13	**(i)**		calculation of P($X < 14$) and P($X > 18$)	**M1**	**3.4**	or solves $-1.476 = \frac{14-\mu}{\sigma}$ and $0.496 = \frac{18-\mu}{\sigma}$ simultaneously	or solves $-1.476 = \frac{x-15}{2}$ and $0.496 = \frac{x-15}{2}$
			0.3085 and 0.0668 to 1 sf or better	**A1**	**1.1**	$\mu \approx 17$ and $\sigma \approx 2.02$	x = 12.048 and 15.992 to nearest whole number or better
			these figures do not support the model	**A1** **[3]**	**3.5a**	17 is (relatively) far from 15 so not a good fit the second **A1** is only available if the first **A1** is awarded allow **SC2** for showing the model is not a good fit for either value with all working correct or for a complete argument based on symmetry which refers to both tails	which are not close to 14 and 18 or $\frac{14-15}{2}$ and $\frac{18-15}{2}$ evaluated – 0.5 and 1.5 obtained which are not close to –1.476 and 0.496 respectively

Question			Answer	Marks	AOs	Guidance	
13	(ii)		$\Phi^{-1}(0.07) = -1.476 = \frac{14-\mu}{2}$ $[\mu = 16.95]$ **OR** $\Phi^{-1}(0.69) = 0.496 = \frac{18-\mu}{2}$ $[\mu = 17.008]$ $[\mu =]17$	**M1** **A1** **[2]**	**3.5c** **2.4**	*alternatively* since the variance is assumed to be correct, the mean must be as far above the midpoint as it was previously below it. 16 + 1 = 17	if **M0** allow **B2** for 17 unsupported
13	(iii)		$z = \pm 1.96$ used $\frac{16-\mu}{\frac{2}{\sqrt{n}}} < -1.96$ or $\frac{\mu-16}{\frac{2}{\sqrt{n}}} > 1.96$ $\sqrt{n}$ isolated from their $\frac{16-\mu}{\frac{\sigma}{\sqrt{n}}} < -1.96$ oe $[n >]$ 15.3664 – 15.4 $n = 16$ cao	**B1** **M1** **M1** **A1** **A1** **[5]**	**1.1a** **3.1b** **2.1** **3.4** **2.2b**	 allow method marks only if other z – value, eg – 1.645 used; FT μ eg $\sqrt{n} > 2 \times 1.96$ previous **A1** must be awarded for the award of final **A1**	NB 1.959963985…rounded to 3 or more sf **M0** if other value for σ used all marks are available if works with = instead of < or > throughout, but withhold final **A1** if works with < instead of > or > instead of < throughout