Question Number	Scheme	Marks
5 (a)	$\bar{x} \pm 1.6449 \times \dfrac{5}{\sqrt{10}}$	M1 B1
	$\bar{x} \pm 2.60 \Rightarrow (\bar{x} - 2.60,\ \bar{x} + 2.60)$ *	A1*
		(3)
(b)	$\bar{y} \pm 1.96 \times \dfrac{3}{\sqrt{20}}$	M1 B1
	$\bar{y} \pm 1.31 \Rightarrow (\bar{y} - 1.31,\ \bar{y} + 1.31)$	A1
		(3)
(c)(i)	$\bar{X} - \bar{Y} \sim \mathrm{N}\left(\mu - \mu,\ \dfrac{5^2}{10} + \dfrac{3^2}{20}\right) \Rightarrow \bar{X} - \bar{Y} \sim \mathrm{N}(0,\ 2.95)$	M1 A1
(ii)	Do not overlap when either	
	$\bar{x} - 2.60 > \bar{y} + '1.31'$ or $\bar{x} + 2.60 < \bar{y} - '1.31'$	M1
	$\bar{x} - \bar{y} > 3.91$ or $\bar{x} - \bar{y} < -3.91$	A1ft
	$2 \times \mathrm{P}(\bar{X} - \bar{Y} > 3.91) = 2 \times \mathrm{P}\left(Z > \dfrac{'3.91' - '0'}{'\sqrt{2.95}'}\right) = \left[2 \times \mathrm{P}(Z > 2.276...)\right]$	M1 M1
	$\left[2 \times 0.0113\right] = 0.0226$ (calculator gives $\left[2 \times 0.0114...\right] = 0.0228$)	A1
		(7)
	Notes	**Total 3**

(a)	**M1**	For use of $\bar{x} \pm z$ value $\times \dfrac{5}{\sqrt{10}}$
	B1	For use of z = 1.6449 or better
	A1*	Answer is given so no incorrect working should be seen (condone use of 1.645)
(b)	**M1**	For use of $\bar{y} \pm z$ value $\times \dfrac{3}{\sqrt{20}}$
	B1	For use of z = 1.96 or better
	A1	For $(\bar{y} - \text{awrt}1.31,\ \bar{y} + \text{awrt}1.31)$ Allow 1.315
(c)(i)	**M1**	For a correct method to find the variance (May be seen in a standardisation expression)
	A1	For $\mathrm{N}(0,\ 2.95)$ (May be seen in a standardisation expression) Allow $\mathrm{N}\left(0,\ \dfrac{5^2}{10} + \dfrac{3^2}{20}\right)$ oe
(ii)	**M1**	For $\bar{x} - 2.60 > \bar{y} + 1.31$ oe or $\bar{x} + 2.60 > \bar{y} - 1.31$ oe ft part (b)
	A1ft	For $\bar{x} - \bar{y} > '3.91'$ or $\bar{x} - \bar{y} < -'3.91'$ ft part (b)
	M1	For multiplying by 2 (may be seen at any stage of their working)
	M1	For standardising ft their 3.91, their mean and their standard deviation (Do not allow use of 2.6 or 1.31 as their 3.91)
	A1	For answers in the range awrt 0.0226 – awrt 0.0228