

Marking Scheme Strictly Confidential
(For Internal and Restricted use only)
Secondary School Examination, 2026(2nd Board Examination)
SUBJECT NAME MATHEMATICS (BASIC) (Q.P. CODE 430/8/1)

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.

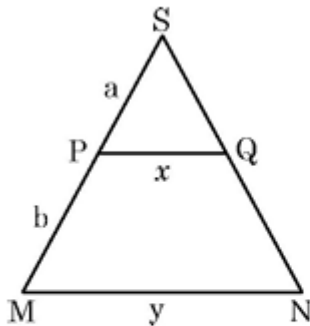
13	Ensure that you do not make the following common types of errors committed by the Examiner in the past:- Leaving answer or part thereof unassessed in an answer book. Giving more marks for an answer than assigned to it. Wrong totaling of marks awarded on an answer. Wrong transfer of marks from the 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.

MARKING SCHEME
MATHEMATICS BASIC (Subject Code 241)

Section – A (Multiple Choice Questions) 20 × 1 = 20 Q. Nos. 1 to 20 are multiple type questions of 1 mark each.	
1. If $a = 2^5 \times 3^3$, $b = 2^3 \times 3^2 \times 5$ and $c = 3^3 \times 5^n$ and L.C.M. (a, b, c) = $2^5 \times 3^3 \times 5^7$ then n is equal to (A) 7 (B) 5 (C) 3 (D) 1	
Answer : (A) 7	1
2. The pair of equations $x = 2$ and $y = 3$ represent the lines which are (A) intersecting at $(-2, -3)$ (B) intersecting at $(2, 3)$ (C) parallel (D) coincident	
Answer : (B) intersecting at $(2, 3)$	1
3. If $x = 3$ is a zero of the polynomial $p(x) = x^2 - 9k$, then k is equal to (A) 1 (B) 10 (C) 0.1 (D) 100	
Answer : (A) 1	1
4. The common difference of the A.P. 2, -2, -6, -10, is (A) 4 (B) 10 (C) -4 (D) -16	
Answer : (C) -4	1
5. If $x = a \sin \theta$ and $y = a \cos \theta$, then the value of $x^2 + y^2$ is (A) 1 (B) a^2 (C) a (D) 0	
Answer : (B) a^2	1

6. The total surface area of a solid hemisphere of radius 7 cm is (A) 447π sq. cm (B) 239π sq. cm (C) 174π sq. cm (D) 147π sq. cm	
Answer : (D) 147π sq. cm	1
7. If a and b are two consecutive natural numbers, then HCF (a, b) is (A) a (B) b (C) 1 (D) ab	
Answer: (C) 1	1
8. The quadratic equation $2x^2 - \sqrt{5}x + 1 = 0$ has (A) two distinct real roots. (B) two equal real roots. (C) no real roots. (D) more than two real roots.	
Answer : (C) no real roots	1
9. The fourth term of the A.P. $\sqrt{5}, \sqrt{20}, \sqrt{45}$ is (A) 25 (B) $\sqrt{80}$ (C) $\sqrt{125}$ (D) $\sqrt{85}$	
Answer : (B) $\sqrt{80}$	1
10. A card is drawn at random from a well shuffled deck of 52 playing cards. The probability of it being a card of spade or an ace is (A) $\frac{7}{13}$ (B) $\frac{5}{13}$ (C) $\frac{4}{13}$ (D) $\frac{3}{13}$	
Answer: (C) $\frac{4}{13}$	1

11. If in the given figure, $PQ \parallel MN$, then which of the following is true ?



(A) $x = \frac{a+b}{ay}$

(B) $\frac{x}{y} = \frac{a}{b}$

(C) $x = \frac{ay}{a+b}$

(D) $\frac{x}{y} = \frac{b}{a}$

Answer : (C) $x = \frac{ay}{a+b}$

1

12. If $3 \cos \theta = 1$, then the value of $\cot \theta$ is

(A) $\frac{1}{3}$

(B) $\frac{1}{2\sqrt{2}}$

(C) $2\sqrt{2}$

(D) $\frac{2\sqrt{2}}{3}$

Answer : (B) $\frac{1}{2\sqrt{2}}$

1

13. The product of the roots of the quadratic equation $kx^2 + 3x + 2k^2 = 0$ in x is 1, then the value of k is

(A) $-\frac{1}{2}$

(B) $\frac{1}{2}$

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

(D) 0

Answer : (B) $\frac{1}{2}$

1

14. Among the following pair of irrational numbers, whose product is a rational number ?

(A) $\sqrt{8}, \sqrt{32}$

(B) $\sqrt{3}, \sqrt{5}$

(C) $\sqrt{8}, \sqrt{20}$

(D) $\sqrt{2}, \sqrt{15}$

Answer : (A) $\sqrt{8}, \sqrt{32}$

1

15. A chord of a circle of radius 10 cm, subtends a right angle at its centre.

The length of the chord (in cm) is :

- (A) $5\sqrt{2}$ (B) $10\sqrt{2}$
(C) $\frac{5}{\sqrt{2}}$ (D) $10\sqrt{3}$

Answer : (B) $10\sqrt{2}$

1

16. The upper limit of median class in the following frequency distribution is :

Class	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
Frequency	5	12	20	8	5

- (A) 10 (B) 20
(C) 30 (D) 40

Answer : (C) 30

1

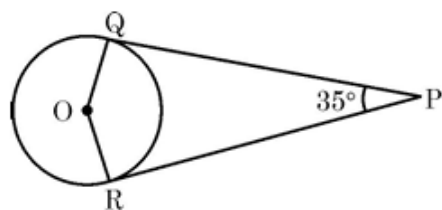
17. If $\triangle ABC$ and $\triangle PRQ$ are such that $\frac{AB}{PR} = \frac{AC}{PQ}$, then they will be similar if

- (A) $\angle A = \angle P$ (B) $\angle A = \angle R$
(C) $\angle B = \angle Q$ (D) $\angle B = \angle R$

Answer : (A) $\angle A = \angle P$

1

18. In the given figure, PQ and PR are tangents to a circle with centre O. If $\angle QPR = 35^\circ$, then $\angle QOR$ is equal to



- (A) 70° (B) 90°
(C) 135° (D) 145°

Answer : (D) 145°

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 labelled as Reason (R). Select the correct answer to these questions from the option (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) :** The mid-point of the line segment joining A(-4, 3) and B(4, 3) is (0, 3).

Reason (R) : The mid-point of the line segment joining two points $A(x_1, y_1)$ and $B(x_2, y_2)$ can be determined by using section formula with ratio 1 : 1.

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

1

20. **Assertion (A) :** Two congruent triangles are always similar.

Reason (R) : If the area of two triangles are equal, then they are congruent.

Answer : (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) If A(a, b) is a point which is equidistant from points B(2, 4) and C(-2, -3), then find the relation between a and b.

OR

- (b) Find the ratio in which the line $x + 3y = 12$ divides the line segment joining (1, 3) and (2, 5).

Solution: (a) $(a - 2)^2 + (b - 4)^2 = (a + 2)^2 + (b + 3)^2$

$$8a + 14b = 7$$

OR

(b) Let P be the point $P\left(\frac{2K+1}{K+1}, \frac{5K+3}{K+1}\right)$ which also lies on the line $x + 3y = 12$

$$2K + 1 + 15K + 9 = 12K + 12$$

$$\Rightarrow K = \frac{2}{5}$$

$$\text{Ratio} = 2 : 5$$

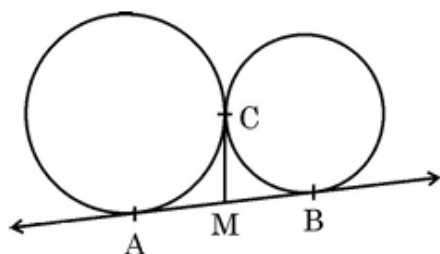
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1

1

$\frac{1}{2}$

$\frac{1}{2}$

22. The two touching circles have common tangents AB and CM as shown in the given figure. Show that M is the midpoint of line segment AB.



Solution: Tangents from an external point to a circle are equal in length.

$$CM = AM$$

$$CM = MB$$

$$AM = MB$$

Therefore, M is the mid-point of AB.

1

$\frac{1}{2}$

$\frac{1}{2}$

23. (a) Which term of the A.P. 6, 12, 18, will be 150 more than its 25th term ?

OR

(b) Determine the n^{th} term of an A.P. whose 5th term is 3 and 12th term is 17.

Solution: (a) Let a_n be 150 more than a_{25}

$$\therefore a_n = 150 + a + 24d$$

$$6 + (n - 1)6 = 150 + 6 + 24 \times 6$$

$$\Rightarrow n = 50$$

OR

$$(b) a + 4d = 3 \dots\dots\dots(1)$$

$$a + 11d = 17 \dots\dots\dots(2)$$

Solving equation (1) and (2) we get, $a = -5$ and $d = 2$

1

$\frac{1}{2}$

$\frac{1}{2}$

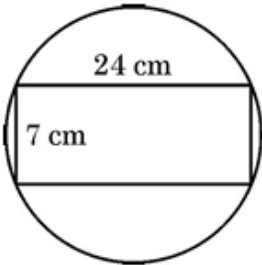
$\frac{1}{2}$

$\frac{1}{2}$

$\frac{1}{2}$

$a_n = -7 + 2n$						$\frac{1}{2}$																												
24. The mean of the following data is 15.6. Find the value of k. <table border="1"> <tr> <td>Class</td><td>6 – 10</td><td>10 – 14</td><td>14 – 18</td><td>18 – 22</td><td>22 – 26</td><td></td></tr> <tr> <td>Frequency</td><td>4</td><td>6</td><td>k</td><td>5</td><td>3</td><td></td></tr> </table>							Class	6 – 10	10 – 14	14 – 18	18 – 22	22 – 26		Frequency	4	6	k	5	3															
Class	6 – 10	10 – 14	14 – 18	18 – 22	22 – 26																													
Frequency	4	6	k	5	3																													
Solution: <table border="1"> <tr> <td>Class</td><td>6-10</td><td>10-14</td><td>14-18</td><td>18-22</td><td>22-26</td><td>Total</td></tr> <tr> <td>x_i</td><td>8</td><td>12</td><td>16</td><td>20</td><td>24</td><td></td></tr> <tr> <td>f_i</td><td>4</td><td>6</td><td>k</td><td>5</td><td>3</td><td>$18 + k$</td></tr> <tr> <td>fix_i</td><td>32</td><td>72</td><td>$16k$</td><td>100</td><td>72</td><td>$276 + 16k$</td></tr> </table> $15.6 = \frac{276 + 16k}{18 + k}$ $k = 12$						Class	6-10	10-14	14-18	18-22	22-26	Total	x_i	8	12	16	20	24		f_i	4	6	k	5	3	$18 + k$	fix_i	32	72	$16k$	100	72	$276 + 16k$	$\frac{1}{2}$ 1 $\frac{1}{2}$
Class	6-10	10-14	14-18	18-22	22-26	Total																												
x_i	8	12	16	20	24																													
f_i	4	6	k	5	3	$18 + k$																												
fix_i	32	72	$16k$	100	72	$276 + 16k$																												
25. If $\cos \theta = \frac{4}{5}$, find the value of $\frac{\sec \theta - \tan \theta}{\sec \theta + \tan \theta}$.																																		
Solution: $\sec \theta = \frac{5}{4}$ $\tan \theta = \frac{3}{4}$ $\frac{\sec \theta - \tan \theta}{\sec \theta + \tan \theta} = \frac{1}{4}$						$\frac{1}{2}$ $\frac{1}{2}$ 1																												
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) Find the smallest number which when increased by 17 is exactly divisible by both 520 and 468. OR (b) Prove that $\sqrt{5}$ is an irrational number.																																		

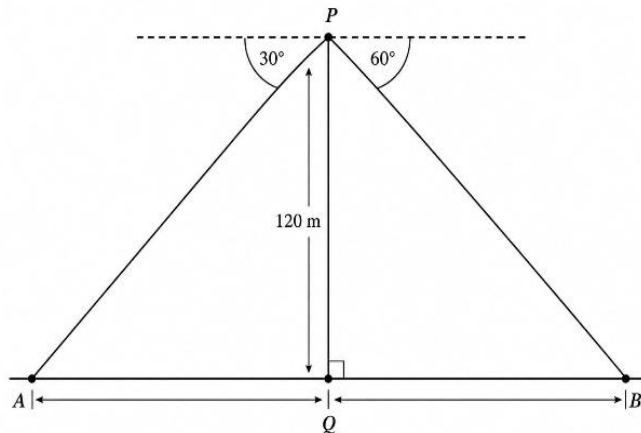
Solution: (a) $520 = 2^3 \times 13 \times 5$, $468 = 2^2 \times 3^2 \times 13$ $\text{LCM}(520, 468) = 2^3 \times 3^2 \times 5 \times 13 = 4680$ Required number = $4680 - 17 = 4663$ OR (b) Let $\sqrt{5}$ be a rational number such that $\sqrt{5} = \frac{p}{q}$ where p and q are co-prime integers and $q \neq 0$. $\sqrt{5}q = p \Rightarrow 5q^2 = p^2$ 5 divides $p^2 \Rightarrow 5$ divides p as well Let $p = 5m$ (for some integer m) $5q^2 = 25m^2 \Rightarrow q^2 = 5m^2$ 5 divides $q^2 \Rightarrow 5$ divides q as well p and q have a common factor 5, which is a contradiction as p and q are co-prime integers. $\therefore$ our assumption is wrong Hence, $\sqrt{5}$ is an irrational number.	1 1 1 $\frac{1}{2}$ 1 1 $\frac{1}{2}$
27. (a) In a certain fraction, if the numerator is multiplied by 4 and the denominator is decreased by 5, the result becomes $\frac{8}{5}$. But if the numerator is increased by 1 and denominator is increased by 2, the result becomes $\frac{1}{3}$. Find the original fraction. OR (b) A 2-digit number is such that its units digit is two less than the tens digit, also the sum of the number and the number formed by reversing the digits is 154. Find the number.	
Solution: (a) Let the fraction is $\frac{x}{y}$ ATQ $\frac{4x}{y-5} = \frac{8}{5}$ $\Rightarrow 20x - 8y + 40 = 0$	1

and $\frac{x+1}{y+2} = \frac{1}{3}$ $\Rightarrow 3x - y + 1 = 0$ $x = 8, y = 25 \therefore$ fraction is $\frac{8}{25}$ OR (b) Let units digit is $x - 2$ and tens digit is x ATQ $(10x + x - 2) + [10(x - 2) + x] = 154$ $22x - 22 = 154$ $22x = 176$ $x = 8$ Unit's place = 6 and ten's place = 8 $\therefore$ Number = 86	1 1 $\frac{1}{2}$ 1 $\frac{1}{2}$ 1
28. A rectangle with side lengths 24 cm and 7 cm is inscribed in a circle. Find the radius of the circle. 	
Solution: Since the diagonal of the rectangle will be diameter. $\therefore (2r)^2 = 24^2 + 7^2$ $4r^2 = 576 + 49 = 625$ $r^2 = \frac{625}{4}$ $r = \frac{25}{2} = 12.5 \text{ cm}$	$\frac{1}{2}$ 1 1 $\frac{1}{2}$
29. If $A(-7, 5)$ and $B(8, -3)$ are two given points, then find (i) the length of line segment AB ; (ii) the coordinates of point P which divides the line segment AB in the ratio 3 : 2.	
Solution: (i) Length of the line segment AB = $\sqrt{(8+7)^2 + (-3-5)^2}$ $= 17$	1

(ii) Coordinates of point P : $x = \frac{3 \times 8 - 2 \times 7}{3 + 2} = \frac{10}{5} = 2$ $y = \frac{3 \times (-3) + 2(5)}{5} = \frac{1}{5}$ Hence, $P(2, \frac{1}{5})$		1 1																						
30. If $\sin (A - B) = \frac{1}{2}$ and $\cos (A + B) = \frac{1}{2}$, $0 < A + B \leq 90^\circ$, $A > B$, then find the value of $\sin A$.																								
Solution: $\sin(A-B) = \frac{1}{2} \Rightarrow A-B = 30^\circ$ $\cos(A+B) = \frac{1}{2} \Rightarrow A+B = 60^\circ$ $\Rightarrow A = 45^\circ, B = 15^\circ$ $\sin A = \sin 45^\circ = \frac{1}{\sqrt{2}}$		1 1 $\frac{1}{2}$ $\frac{1}{2}$																						
31. The number of students absent in a school was recorded everyday for 140 days and the data was presented in the form of the following frequency table.																								
<table><tr><td>Number of absentees</td><td>2-4</td><td>4-6</td><td>6-8</td><td>8-10</td><td>10-12</td><td>12-14</td><td>14-16</td><td>16-18</td><td>18-20</td><td>Total</td></tr><tr><td>Number of days</td><td>1</td><td>5</td><td>11</td><td>14</td><td>16</td><td>13</td><td>14</td><td>60</td><td>6</td><td>140</td></tr></table>			Number of absentees	2-4	4-6	6-8	8-10	10-12	12-14	14-16	16-18	18-20	Total	Number of days	1	5	11	14	16	13	14	60	6	140
Number of absentees	2-4	4-6	6-8	8-10	10-12	12-14	14-16	16-18	18-20	Total														
Number of days	1	5	11	14	16	13	14	60	6	140														
Obtain the median and the mode of the data.																								
Solution:		Correct table: 1 mark 																						

$\text{Mode} = 16 + \frac{60-14}{120-14-6} \times 2$ $= 16.92$	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. (a) The sum of ages of a father and his son is 45 years. Five years ago, the product of their ages (in years) was 124. Determine their ages respectively after five years. OR (b) Express the equation $\frac{1}{x-3} - \frac{1}{x+5} = \frac{1}{6}$; ($x \neq 3, -5$) as a quadratic equation in standard form. Hence, solve the equation so formed.	
Solution: (a) Let Son's present age be x years and Father's present age be $(45-x)$ years ATQ $(x-5)(45-x-5) = 124$ $x^2 - 45x + 324 = 0$ $x = 9, 36 \text{ (rejecting } x = 36)$ Son's age after 5 years = 14 and Father's age after 5 years = 41 OR (b) $\frac{1}{x-3} - \frac{1}{x+5} = \frac{1}{6}$ $x^2 + 2x - 63 = 0$ $(x+9)(x-7) = 0$ $x = -9, 7$	1 1 1 1 1 2 2 1
33. A building is 120 m tall. From the top of the building, the angles of depression of two persons standing on opposite sides of the building are 30° and 60°. Calculate the distance between the two persons.	

Solution:



Let PQ is the building and A and B be the positions of two persons such that $\angle PAQ = 30^\circ$ and $\angle PBQ = 60^\circ$

$$\text{In } \triangle PAQ \quad \frac{AQ}{PQ} = \cot 30^\circ$$

$$AQ = 120\sqrt{3}$$

$$\text{In } \triangle PBQ \quad \frac{QB}{PQ} = \cot 60^\circ$$

$$QB = \frac{120}{\sqrt{3}} = 40\sqrt{3}$$

$$\begin{aligned} \text{Distance between A and B} &= 120\sqrt{3} + 40\sqrt{3} \\ &= 160\sqrt{3} \text{ m} \end{aligned}$$

Correct
figure: 1
mark

1

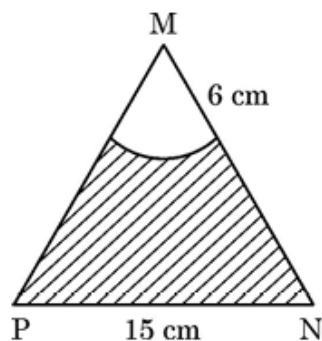
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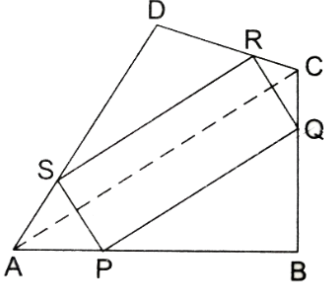
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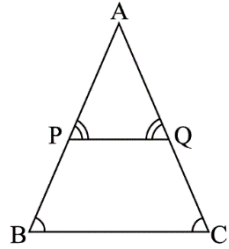
34. Find the area of the shaded region in the given figure, where a circular arc of radius 6 cm has been drawn with vertex M of an equilateral triangle PMN of side 15 cm as centre. [Use $\sqrt{3} = 1.732$]



Solution: Area of equilateral triangle = $\frac{\sqrt{3}}{4} \times 15 \times 15$ $= \frac{225\sqrt{3}}{4} \text{ cm}^2 \text{ or } 97.425 \text{ cm}^2$ Area of sector = $\frac{1}{6} \times \frac{22}{7} \times 6 \times 6$ $= \frac{132}{7} \text{ cm}^2 \text{ or } 18.857 \text{ cm}^2$ Area of the shaded Region = $97.425 - 18.857 = 78.568 \text{ cm}^2$	1 1 1 1 1
35. (a) ABCD is a quadrilateral and P, Q, R and S are the points of trisection of sides AB, BC, CD and DA respectively such that these are adjacent to A and C. Prove that PQRS is a parallelogram. OR (b) In an isosceles $\triangle ABC$ with $AB = AC$, points P and Q are on the sides AB and AC respectively such that $AP = AQ$. Show that the points B, C, Q, P are concyclic.	
Solution: (a)  Construction: Join AC. Proof: In $\triangle ABC$, we have $\frac{AP}{PB} = \frac{CQ}{QB} = \frac{1}{2}$ $\therefore$ By converse of BPT $PQ \parallel AC$(1) Similarly, In $\triangle ADC$, we have $\frac{AS}{SD} = \frac{CR}{RD} = \frac{1}{2}$ $\therefore SR \parallel AC$(2) Thus, $SR \parallel PQ$ [from 1 and 2] Similarly, $SP \parallel RQ$ Hence, PQRS is a parallelogram.	Correct figure: 1 mark 1 $\frac{1}{2}$ 1 $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$

OR

(b)



Since, $AB = AC$ and $AP = AQ$

$\Rightarrow \angle B = \angle C = \alpha$

Similarly, $\angle P = \angle Q = \beta$

Also, $\frac{AP}{AB} = \frac{AQ}{AC} \Rightarrow PQ \parallel BC$ (by converse of BPT)

$\angle APQ = \angle ABC$

$\therefore \alpha = \beta$

$\angle QPB = 180 - \alpha$

$\therefore \angle QPB + \angle C = 180^\circ$

$\therefore B, C, Q$ and P is a concyclic.

Correct
Fig:
1

$\frac{1}{2}$

$\frac{1}{2}$

1

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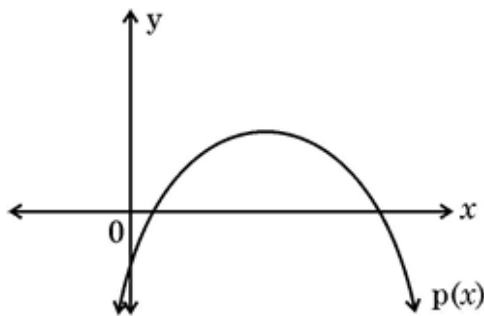
Section – E

(Case-study based Questions)

$3 \times 4 = 12$

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

36. A parabolic fountain in a park is designed such that its shape follows the polynomial $p(x) = -x^2 + 6x - 5$, where $p(x)$ is the height (in metres) above ground level at a horizontal distance x metre from the origin.



Based on the above, answer the following questions :

- (i) What are the zeroes of $p(x)$? (1)
- (ii) What is the height of the fountain at a horizontal distance of 2 metres from origin ? (1)
- (iii) (a) If $q(x)$ is a reflection of $p(x)$, that is $q(x) = -p(x)$, write its value as polynomial and draw its figure. (2)

OR

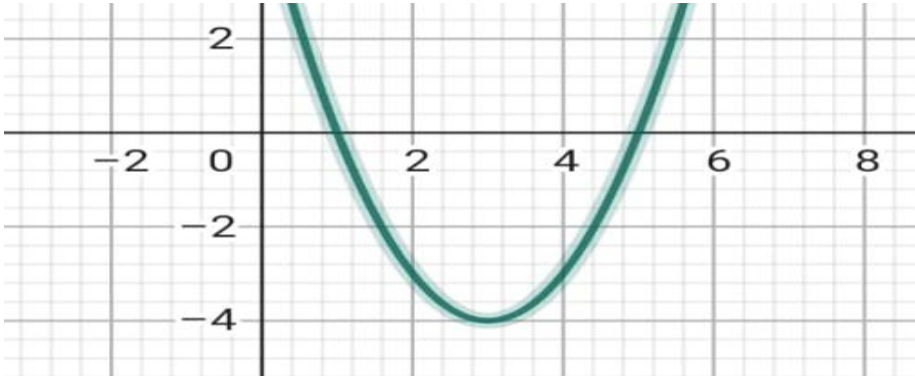
- (b) At what horizontal distance from the origin does water hit the ground ? (2)

Solution: (i) $p(x) = -x^2 + 6x - 5$
 $= (x - 5)(x - 1)$
 Zeroes of $p(x)$ are 5 & 1

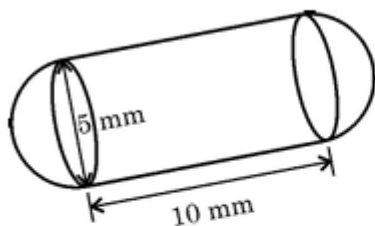
(ii) $p(2) = -(2)^2 + 6(2) - 5$
 $= 12 - 9 = 3\text{m}$

1

1

(iii)	(a)		1
		Reflection of $p(x)$ is $q(x) = -p(x)$ $= x^2 - 6x + 5$ OR	1
		(b) Water hits the ground when $p(x) = 0$ at 1 metre or 5 metre away from origin water hits the ground.	2

37. A hospital stores medicine capsules shaped like cylinders with hemispherical ends. Each capsule has length of the cylindrical part of 10 mm and a diameter of 5 mm.



Based on the above, answer the following questions :

- (i) Find the total surface area of one capsule. (1)
- (ii) What is the capacity of the capsule ? (1)
- (iii) (a) If the capsule is filled with medicine, which costs ₹ 0.05/mm³, calculate the cost of medicine per capsule. (2)

OR

- (b) How much extra medicine (in volume) can be stored in the capsule, if the capsule length is doubled ? (2)

Solution: (i)	$\begin{aligned} \text{Surface Area} &= 2\pi rh + 4\pi r^2 = 2\pi r(h + 2r) \\ &= 2 \times \frac{22}{7} \times \frac{5}{2} (10 + 5) \\ &= \frac{110}{7} \times 15 = \frac{1650}{7} \text{ mm}^2 \text{ or } 235.71 \text{ mm}^2 \end{aligned}$	$\frac{1}{2}$
(ii)	$\text{Capacity} = \pi r^2 \left(h + \frac{4}{3}r \right)$	$\frac{1}{2}$
		$\frac{1}{2}$

	$= \frac{22}{7} \times \frac{5}{2} \times \frac{5}{2} \left(10 + \frac{4}{3} \times \frac{5}{2} \right)$ $= \frac{11000}{42} \text{ mm}^3 \text{ or } 261.9 \text{ mm}^3$	$\frac{1}{2}$ 1 1
(iii) (a)	Cost of medicine = 0.05×261.9 = ₹ 13.10 OR	
(b)	Extra medicine = $\left(\pi r^2 (2h) + \frac{4}{3} \pi r^3 \right) - \frac{11000}{42}$ $= \left(\frac{275}{14} \times \frac{70}{3} + \frac{2750}{6} \right) - \frac{11000}{42}$ $= \frac{8250}{42} \text{ mm}^3 \text{ or } 196.43 \text{ mm}^3.$	$1\frac{1}{2}$ $\frac{1}{2}$
38. A school conducted a lucky draw during its annual function. The draw box contained 100 chits, each with a unique number from 1 to 100. The distribution of the chits is as follows : – 30 chits had red markings. – 20 chits were having numbers which are multiples of 5. – 15 chits had both red markings and numbers which are multiples of 5. – The rest were plain having no marking and no number. One chit is drawn at random from the box. Based on the above, answer the following questions : (i) What are the total number of outcomes ? (1) (ii) What is the probability that the chit drawn has a red marking only ? (1) (iii) (a) What is the probability that the chit has a multiple of 5 but no red marking ? (2) OR (b) What is the probability that the chit drawn is neither of red marking nor a multiple of 5 ? (2)		
Solution: (i) Total number of outcomes = 100 (ii) Chits having Red marking only = $30 - 15 = 15$ $P(\text{Red marking only}) = \frac{15}{100} = \frac{3}{20}$ (iii) (a) Chits which are multiple of 5 only = $20 - 15 = 5$ $P(\text{Multiple of 5 but no red marking}) = \frac{5}{100} = \frac{1}{20}$ OR (b) Chits drawn is neither of red marking nor multiple of 5 = $100 - 35 = 65$ $P(\text{neither of red marking nor a multiple of 5}) = \frac{65}{100} = \frac{13}{20}$		1 $\frac{1}{2}$ $\frac{1}{2}$ 1 1 1 1