

ICSE 2027 SPECIMEN
DRAFT MARKING SCHEME – MATHEMATICS

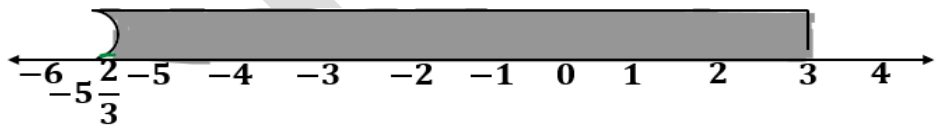
Question 1		
(i)	(c) ₹ 5000	[15]
(ii)	(c) Both (A) and (R) are true and (R) is the correct explanation for (A).	
(iii)	(c) ₹ 5000	
(iv)	(c) 4	
(v)	(b) 27	
(vi)	(a) $(x - 1)$	
(vii)	(c) [5]	
(viii)	(a) 2	
(ix)	(c) (1, 2) and (- 1, - 2)	
(x)	(a) $3 km^2$	
(xi)	(c) $3\sqrt{2}$ cm	
(xii)	(d) 12 m	
(xiii)	(c) Both (A) and (R) are true and (R) is the correct explanation for (A).	
(xiv)	(a) 0.5	
(xv)	(c) $\frac{1}{2}$	
Question 2		
(i)	(a) $\frac{4}{3}\pi r^3 = \frac{1}{3}\pi R^2 H \rightarrow \frac{4}{3}\pi r^3 = \frac{1}{3}\pi 7^2 \cdot 28 \rightarrow r^3 = 7^3 \rightarrow r = 7cm$ (b) $\frac{4}{3}\pi r^3 = \pi R'^2 H' \rightarrow \frac{4}{3} \times \pi \times 7 \times 7 \times 7 = \pi \times 14^2 \times H' \rightarrow H' = \frac{7}{3} cm$ $= 2.33cm = 2cm$ (c) $\frac{1}{3}\pi R^2 H = \frac{1}{3} \times \frac{22}{7} \times 7^2 \times 28 = 1437.33 = 1437cm^3$	[4]

(ii)	$(x - 2)^2 + 11x - 7 = 0$ $x^2 + 4 - 4x + 11x - 7 = 0$ $x^2 + 7x - 3 = 0$ $x = \frac{-7 \pm \sqrt{49 - 4(1)(-3)}}{2 \times 1} = \frac{-7 \pm \sqrt{61}}{2} = \frac{-7 \pm 7.8102}{2}$ $x = 0.4051, \quad x = -7.4051$ $x = 0.405, \quad x = -7.41$	[4]
(iii)	(a) $R(x, 0), \frac{m(-2)+n(1)}{m+n} = 0 \rightarrow -2m + n = 0 \rightarrow m:n = 1:2$ $\therefore PR:RQ = 1:2$ (b) $x = \frac{1(11)+2(-4)}{1+2} \rightarrow x = 1,$ $R(1, 0)$ (c) $m_{PQ} = \frac{-2-1}{11+4} = -\frac{1}{5}$ <i>Slope of line perpendicular to PQ = 5</i> <i>Required equation, $y - 0 = 5(x - 1)$</i> $5x - y = 5$	[4]
Question 3		
(i)	Let the reduced price be x $x + 18\% \text{ of } x = 1888 \rightarrow x = ₹ 1600$ Reduction in price = ₹ 2000 – ₹1600 = ₹400 Percentage reduction = $\frac{400}{2000} \times 100 = 20\%$	[4]
(ii)	(a) $a = 15 \text{ and } d = 15$ (b) $T_{10} = a + (10 - 1)d = 15 + 9 \times 15 = 150$ (c) $S_{10} = \frac{10}{2} [2 \times 15 + 9 \times 15] = 825$	[4]
(iii)	(a) $A(0, 3), B(1, 2), C(2, 2), D(2, 1) \text{ and } E(3, 0)$ (b) <i>image of A under reflection on the y – axis is A(0, 3)</i>	[5]

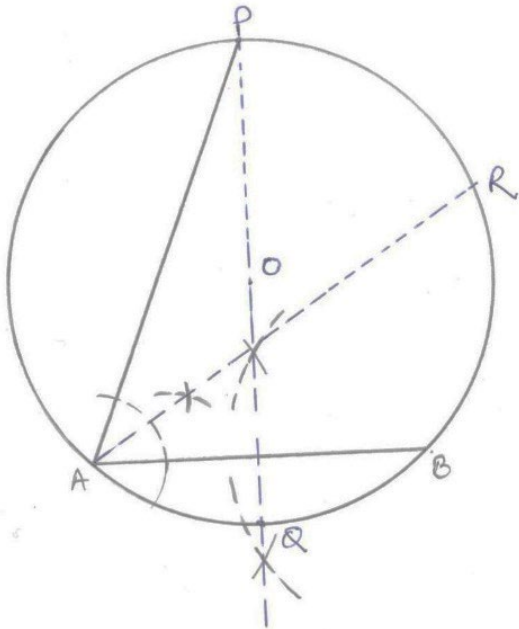
(c) $K(-2, -2)$	
(d) $APONMLKJI$	
(e) $y = 1$	

SECTION – B

Question 4		
(i)	$P = ₹ 1000, n = 2 \text{ yrs}, MV = 26 P \therefore MV = ₹ 26000$ (a) $I = ₹ 26000 - ₹ 24000 = ₹ 2000$ (b) $Interest = \frac{1000 \times 24 \times 25}{2} \times \frac{r}{100} \times \frac{1}{12} = 2000$ $r = 8\% \text{ p.a.}$	[3]
(ii)	(a) <i>order of matrix AB is $(2 \times 1) = \text{order of null matrix}$</i> (b) $AB = \begin{bmatrix} x & 1 \\ 2 & 2 \end{bmatrix} \begin{bmatrix} x \\ x - 2 \end{bmatrix}$ $AB = \begin{bmatrix} x^2 + x - 2 \\ 4x - 4 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$ $4x - 4 = 0$ $x = 1$	[3]
(iii)	$LHS = \frac{\cos^2 \theta}{1 - \tan \theta} + \frac{\sin^2 \theta}{1 - \cot \theta}$ $= \frac{\cos^2 \theta}{1 - \frac{\sin \theta}{\cos \theta}} + \frac{\sin^2 \theta}{1 - \frac{\cos \theta}{\sin \theta}}$ $= \frac{\cos^3 \theta}{\cos \theta - \sin \theta} + \frac{\sin^3 \theta}{\sin \theta - \cos \theta}$ $= \frac{\cos^3 \theta}{\cos \theta - \sin \theta} - \frac{\sin^3 \theta}{\cos \theta - \sin \theta}$ $= \frac{1}{(\cos \theta - \sin \theta)} [\cos^3 \theta - \sin^3 \theta]$ $= \frac{(\cos \theta - \sin \theta)(\cos^2 \theta + \sin^2 \theta + \cos \theta \sin \theta)}{(\cos \theta - \sin \theta)} = 1 + \cos \theta \sin \theta = RHS$	[4]

Question 5		
(i)	(a) $\text{No. of shares} = \frac{8000}{80} = 100$ $\text{Annual Dividend} = \frac{6 \times 100 \times 100}{100} = ₹600$ (b) $\text{Sale proceeds} = ₹75 \times 100 = ₹7500$ $\text{and Total proceeds} = ₹7500 + ₹600 = ₹8100$ $\text{No. of shares} = \frac{8100}{27} = 300$	[3]
(ii)	$-6 + \frac{12x}{5} \leq \frac{7x}{5} - 3 < \frac{2}{5} + 2x, x \in R$ $-6 + \frac{12x}{5} \leq \frac{7x}{5} - 3$ $\frac{12x}{5} - \frac{7x}{5} \leq 6 - 3$ $\frac{5x}{5} \leq 3$ $x \leq 3$ $\frac{7x}{5} - 3 < \frac{2}{5} + 2x$ $\frac{7x}{5} - 2x < \frac{2}{5} + 3$ $-\frac{3x}{5} < \frac{17}{5}$ $x > -\frac{17}{3}$ $x > -5\frac{2}{3}$ Solution: $\left\{x: -5\frac{2}{3} < x \leq 3, x \in R\right\}$ 	[3]
(iii)	(a) In $\triangle ABC$, $\angle BAC = 90^\circ$ ($\angle$s in a semi-circle) $\therefore x + 90^\circ + 32^\circ = 180^\circ$, $x = 58^\circ$ $y = x = 58^\circ$ (alt. seg. theorem.) $z = x = 58^\circ$ ($\angle$s on same segment)	[4]

	<i>In $\triangle ADE$, $AD = AB$ (given)</i> $\angle ADB = \angle ABD = z = 58^\circ$ $v + z + z = 180^\circ \rightarrow v = 180^\circ - 116^\circ$ $v = 64^\circ$ <i>In quad ADEB, $v + w = 180^\circ$ (opp. $\angle$s of cyclic quad. are supp)</i> $w = 180^\circ - 64^\circ, \quad w = 116^\circ$	
Question 6		
(i)	$f(x) = 2x^3 + 5x^2 - 28x - 15$ $f(3) = 2(3)^3 + 5(3)^2 - 28(3) - 15$ $= 54 + 45 - 84 - 15 = 99 - 99 = 0$ $\therefore (x - 3)$ is a factor of $f(x)$. $2x^2 + 11x + 5$ $x - 3 \overline{) 2x^3 + 5x^2 - 28x - 15}$ $\underline{2x^3 - 6x^2}$ $11x^2 - 28x$ $\underline{11x^2 - 33x}$ $5x - 15$ $\underline{5x - 15}$ $\times \times$ $f(x) = (x - 3)(2x^2 + 11x + 5)$ $f(x) = (x - 3)(x + 5)(2x + 1)$	[3]
(ii)	(a) <i>In $\triangle ADC$, FE is parallel to AD, given</i> $\therefore \frac{AF}{FC} = \frac{DE}{EC} = \frac{18}{3} = \frac{6}{1}$ (B.P.T.) $AF : FC = 6 : 1$ similarly, $\frac{AG}{GB} = \frac{AF}{FC} = \frac{6}{1}, \quad AG : GB = 6 : 1$	[3]

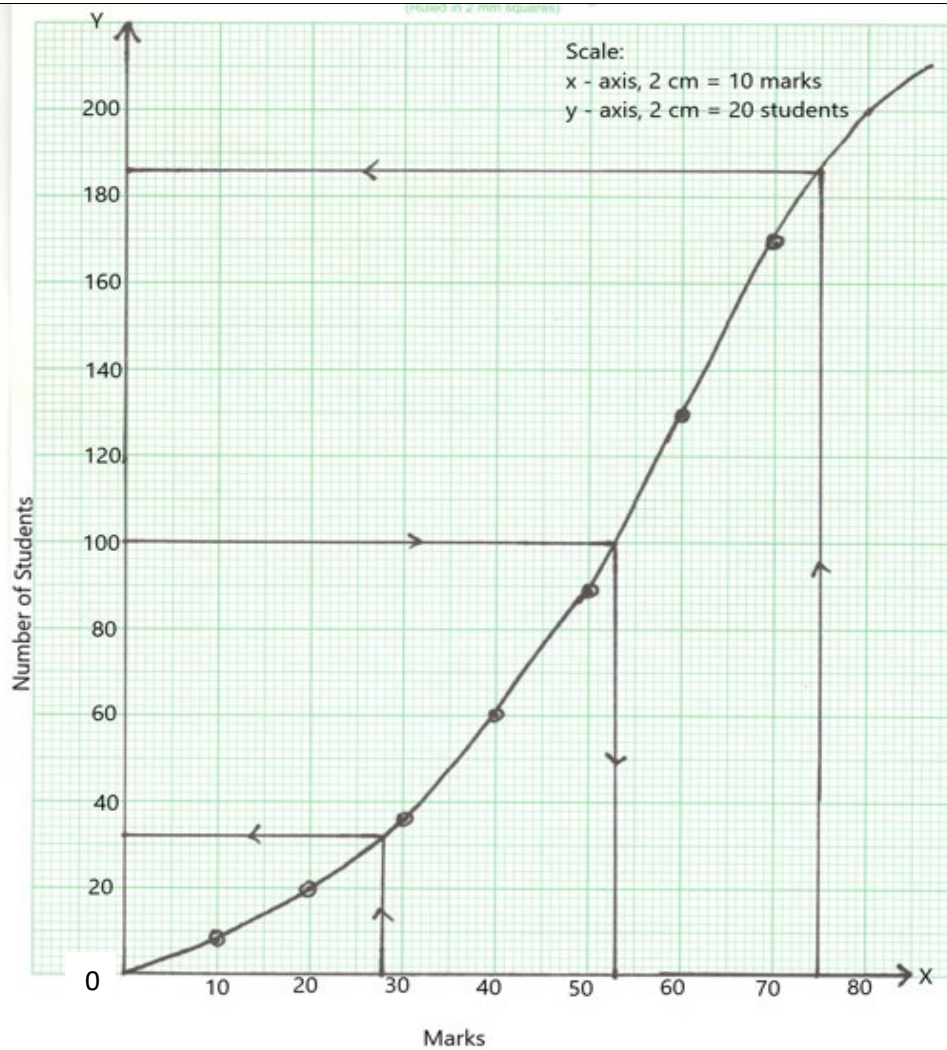
	(b) $\Delta ADC \sim \Delta FEC, \therefore \frac{EF}{AD} = \frac{EC}{DC} \rightarrow \frac{EF}{35} = \frac{3}{21} \therefore EF = 5 \text{ cm}$ (c) $\frac{\text{area trap. ADEF}}{\text{area } \Delta EFC} = \frac{AD^2 - EF^2}{EF^2} = \frac{35^2 - 5^2}{5^2} = \frac{40 \times 30}{25} \rightarrow \mathbf{48 : 1}$	
(iii)		[4]
Question 7		
(i)	(a) $\{6, 12, 18, 24, 30, 36, 42, 48\}, P(\text{divisible by } 6) = \frac{8}{50} = \frac{4}{25}$ (b) $P(\text{not divisible by } 2 \text{ and } 3) = 1 - \frac{4}{25} = \frac{21}{25}$	[3]
(ii)	(a) Given, ABCD is a parallelogram, AP = AS (tangents drawn from an external point are equal) BP = BQ (tangents drawn from an external point are equal) CR = CQ (tangents drawn from an external point are equal) DR = DS (tangents drawn from an external point are equal) Adding, $(AP + BP) + (CR + DR) = (AS + DS) + (BQ + CQ)$ $AB + CD = AD + BC$ $AB + AB = BC + BC$ (opp. Sides of parallelogram are equal) $2AB = 2BC$ $AB = BC$	[3]

	(b) In quad ABCD, $AB = BC = CD = DA$ $\therefore ABCD$ is a rhombus $\therefore AC$ and BD bisect each other at rt. angles (diagonals of rhombus)																													
(iii)	$\frac{a + 2b + x}{a - 2b + x} = \frac{(a + b)^2}{(a - b)^2}$ Applying C & D, $\frac{a+2b+x+a-2b+x}{a+2b+x-a+2b-x} = \frac{(a+b)^2+(a-b)^2}{(a+b)^2-(a-b)^2}$ $\frac{2(a + x)}{4b} = \frac{2(a^2 + b^2)}{4ab}$ $(a + x) = \frac{(a^2 + b^2)}{a}$ $x = \frac{b^2}{a}$	[4]																												
Question 8																														
(i)	<table><tr><th>Class</th><th>x</th><th>f</th><th>fx</th></tr><tr><td>0 – 10</td><td>5</td><td>8</td><td>40</td></tr><tr><td>10 – 20</td><td>15</td><td>x</td><td>$15x$</td></tr><tr><td>20 – 30</td><td>25</td><td>12</td><td>300</td></tr><tr><td>30 – 40</td><td>35</td><td>13</td><td>455</td></tr><tr><td>40 – 50</td><td>45</td><td>y</td><td>$45y$</td></tr><tr><td></td><td></td><td>$x+y+33=50$</td><td>$795+15x+45y$</td></tr></table> $Mean = \frac{\sum fx}{\sum f} = \frac{795 + 15x + 45y}{50} = 27$ $3x + 9y = 111 \quad \text{and } x + y = 17$ $x = 7 \text{ and } y = 10$	Class	x	f	fx	0 – 10	5	8	40	10 – 20	15	x	$15x$	20 – 30	25	12	300	30 – 40	35	13	455	40 – 50	45	y	$45y$			$x+y+33=50$	$795+15x+45y$	[3]
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		$x+y+33=50$	$795+15x+45y$																											
(ii)	$12 \times 10 - (12 - x)(10 - x) = 57$ $120 - 120 + 22x - x^2 = 57$ $x^2 - 22x + 57 = 0 \rightarrow (x - 19)(x - 3) = 0$ $x = 19 \text{ is not possible, } \therefore x = 3 \text{ m}$	[3]																												

(iii)	$V_A = \pi r^2 h - \frac{2}{3} \pi r^3 = \pi \cdot 3.5^2 \cdot 10 - \frac{2}{3} \cdot \pi \cdot 3.5^3$ $V_B = \pi r^2 h - \frac{1}{3} \pi r^2 h' = \pi \cdot 3.5^2 \cdot 10 - \frac{1}{3} \cdot \pi \cdot 3.5^3$ $\therefore V_B > V_A$ $V_B - V_A = \left(\pi r^2 h - \frac{1}{3} \pi r^2 h' \right) - \left(\pi r^2 h - \frac{2}{3} \pi r^3 \right)$ $= \pi r^2 h - \frac{1}{3} \pi r^2 h' - \pi r^2 h + \frac{2}{3} \pi r^3$ $V_B - V_A = \frac{2}{3} \pi r^3 - \frac{1}{3} \pi r^2 h'$ $= \frac{2}{3} \times \frac{22}{7} \times 3.5^3 - \frac{1}{3} \times \frac{22}{7} \times 3.5^2 \times 3.5$ $= \frac{1}{3} \times \frac{22}{7} \times 3.5^3$ $= 44.916$ Difference in the capacity of Glass A and Glass B = 44.92 cm^3 Also, Glass B has greater capacity than Glass A as $V_B - V_A > 0$	[4]
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Question 9

(i)	Marks	f	cf	(a) <i>Median</i> = 53 ± 1 (b) <i>More than 75</i> = $200 - 186 = 14 \text{ students}$ (c) number of students who scored 35% and below. = 33 ± 2	[5]
	0 – 10	8	8		
	10 – 20	12	20		
	20 – 30	16	36		
	30 – 40	24	60		
	40 – 50	29	89		
	50 – 60	38	127		
	60 – 70	42	169		
	70 – 80	31	200		



(ii)

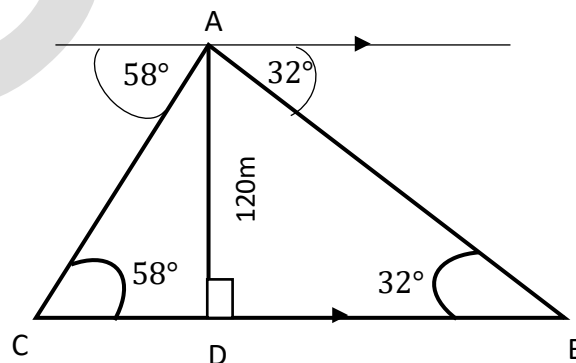
$$\text{In } \triangle ABD, \frac{BD}{AD} = \tan(90^\circ - 32^\circ)$$

$$BD = 120 \times \tan 58^\circ = 120 \times 1.600 = 192$$

$$\text{In } \triangle ACD, \frac{CD}{AD} = \tan(90^\circ - 58^\circ)$$

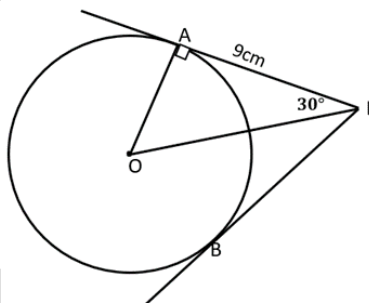
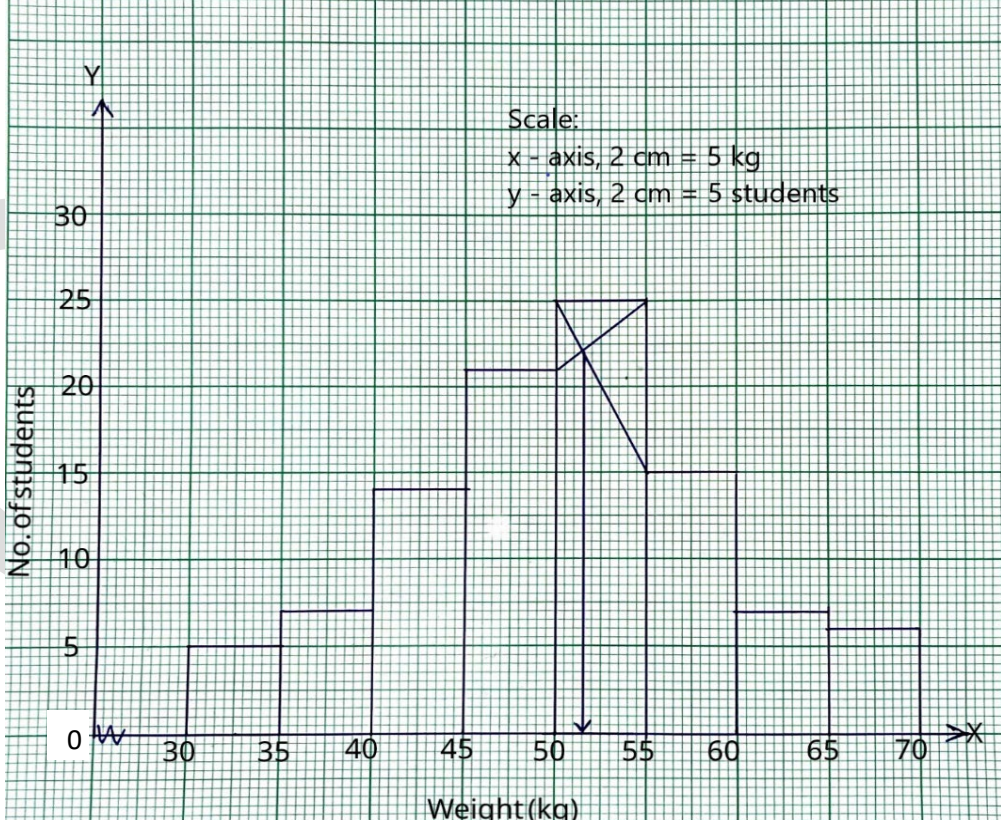
$$CD = 120 \times \tan 32^\circ = 120 \times 0.6249 = 74.988 \text{ m}$$

$$\begin{aligned} BC &= BD + CD = 120 \times 1.600 + 120 \times 0.6249 = 120 \times 2.2249 \\ &= 266.988 = 267 \text{ m} \end{aligned}$$



[5]

Question 10

(i)	Let the terms be $a, ar, ar^2, \dots \dots \dots ar^9$ Given, $a + ar + ar^2 = 7$ and $ar^7 + ar^8 + ar^9 = 896$ $\frac{ar^7 + ar^8 + ar^9}{a + ar + ar^2} = \frac{896}{7}$ $\frac{ar^7(1 + r + r^2)}{a(1 + r + r^2)} = 128$ $r^7 = 128 \rightarrow r = 2$ $a(1 + 2 + 2^2) = 7 \rightarrow a = 1$	[3]
(ii)	PA = PB = 9 cm (tangents from the same point) In $\triangle OAP$, $\frac{OA}{PA} = \tan 30^\circ = \frac{1}{\sqrt{3}}$ radius = $OA = 9 \times \frac{1}{\sqrt{3}} = 3\sqrt{3} = 3 \times 1.7321$ = 5.1963 = 5.2 cm	
(iii)	 Scale: x - axis, 2 cm = 5 kg y - axis, 2 cm = 5 students Mode: 51.5kg.	[4]