

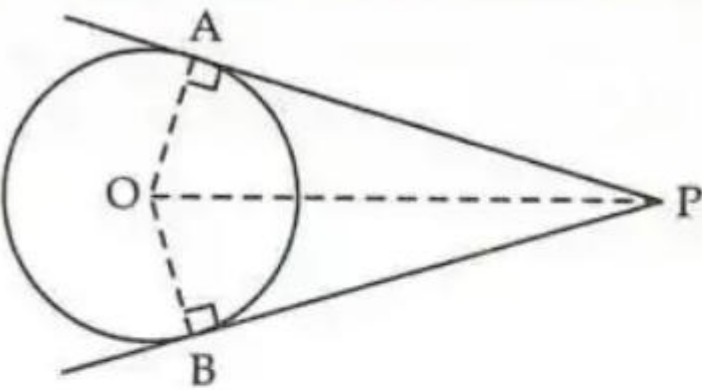
MATHEMATICS (BASIC)–Code No. 241

MARKING SCHEME

CLASS-X-(2025-26)

SET: 3

Section A		
1.	c)7	1
2.	c)30-40	1
3.	c) $\sqrt{2} a$	1
4.	b) $\frac{1}{5}$	1
5.	d)9	1
6.	a) 7	1
7.	c)40 m	1
8.	a) 5cm	1
9.	d)4: 7	1
10.	c) $4x - 6y = 3$	1
11.	d)3 cm	1
12.	c) 65°	1
13.	b)7 cm	1
14.	a) $\frac{3}{8}$	1
15.	d) $\frac{5}{3}$	1
16.	c) $3\text{Median} = \text{Mode} + 2 \text{Mean}$	1
17.	c) $x^2+6x + 5$	1

18.	b) 5	1
19.	Ans : a	1
20.	Ans: b	1
Section B		
21.	<p>Given: PA and PB are tangents drawn to circle with centre O from external point</p>  <p>To Prove: PA = PB</p> <p>Construction: Join OA, OB and OP.</p> <p>Proof: $\angle OAP = \angle OBP = 90^\circ$.</p> <p>(Radius \perp Tangent)</p> <p>In $\triangle OAP$ and $\triangle OBP$,</p> <p>OA = OB (Radii of same circle)</p> <p>OP = OP (Common side)</p> <p>$\angle OAP = \angle OBP$ (Each 90°)</p> <p>$\therefore \triangle OAP \cong \triangle OBP$ (RHS congruency)</p> <p>$\therefore PA = PB$ (c.p.c.t.c.)</p> <p>Thus, length of tangents drawn from an external point are equal.</p>	<p style="text-align: center;">1/2</p> <p style="text-align: right;">1 1/2</p>
22.	$\alpha \cdot \beta = \frac{c}{a}$ $\alpha \cdot \frac{1}{\alpha} = \frac{3k}{5k-2}$ $5k-2 = 3k$ $k = 1$	<p style="text-align: right;">1/2 1/2 1</p>

	OR								
	$\alpha \cdot \beta = \frac{c}{a} \text{ and } \alpha + \beta = \frac{-b}{a}$ $\alpha \cdot \beta = \frac{6}{2} = 3 \text{ and } \alpha + \beta = \frac{3}{2}$ $2\alpha + 2\beta + \alpha\beta = 2 \times \frac{3}{2} + 3 = 6$	1/2 1/2 1							
23.	<p>A + B = 60 A - B = 30 A = 45 B = 15</p> <p style="text-align: center;">OR</p> <p>Hypotenuse = 5 tanθ = 3/4 sinθ = 3/5 cosθ = 4/5</p> $\frac{\sin\theta - \cos\theta}{\sin\theta + \cos\theta} = \frac{3/5 - 4/5}{3/5 + 4/5} = \frac{-1}{7}$	1/2 1/2 1/2 1/2 1/2 1/2 1							
24.	$x + \frac{1}{x} = \frac{10}{3}$ $3(x^2 + 1) = 10x$ $3x^2 - 10x + 3 = 0$ $x = 3 \text{ or } \frac{1}{3}$	1/2 1/2 1/2 1/2							
25.	HCF. LCM = a.b 40 x 120 = a x 80 a = 60	1/2 1/2 1							
Section C									
26.	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="padding: 5px;">Cf</td> <td style="padding: 5px;">7</td> <td style="padding: 5px;">13</td> <td style="padding: 5px;">22</td> <td style="padding: 5px;">32</td> <td style="padding: 5px;">40</td> <td style="padding: 5px;"></td> </tr> </table> $\text{Median} = l + \left(\frac{\frac{n}{2} - cf}{f} \right) h$ L = 40, h = 20, n = 40, f = 9, cf = 13	Cf	7	13	22	32	40		1/2 1/2 1
Cf	7	13	22	32	40				

	Median = $40 + \left(\frac{20-13}{9}\right) 20 = 40 + 15.5 = 55.5$	1
27.	<p>AP = AS BP = BQ CR = CQ DR = DS Add all four equations AB + CD = AD + BC</p>	2 1
28.	<p>Initial assumption: Assume that $9 - 7\sqrt{2}$ is a rational number.</p> <p>Definition of a rational number: If $9 - 7\sqrt{2}$ is rational, it can be written as a fraction $\frac{p}{q}$, where p and q are integers, and $q \neq 0$.</p> $9 - 7\sqrt{2} = \frac{p}{q}$ <p>Subtract 9 from both sides:</p> $-7\sqrt{2} = \frac{p}{q} - 9$ <p>Combine the rational numbers on the right side:</p> $-7\sqrt{2} = \frac{p}{q} - \frac{9q}{q} = \frac{p - 9q}{q}$ <p>Divide both sides by -7:</p> $\sqrt{2} = \frac{p - 9q}{-7q}$ <p>analyze the result:</p> <p>The numerator, $p - 9q$, is an integer because p and q are integers, and integers are closed under multiplication and subtraction.</p> <p>The denominator, $-7q$, is a non-zero integer because q is a non-zero integer.</p> <p>This means that the expression $\frac{p - 9q}{-7q}$ is a rational number.</p> <p>—</p> <p>which is not possible as $\sqrt{2}$ is given irrational.</p>	1/2 1/2 1

29. Let the fraction be $\frac{x}{y}$.

From the first condition, "if the numerator is multiplied by 2 and the denominator increased by 2 we get $\frac{5}{4}$ ", we can write the equation:

$$\frac{2x}{y+2} = \frac{5}{4}$$

Cross-multiplying gives us:

$$4(2x) = 5(y+2)$$

$$8x = 5y + 10$$

Equation (1): $8x - 5y = 10$

From the second condition, "if the numerator is increased by 1 and the denominator doubled we get $\frac{1}{2}$ ", we can write the equation:

$$\frac{x+1}{2y} = \frac{1}{2}$$

Cross-multiplying gives us:

$$2(x+1) = 1(2y)$$

$$2x + 2 = 2y$$

Dividing by 2, we get:

Equation (2): $x + 1 = y$

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1/2

1/2

1/2

	$8x - 5(x + 1) = 10$ $8x - 5x - 5 = 10$ $3x - 5 = 10$ $3x = 10 + 5$ $3x = 15$ $x = 5$ <p>Now, substitute the value of x back into Equation (2) to find y:</p> $y = x + 1$ $y = 5 + 1$ $y = 6$ <p>Fraction = 5/6</p>	<p>1/2</p> <p>1/2</p>
30.	<p>Let the arithmetic progression have a first term a and a common difference d. The formula for the n^{th} term is $a_n = a + (n - 1)d$.</p> <p>Given the 18th term is 63:</p> $a_{18} = a + (18 - 1)d$ <p>Equation (1): $63 = a + 17d$</p> <p>Given the 11th term is 42:</p> $a_{11} = a + (11 - 1)d$ <p>Equation (2): $42 = a + 10d$</p> $(63) - (42) = (a + 17d) - (a + 10d)$ $21 = 7d$ $d = \frac{21}{7}$ $d = 3$ <p>$a = 12$</p>	<p>1/2</p> <p>1/2</p> <p>1/2</p> <p>1</p>

$$\frac{6}{4} + \frac{2}{4} + \frac{12}{4}$$

$$\frac{27}{4} = 27/20$$

$$20/4$$

OR

$$\left(\frac{1}{\cos \theta} - \frac{\sin \theta}{\cos \theta} \right)^2$$

$$= \left(\frac{1 - \sin \theta}{\cos \theta} \right)^2$$

$$= \frac{(1 - \sin \theta)^2}{\cos^2 \theta}$$

$$= \frac{(1 - \sin \theta)^2}{1 - \sin^2 \theta}$$

$$= \frac{(1 - \sin \theta)(1 - \sin \theta)}{(1 - \sin \theta)(1 + \sin \theta)}$$

$$= \frac{1 - \sin \theta}{1 + \sin \theta}$$

1

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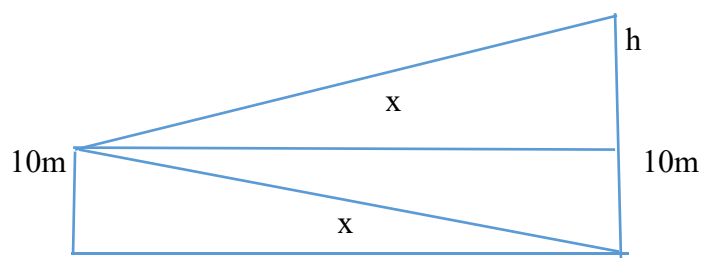
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Section D

32.



$$\tan 60 = h/x$$

$$\sqrt{3} = h/x$$

1

1

	$h = \sqrt{3}x \quad (1)$ $\tan 30 = 10/x$ $1/\sqrt{3} = 10/x$ $x = 10\sqrt{3} \text{ m}$ $h = \sqrt{3} \cdot 10\sqrt{3} = 30 \text{ m}$ <p>Height of hill = 40 m</p>	<p>1</p> <p>1</p> <p>1</p>
33.	<p>Radius, $r = 7 \text{ cm}$ Height of cylinder = $24 - 14 = 10 \text{ cm}$ Volume of a cylinder: $V_{cylinder} = \pi r^2 h$</p> <p>Volume of a hemisphere: $V_{hemisphere} = \frac{2}{3} \pi r^3$</p> $V_{total} = V_{cylinder} + 2 \times V_{hemisphere}$ $V_{total} = \pi r^2 h + 2 \left(\frac{2}{3} \pi r^3 \right) = \pi r^2 h + \frac{4}{3} \pi r^3$ <p>Substitute the values ($r = 7, h = 10, \pi = \frac{22}{7}$):</p> $V_{total} = \left(\frac{22}{7} \right) (7)^2 (10) + \frac{4}{3} \left(\frac{22}{7} \right) (7)^3$ $V_{total} = \left(\frac{22}{7} \right) (49)(10) + \frac{4}{3} \left(\frac{22}{7} \right) (343)$ $V_{total} = (22 \times 7)(10) + \frac{4}{3} (22 \times 49)$ $V_{total} = 1540 + \frac{4312}{3}$ <hr/> <p>Volume = 2977.33 cc</p>	<p>1/2</p> <p>1/2</p> <p>1</p> <p>1/2</p>

Lateral surface area of a cylinder: $A_{cylinder} = 2\pi rh$

Surface area of a hemisphere: $A_{hemisphere} = 2\pi r^2$

$$A_{total} = A_{cylinder} + 2 \times A_{hemisphere}$$

$$A_{total} = 2\pi rh + 2(2\pi r^2) = 2\pi rh + 4\pi r^2$$

Substitute the values ($r = 7, h = 10, \pi = \frac{22}{7}$):

$$A_{total} = 2 \left(\frac{22}{7} \right) (7)(10) + 4 \left(\frac{22}{7} \right) (7)^2$$

$$A_{total} = 2(22)(10) + 4 \left(\frac{22}{7} \right) (49)$$

$$A_{total} = 440 + 4(22 \times 7)$$

$$A_{total} = 440 + 4(154)$$

$$A_{total} = 440 + 616$$

$$A_{total} = 1056 \text{ cm}^2$$

OR

The cylindrical vessel has a radius (R) of 14 cm and a height (H) of 20 cm.

The formula for the volume of a cylinder is $V_{cylinder} = \pi R^2 H$.

$$V_{cylinder} = \pi(14)^2(20)$$

$$V_{cylinder} = \pi(196)(20)$$

$$V_{cylinder} = 3920\pi \text{ cm}^3$$

The initial volume of water is $3920\pi \text{ cm}^3$.

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1

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1

The iron solid is composed of a cone and a hemisphere with a common radius (r)
 The height of the cone is (h) 10 cm.
 The formulas for the volumes are:

- Volume of a cone: $V_{cone} = \frac{1}{3} \pi r^2 h$

- Volume of a hemisphere: $V_{hemisphere} = \frac{2}{3} \pi r^3$

$$V_{solid} = V_{cone} + V_{hemisphere}$$

$$V_{solid} = \frac{1}{3} \pi (7)^2 (10) + \frac{2}{3} \pi (7)^3$$

$$V_{solid} = \frac{1}{3} \pi (490) + \frac{2}{3} \pi (343)$$

$$V_{solid} = \frac{490\pi}{3} + \frac{686\pi}{3}$$

$$V_{solid} = \frac{1176\pi}{3} = 392\pi \text{ cm}^3$$

$$V_{remaining} = V_{cylinder} - V_{solid}$$

$$V_{remaining} = 3920\pi - 392\pi$$

$$V_{remaining} = 3528\pi \text{ cm}^3$$

$$V_{remaining} = 3528 \times \frac{22}{7} = 504 \times 22 = 11088 \text{ cm}^3$$

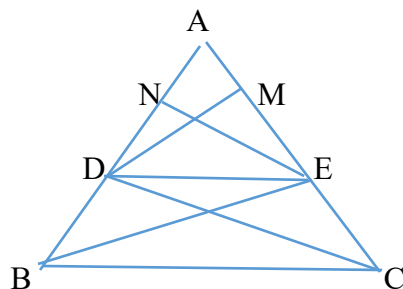
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34.



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1. Consider the ratio of the area of $\triangle ADE$ to the area of $\triangle BDE$, both with height EN :

$$\frac{\text{Area}(\triangle ADE)}{\text{Area}(\triangle BDE)} = \frac{\frac{1}{2} \times AD \times EN}{\frac{1}{2} \times DB \times EN} = \frac{AD}{DB} \quad (\text{Equation 1})$$

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2. Similarly, consider the ratio of the area of $\triangle ADE$ to the area of $\triangle CDE$, both with height DM :

$$\frac{\text{Area}(\triangle ADE)}{\text{Area}(\triangle CDE)} = \frac{\frac{1}{2} \times AE \times DM}{\frac{1}{2} \times EC \times DM} = \frac{AE}{EC} \quad (\text{Equation 2})$$

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Relate the areas of $\triangle BDE$ and $\triangle CDE$.

Triangles $\triangle BDE$ and $\triangle CDE$ share the same base, DE . They also lie between the same pair of parallel lines, DE and BC . According to a fundamental geometric property, triangles with the same base and between the same parallels have equal areas.

$$\text{Area}(\triangle BDE) = \text{Area}(\triangle CDE) \quad (\text{Equation 3})$$

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3. Equate the area ratios.

From Equation (3), we know that the denominators of Equation (1) and Equation (2) are equal. Since the numerators ($\text{Area}(\triangle ADE)$) are also identical, the two ratios must be equal to each other.


$$\frac{\text{Area}(\triangle ADE)}{\text{Area}(\triangle BDE)} = \frac{\text{Area}(\triangle ADE)}{\text{Area}(\triangle CDE)}$$

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4. Final conclusion.

By substituting the results from Equation (1) and Equation (2), we can conclude that the ratios of the corresponding sides are equal:

$$\frac{AD}{DB} = \frac{AE}{EC}$$

This proves that the line DE drawn parallel to side BC divides the other two sides of the triangle (AB and AC) in the same ratio. 

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$$AQ \parallel BC \text{ gives } CR/AR = BR/QR$$

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$$PQ \parallel AB \text{ gives } AR/PR = RB/QR$$

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$$\text{RHS is common which gives } CR/AR = AR/PR$$

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$$\text{Therefore } AR^2 = PR \cdot CR$$

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35.	<p>Let the uniform speed be x Distance = 360 km Time = distance / speed</p> <p>Therefore, $\frac{360}{x} - \frac{360}{x+5} = 1$ $360(x+5) - 360x = x^2 + 5x$ $x^2 + 5x - 1800 = 0$ $(x - 40)(x + 45) = 0$ $x = 40$ So uniform speed = 40 km/h</p> <p style="text-align: center;">OR</p> $\frac{(5x+1)+3(x+1)}{(x+1)(5x+1)} = \frac{5}{x+4}$ $(8x+4)(x+4) = 5(5x^2+6x+1)$ $8x^2+32x+4x+16 = 25x^2 + 30x + 5$ $17x^2-6x-11 = 0$ $(x-1)(x+11/17) = 0$ <p>$x = 1$ and $-11/17$</p>	1 1 1 1 1 1 1 1 1 1 1 1 1
Section E		
36.	<p>Case Study 1:</p> <p>(i) Q(2,3) and R(9,3)</p> <p>(ii) Mid point = (5.5, 3)</p> $PA^2 = PB^2$ $(x - 2)^2 + (0 - 3)^2 = (x - 9)^2 + (0 - 3)^2$ $(x - 2)^2 + 9 = (x - 9)^2 + 9$ $(x - 2)^2 = (x - 9)^2$ $x^2 - 4x + 4 = x^2 - 18x + 81$	1 1 1

	$18x - 4x = 81 - 4$ $14x = 77$ $x = \frac{77}{14}$ $x = \frac{11}{2} = 5.5$ <p style="text-align: center;">OR</p> <p>Base = $9 - 2 = 7$ units Height = $9 - 3 = 6$ units</p> <p>Area of triangle = $\frac{1}{2}$ base x height</p> $= \frac{1}{2} \times 7 \times 6$ $= 21 \text{ sq. units}$	<p style="text-align: center;">1</p> <p style="text-align: center;">1</p> <p style="text-align: center;">1</p>
37.	<p>Case Study 2:</p> <p>(i) Area of semi circle = $\frac{\pi r^2}{2} = 22 \times 7 \times \frac{7}{28} = \frac{77}{2}$ sq. units</p> <p>(ii) Area = $\frac{\pi r^2}{2} = 22 \times 2 \times \frac{2}{14} = \frac{44}{7}$ square units</p> <p>(iii) Perimeter = $14 + 14 + 7 + \pi r$ = $35 + 22 \times \frac{7}{14} = 46$ units</p> <p style="text-align: center;">OR</p> <p>Total area = $l \times b + \frac{\pi r^2}{2}$ = $14 \times 7 + 22 \times 7 \times \frac{7}{2} \times \frac{1}{8}$ = $98 + \frac{77}{4}$ = 117.2 square units</p>	<p style="text-align: center;">1</p> <p style="text-align: center;">1</p> <p style="text-align: center;">2</p> <p style="text-align: center;">2</p>
38.	<p>Case Study 3:</p> <p>(i) Probability = $\frac{18}{36} = \frac{1}{2}$</p> <p>(ii) Probability = $\frac{4}{36} = \frac{1}{9}$</p> <p>(iii) Probability = $\frac{10}{36} = \frac{5}{18}$</p> <p style="text-align: center;">OR</p> <p>Probability = $\frac{18}{36} = \frac{1}{2}$</p>	<p style="text-align: center;">1</p> <p style="text-align: center;">1</p> <p style="text-align: center;">2</p> <p style="text-align: center;">2</p>