Question Number	Scheme	Marks
8 (a)	$\frac{162-\mu}{\sigma}=-1.2816$ (Calculator gives $-1.28155\ldots$) or $\frac{175-\mu}{\sigma}=1.04$ (Calculator gives $1.03987\ldots$)	M1 A1 A1
	$\mu-1.2816\sigma=162$	
	$\mu+1.04\sigma=175$	
	$2.3216\sigma=13$	dM1
	$\sigma=5.5995\ldots$ awrt 5.6 $\mu=169.1764\ldots$ 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**	
	$[\mathrm{P}(B>'241.96')=]$ $\mathrm{P}\left(Z>\frac{'241.96'-215}{10}\right)[=\mathrm{P}(Z>2.70)]$ or $[\mathrm{P}(B<'188.04')=]$ $\mathrm{P}\left(Z<\frac{'188.04'-215}{10}\right)[=\mathrm{P}(Z<-2.70)]$ or	$[\mathrm{P}('188.04'<B<'241.96')=]$ $\mathrm{P}\left(\frac{'188.04'-215}{10}<Z<\frac{'241.96'-215}{10}\right)$ $[=\mathrm{P}(-2.70)<Z<\mathrm{P}(2.70)]$	dM1
	$=0.0035$ (Calculator gives $0.0034883\ldots$)	$=0.993$ (Calculator gives $0.99298\ldots$)	
	$\mathrm{P(Outlier)}=2\times'0.0035'$	$\mathrm{P(Outlier)}=1-'0.993'$	M1
	$=0.007$ (Calculator gives $0.006976\ldots$) awrt 0.007	$=0.007$ (Calculator gives $0.007017\ldots$) awrt 0.007	A1
			(5)
	Notes		**Total 10**

Question Number		Scheme	Marks
3.	(a)	$[W\sim\mathrm{N}(64,8^2)]$ $\mathrm{P}(W<51)=\mathrm{P}\left(Z<\frac{51-64}{8}\right)$ <u>or</u> $\mathrm{P}(Z<-1.625)$	M1
		$=1-0.9484$ (calc. $1-0.9479187299\ldots$)	M1
		$=$ awrt **<u>0.052</u>**	A1
			(3)
	(b)	Require: $\mathrm{P}(W>49\mid W<51)$	M1
		$=\frac{\mathrm{P}(49<W<51)}{\mathrm{P}(W<51)}$ <u>or</u> $\frac{\mathrm{P}(-1.875<Z<-1.625)}{\mathrm{P}(Z<-1.625)}$	M1
		$=\frac{0.021684\ldots}{(a)}$	A1ft
		$=0.4163\ldots$ awrt **<u>0.42</u>**	A1
			(4)
	(c)	$[\mathrm{P}(W>H)=0.10\Rightarrow]$ $\frac{H-64}{8}=1.2816$	M1B1
		$H=74.2528\ldots$ awrt **<u>74.3</u>**	A1
			(3)
			[10 marks]

Question Number	Scheme	Marks
3. (a)	[D = distance achieved] $P(D > 4.3) = P\left(Z > \frac{4.3-3.8}{0.9}\right)$ or $P(Z > 0.555\ldots)$	M1
	$= 1 - 0.7123$ (tables)	M1
	$= 0.2877$ (tables) or $0.289257\ldots$ (calc) awrt **0.288** or awrt **0.289**	A1
		(3)
(b)	$\frac{d-3.8}{0.9} = -0.8416$ (calc $-0.84162123\ldots$)	M1 ; B1
	$d = 3.0425\ldots$ awrt **3.04**	A1
		(3)
(c)	$P(D > g \mid D > 4.3) = \frac{P(D > g)}{P(D > 4.3) \text{ or (a)}}$ $\left[= \frac{1}{3}\right]$ (o.e.)	M1
	$\therefore P(D > g) = \frac{1}{3}(a) = 0.096419\ldots$	A1ft (o.e)
	$\frac{g-3.8}{0.9} = 1.302228\ldots$	dM1
	so $g = 4.97200..$ awrt **4.97** or awrt **4.98**	A1
		(4)
(d)	P(no gold medals) = $\left(\frac{2}{3}\right)^3$	M1
	P(at least one gold) = $1 - \left(\frac{2}{3}\right)^3$	M1
	$= \frac{19}{27}$	A1
		(3)
		[13]

Question	Scheme	Marks
4. (a)	$P(Y > 17) = 1 - P(Y < 17) =$ **0.4**	B1
		(1)
(b)	$P(Y < \mu) = 0.5$ or $[P(\mu < Y < 17) =] 0.6 - 0.5$	M1
	$=$ **0.1**	A1
		(2)
(c)	$[P(Y < \mu \mid Y < 17) =]$	
	$\frac{P(Y < \mu)}{P(Y < 17)}$ or $\frac{0.5}{0.6}$	M1
	$= \frac{5}{6}$ awrt **0.833**	A1
		(2)
		[5]

Question Number	Scheme	Marks
5 (a)	$P(X<38.8)=P\left(Z<\frac{38.8-40}{4}\right)\left[=P((Z<-0.3)\right]$	M1
	$=1-0.6179=0.3821*$	A1*
		(2)
(b)	$P(\text{Qualify})=1-(0.3821)^3$ or $1-0.3821+0.3821\times(1-0.3821)+0.3821^2\times(1-0.3821)$	M1
	$[=0.9442]$	
	$P(X>44)=P\left(Z>\frac{44-40}{4}\right)\left[=P((Z>1)\right]$	M1
	$[=1-0.8413]=0.1587$	A1
	$P(X>44 \text{ on 2nd attempt}\mid \text{Qualify})=\frac{0.3821\times'0.1587'}{'0.9442'}$	M1
	0.06422... awrt 0.0642	A1
		(5)
	Notes	**Total 7**

Question Number	Scheme	Marks
6 (a)	$\frac{15-\mu}{\sigma}=1.2816$	M1
	$\frac{5-\mu}{\sigma}=-1.6449$	M1 B1
	$10=2.9265\sigma$	depM1
	$\sigma=3.41705...$ awrt **3.42**	A1
	$\mu=10.6207...$ awrt **10.6**	A1
		(6)
(b)	Number of people $=[23\times]P(L>12)$	
	$=[23\times]P\left(Z>\frac{12-10.6}{3.42}\right)$	M1
	$=23\times(1-0.6591)$	depM1
	$\approx$ awrt 7.8 / awrt 7.9	A1
		(3)
	Notes	Total 9