Question Number	Scheme	Marks
5 (a)(i)	Quota sampling would remove the need for a sampling frame oe	B1
(ii)	Quota sampling [can be/introduce] bias	B1
		(2)
(b)(i)	$\frac{(66+40)\times 120}{200} = 63.6$	M1 A1
(ii)	$(66+40)-63.6 = 42.4$ or $\frac{(66+40)\times 80}{200} = 42.4$	A1
		(3)
(c)	H_0: Students favourite science **subject** and **place** lived are independent/not associated H_1: Students favourite science **subject** and **placed** lived are not independent/associated	B1
	Observed / Expected / $\frac{(O-E)^2}{E}$ 66 / 63.6 / $\frac{(66-63.6)^2}{63.6}\left[=\frac{24}{265}=0.09056...\right]$ 40 / '42.4' / $\frac{(40-'42.4')^2}{'42.4'}\left[=\frac{36}{265}=0.13584...\right]$	M1
	$\sum\frac{(O-E)^2}{E} = 4.549+'0.09056...'+'0.13584...'$	M1
	$= 4.775\ldots$ awrt 4.78	A1
	$\nu = (2-1)(3-1) = 2$	B1
	$c_2^2(0.1) = 4.605 \Rightarrow$ CR: X^2 …4.605	B1ft
	[in the CR/significant/Reject H_0] There is sufficient evidence to suggest that students' favourite science **subject** is not independent of the **place** they live.	dA1ft
		(7)

	Notes	Total 12
(a)(i)	**B1**	For a correct advantage. Possible advantages (but not an exhaustive list): includes all key subgroups, effective for small populations (Do not allow quick oe or cheap oe or easy oe)
(ii)	**B1**	For a correct disadvantage. Possible disadvantages (but not an exhaustive list): [risk of] non-random [selection], difficulty in setting quotas
(b)(i)	**M1**	For a correct method to find either expected frequency May be implied by 63.6 or 42.4
(ii)	**A1**	For either 63.6 or 42.4
	A1	For both 63.6 and 42.4
(c)	**B1**	For both hypotheses correct. Must mention subject and place at least once. Do not allow correlation to imply association. Allow dependent to imply not independent
	M1	A correct method for finding both contributions to the χ^2 value ft their 63.6 and their 42.4
	M1	Adding their two values to 4.549 (may be implied by a full χ^2 calculation, do not ISW)
	A1	awrt 4.78 **NB** This implies M1M1A1
	B1	$\nu = 2$ This mark can be implied by a correct critical value of 4.605
	B1ft	4.605 or better ft their degrees of freedom [$c_3^2(0.1) = 6.251$]
	dA1ft	Dependent on both M marks being awarded. A correct contextual conclusion, which has the words subject and place (Allow 'where they live' to imply 'the place they live'). Allow an answer in terms of association. Do not allow correlation to imply association. Allow dependent to imply not independent ft their $\sum\frac{(O-E)^2}{E}$ and their χ^2 critical value This mark is independent of hypotheses