Question Number	Scheme	Marks
5(a)(i) (ii)	Quota (sampling)	B1
	e.g. May not reach the quota of customers.	dB1
		(2)
(b)	$\frac{65\times 60}{200}$ or $\frac{57\times 60}{200}$	M1
	19.5 and 17.1	A1
		(2)
(c)	H_0: The type of **products** bought, and customer **age** are independent (not associated) H_1: The type of **products** bought, and customer **age** are not independent (are associated)	B1
	Observed / Expected / $\frac{(O-E)^2}{E}$ 29 / "19.5" / $\frac{(29-"19.5")^2}{"19.5"}=4.628...$ 8 / "17.1" / $\frac{(8-"17.1")^2}{"17.1"}=4.84...$	M1
	$\sum\frac{(O-E)^2}{E}=6.456+"4.628..."+"4.84..."$	M1
	$=15.926...$ **awrt 15.9**	A1
	$\nu=(3-1)(3-1)=4$ $\quad\chi^2_4(0.01)=13.277\Rightarrow \text{CR}: X^2\geqslant 13.277$	B1 B1ft
	[In the CR / Significant / Reject H_0] Sufficient evidence to suggest there is evidence of an association between the range of **products** bought and customer **age**	dA1
		(7)

	Notes	Total 11
(a)(i)	**B1**	Correct sampling method
(a)(ii)	**dB1**	**Dependent on B mark awarded in a(i).** For a suitable contextual comment e.g., customers divided into groups which may not be appropriate or customers who do not want to participate are not recorded. Allow e.g. not all people may want to say what their age is or may give a different age. No reason that this would give a sample representative of the customers, (Condone introduces bias, it is not random so can introduce bias (o.e)) Random on its own is not enough . eg. It is not random\ non-random sampling)– B0,
(b)	**M1**	A correct method for finding one expected value. Implied by one correct value.
	A1	Both answers correct
(c)	**B1**	For both hypotheses and attached to H_0 and H_1 Must mention **product** and **age** at least once. Use of "relationship" or "correlation" or "connection" is B0.
	M1	A correct method for finding **both** missing values for the χ^2 value or awrt 4.63 or awrt 4.84 Allow truncated answers. May be implied by awrt 15.9. May be seen by the table.
	M1	For adding their two values to 6.456 (may be implied by a full χ^2 calculation, with at least 3 correct expressions or values. May be seen by the table.
	A1	awrt 15.9 (Correct answer only with no incorrect working seen M1 M1 A1)
	B1	$\nu=4$ This mark can be implied by a correct critical value of 13.27[7] or better
	B1ft	13.277 or better, ft their degrees of freedom and using a 1% significance level. e.g. $\nu=2$ 9.21[0] or better, $\nu=3$ 11.34[5] or better, $\nu=9$ 21.66[6].or better, $\nu=8$ 20.09[0] or better
	dA1	**Independent of the hypotheses mark but dependent on all other previous marks.**