Question Number	Scheme	Marks
8 (a)	$\frac{162-\mu}{\sigma}=-1.2816$ (Calculator gives –1.28155…) or $\frac{175-\mu}{\sigma}=1.04$ (Calculator gives 1.03987…)	M1 A1 A1
	$\mu-1.2816\sigma=162$	
	$\mu+1.04\sigma=175$	
	$2.3216\sigma=13$	dM1
	$\sigma=5.5995...$ awrt 5.6 $\mu=169.1764...$ awrt 169	A1
		(5)
(b)	$Q_1=208.26$ or $Q_3-Q_1=13.48$	B1
	$221.74+1.5(221.74-'Q_1')[=241.96]$ or $'Q_1'-1.5(221.74-'Q_1')[=188.04]$	M1
	Probability of an outlier / **1 – Probability of not an outlier**	
	$\left[\mathrm{P}\left(B>'241.96'\right)=\right]$ $\mathrm{P}\left(Z>\frac{'241.96'-215}{10}\right)\left[=\mathrm{P}(Z>2.70)\right]$ or $\left[\mathrm{P}\left(B<'188.04'\right)=\right]$ $\mathrm{P}\left(Z<\frac{'188.04'-215}{10}\right)\left[=\mathrm{P}(Z<-2.70)\right]$ or	$\left[\mathrm{P}\left('188.04'<B<'241.96'\right)=\right]$ $\mathrm{P}\left(\frac{'188.04'-215}{10}<Z<\frac{'241.96'-215}{10}\right)$ $\left[=\mathrm{P}(-2.70)<Z<\mathrm{P}(2.70)\right]$	dM1
	$=0.0035$ (Calculator gives 0.0034883…)	$=0.993$ (Calculator gives 0.99298…)	
	$\mathrm{P(Outlier)}=2\times'0.0035'$	$\mathrm{P(Outlier)}=1-'0.993'$	M1
	$=0.007$ (Calculator gives 0.006976…) awrt 0.007	$=0.007$ (Calculator gives 0.007017…) awrt 0.007	A1
			(5)

	Notes		Total 10
(a)	**M1**	For standardising with μ and σ and setting = to a z value with $\lvert z\rvert>1$	
	A1	For one correct equation in any form with correct z value as given or better	
	A1	For a 2nd correct equation in any form allow 2dp or better for the z value	
	dM1	Dependent on previous M1. For solving their 2 linear simultaneous equations (Can be implied by both correct answers) If answers are incorrect then we need to see evidence of correct working	
	A1	For $\mu=$ awrt 169 and $\sigma=$ awrt 5.6	
(b)	**B1**	For $Q_1=208.26$ or $Q_3-Q_1=13.48$ Do not accept rounded values	
	M1	For a correct method for finding 1 outlier limit, ft their Q_1 or their IQR. You will need to check that these are correct if no working shown.	
	dM1	Dependent on previous M1. For standardising using their limit(s), 215 and 10 (allow ±) May be implied by ± awrt 2.70 or awrt 0.0035 or awrt 0.993 or final answer of awrt 0.007	
	M1	If using the LHS of the MS: for multiplying their probability by 2 or If using the RHS of the MS: for 1 – their probability May be implied by awrt 0.007	
	A1	awrt 0.007	

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