Question Number	Scheme	Marks
3. (a)	H_0 : There is no association between **centre** and **result** (independent) H_1 : There is an association between **centre** and **result** (dependent) Correct hypotheses with centre and result at least once	B1
	Expd / ***A*** / ***B*** / ***C*** / **Total** **Pass** / 92.482... / 100.970... / 83.546... / 277 **Fail** / 114.517... / 125.029... / 103.453... / 343 **Total** / 207 / 226 / 187 / 620 Some attempt at $\frac{(\text{Row Total})(\text{Column Total})}{(\text{Grand Total})}$ Can be implied by at least one correct E_i to awrt 3 sf	M1
	All expected frequencies are correct to awrt 3 sf	A1
	Observed / Expected / $\frac{(O-E)^2}{E}$ / $\frac{O^2}{E}$ 99 / 92.48 / 0.4596... / 105.9796... 110 / 100.97 / 0.8075... / 119.8375... 68 / 83.55 / 2.8941... / 55.3441... 108 / 114.52 / 0.3712... / 101.8512... 116 / 125.03 / 0.6521... / 107.6221... 119 / 103.45 / 2.3373... / 136.8873... Totals / 7.522 / 627.522... At least 2 correct terms for $\frac{(O-E)^2}{E}$ or $\frac{O^2}{E}$ **or** correct expressions with their E_i. Accept 2 sf accuracy for this mark (dep on 1st M1).	dM1
	At least 5 correct $\frac{(O-E)^2}{E}$ or $\frac{O^2}{E}$ terms to at least 2 sf **or** at least 5 correct (ft) expressions.	A1
	$X^2 = \sum \frac{(O-E)^2}{E}$ or $\sum \frac{O^2}{E} - 620$;= awrt 7.52 For **applying** either $\sum \frac{(O-E)^2}{E}$ or $\sum \frac{O^2}{E} - 620$	M1
	awrt **7.52**	A1
	$\nu = (2-1)(3-1) = 2$ $\nu = 2$ (can be implied)	B1
	$\chi^2_2(0.05) = 5.991 \Rightarrow$ CR: $X^2 \geqslant 5.991$ **5.991** Allow ft on their stated d.f. < 6 For ft: 3.841, 7.815, 9.488, 11.070	B1ft
	[in the CR/significant/Reject H_0] conclude that there is an association between driving test centre and result. (or they are not independent.) A correct conclusion in context which is rejecting H_0 based on ***their*** X^2-value and ***their*** χ^2-critical value. Dep on 3rd M1 and 3rd B1ft. Do not allow contradictory statements. If hypotheses wrong way around, A0.	A1
		[10]
(b)	Test centre *C* *C*	B1
	• e.g. High values of $\frac{(O-E)^2}{E}$ / contributes most to X^2 test statistic • Condone e.g. Observed and expected differences are bigger [for test centre *C* than for any other test centre.] Any valid reason relating to the test statistic.	dB1
		[2]
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