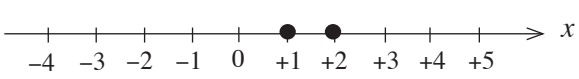
G.C.E.(O.L.) Support Seminar - 2014
Mathematics I (Part A)
Answer Guide

Question No.			Correct Answer	Marks			Remarks
1.			1.55	1	(1)		
2.			Rs. 22.00	1	(1)		
3.			$\frac{1}{5}$	1	(1)		
4.			$x = 45^\circ$	1	(1)		
5.			$x = 4$	1	(1)		
6.			120 g	1	(1)		
7.			3	1	(1)		
8.			$5a$	1	(1)		
9.			6	1	(1)		
10.			$\frac{1}{4}$	1	(1)		
11.			1001_{two}	2	(2)		
12.				2	(2)		Solving the inequality 01 mark
13.	(i)		Highest Common Factor = 3	1			
	(ii)		Least Common Multiple = 120	1	(2)		
14.			$x = 98°$	2	(2)		Exterior angle = 98° or Interior angle = 82° 01 mark

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Question No.			Correct Answer	Marks			Remarks
15.			$\frac{2x-2}{x-1}$	1			
			$= 2$	1	(2)		
16.			Tax for the year = Rs. 2000	1			
			Assessed value of the house = Rs. 40 000	1	(2)		
17.			$tx - x = a$	1			
			$x = \frac{a}{t-1}$	1	(2)		
18.			(3, 5)	2	(2)		$y = 2 \times 3 - 1$ 01 mark
19.			$\frac{1}{2} \times \sqrt{3}\,a \times 2a$	1			Obtaining $\sqrt{3}\,a$
			$= \sqrt{3}\,a^2$	1	(2)		
20.			$\log_3 81 = 4$	1			
			$x = 2$	1	(2)		
21.			$\sqrt{8} = 2\sqrt{2}$	1			
			$5\sqrt{2}$	1	(2)		
22.			×	2	(2)		All three conclusions correct.
			×				
			√				
23.			$a = 80^\circ$	2	(2)		$\hat{PRQ} = 50°$ 01 mark
24.	(i)		$AE : EC$	1			
	(ii)		$\frac{AD}{DB} = \frac{5}{8}$				
			$\frac{4}{DB} = \frac{5}{8}$				
			$DB = 6.4$ cm				
			$AB = 10.4$ cm	1	(2)		

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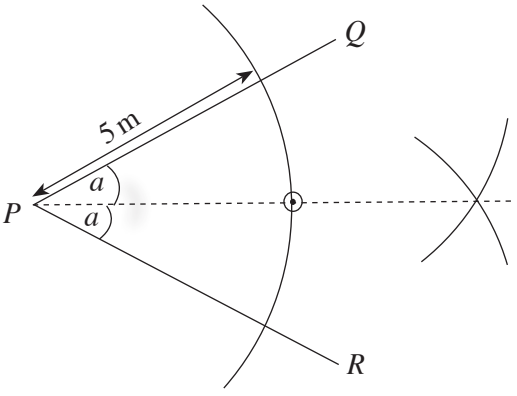
Question No.			Correct Answer	Marks			Remarks
25.			$x + 3x = 180°$ $x = 45°$				
	(i)		$45°$	1			
	(ii)		Number of sides = 8	1	(2)		
26.			Machine hours $= \frac{18 \times 2}{4} = 9$	2	(2)		Number of machine hours = 3 × 6 01 mark
27.	(i)		Median = 12	1			
	(ii)		Inter-quartile range = 20 – 8 = 12	1	(2)		
28.			ΔACB (Triangles with equal base on the same straight line and common vertex)	1			
			ΔABE	1	(2)		
29.			 Bisector of the angle	1			
			Arc of radius 5 m	1	(2)		
30.			34 questions	2	(2)		2 or 0

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G.C.E.(O.L.) Support Seminar - 2014
Mathematics I (Part B)
Answer Guide

Question No.			Correct Answer	Marks			Remarks
1.	(a)		$26 \div \left(2\frac{1}{3} - \frac{1}{6}\right)$				
			$= 26 \div 2\frac{1}{6}$	1			
			$= 26 \times \frac{6}{13}$				
			$= 12$	1	(2)	△2	
	(b)	(i)	Singing or dancing $= \frac{1}{3} + \frac{1}{4}$	1			
			$= \frac{7}{12}$	1	(2)		
		(ii)	Remaining $= 1 - \frac{7}{12} = \frac{5}{12}$	1			
			Dancing $= \frac{5}{12} \times \frac{4}{5}$				
			$= \frac{1}{3}$	1	(2)		
		(iii)	Not participated $= \frac{5}{12} \times \frac{1}{5}$ or $\frac{5}{12} - \frac{1}{3}$	1			
			$= \frac{1}{12}$	1	(2)		
		(iv)	Not participated $\frac{1}{12} = 20$ students				
			Dancing $\frac{1}{4} = 20 \times 3$ or $20 \times 12 \times \frac{1}{4}$				
			$= 60$	2	(2)	△8	
						10	
2.	(i)		$DC = 34$ m	1	(1)		
	(ii)		$\frac{1}{2}(20 + 34) \times 14$ or $20 \times 14 + \frac{1}{2} \times 14 \times 14$	1 + 1			
			$= 378\ m^2$	1	(3)		
	(iii)		Perimeter of the pond $= \frac{1}{2} \times 2 \times \frac{22}{7} \times 7 + 14$	1			
			$= 36$ m	1	(2)		

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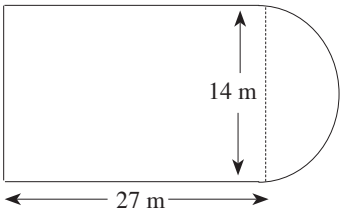
Question No.			Correct Answer	Marks			Remarks
	(iv)		$\frac{1}{2} \times \frac{22}{7} \times 7 \times 7$	1			
			$= 77\ m^2$	1	(2)		
	(v)			1			Diagram
				1	(2)		Indicating 27 m
						10	
						10	
3.	(a)		Chandimal : Ganesh : Razeek 3 : 2 4 : 5				
		(i)	6 : 4 : 5	2	(2)		
		(ii)	$\frac{6}{15} - \frac{4}{15} = \text{Rs. } 20\,000$	1			
			$\frac{2}{15} = \text{Rs. } 20\,000$				
			Total Profit $= \text{Rs. } \frac{20\,000}{2} \times 15$	1			
			$= \text{Rs. } 150\,000$	1	(3)		
		(iii)	Chandimal should give Rs. 10 000 to Ganesh.	2	(2)	7	
	(b)	(i)	Production cost $= \frac{100}{80} \times 1280$	1			
			$= \text{Rs. } 1600$	1	(2)		
		(ii)	Price the dress to be sold $= \text{Rs. } \frac{120}{100} \times 1600$				
			$= \text{Rs. } 1920$	1	(1)	3	
						10	

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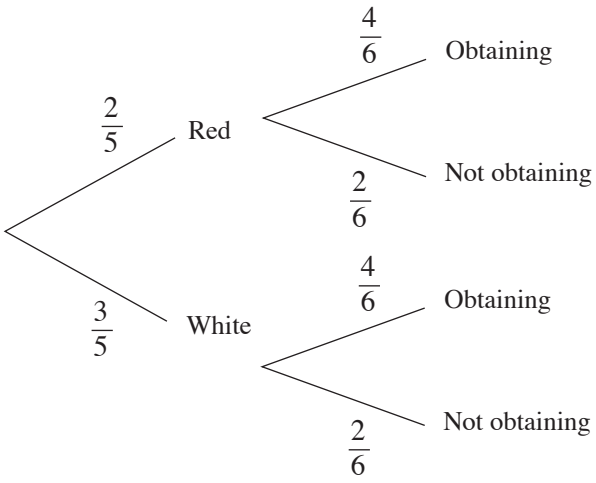
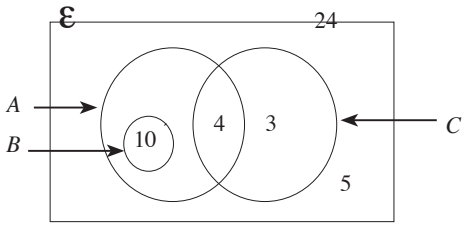
Question No.			Correct Answer	Marks			Remarks
4.	(a)	(i)		1 +1	(2)		for $\frac{2}{5}$ and $\frac{3}{5}$
		(ii)	$\frac{4}{6}$	1	(1)		
		(iii)	Extension of the tree diagram	1 + 1	(2)		Two branches correct
		(iv)	$\frac{3}{5} \times \frac{4}{6}$	1			
			$= \frac{12}{30}$ or $\frac{2}{5}$	1	(2)	7	
	(b)						
		(i)	$n(A \cap C) = 4$	2	(2)		
		(ii)	$A \cap (B \cup C)'$ or $A \cap B' \cap C'$	1	(1)	3	
						10	
5.	(i)		40	1	(1)		
	(ii)		60 – 80 $\longrightarrow$ 8	1			
			110 – 120 $\longrightarrow$ 6	1	(2)		
	(iii)		Correct two columns	1 + 1	(2)		
	(iv)		Both ends correct Joining the mid-points of the columns of different breadth correctly.	1 1 + 1	(3)		
	(v)		$\frac{16}{31} \times 100 = 51.6\% > 50\%$ Agree.	1 1	(2)	10	
						10	
			* * *				

G.C.E.(O.L.) Support Seminar - 2014
Mathematics II (Part A)
Answer Guide

Question No.			Correct Answer	Marks			Remarks
1.	(a)	(i)	Rs. 120 000	1	(1)		
		(ii)	Rs. 120 000/ 24 = Rs. 5000	1	(1)		
		(iii)	5625×24 = Rs. 135 000	1			
			Extra amount = Rs. 135 000 – Rs. 120 000 = Rs.15 000	1	(2)		Rs. 625×24 = Rs. 15 000
		(iv)	Number of month units = Rs. $\frac{24 \times 25}{2}$ = 300	1			
			If rate of interest is r, $\frac{15\,000}{300} = \frac{r}{100} \times \frac{1}{12} \times 5000$	1			
			$r = 12\%$	1	(3)		
		(v)	Selling price = $\frac{88}{100} \times 150\,000$	1			
			= Rs. 132 000	1	(2)	9	
	(b)		Income = $\frac{20}{100} \times 5000 \times 25$				
			= Rs. 25 000	1	(1)	1	
						10	
2.	(a)	(i)	$y = (1 + 2)(3 - 2)$				
			$= 3$	1	(1)		
		(ii)	Correct axes	1			
			Correct points	1			
			Smooth curve	1	(3)	4	
	(b)	(i)	$(-1, 4)$	1			
		(ii)	$x = +1.4$ and $x = -3.4$	2			
		(iii)	$-3 < x < 1$	2			
		(iv)	$y = 4 - (x + 1)^2$	1	(6)	6	
						10	

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Question No.			Correct Answer	Marks			Remarks
3.	(a)	(i)	$2\mathbf{A} = \begin{pmatrix} 3 & 4 \\ -2 & 7 \end{pmatrix} - \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$	1			Identify **I**
			$2\mathbf{A} = \begin{pmatrix} 2 & 4 \\ -2 & 6 \end{pmatrix} \Rightarrow \mathbf{A} = \begin{pmatrix} 1 & 2 \\ -1 & 3 \end{pmatrix}$	1 +1	(3)		
	(b)	(i)	$2(x^2 - 9) = 2(x + 3)(x - 3)$	1			
		(ii)	$9a(x + 2y) - 5b(x + 2y)$	1			
			$= (x + 2y)(9a - 5b)$	1	(3)		
	(c)		$3x + 1 = 4y$	1			
			$x - 4 = y + 4$	1			
			$x = y + 8$				
			$x = 33$	1			
			$y = 25$	1	(4)	△ 10	
						10	
4.	(a)	(i)	Rs. $\frac{2400}{x}$	1	(1)		
		(ii)	Rs. $\frac{2400}{x-5}$	1	(1)		
		(iii)	$\frac{2400}{x-5} - \frac{2400}{x} = 16$	1			
			$x^2 - 5x - 750 = 0$	1			
			$x = 30$ or $x = -25$				
			Number of students = 30	1	(3)	△ 5	
	(b)		$x^2 - 4x - 16 = 0$				
			$(x - 2)^2 = 16 + 4$	1			
			$x - 2 = \pm \sqrt{20}$	1			
			$x = 2 \pm 2\sqrt{5}$				
			$x = 2 \pm 2 \times 2.24$	1			substitution for $\sqrt{5}$
			$x = 2 + 4.48$ or $x = 2 - 4.48$				
			$= 6.48$ $= -2.48$	1 + 1	(5)	△ 5	
						10	

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Question No.			Correct Answer	Marks			Remarks
			Or applying the formula				
			$a = 1,\ b = -4,\ c = -16$	1			
			$x = \dfrac{-(-4) \pm \sqrt{16 - 4 \times 1 \times (-16)}}{2 \times 1}$	1			substitution
			$= \dfrac{4 \pm \sqrt{80}}{2}$	1			
			$= \dfrac{4 \pm 4\sqrt{5}}{2} \quad = \quad 2 \pm 2\sqrt{5}$				
			$x = 6.48$ or $x = -2.48$	1 + 1	(5)		
5.	(a)	(i)	Diagram	1	(1)		
		(ii)	$\sin 38^\circ 20' = \dfrac{CP}{150}$	1			
			$CP = 150 \times 0.6202$	1			
			$= 93.03$ m				
			$= 93$ m	1	(3)		
		(iii)	$\tan \theta = \dfrac{93}{80}$	1			
			$= 1.1625$	1			
			$\theta = 49^\circ 18'$	1			
			Bearing $= 180^\circ - 49^\circ 18' = 130^\circ 42'$	1	(4)	8	
	(b)	(i)	1 cm ⟶ 25 000 cm				
			$= 250$ m				
			10 cm ⟶ 2500 m				
			$= 2.5$ km	1			
		(ii)	1 km ⟶ 4 cm				
			3 km ⟶ 12 cm	1	(2)	2	
						10	

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Question No.			Correct Answer	Marks			Remarks
6.	(i)		160 - 180	1	(1)		
	(ii)						
			Number of loaves of bread sold / **Number of days f** / **Mid value x** / **fx** 100 - 120 / 2 / 110 / 220 120 - 140 / 4 / 130 / 520 140 - 160 / 8 / 150 / 1200 160 - 180 / 12 / 170 / 2040 180 - 200 / 3 / 190 / 570 200 - 220 / 1 / 210 / 210 $\Sigma f = 30$ / $\Sigma fx = 4760$	1			Mid value coloumn
				1			fx coloumn
				1			Σfx
			Mean number of loaves of bread $= \frac{\Sigma fx}{\Sigma f}$				
			$= \frac{4760}{30}$	1			division by 30
			$= 158.6$				
			$= 159$	1	(5)		
	(iii)		Income = Rs. 60 × 159 × 30	1			Rs. 4760 × 60
			= Rs. 286 200	1	(2)		= Rs. 285 600
	(iv)		$(120 \times 2) + (140 \times 4) + (160 \times 8) + (180 \times 12) + (200 \times 3) + (220 \times 1)$ $= 5060$ > 5000 ∴ The statement can be true.	2	(2)	10	
						10	
			Part B				
7.	(a)	(i)	28, 25, 22, . . . An arithmetic progression	1	(1)		
		(ii)	$T_n = a + (n - 1)\,d$				
			$T_7 = 28 + 6 \times (-3)$	1			
			$= 28 - 18$				
			$T_7 = 10$	1	(2)		
			∴ Number of cakes of soap in the 7th layer = 10				

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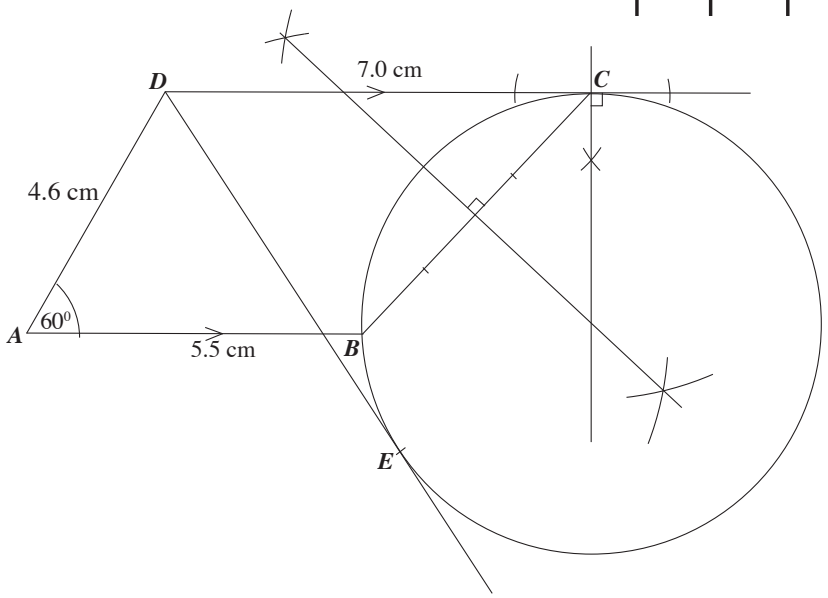
Question No.			Correct Answer	Marks			Remarks
		(iii)	$T_n = a + (n-1)d$				
			$1 = 28 + (n-1)(-3)$	1			
			$1 = 28 - 3n + 3$				
			$1 = 31 - 3n$				
			$3n = 30$				
			$n = 10$				
			Number of layers = 10	1	(2)		
		(iv)	$S_n = \frac{n}{2}(a + l)$				
			$S_{10} = \frac{10}{2}(28 + 1)$				
			$= 5 \times 29$ $= 145$	1			
			Number of cakes of soap in one display = 145				
			Number of cakes of soap in five displays = 145×5 $= 725 > 720$	1			
			$\therefore$ The statement is false.	1	(3)	8	
	(b)		$2x^2$ and $18x^4$ Geometric Mean $= \sqrt{2x^2 \times 18x^4}$	1			
			$= \sqrt{36x^6}$				
			$= 6x^3$	1	(2)	2	
						10	
8.							A rough sketch

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Question No.			Correct Answer	Marks			Remarks
	(i)		$AB = 5.5$ cm	1			
			$B\hat{A}D = 60°$	1			
			$AD = 4.6$ cm	1			
			$AB \parallel DC$	1			
			$ABCD$ Trapizium such that $DC = 7.0$ cm	1	(5)		
	(ii)		Perpendicular bisector of BC	1	(1)		
	(iii)		Perpendicular to DC at C	1			
			Circle	1	(2)		
	(iv)		Radius $= 3.8 \pm 0.1$ cm	1	(1)		
	(v)		Obtaining E on the circle such that $DC = DE$	1	(1)	10	
						10	
9.	(a)	(i)	Height of the cone $= 3a$				
			Height of the compound solid $= 3a + a$ $= 4a$	1	(1)		
		(ii)	Volume of the cone + volume of hemisphere				
			$= \frac{1}{3} \times \pi \times a^2 \times 3a + \frac{1}{2} \times \frac{4}{3} \times \pi \times a^3$	1 + 1	(2)		
			$= \pi a^3 + \frac{2}{3}\pi a^3$				
			$= \frac{5}{3}\pi a^3$				
		(iii)	volume of a cylinderical rod $= \pi\left(\frac{1}{3}a\right)^2 \times 5a = \frac{5}{9}\pi a^3$	1			
			Number of rods $= \frac{\frac{5}{3}\pi a^3}{\frac{5}{9}\pi a^3}$				
			$= \frac{5}{3} \times \frac{9}{5}$				
			$= 3$	1	(2)	5	

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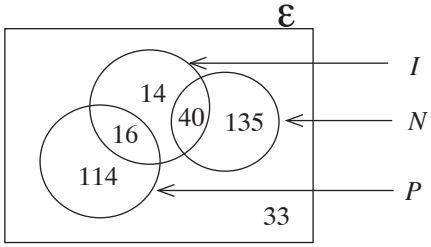
Question No.			Correct Answer	Marks			Remarks
	(b)		$x = \dfrac{43.27^2}{\sqrt{0.0754} \times 852}$				
			$\lg x = 2\lg 43.27 - [\frac{1}{2} \lg 0.0754 + \lg 852]$	1			
			$= 2 \times 1.6362 - [\frac{1}{2} \times \bar{2}.8774 + 2.9304]$	2			All 3 logarithms correct - 2 Two logarithms correct - 1
			$= 3.2724 - [\bar{1}.4387 + 2.9304]$	1			multiplication or division
			$= 3.2724 - 2.3691$				
			x = antilg 0.9033 = 8.003	1	(5)	5 10	
10.	(i)		114	1			
	(ii)			3			
	(iii)		40	1			
	(iv)		Private schools that did not win	1			
	(v)		$I \cap (N \cup P)'$ or $I \cap N' \cap P'$	2			
	(vii)		$\frac{70}{352}$ or $\frac{35}{176}$	2 or 0	(10)	10	
11.	(a)	(i)	Since $C\hat{A}B = 60°$, $C\hat{D}B = 120°$ (Opposite angles of a cyclic quadrilateral are supplementary.)	1 + 1	(2)		
		(ii)	$B\hat{C}D = \dfrac{180° - 120°}{2} = 30°$ (Angles of an isosceles triangle)	1	(1)	3	
	(b)	(i)	$A\hat{C}D = 60° + 30° = 90°$ AD is a diameter. (Since the angle subtended by AD at C is 90°)	1	(1)		
		(ii)	$C\hat{D}E = 60°$ (Exterior angles of a cyclic quadrilateral or any other correct method) $\therefore D\hat{C}E = C\hat{E}D = 60°$ $\therefore CDE$ is an equirateral triangle.	1 1	(2)		
		(iii)	$C\hat{D}A = B\hat{D}A = 60°$ (since ΔCDA and ΔBDA are congruent) $\therefore CE$ // AD (Consecutive interior angles being supplementary or corresponding/ alternate angles being equal)	1 1	(2)	7	
		(iv)	By showing an angle in a relevant Δ is 90°	2	(2)	10	

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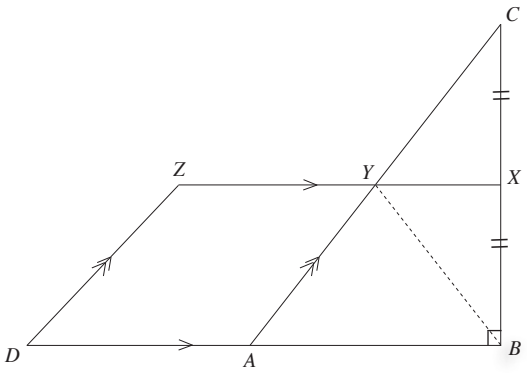
Question No.			Correct Answer	Marks			Remarks
12.	(i)			1	(1)		figure
	(ii)		ZY // DA and DZ // AY	1	(1)		
	(iii)		$AY = YC$	1			
			(Converse of the mid point theorem)	1	(2)		
	(iv)		Since Y is the mid point of AC and since $A\hat{B}C = 90°$, the circle with centre Y and diameter AC passes through the point B. (Converse of the theorem "the angle in a semi circle is a right angle")	2			
			$\therefore YA = YB = YC$	1	(3)		
			$\therefore YB = DZ$				
			aliter				
			When ΔYXB and ΔYXC are considered,				
			$Y\hat{X}B = Y\hat{X}C = 90°$ (since YX // AB)	1			
			$XB = XC$				
			XY is common.				
			$\therefore \Delta YXB \equiv \Delta YXC$ (S.A.S.)	1			
			$\therefore YC = YB$	1			
			But, since $YC = YA = ZD$, $YB = ZD$				
	(v)		Area of the trapezium $DZYB$ = Area of the parallelogram $DZYA$ + area of the ΔAYB	1			
			$= 3 \times$ area of the ΔAYB				
			$= 3 \times 2 \times$ area of the ΔBXY	1			
			$= 6 \times$ area of the ΔXYC				
			Reasoning	1	(3)	10	
						10	
			* * *				