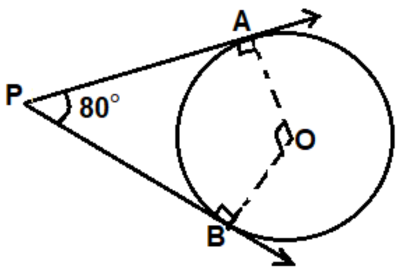
MATHEMATICS BASIC (241)
MARKING SCHEME
CLASS - X (2026 - 27)

SECTION: A

[Solution of MCQs of 1 Mark each, no part marks]

Q. No.	ANS	HINTS/SOLUTION	Marks
1.	**D**	HCF × LCM = Product of two numbers 40 × 252 × k = 2520 × 6600 **(D) 1650**	**1**
2.	**C**	$\alpha + \beta = 2; \alpha\beta = -\frac{5}{2}$ $(\alpha-\beta)^2 = (\alpha+\beta)^2 - 4\alpha\beta = 2^2 - 4\left(-\frac{5}{2}\right) = 14$ **(C) 14**	**1**
3.	**C**	For unique solution $\frac{a_1}{a_2} \neq \frac{b_1}{b_2} \Rightarrow \frac{4}{2} \neq \frac{p}{2} \Rightarrow p \neq 4$ **(C) $p \neq 4$**	**1**
4.	**C**	Let numerator be x and denominator be y Given, x + y = 11 $\frac{\mathbf{x}}{(\mathbf{y+1})} = \frac{\mathbf{1}}{2}$ Solving these equations, we get x = 4, y = 7; ∴ Fraction = $\frac{\mathbf{4}}{7}$ **(C) $\frac{4}{7}$**	**1**
5.	**D**	Let the roots be α and $\frac{1}{\alpha}$ Product of roots $\alpha \times \frac{1}{\alpha} = \frac{c}{a} \Rightarrow 1 = \frac{c}{a} \Rightarrow a = c$ **(D) $a = c$**	**1**
6.	**C**	$a_{10} = a + (10-1)d = p + 9q$ **(C) $p + 9q$**	**1**
7.	**B**	$210 = 21 + (n-1)21 \Rightarrow n = 10$ **(B) 10^{th}**	**1**

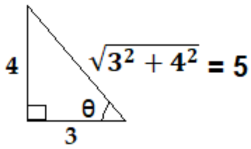
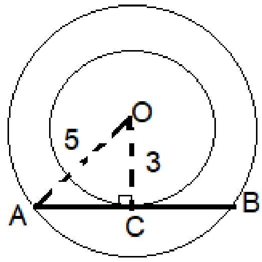
<table>
<tr><td>8.</td><td>D</td><td>Using Section formula, $\frac{3y+5}{3+1} = 2 \Rightarrow \frac{3y+5}{4} = 2 \Rightarrow y = 1$
(D) 1</td><td>1</td></tr>
<tr><td>9.</td><td>C</td><td>INDEPENDENCE;
Total number of letters = 12
Number of times ‘I’ occurs = 1; Number of times ‘E’ occurs = 4
P(most occurring vowel ‘E’) = $\frac{4}{12} = \frac{1}{3}$
(C) $\frac{1}{3}$</td><td>1</td></tr>
<tr><td>10.</td><td>B</td><td>$\frac{N}{2} = \frac{66}{2}$ = 33, which lies in the interval 10-15
<table>
<tr><th></th><th>Class</th><th>Frequency</th><th>Cumulative frequency</th></tr>
<tr><td></td><td>0 – 5</td><td>10</td><td>10</td></tr>
<tr><td></td><td>5 – 10</td><td>15</td><td>25</td></tr>
<tr><td>Median class →</td><td>10 – 15</td><td>12</td><td>37</td></tr>
<tr><td></td><td>15 – 20</td><td>20</td><td>57</td></tr>
<tr><td></td><td>20 – 25</td><td>9</td><td>66</td></tr>
</table>
⇒ Median Class is 10-15
Lower limit of median class =10
(B) 10</td><td>1</td></tr>
<tr><td>11.</td><td>C</td><td>(Distance of point from the centre)^2 = (Length of tangent)^2+(radius)^2
$(10)^2 = (8)^2 + (\text{radius})^2 \Rightarrow r = \sqrt{100 - 64} \Rightarrow r = 6$
(C) 6 cm</td><td>1</td></tr>
<tr><td>12.</td><td>B</td><td>Mode = 3Median – 2Mean ⇒ Mode= 3×30 - 2×32 ⇒ Mode = 26
(B) 26</td><td>1</td></tr>
<tr><td>13.</td><td>B</td><td>(Hypotenuse)^2 =(Base)^2 + (Perpendicular)^2 ⇒ $(15)^2$ = (Base)^2 +$(12)^2$
⇒ Base = 9 m
(B) 9m</td><td>1</td></tr>
<tr><td>14.</td><td>A</td><td>$\sin^2 60° - 2\tan^2 45° - \cos^2 30° = \left(\frac{\sqrt{3}}{2}\right)^2 - 2(1)^2 - \left(\frac{\sqrt{3}}{2}\right)^2 = -2$
(A) −2</td><td>1</td></tr>
<tr><td>15.</td><td>A</td><td>$\frac{\text{Perimeter of First Triangle}}{\text{Perimeter of second Triangle}} = \frac{\text{Side of first Triangle}}{\text{Side of second Triangle}}$
$\Rightarrow \frac{28}{35} = \frac{8}{\text{Side of second Triangle}} \Rightarrow \text{side of second triangle} = 10\text{cm}$
(A) 10cm</td><td>1</td></tr>
</table>

16.	**B**	In ΔABC and ΔPQR , $\angle B = \angle Q$; $\angle R = \angle C$; $\frac{AB}{PQ} = \frac{2}{1}$ $\therefore$ $\Delta ABC \sim \Delta PQR$ Hence , the triangles are similar but not congruent because $AB \neq PQ$ **(B) Similar but not congruent**	**1**
17.	**D**	$\angle APB = 80°$ Join OA and OB $\angle OAP = \angle OBP = 90°$ (Radius through the point of contact is perpendicular to tangent) In Quadrilateral AOBP, $\angle APB + \angle OAP + \angle AOB + \angle OBP = 360°$ $\Rightarrow 80° + 90° + \angle AOB + 90° = 360°$ $\Rightarrow \angle AOB = 100°$  **(D) 100°**	**1**
18.	**B**	Volume of cube, $a^3 = 64 \Rightarrow a = 4$ cm On joining two cubes of side = 4 cm, we get a cuboid whose Length (l) = 8 cm, Breadth (b) = 4 cm, Height (h) = 4 cm Surface area of resulting cuboid = $2(lb + bh + h\,l)$ $= 2(8 \times 4 + 4 \times 4 + 4 \times 8)$ $= 160$ cm^2 **(B) 160cm^2**	**1**
19.	**A**	P(getting 8 on rolling a die) = $\frac{0}{8}$ This is an impossible event as the numbers on the faces of a die are 1,2,3,4,5 and 6 **(A)Both Assertion (A)and Reason (R)are true and Reason (R)is the correct explanation of Assertion (A)**	**1**
20.	**B**	**(B)Both Assertion (A)and Reason (R)are true and Reason (R)is not the correct explanation of Assertion (A)**	**1**

Section –B

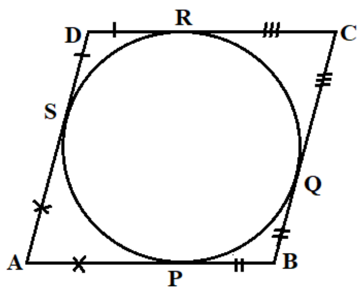
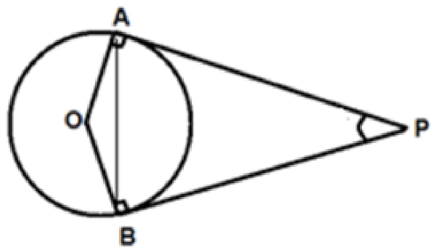
[This section comprises of solution of very short answer type questions (VSA) of 2 marks each]

21(A).	$520 = 2^3 \times 5 \times 13$; $468 = 2^2 \times 3^2 \times 13$ LCM = $2^3 \times 3^2 \times 5 \times 13 = 4680$ $\therefore$ The required number is (4680 – 17). i.e., **4663**	**1** **½** **½**

	OR	
21(B).	$(25)^n = (5^2)^n = 5^{2n}$ So, prime factorization of $(25)^n$ contains only 5 and this factorization is unique. Now, for $(25)^n$ to end with digit 0, there must be pair of 2 and 5 in its prime factorization. But 2 is not a factor of $(25)^n$. Hence, $(25)^n$ can never end with digit zero for any natural number.	½ ½ ½ ½
22.	$\frac{\sin\theta}{\cos\theta} = \frac{4}{3} \Rightarrow \tan\theta = \frac{4}{3}$  $\therefore \sin\theta + \cos^2\theta - 1 = \frac{4}{5} + \frac{9}{25} - 1 = \frac{4}{25}$	½+½ 1
23.	Since, 3 is a zero of $p(x) = 2x^2 - 3x + p \Rightarrow$ p(3) = 0 $\Rightarrow 2(3)^2 - 3(3) + p = 0$ $\Rightarrow \quad p = -9$ Let another zero be β, $3 + \beta = \frac{-(-3)}{2}$ (sum of zeroes) $\Rightarrow \quad \beta = -\frac{3}{2}$	½ ½ ½ ½
24.	BQ = QA = 5 cm CP = PA = 9 cm (Lengths of tangents from an external point to a circle are equal) PQ = AP – AQ = 9cm – 5cm = 4cm	½+½ 1
	For visually Impaired students only Join OC, OA ∠ACO = 90° (Radius through the point of contact is perpendicular to tangent) In rt ΔACO, AC = $\sqrt{\mathbf{OA^2 - OC^2}}$ = 4cm ∴ AB = 2(AC) (perpendicular from centre bisects the chord) = 2×4 cm = 8 cm 	½ ½ ½ ½
25(A).	Since, diagonals of parallelogram bisect each other ∴ Midpoint of AC = midpoint of BD $\Rightarrow \left(\frac{3+a}{2}, \frac{1+b}{2}\right) = \left(\frac{5+4}{2}, \frac{1+3}{2}\right)$ $\Rightarrow \frac{3+a}{2} = \frac{9}{2}$ and $\frac{1+b}{2} = \frac{4}{2}$ $\Rightarrow a = 6;\ b = 3$	½ 1 ½
	OR	
25(B).	PA = PB $\Rightarrow \sqrt{(x-1)^2 + (y-4)^2} = \sqrt{(x+1)^2 + (y-2)^2}$ $\Rightarrow x^2 - 2x + 1 + y^2 - 8y + 16 = x^2 + 2x + 1 + y^2 - 4y + 4$ $\Rightarrow 4x + 4y = 12$ $\Rightarrow x + y = 3$	½ 1 ½

Section –C

[This section comprises of solution short answer type questions (SA) of 3 marks each]

26.	Let 2 +3$\sqrt{5}$ be a rational. Then 2+3$\sqrt{5}$ = $\frac{p}{q}$, where p and q are integers and q ≠0 $\sqrt{5} = \frac{p-2q}{3q}$ Since p,q are integers, so $\frac{p-2q}{3q}$ will be rational number. But $\sqrt{5}$ is irrational Since, rational is not equal to irrational This is a contradiction Hence, our assumption is incorrect. Therefore, 2 +3$\sqrt{5}$ is irrational.	½ 1 ½ ½ ½
27(A).	AB+BC+CA= AB+BQ+CQ+AC = AB+BP+CR+AC (BQ = BP and CQ = CR, lengths of tangents from an external point to a circle are equal) = AP + AR = 2AP (AP = AR) Hence, AP = $\frac{1}{2}$ (AB + BC + CA)	1 ½ 1 ½
	For visually Impaired students only Parallelogram ABCD circumscribes a circle as shown in figure.  Lengths of tangents drawn to a circle from an external point are equal. So, $AP = AS, PB = BQ,$ $CR = CQ, DR = DS$ On adding the above equations, $(AP + PB) + (CR + RD) = (AS + DS) + (CQ + QB)$ $\Rightarrow AB + CD = AD + BC$ $\Rightarrow 2AB = 2BC$ (Opposite sides of parallelogram are equal) Thus, $AB = BC$ Since, ABCD is a parallelogram with pair of adjacent sides equal. Hence, ABCD is a rhombus.	1 ½ ½ ½ ½
	OR	
27(B).	In ΔAPB, ∠APB+∠BAP+∠ABP=180°  ∠APB+2∠BAP=180° (∠BAP=∠ABP) ______(i) ∠OAB+∠BAP=90° ⇒ ∠BAP= 90°– ∠OAB ______(ii) (tangent is perpendicular to the radius at the point of contact)	½ (for correct figure) ½ ½

Substituting ∠BAP in (i),we get

∠APB + 2(90°– ∠OAB) = 180° **1**

Hence, ∠APB = 2∠OAB **½**

28.

$A(-3,-1)$; $B(-8,9)$ are given points

Let the ratio in which AB is divided be $k:1$ **½**

Coordinates of the required point are $\left(\frac{-8k-3}{k+1}, \frac{9k-1}{k+1}\right)$ **½**

Hence, $\frac{-8k-3}{k+1} = -6 \Rightarrow k = \frac{3}{2}$, i.e., Required ratio is 3:2 **1**

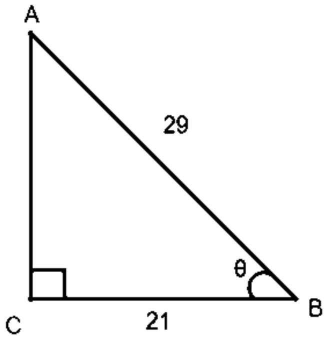
$\therefore y = \frac{9\left(\frac{3}{2}\right)-1}{\left(\frac{3}{2}\right)+1} \Rightarrow y = 5$ **1**

29.

$\text{AC} = \sqrt{(\text{AB})^2 - (\text{BC})^2} = \sqrt{29^2 - 21^2}$

$= \sqrt{400} = 20$ units **½**

$\sin\theta = \frac{\text{AC}}{\text{AB}} = \frac{20}{29}$, $\cos\theta = \frac{\text{BC}}{\text{AB}} = \frac{21}{29}$ **½**



(i) $1 + \tan^2\theta = 1 + \left(\frac{20}{21}\right)^2 = \frac{841}{441}$ **1**

(ii) $\cos^2\theta - \sin^2\theta = \left(\frac{21}{29}\right)^2 - \left(\frac{20}{29}\right)^2 = \frac{41}{841}$ **1**

30(A).

Class interval	**f_i**	**x_i (mid-value)**	**$u_i = \frac{x_i - 45}{h}$**	**$f_i u_i$**
20-30	8	25	- 2	- 16
30-40	6	35	-1	- 6
40-50	**x**	45	0	0
50-60	11	55	1	11
60-70	**y**	65	2	2y
Total	25+ x+ y			2y - 11

1

Assumed mean(A) = 45, Width of the interval (h) = 10 **½**

25 + x + y = 50 ⇒x + y = 25……(1) **½**

$$\text{Mean} = 45 + \left(\frac{2\text{y} - 11}{50}\right) \times 10 \Rightarrow 48 = 45 + \left(\frac{2\text{y} - 11}{5}\right)$$ **½**

⇒ y = 13

∴ from (1), x = 12 **½**

OR

30(B).

Weight (in kg)	No. of students	
35 – 45	5	
45 – 55	10	f_0
55 – 65	20	f_1
65 – 75	12	f_2
75 – 85	3	

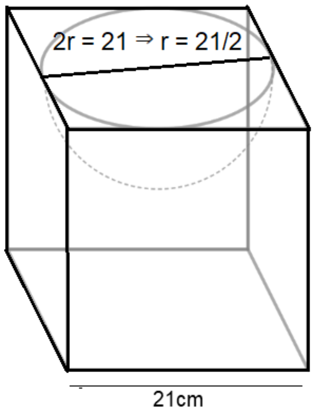
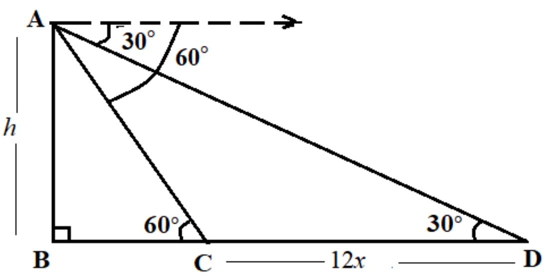
Modal class → **55 – 65** **1**

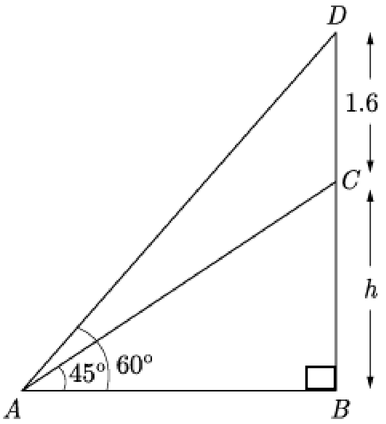
	∴ Modal class = 55 – 65, l = 55, h = 10 Mode = $l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right)h = 55 + \left(\frac{20 - 10}{2(20) - 10 - 12}\right) 10$ = 60.555… Hence, modal weight of students is 60.56 kg (approx.)	½ **1** ½
31.	Let the ten's place digit be x Let the unit's place digit be y Number = $10x + y$ Reversed Number = $10y + x$ ATQ $x + y = 9$ —---------(1) $9(10x + y) = 2(10y + x)$ -------------(2) Solving (1) and (2), we get $x = 1, y = 8$ Required Number = 18	 ½ ½ ½ **1** ½

Section –D

[This section comprises of solution of long answer type questions (LA) of 5 marks each]

32.	Correct figure, Given, To prove and Construction Correct proof of theorem	4x½ = **2** **3**
33(A).	Let the speed of the train be x km/h Then the increased speed of the train be $(x + 5)$ km/h ATQ, $\frac{360}{x} - \frac{360}{x+5} = 1$ On simplifying, we get $x^2 + 5x - 1800 = 0$ $x = \frac{-5 \pm \sqrt{5^2 + 4(1800)}}{2}$ $x = 40, -45$ Hence, $x = 40$ ∴ Speed of the train= 40 km/h	 ½ **1** **1** **1** **1** ½
	OR	
33(B).	Let the number of marbles John had in the beginning be x Then the number of marbles Jivanti had in the beginning = $45 - x$ ATQ $(x - 5)(40 - x) = 124$ $x^2 - 45x + 324 = 0$ $x = \frac{45 \pm \sqrt{45^2 - 4\ (324)}}{2}$ $x = 36, 9$	 ½ **1** ½ **1** **1**

	Case 1 Number of marbles John had in the beginning = $x = 36$ Then, number of marbles Jivanti had in the beginning = $45 - x = 9$ *Case 2* Number of marbles John had in the beginning = $x = 9$ Then, number of marbles Jivanti had in the beginning = $45 - x = 36$	½ ½
34.	Side of cube (a) = 21 cm Radius of hemi-sphere (r) = $\frac{21}{2}$ cm i) Volume of solid = $V_{\textbf{Cube}} - V_{\textbf{Hemi-sphere}}$ $= a^3 - \frac{2}{3}\pi r^3$ $= 21^3 - \frac{2}{3} \times \frac{22}{7} \times \frac{21\times21\times21}{2\times2\times2}$ $= 6835.5 \text{ cm}^3$ ii) Surface area of wooden block  $= 6a^2 - \pi r^2 + 2\pi r^2$ $= 6a^2 + \pi r^2 = 6(21)^2 + \frac{22}{7} \times \left(\frac{21}{2}\right)^2$ $= 2992.5 \text{ cm}^2$	½ ½ 1 ½ ½+1 1
35(A).	Let height of drone (AB) be h m Let speed of ambulance be x m/min CD = 12 x m  In rt ΔABC, $\tan 60° = \frac{AB}{BC} \Rightarrow BC = \frac{h}{\sqrt{3}}$ In rt ΔABD, $\tan 30° = \frac{AB}{BD} \Rightarrow BD = h\sqrt{3}$ $\Rightarrow \frac{h}{\sqrt{3}} + 12x = h\sqrt{3} \Rightarrow h = 6\sqrt{3}x$ $\therefore$ BC = 6 x time taken from C to B is $\frac{6x}{x}$ = 6 minutes $\therefore$ Total time taken = (6+12) minutes = 18 minutes	**1 for correct figure** 1 1 1 ½ ½
	OR	

35(B).	Let height of the pedestal (BC) be h m CD = height of statue = 1.6 m  In rt ΔABC, $\tan 45° = \frac{BC}{AB} \Rightarrow 1 = \frac{h}{AB}$ $\Rightarrow AB = h$ --------(i) In rt ΔABD, $\tan 60° = \frac{BD}{AB} \Rightarrow \sqrt{3} = \frac{h+1.6}{AB}$ $\Rightarrow AB = \frac{h+1.6}{\sqrt{3}}$ -------(ii) Equating (i) and (ii), we get $h = \frac{h+1.6}{\sqrt{3}}$ $(\sqrt{3}-1)\, h = 1.6$ $h = \frac{1.6}{\sqrt{3}-1} = 0.8(\sqrt{3}+1)$ ∴ height of the pedestel is $0.8(\sqrt{3}+1)$ m	**1 for correct figure** **1** **1** **½** **1** ½

<u>**Section –E**</u>

[This section comprises solution of 3 case- study/passage-based questions of 4 marks]

36.	Central angle, $\Theta = 60°$, r = 4cm, R = 10cm (i) Required area of one face of the fan = $\frac{\theta}{360}\pi R^2 = \frac{60}{360} \times \frac{22}{7} \times 10^2$ = 52.38 cm² (ii) Required area of black sheet = $\frac{\theta}{360}\pi(R^2 - r^2)$ $= \frac{60}{360} \times \frac{22}{7}(10^2 - 4^2) = 44 \text{ cm}^2$ (iii) (A) boundary length of black sheet region on one face of the fan $= 2(10 - 4) + \frac{60}{360} \times 2 \times \frac{22}{7}(10+4)$ $= 12 + \frac{44}{3} = \frac{80}{3}$ cm **OR** (iii) (B) $2(10 - 4) + \frac{\theta}{360} \times 2 \times \frac{22}{7}(10+4) = 29.6$ $\frac{\theta}{360} \times 88 = 17.6$ $\theta = \frac{17.6 \times 360}{88} = 72°$	½+½ ½+½ **1** **1** **½** **1** **½**

	For visually Impaired students only Radius, i.e., range of distance covered, r = 24 m; Central angle, θ = 70° (i) $\frac{A}{l} = \frac{\frac{\theta}{360}\pi r^2}{\frac{\theta}{360}\times 2\pi r} \Rightarrow A = \frac{1}{2}\, lr$ (ii) Area monitored = $\frac{\theta}{360}\pi r^2$ $= \frac{70}{360} \times \frac{22}{7} \times 24^2$ = 352 m^2 (iii) (A) $\frac{\theta}{360}\pi(24)^2 = \frac{150}{100} \times 352$ $\theta = \frac{3}{2} \times \frac{7\times 360}{22\times 24^2} \times 352$ θ = 105° **OR** (iii) (B) $\frac{91}{360}\pi r^2 = \frac{130}{100} \times 352$ $r^2 = \frac{13}{10} \times \frac{7\times 360}{22\times 91} \times 352 = 36 \times 16$ r = 24 m	 **½+½** **½+½** **½** **1** **½** **½** **1** **½**
37.	Number of trees planted by class I = 2{2(**1**) +3} = 10 Number of trees planted by class II = 2{2(**2**) +3} = 14 Number of trees planted by class III = 2{2(**3**) +3} = 18 ……so on Hence, it follows AP: 10, 14, 18, 22, …. (i) Common difference = 14 – 10 = 4 (ii) Number of trees planted by class VI = 2{2(**6**) +3} = 30 (iii) (A) Total number of trees planted = $S_n = \frac{n}{2}\{2a + (n-1)d\}$ $= \frac{12}{2}\{2(10) + (12-1)4\}$ $= 6 \times 64 = 384$ **OR** (iii) (B) Let class that planted 34 trees be n. $2\{2(n) + 3\} = 34$ $2(n) + 3 = 17$ $n = 7$	 **1** **1** **1** **1** **1** **½** **½**

38.	Total number T-shirts printed = 400 Number of T-shirts with good print = 312 Number of T-shirts with minor print defect = 54 (i) P(Harish buys T-shirt) = $\frac{312}{400}$ or $\frac{39}{50}$ (ii) P(Trader buys T-shirt) = $\frac{312+54}{400} = \frac{366}{400}$ or $\frac{183}{200}$ (iii) (A) P(T-shirt is not good) = 1 – P(T-shirt is good) = 1 – $\frac{312}{400} = \frac{88}{400}$ or $\frac{11}{50}$ **OR** (iii) (B)P(neither Harish nor Trader buys T-shirt) = $\frac{400-54-312}{400} = \frac{34}{400}$ or $\frac{17}{200}$	 **1** **1** **1+1** **1+1**