Question	Answer	Marks	Guidance
(a)	$\mathrm{P}(X < 6) = \mathrm{P}(Z < \dfrac{6-5.2}{1.5}) = \mathrm{P}(Z < 0.5333)$	**M1**	6, 5.2, 1.5 substituted into ± standardisation formula, condone 1.5^2, continuity correction ±0.5
	0.703	**A1**	
		2	
(b)	$z_1 = \dfrac{3-\mu}{\sigma} = -1.329$ $z_2 = \dfrac{8-\mu}{\sigma} = 0.878$	**B1**	$1.328 < z_1 \leqslant 1.329$ or $-1.329 \leqslant z_1 < -1.328$
		B1	$0.877 < z_2 \leqslant 0.878$ or $-0.878 \leqslant z_2 < -0.877$
	Solve to find at least one unknown: $\dfrac{3-\mu}{\sigma} = -1.329$ $\dfrac{8-\mu}{\sigma} = 0.878$	**M1**	Use of the ± standardisation formula once with μ, σ, a z-value (not 0.8179, 0.7910, 0.5367, 0.5753, 0.19, 0.092 etc.) and 3 or 8, condone continuity correction but not σ^2 or $\sqrt{\sigma}$
		M1	Use either the elimination method or the substitution method to solve their two equations in μ and σ
	$\sigma = 2.27, \quad \mu = 6.01$	**A1**	$2.26 \leqslant \sigma \leqslant 2.27$, $6.01 \leqslant \mu \leqslant 6.02$
		5	

Question	Answer	Marks	Guidance
(c)	$[P(Z < -1) + P(Z > 1)]\ \Phi(1) - \Phi(-1) =$ $= 2 - 2\ \Phi(1)$ $= 2 - 2 \times 0.8413$	**M1**	Identify 1 and –1 as the appropriate z-values.
		M1	Calculating the appropriate area from stated phis of z-values which must be ± the same number
	0.3174	**A1**	Accept AWRT 0.317
	Number of leaves: $2000 \times 0.3174 = 634.8$ so 634 or 635	**B1 FT**	FT *their* 4 s.f. (or better) probability, final answer must be positive integer no approximation or rounding stated
		4	