Δ DBA ~ Δ DAC $\therefore \frac{DA}{DC} = \frac{DB}{DA}$ $\Rightarrow DA^2 = DC \times DB$	1
	(iii) taking DC = 16 cm and DB = 9 cm, $DA^2 = 9 \times 16$ $\Rightarrow$ DA = 12 cm Area $\Delta ABC = \frac{1}{2} \times 25 \times 12 = 150$ cm^2	1 1
	OR	
	(b) Correct Given, To Prove, Construction, Figure Given: In Δ ABC, DE $\parallel$ BC intersecting AB at D and AC at E.	$4 \times ½ = 2$

To Prove: $\frac{AD}{DB} = \frac{AE}{EC}$



Construction: Draw DM ⊥ AC, EN ⊥ AB, join BE and CD

Proof : $\frac{ar(\Delta ADE)}{ar(\Delta DBE)} = \frac{\frac{1}{2}\times AD\times EN}{\frac{1}{2}\times DB\times EN} = \frac{AD}{DB}$……………………(i) 1

$\frac{ar(\Delta ADE)}{ar(\Delta DCE)} = \frac{\frac{1}{2}\times AE\times DM}{\frac{1}{2}\times EC\times DM} = \frac{AE}{EC}$……………………(ii) 1

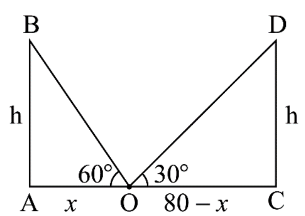
As ΔDBE and ΔDCE lie on the same base and between same parallels BC and DE

∴ ar(ΔDBE) = ar(ΔDCE). Thus, $\frac{ar(\Delta ADE)}{ar(\Delta DBE)} = \frac{ar(\Delta ADE)}{ar(\Delta DCE)}$………(iii) ½

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

33. Two poles of equal heights are standing opposite each other on either side of the road, which is 80 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 distance of the point from the poles.

Solution:



correct figure 1

Let AB and CD be the poles of height $h\,m$ and O is the observation point.

In ΔDCO , $\tan 30° = \frac{h}{80-x}$ 1

⇒ $80 - x = h\sqrt{3}$_____(i) ½

In ΔBAO, $\tan 60° = \frac{h}{x}$

⇒ $h = x\sqrt{3}$_____(ii) 1

Using (i) and (ii) we get $x = 20$, i.e., AO = 20 m and $h = 20\sqrt{3}$ m . ½+½

∴ CO = 60 m. ½

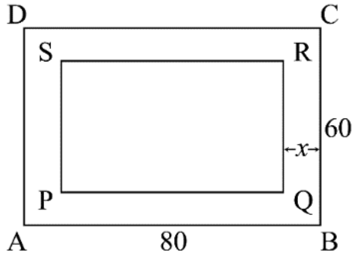
∴ The height of the pole is $20\sqrt{3}$ m and the distance of the point from the poles is 20 m and 60 m.

34. (a) ABCD is a rectangle of dimensions 80 cm × 60 cm. Another rectangle PQRS is drawn inside ABCD leaving space of equal width x cm along the edges of ABCD. If area PQRS is half of the area ABCD, then find the value of x.

OR

(b) A train covers a distance of 90 km at a uniform speed. Had the speed been 15 km/h more, it would have taken 30 minutes less for the same journey. Find the original speed of the train.

Solution:



(a) $PQ = (80-2x)\ cm,\ \ QR = (60-2x)\ \ cm$ — 2

Area PQRS $= \frac{1}{2}$ Area ABCD

$2 \times (80-2x)(60-2x) = 80 \times 60$ — 1

$4x^2 - 280x + 2400 = 0$ or $x^2 - 70x + 600 = 0$ — 1

$x = 10\,, 60$ (rejected) — 1

$\therefore\ x = 10\ cm$

OR

(b) Let the original speed of train be $x\ km/hr$.

According to the Question, $\frac{90}{x} - \frac{90}{x+15} = \frac{30}{60}$ — 2

$\Rightarrow\ x^2 + 15x - 2700 = 0$ — 2

$\Rightarrow\ x = 45\,, -60$ (rejected) — 1

$\therefore$ The original speed of the train $= 45\ km/hr$

35. Find mean and mode of the following data :

Class	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	5	4	10	13	12	10	6

Solution:

Class Interval	f_i	x_i	u_i	f_iu_i
10-20	5	15	– 3	– 15
20-30	4	25	– 2	– 8
30-40	10	35	– 1	– 10
40-50	13	45	0	0
50-60	12	55	1	12
60-70	10	65	2	20
70-80	6	75	3	18
	60			17

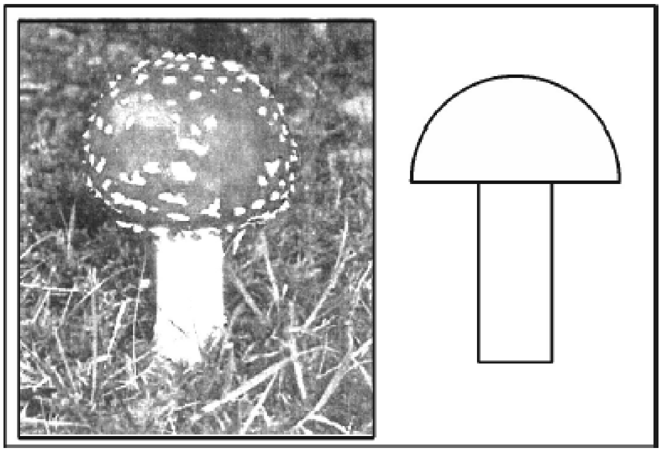
Correct table 1½

Assumed Mean = 45

Mean $= 45 + \frac{17}{60} \times 10$ — 1

$= 47.83$ (approx) Modal class is 40 - 50 Mode $= 40 + \frac{13-10}{2\times13-10-12} \times 10$ $= 47.5$	½ 1½ ½
Section – E **(Case-study based Questions)** **$3 \times 4 = 12$** Q. Nos. **36** to **38** are Case-study based Questions of **4** marks each.	
36.  Seema daily goes to a park to exercise on machines available there. When Seema spent 15 minutes on exercise bicycle and 30 minutes on double cross walker, she received a message of burning 435 calories on her fitness watch. When she spent 30 minutes on exercise bicycle and 40 minutes on double cross walker, she received a message of burning 690 calories. To find the number of calories burned per minute on each machine, answer the following : (i) Represent the above situation in terms of a pair of linear equations in two variables. (ii) Show that the equations have unique solution. (iii) (a) Solve both equations to find the values of the variables using elimination method. **OR** (b) Solve both equations to find the values of the variables using substitution method.	
Solution: (i) Let x and y be number of calories burned per minute on bicycle and walker respectively $\therefore 15x + 30y = 435$, $30x + 40y = 690$ (ii) We get, $\frac{15}{30} \neq \frac{30}{40}$ Thus, equations have unique solution (iii) a) Using elimination method, $x = 11$ and $y = 9$ **OR** (iv) b) Using Substitution method, $x = 11$ and $y = 9$	 1 1 2 2

37.



There are many varieties of mushrooms available in the world. One such mushroom 'Amanita muscaria' has a upper part which is like red cap (hemispherical) and lower part is like white stem (cylinderical).

The hemispherical cap's radius = 3 cm and cylindrical stem is 2 cm high with diameter 1.4 cm. Considering mushroom a solid object, answer the following questions :

(i) What is the total height of a mushroom ?

(ii) Find the volume of the stem.

(iii) (a) Determine the volume of 7 such mushrooms.

OR

(b) Find the total surface area of 7 such mushrooms.

Solution: (i) Height of a mushroom = 2 + 3 = 5 cm 1

(ii) Volume of the stem $= \frac{22}{7} \times \frac{1.4}{2} \times \frac{1.4}{2} \times 2$

$= \frac{8624}{2800}\ cm^3$ or $3.08\ cm^3$ 1

(iii)(a) Volume of 7 mushrooms $= 7 \times \left(\frac{2}{3}\pi R^3 + \pi r^2 h\right)$, where R = 3 cm, r = 0.7 cm, h = 2 cm.

$= 7\left(\frac{2}{3} \times \frac{22}{7} \times 3^3 + \frac{22}{7} \times (0.7)^2 \times 2\right)$ 1

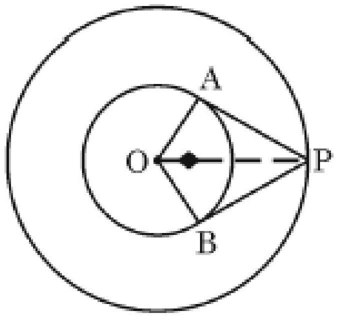
$= \frac{41756}{100}\ cm^3$ or $417.56\ cm^3$ 1

OR

(b) TSA $= 7\{2\pi R^2 + (\pi R^2 - \pi r^2) + 2\pi rh + \pi r^2\} = 7(3\pi R^2 + 2\pi rh)$

$= 7 \times \left(3 \times \frac{22}{7} \times 3 \times 3 + 2 \times \frac{22}{7} \times \frac{7}{10} \times 2\right)$ 1

$= \frac{6556}{10}\ cm^2$ or $655.6\ cm^2$ 1

38.  

In a circular museum hall of radius 14 m, some statues are displayed. Statues are kept inside the inner concentric circle of radius 7 m. One such statue lying in sector OAB, is fenced along line segments OA, AP, PB and BO where P is a point on outer circle.

Based on above information, answer the following questions :

(i) Find m$\angle$AOP. **1**

(ii) Prove that $\Delta OAP \cong \Delta OBP$. **1**

(iii) (a) Find the length of fencing required to protect the statue.

(Take $\sqrt{3} = 1.73$) **2**

OR

(b) Find area of quadrilateral OAPB. (Take $\sqrt{3} = 1.73$)

Solution:

(i) OA = 7 m, OP = 14 m

If $\angle AOP = \theta$ $\therefore \cos\theta = \frac{7}{14} = \frac{1}{2}$

$\Rightarrow$ m$\angle$AOP = 60° — 1

(ii) In ΔOAP and ΔOBP

$\angle A = \angle B = 90°$ (radius $\perp$ to tangent at the point of contact)

OP = OP (common)

OA = OB (radii of the same circle)

Thus, $\Delta OAP \cong \Delta OBP$ (by RHS congruency) — 1

(iii) (a) $\sin 60° = \frac{AP}{14}$

$\Rightarrow$ AP = $7\sqrt{3}\ m$ or $12.11\ m$ — 1

Total fencing required = 2(OA + AP) = 38.22 m — 1

OR

(b) $\sin 60° = \frac{AP}{14}$

$\Rightarrow$ AP = $7\sqrt{3}\,m$ or $12.11\ m$ — 1

Area OAPB = $2 \times \frac{1}{2} \times OA \times AP = 84.77\ m^2$ — 1