Question Number	Scheme	Marks
7.		
(a)	$C_1 + C_2 + C_3 \sim \mathrm{N}(480,\ 3\times 1.25^2)$	M1 A1
	$\mathrm{P}(C_1 + C_2 + C_3 > 475.8) = \mathrm{P}\left(Z > \dfrac{475.8-480}{\sqrt{3\times 1.25^2}} (= -1.94)\right)$	M1
	= awrt **0.974**	A1
		(4)
(b)	$W = T_1 + T_2 + T_3 + T_4 + T_5 + C_1 + C_2 \sim \mathrm{N}(5\times 60 + 2\times 160,\ 5\times 2^2 + 2\times 1.25^2)$	M1 A1
	$\mathrm{P}(W > 625) = \mathrm{P}\left(Z > \dfrac{625-620}{\sqrt{23.125}} (= 1.03975...)\right)$	M1
	= awrt **0.149**	A1
		(4)
(c)	$Y = (n-1)T_1 - \sum_{r=2}^{n} T_r$	
	$Y \sim \mathrm{N}(\mu\ ,\ \sigma^2)$	
	$\mu = (n-1)\times 60 - (n-1)\times 60\ [= 0]$	M1 A1
	$\sigma^2 = (n-1)^2 \times 4 + (n-1)\times 4\ [= 4n^2 - 4n]$	M1 A1
	$\dfrac{40-0}{\sqrt{4n^2-4n}} = 1.38$	M1 B1
	$4n^2 - 4n - 840(.159...) = 0$	dM1
	$n = 15$	A1
		(8)
		Total 16
	Notes	
(a)	M1 for setting up Normal distribution with mean 480 A1 for correct expression for variance (= 4.6875) or for standard deviation (= 2.165…) M1 standardising with 475.8, 480 and their standard deviation (their standard deviation ≠ 3.75) A1 awrt 0.974	
(b)	M1 for setting up Normal distribution with mean 620 A1 for correct expression for variance (= 23.125) or for standard deviation (= 4.8088…) M1 standardising with 625, 620 and their standard deviation A1 awrt 0.149	
(c)	M1 for a single combined normal distribution (may be implied by a single standardisation) A1 correct expression for μ M1 for use of $a^2 \times 4 + a \times 4$ A1 correct expression for σ^2 M1 standardising with their mean and their sd = z where $1 < \lvert z \rvert < 1.5$ B1 awrt 1.38 dM1 solving their 3TQ (working must be shown if answer is incorrect) (dependent upon 2nd M1) A1 15 cao (must reject –14 if found). Must come from compatible signs in standardisation.	

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