Question Number	Scheme	Marks
5 (a)	$X \sim \mathrm{N}(210, 25^2)$	
	$\mathrm{P}(X < 240) = \mathrm{P}\left(Z < \dfrac{240-210}{25}\right)\left[= \mathrm{P}(Z < 1.2)\right]$	M1
	$= 0.8849$*	A1*
		(2)
(b)	$\mathrm{P}(190 < X < 240) = 0.8849 - \mathrm{P}\left(Z < \dfrac{190-210}{25}\right)\left[= 0.8849 - \mathrm{P}(Z < -0.8)\right]$	M1
	$0.8849 - 0.2119 = 0.673$ awrt 0.673	A1
		(2)
(c)	$\dfrac{210+k-210}{25} = 1.96$ or $\dfrac{210-k-210}{25} = -1.96$	M1 B1
	$k = 49$ awrt 49	A1
		(3)
(d)	$\mathrm{P}(X < S) = 0.15 \Rightarrow \dfrac{S-210}{25} = -1.0364$	M1 B1
	$S = 184.09$ awrt 184	A1
		(3)
(e)	$Y \sim \mathrm{N}(\mu,\ \sigma^2)$	
	$\mathrm{P}(Y < 152) = 0.05 \Rightarrow \dfrac{152-\mu}{\sigma} = -1.6449$	M1 A1
	$\mathrm{P}(Y > 180) = 0.40 \Rightarrow \dfrac{180-\mu}{\sigma} = 0.2533$	A1
	$28 = 1.8982\sigma$	dM1
	$\sigma = 14.75...$ and $\mu = 176.26...$	A1
		(5)
	Notes	**Total 15**

(a)	**M1**	For standardising using 240, 210 and 25
	A1*	Cao As the answer is given then no incorrect working should be seen
(b)	**M1**	For standardising using 190/230, 210 and 25 and subtracting from 0.8849 May be implied by $\Phi(1.2) + \Phi(0.8) - 1$ or 0.8849 + 0.7881 – 1
	A1	awrt 0.673
(c)	**M1**	For standardising and setting equal to a z value, where $1.9 < \lvert z \rvert < 2$
	B1	For $\lvert z \rvert = 1.96$ or better
	A1	awrt 49
(d)	**M1**	For standardising using *S* (allow any letter) and setting equal to a *z* value, where $1 < \lvert z \rvert < 1.1$
	B1	For *z* = -1.0364
	A1	awrt 184
(e)	**M1**	For a correct method to form an equation in μ and σ set equal to a *z* value, where $-1.6 < z < -1.7$ or $0.2 < z < 0.3$ (Signs must be compatible)
	A1	For a correct equation for $\mathrm{P}(Y < 152)$
	A1	For a correct equation for $\mathrm{P}(Y > 180)$
	dM1	Dependent on previous M mark. For solving the 2 equations simultaneously. If answers are incorrect then working must be shown. May be implied by σ = awrt 14.8 and μ = awrt 176
	A1	For σ = awrt 14.8 and μ = awrt 176