Qu. No.	Scheme	Marks
6(a)	$\mathrm{P}(S<303.5)=\mathrm{P}\left(Z<\dfrac{303.5-310}{4}\right)$ or $\mathrm{P}(S>315.5)=\mathrm{P}\left(Z>\dfrac{315.5-310}{4}\right)$	M1
	$=0.05208$ or $0.084565\ldots$ awrt 0.052 or awrt 0.084/0.085	A1
	So $a=5.2$ or $b=8.5$ awrt 5.2 or awrt 8.4/8.5	A1
	e.g. $b=100-10.6-16.3-19.6-18.4-13.6-7.8-$ '5.2'	M1
	Both $a=5.2$ and $b=8.5$ awrt 5.2/5.3 and awrt 8.4/8.5	A1
		(5)
(b)	H_0: The normal distribution N(310, 16) is a suitable model/The data are consistent with the model. H_1: The normal distribution N(310, 16) is not a suitable model/The data are not consistent with the model.	B1
	$\left[X^2=\right]\sum\dfrac{(O-E)^2}{E}=\dfrac{(5-'5.2')^2}{'5.2'}+\dfrac{(4-'8.5')^2}{'8.5'}+9.71$	M1 M1
	$=12.10\ldots$ awrt 12.0 to 12.1	A1
	$\nu=7$	B1
	$\chi^2_7(0.05)=14.067$	B1ft
	[not in the CR/not significant/Do not reject H_0] There is not sufficient evidence to suggest that N[(310, 16)] is not a suitable model/The model is suitable/The data are consistent with the model	A1
		(7)
(c)	$\nu=8-3=5$ / two parameters estimated so additional degrees of freedom subtracted	M1
	Therefore the critical value is reduced/now 11.070	A1
		(2)

	Notes	Total 14
(a)	**M1**	for standardising with 303.5 or 315.5, 310 and 4
	A1	awrt 0.052 or awrt 0.084/0.085
	A1	either correct value
	M1	a complete method to find the second missing value
	A1	both correct values
(b)	**B1**	both hypotheses correct. If mentioning normal, must mention N(310, 16) at least once.
	M1	for either $\dfrac{(5-'5.2')^2}{'5.2'}$ or $\dfrac{(4-'8.5')^2}{'8.5'}$
	M1	for a complete method to find $\sum\dfrac{(O-E)^2}{E}$ e.g. 9.71 + 2 additional terms this mark is independent of the 1st M1
	A1	allow awrt 12.0 to 12.1
	B1	$\nu=7$ This mark can be implied by a correct critical value of 14.067
	B1ft	14.067 (may see 5.991, 7.815, 9.488, 11.070, 12.592)
	A1	dependent on 2nd M1 a correct conclusion which states that the model is suitable and must be consistent with their X^2 value and their χ^2 critical value. If no hypotheses or hypotheses wrong way round do not award.
(c)	**M1**	a statement that implies 2 additional degrees of freedom are subtracted
	A1	a correct conclusion from correct reasoning.

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