	A1	dep on M1 scored. It is for identifying student A (as more reliable) oe (e.g. allow 62 or 68 for A) **Note that M0A1 is not possible**

Question Number	**Scheme**	**Marks**
8 (a)(i)	$\left[\mathrm{P}\left(X<440\right)=\right]\mathrm{P}\left(Z<\dfrac{440-443}{3}\right)$	M1
	$\left[\mathrm{P}\left(Z<-1\right)=1-0.8413\right]=0.1587$ (Calc 0.158655…) **awrt 0.159**	A1
(ii)	$\left[\mathrm{P}\left(441.5<X<447.5\right)=\right]\mathrm{P}\left(\dfrac{441.5-443}{3}<Z<\dfrac{447.5-443}{3}\right)$	M1
	$\left[\mathrm{P}\left(-0.5<Z<1.5\right)=0.9332-0.3085\right]=0.6247$ (Calc 0.62465…) **awrt 0.625**	A1
		(4)
(b)	$\dfrac{443+k-443}{3}=2.3263$ or $\dfrac{443-k-443}{3}=-2.3263$	M1 B1
	$k=6.9789$ **awrt 6.98**	A1
		(3)
(c)	$\mathrm{P}\left(Y<338.1\right)=0.025\Rightarrow\dfrac{338.1-\mu}{\sigma}=-1.96$ or $\mathrm{P}\left(Y>344\right)=0.30\Rightarrow\dfrac{344-\mu}{\sigma}=0.5244$	M1 A1A1
	$\left[5.9=2.4844\sigma\Rightarrow\right]\sigma=...,\ \mu=...$	dM1
	$\sigma=2.3748...$ and $\mu=342.7546...$ **awrt 2.37 and awrt 343**	A1
		(5)

	Notes	**Total 12**
	Note	Standardising using $\sigma=9$ scores maximum (a)(i) M0A0 (ii) M0A0 (b)M0B1A0
(a)(i)	**M1**	for standardising using 443 and 3 oe (implied by ±1)
	A1	awrt 0.159 and evidence of standardisation is seen (**answer only is 0/2**)
(ii)	**M1**	for standardising **both** parts using 443 and 3 oe (implied by ±0.5 **and** ±1.5). It cannot be implied by $0.9332-0.3085$
	A1	awrt 0.625 and evidence of standardisation is seen **(answer only is 0/2)**
(b)	**M1**	for achieving an expression of $\pm\frac{k}{3}$ which may be unsimplified. May be seen in an equation or within a probability statement. Look out for use of e.g. $x=443+k$ and standardise $\dfrac{x-443}{3}$ which would still score this mark. Condone if they use *k* for '*x*' provided evidence of substituting back correctly in later work.
	B1	for sight of ± 2.3263 or better
	A1	awrt 6.98 (correct answer with no incorrect method seen scores 3/3) Allow 6.96 for use of $z=\pm2.32$ and allow 6.99 for use of $z=\pm2.33$

		Note that M1B0A1 is possible
Alt(b)	**M1**	Sets $443+k=a$ where $448<a<452$ or sets $443-k=b$ where $434<b<438$
	B1	for sight of either 449.97(90438…) so awrt 449.98 or 436.02(0956…) so awrt 436.02
	A1	awrt 6.98 (correct answer with no incorrect method seen scores 3/3)
(c)	**M1**	for standardising with 338.1 and σ and setting = to a z value where $1.9<\|z\|<2$ or for standardising with 344 and setting = to a z value where $0.5<\|z\|<0.6$
	A1	for **one** correct equation with z value 3sf or better with compatible signs
	A1	for **both** equations correct with z values 3sf or better with compatible signs
	dM1	dep on the previous M. It is for solving simultaneously their two equations in μ and σ and proceeding to values for **both** μ and σ. Condone if σ is negative for this mark. You do not need to check this on your calculator.
	A1	dep on all previous marks scored it is for awrt 2.37 (also accept 2.375) and awrt 343 and **both z values seen** are 3sf or better