Stats 2 Chi-Squared Contingency Table Tests Answers

2(a)	H_o : Choice independent of gender	B1		gender not associated with choice
	Squash Badminton Archery Hockey Male 5/3.5 16/14 30/24.5 19/28 Female 4/5.5 20/22 33/38.5 53/44	M1		
	Combine Squash and Badminton	M1		$E_i < 5$ (Similar categories)
	S & B Archery Hockey Male 21/17.5 30/24.5 19/28 Female 24/27.5 33/38.5 53/44	M1 M1		
	χ^2 values S & B Archery Hockey Male 0.7000 1.2347 2.8928 Female 0.4455 0.7857 1.8409	M1		
	$\chi^2_{calc} = 7.90$	A1		(7.8 to 7.9)
	$\nu = 2$	B1		
	$\chi^2_{5\%}(2) = 5.991$	B1ft		(on their ν)
	Reject H_o Sufficient evidence, at the 1% level of significance, to support an association between the choice of sport and gender	A1ft	10	reject H_o and H_o stated **or** statement in context
(b)	**More females and fewer males** chose to participate in hockey **than expected**	B1 B1	2	
	Total		**12**	

4(a)(i)

	A	B	Total
22-34	21	32	53
35-39	72	36	108
40-59	27	12	39
Total	120	80	200

B1 for A values
B1 2 for B values

(ii)

H_0 : no association between area and age profile

H_1 : association between area and age profile

B1 At least H_0

O_i	E_i	$\frac{(O_i - E_i)^2}{E_i}$
24	31.8	3.6679
72	64.8	0.8000
24	23.4	0.5538
32	21.2	5.5019
36	43.2	1.2000
12	15.6	0.8308
$\sum O_i = 200$	$\sum E_i = 200$	$\chi^2 = 12.554$

M1 Attempt at Row & Column totals
M1 Attempt at E_i
M1 Attempt at $\frac{(O_i - E_i)^2}{E_i}$
M1 Attempt at χ^2
A1 AWFW 12.5 to 12.6 provided correct method used

$\nu = (3-1)(2-1) = 2$ B1

$\chi^2_{1\%}(2) = 9.210 < 12.554$ B1√ ft on their ν and χ^2

Reject H_0

The evidence suggests that the area within which a school is situated seems to have an effect on the age-profile of the staff employed. E1√ 9 ft on χ^2 and calculated value depends on H_0 correct, if stated

(b) There seems to be fewer staff employed in 22 - 34 age group than expected in school A E1
and more than expected in school B E1 2

Total **13**

7(a)	H_0 : No association between the performances at KS3 and GCE	B1		
	O_i | E_i | $O_i - E_i$ | X^2 60 | 63.55 | −3.55 | 0.1983 55 | 44.64 | 10.36 | 2.4043 40 | 46.81 | −6.81 | 0.9907 55 | 51.25 | 3.75 | 0.2744 32 | 36.00 | −4.00 | 0.4444 38 | 37.75 | 0.25 | 0.0017 47 | 46.33 | 0.67 | 0.0097 31 | 32.54 | −1.54 | 0.0733 35 | 34.13 | 0.87 | 0.0222 43 | 43.87 | −0.87 | 0.0173 26 | 30.82 | −4.82 | 0.7527 38 | 32.31 | 5.69 | 1.0005	M1 M1 M1 M1		E_i $O_i - E_i$ $(O_i - E_i)^2 / E_i$ $\sum$
	$X^2 = 6.1897$	A1		AWFW 6.05 – 6.35
	$\nu = 3 \times 2 = 6 \Rightarrow \chi^2_{90\%} = 10.645$	B1B1√		on their ν
	Do not reject H_0 No evidence to suggest an association between KS3 results and GCE grades at 10% level of significance.	E1√	9	
(b)	More of the students achieving level 7 at KS3 gain grade A's at GCE than expected.	E1	1	
	Total		**10**	

1	H_0: condition independent of treatment H_1: condition dependent upon treatment	B1	
	Totals: 66, 84, 75, 75	B1	
	O | E | $\lvert O-E\rvert-0.5$ | $\frac{(\lvert O-E\rvert-0.5)^2}{E}$ 20 | 33 | 12.5 | 4.7348 55 | 42 | | 3.7202 46 | 33 | | 4.7348 29 | 42 | | 3.7202	M1A1 M1 M1	for E_i attempted, correctly for use of Yates' correction final column
	$\chi^2 = 16.91$	A1	allow 16.9 If no Yates' correction: possible M1A1M0M1A0 If 0.5 incorrectly used: possible M1A1M1M1A0
	$\chi^2_{5\%}(1) = 3.841 < 16.91$ Reject H_0	B1√ A1√	for χ^2 on their ν iff H_0 stated correctly dependent on third M1
	Evidence to suggest that the condition of the patients may be dependent upon the treatment that they received	E1√	10
	Total		**10**