



ASSESSMENT and  
QUALIFICATIONS  
ALLIANCE

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# Mark scheme January 2004

## GCE

## Mathematics & Statistics B

## Unit MBS1

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## Key to mark scheme

<b>M</b>	mark is for	method
<b>m</b>	mark is dependent on one or more M marks and is for	method
<b>A</b>	mark is dependent on M or m mark and is for	accuracy
<b>B</b>	mark is independent of M or m marks and is for	method and accuracy
<b>E</b>	mark is for	explanation
<b>√ or ft or F</b>		follow through from previous incorrect result
<b>CAO</b>		correct answer only
<b>AWFW</b>		anything which falls within
<b>AWRT</b>		anything which rounds to
<b>AG</b>		answer given
<b>SC</b>		special case
<b>OE</b>		or equivalent
<b>A2,1</b>		2 or 1 (or 0) accuracy marks
<b>- x EE</b>		Deduct $x$ marks for each error
<b>NMS</b>		No method shown
<b>PI</b>		Perhaps implied
<b>c</b>		Candidate

## Abbreviations used in marking

<b>MC - <math>x</math></b>	deducted $x$ marks for miscopy
<b>MR - <math>x</math></b>	deducted $x$ marks for misread
<b>ISW</b>	ignored subsequent working
<b>BOD</b>	gave benefit of doubt
<b>WR</b>	work replaced by candidate

## Application of mark scheme

Correct answer without working	mark as in scheme
Incorrect answer without working	zero marks unless specified otherwise

Award method and accuracy marks as appropriate to an alternative solution using a correct method or partially correct method.

Question Number and part	Solution	Marks	Total	Comments
1(a)(i)	$P(6 \text{ or fewer}) = 0.3782$	M1 A1		Correct use of Poisson tables or formula 0.378 (0.378 – 0.379)
(ii)	$P(8) = 0.6620 - 0.5246 = 0.137$	M1 A1	4	$P(8) = P(8 \text{ or fewer}) - P(7 \text{ or fewer})$ <b>or</b> use of correct formula 0.137 (0.137 , 0.138)
(b)	$\sqrt{7.5} = 2.74$	M1 A1	2	method <span style="float: right;">sc B1 var = 7.5</span> 2.74 (2.73 , 2.74)
<b>Total</b>			<b>6</b>	
2 (a)	0.209	B3	3	0.209 – 0.21 allow M2A1 if method shown
(b)	Little evidence of linear association between Henri's and Michelle's estimates. Such slight evidence as there is suggests some agreement.	E1✓ E1✓	2	Small/weak/no Some evidence of agreement Allow a mark for appropriate mention of 'linear' (not for 'positive')
<b>Total</b>			<b>5</b>	
3 (a)(i)	Mean number of courses of treatment for all adult dental patients in England	E1		Definition implied
(ii)	Mean for participants	E1	2	In context
(b)(i)	All teachers	E1		Reason
(ii)	No, all from local schools	M1 A1	3	No Reason
<b>Total</b>			<b>5</b>	



Question Number and part	Solution	Marks	Total	Comments
6(a)(i)	Binomial $n = 8$ $p = 0.3$	B1		Binomial
	$P(2 \text{ or fewer}) = 0.552$	B1		8, 0.3
(ii)	$P(2) = 0.5518 - 0.2553 = 0.2965$	B1		0.552 (0.551, 0.5525)
		M1		$P(2 \text{ or fewer}) - P(1 \text{ or fewer})$ or use of correct formula
(iii)	$P(>3) = 1 - 0.8059 = 0.194$	A1		0.2965 (0.296, 0.297)
		M1		$P(>3) = 1 - P(3 \text{ or fewer})$ or use of correct formula
		A1	7	0.194 (0.193, 0.195)
				sc B1 0.448 (0.448, 0.449)
(b)	No, $n$ not constant/probabilities not random/not independent/0,1 not possible outcomes	M1		No
		A1	2	Reason
(c)	No, $p$ not constant/ not independent	M1		No
		A1	2	Reason
	<b>Total</b>		<b>11</b>	
7(a)	0.3	B1	1	0.3 cao
(b)	$0.6 \times 0.3 \times 0.75 = 0.135$	M1		3 probabilities multiplied
		m1		Correct method
		A1	3	0.135 cao
(c)(i)	$0.4 \times 0.3 + 0.12$	M1		method – may be earned in (ii)
		A1		0.12 cao
(ii)	$0.75 \times 0.4 = 0.3$	A1	3	0.3 cao
(d)	$0.5 \times 0.12 + 0.5 \times 0.3 = 0.21$	M1		Use of 0.5
		m1		Correct method
		A1	3	0.21 cao
	<b>Total</b>		<b>10</b>	

Question Number and part	Solution	Marks	Total	Comments
8(a)	(See graph on next page)	M1 B1 A1	3	method for scatter diagram Scales and labels Accurate plot (by eye) allow one small slip
(b)	$y = -2.70 + 0.268x$ $x = 20 \quad y = 2.67 \quad x = 200 \quad y = 50.99$ + line	B2 B2 M1 A1	6	- 2.70 (-2.69 , - 2.7) sc B1 2.70 0.268 (0.268 , 0.269) Allow M1 A1 M1 A1 if method shown method for line Accurate line
(c)(i)	I $17 - (-2.6951) - 0.268437 \times 88$ $= -3.93$ J $47 - (-2.6951) - 0.268437 \times 195$ $= -2.65$	M1 m1 A1	3	method their line – ignore sign method needs all previous M marks- ignore sign -3.93 (-3.8 , - 4) and -2.65 (-2.5 , -2.7) allow read from graph, allow -3
(ii)	5.13	M1 A1	2	Method 5.13 (5.1 , 5.2)
(d)(i)	26.8	B1	1	26.8 (26.7 , 27)
(ii)	£22 about £5 below amount predicted by regression equation. Similar to mean residual. No reason to say Karen should have been supervised.	E1✓ E1✓	2	Below predicted amount No reason to say she should have been supervised, with references to residuals implied
	<b>Total</b>		<b>17</b>	
	<b>TOTAL</b>		<b>80</b>	

Graph for Q 8(a)

