OCR
RECOGNISING ACHIEVEMENT

GCE

Statistics (MEI)

Advanced Subsidiary GCE **AS H132**

Mark Scheme for the Units

June 2008

H132/MS/R/08J

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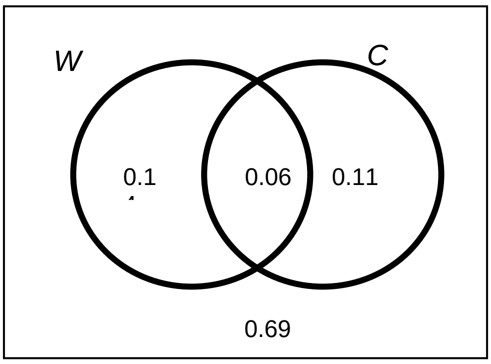
CONTENTS

Advanced Subsidiary GCE Statistics (H132)

MARK SCHEMES FOR THE UNITS

G241 Statistics 1

1		(i)	Mean = 7.35 (or better) Standard deviation: 3.69 – 3.70 (awfw) Allow s^2 = 13.62 to 13.68 Allow rmsd = 3.64 – 3.66 (awfw) **After B0, B0 scored** then if at least 4 correct mid-points seen or used. {**1.5, 4, 6, 8.5, 15**} Attempt of their mean $= \frac{\sum fx}{\mathbf{44}}$, with $301 \le fx \le 346$ and fx strictly from mid-points not class widths or top/lower boundaries.	B2cao $\sum fx = 323.5$ B2cao $\sum fx^2 =$ 2964.25 (B1) for variance s.o.i.o (B1) for rmsd (B1) mid-points (B1) $6.84 \le \text{mean} \le 7.86$	4
		(ii)	Upper limit = 7.35 + 2 × 3.69 = 14.73 or 'their sensible mean' + 2 × 'their sensible s.d.' So there could be one or more outliers	M1 (with s.d. < mean) E1**dep** on B2, B2 earned and comment	2
				TOTAL	**6**
2		(i)	P(*W*) × P(*C*) = 0.20 × 0.17 = 0.034 P(*W*∩*C*) = 0.06 (given in the question) Not equal so not independent (Allow 0.20 × 0.17 ≠ 0.06 or ≠ p (W ∩ C) so not independent).	M1 for multiplying or 0.034 seen A1 (numerical justification needed)	2
		(ii)	 The last two G marks are independent of the labels	G1 for two **overlapping** circles labelled G1 for 0.06 and either 0.14 or 0.11 in the **correct places** G1 for all 4 **correct** probs in the **correct** places **(including the 0.69)** NB No credit for Karnaugh maps here	3
		(iii)	$P(W\|C) = \frac{P(W \cap C)}{P(C)} = \frac{0.06}{0.17} = \frac{6}{17} = 0.353$ (awrt 0.35)	M1 for 0.06 / 0.17 A1 cao	2

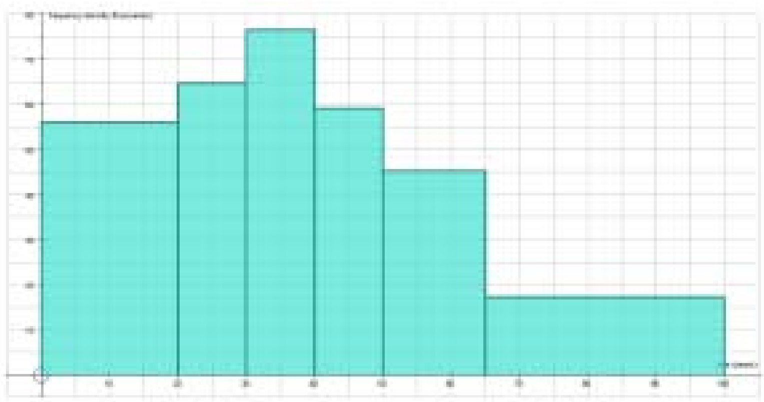
		(iv)	Children are more likely than adults to be able to speak Welsh or 'proportionally more children speak Welsh than adults' Do not accept: **'**more Welsh children speak Welsh than adults'	E1FT Once the correct idea is seen, apply ISW	**1**
				TOTAL	**8**

3		(i)	(A) $0.5 + 0.35 + p + q = 1$ so $p + q = 0.15$ (B) $0 \times 0.5 + 1 \times 0.35 + 2p + 3q = 0.67$ so $2p + 3q = 0.32$ (C) from above $2p + 2q = 0.30$ so $q = 0.02, p = 0.13$	B1 p + q in a correct equation before they reach p + q =0.15 B1 2p + 3q in a correct equation before they reach 2p + 3q = 0.32 (B1) for any 1 correct answer B2 for both correct answers	1 1 2
		(ii)	$E(X^2) = 0 \times 0.5 + 1 \times 0.35 + 4 \times 0.13 + 9 \times 0.02 = 1.05$ Var(X) = 'their 1.05' – $0.67^2 = 0.6011$ (awrt 0.6) (M1, M1 can be earned with their p^+ and q^+ but not A mark)	M1 $\Sigma x^2 p$ (at least 2 non zero terms correct) M1dep for (– 0.67^2), provided Var(X) > 0 A1 cao (No n or n-1 divisors)	3
				TOTAL	7
4		(i)	$X \sim B(8, 0.05)$ (A) $P(X = 0) = 0.95^8 = 0.6634$ 0.663 or better *Or* using tables $P(X = 0) = 0.6634$ (B) $P(X = 1) = \binom{8}{1} \times 0.05 \times 0.95^7 = 0.2793$ $P(X > 1) = 1 - (0.6634 + 0.2793) = 0.0573$ *Or* using tables $P(X > 1) = 1 - 0.9428 = 0.0572$	M1 0.95^8 A1 CAO Or B2 (tables) M1 for $P(X = 1)$(allow 0.28 or better) M1 for $1 - P(X \le 1)$ must have both probabilities A1cao (0.0572 – 0.0573) M1 for $P(X \le 1)$ 0.9428 M1 for $1 - P(X \le 1)$ A1 cao (must end in…2)	2 3
		(ii)	Expected number of days = 250 × 0.0572 = 14.3 awrt	M1 for 250 x prob(B) A1 FT but no rounding at end	2
				TOTAL	7
5		(i)	Let p = probability of remembering or naming all items (for population) (whilst listening to music.) H_0: $p = 0.35$ H_1: $p > 0.35$ H_1 has this form since the student believes that the	B1 for definition of p B1 for H_0 B1 for H_1 E1dep on p>0.35 in	

			probability will be increased/ improved/ got better /gone up.	H_0 In words not just because p > 0.35	4
		(ii)	Let $X \sim B(15, 0.35)$ ***Either:*** $P(X \geq 8) = 1 - 0.8868 = 0.1132 > 5\%$ Or $0.8868 < 95\%$ So not enough evidence to reject H_0 (Accept H_o) Conclude that there is not enough evidence to indicate that the probability of remembering all of the items is improved / improved/ got better /gone up. (when listening to music.) -- ***Or:*** Critical region for the test is {9,10,11,12,13,14,15} 8 does not lie in the critical region. So not enough evidence to reject H_0 Conclude that there is not enough evidence to indicate that the probability of remembering all of the items is improved / improved/ got better /gone up. (when listening to music.) -- ***Or:*** The smallest critical region that 8 could fall into is {8, 9, 10, 11, 12, 13, 14, and 15}. The size of this region is 0.1132 $0.1132 > 5\%$ So not enough evidence to reject H_0 Conclude that there is not enough evidence to indicate that the probability of remembering all of the items is improved (when listening to music)	***Either:*** M1 for probability (0.1132) M1**dep** for comparison A1**dep** E1**dep on all previous marks** for conclusion in **context** --------------------------- ***Or:*** M1 for correct CR(no omissions or additions) M1**dep** for 8 does not lie in CR A1**dep** E1**dep on all previous marks** for conclusion in **context** --------------------------- **Or**: M1 for CR{8,9,…15}**and** size = 0.1132 M1 **dep** for comparison A1**dep** E1**dep on all previous marks** for conclusion in **context**	4
				TOTAL	**8**

			Section B		
6		(i)	(*A*) P(both rest of UK) = 0.20×0.20 = 0.04	M1 for multiplying A1cao	2
			(*B*) *Either:* **All 5 case** P(at least one England) = (0.79 x 0.20) + (0.79 x 0.01) + (0.20 x 0.79) + (0.01 x 0.79) + (0.79 x 0.79) = 0.158 + 0.0079 + 0.158 + 0.0079 + 0.6241 = 0.9559 *Or* P(at least one England) = 1 – P(neither England) = 1 – (0.21×0.21) = 1 – 0.0441 = 0.9559 or listing all = 1 –{ (0.2 x 0.2) + (0.2 x 0.01) + (0.01 x 0.20) + (0.01x 0.01)} = 1 – (**) = 1 – { 0.04 + 0.002 + 0.002 + 0.0001) = 1 – 0.0441 = 0.9559 Or: **All 3 case** P(at least one England) = = $0.79 \times 0.21 + 0.21 \times 0.79 + 0.79^2$ = 0.1659 + 0.1659 + 0.6241 = 0.9559	M1 for any correct term (3case or 5case) M1 for correct sum of all 3 (or of all 5) with **no extras** A1cao (condone 0.96 www) *Or* M1 for 0.21×0.21 or for (**) fully enumerated or 0.0441 seen M1**dep** for 1 – (1st part) A1cao See above for 3 case	3
			(*C*)*Either* 0.79 x 0.79 + 0.79 x 0.2 + 0.2 x 0.79 + 0.2 x 0.2 = 0.9801 *Or* 0.99×0.99 = 0.9801 Or 1 – { 0.79 x 0.01 + 0.2 x 0.01 + 0.01 x 0.79 + 0.01 x 0.02 + 0.01^2 } = 1 – 0.0199 = 0.9801	M1 for sight of all 4 correct terms summed A1 cao (condone 0.98 www) *or* M1 for 0.99 x 0.99 A1cao ***Or*** M1 for everything 1 – {…..} A1cao	2

		(ii)	P(both the rest of the UK | neither overseas) $= \dfrac{\text{P(the rest of the UK } \textit{and} \text{ neither overseas)}}{\text{P(neither overseas)}}$ $= \dfrac{0.04}{0.9801} = 0.0408$ {Watch for: $\dfrac{answer(A)}{answer(C)}$ as evidence of method (p <1)}	M1 for numerator of 0.04 or 'their answer to (i)(A)' M1 for denominator of 0.9801 or 'their answer to (i) (C)' A1 FT (0 < p < 1) 0.041 at least	**3**
		(iii)	(A) Probability = $1 - 0.79^5$ $= 1 - 0.3077$ $= 0.6923$ (accept awrt 0.69) see additional notes for alternative solution (B) $1 - 0.79^n > 0.9$ **EITHER:** $1 - 0.79^n > 0.9$ or $0.79^n < 0.1$ (condone = and ≥ throughout) but not reverse inequality $n > \dfrac{\log \mathbf{0.1}}{\log \mathbf{0.79}}$, so $n > 9.768…$ Minimum $n = 10$ Accept $n \geq 10$ -- **OR** (using trial and improvement): Trial with 0.79^9 or 0.79^{10} $1 - 0.79^9 = 0.8801$ (< 0.9) or $0.79^9 = 0.1198$ (> 0.1) $1 - 0.79^{10} = 0.9053$ (> 0.9) or $0.79^{10} = 0.09468$ (< 0.1) Minimum $n = 10$ Accept $n \geq 10$ -- NOTE: $n = 10$ unsupported scores SC1 only	M1 for 0.79^5 or 0.3077... M1 for $1 - 0.79^5$ dep A1 CAO M1 for equation/inequality in n (accept either statement opposite) M1(indep) for process of using logs i.e. $\dfrac{\log a}{\log b}$ A1 CAO ---------------------------- M1(indep) for sight of 0.8801 **or** 0.1198 M1(indep) for sight of 0.9053 **or** 0.09468 A1 dep **on both M's** cao ----------------------------	**3** **3** **3**
				TOTAL	**16**

7		**(i)**	Positive	B1	**1**
		(ii)	Number of people = 20 × 33 (000) + 5 × 58 (000) = 660 (000) + 290 (000) = 950 000	M1 first term M1(indep) second term A1 cao NB answer of 950 scores M2A0	**3**
		(iii)	(*A*) *a* = 1810 + 340 = 2150 (*B*) Median = age of 1 385 (000th) person or 1385.5 (000) Age 30, cf = 1 240 (000); age 40, cf = 1 810 (000) Estimate median = (30) + $\frac{\mathbf{145}}{\mathbf{570}} \times \mathbf{10}$ Median = 32.5 years (32.54...) If no working shown then 32.54 or better is needed to gain the M1A1. If 32.5 seen with **no previous working** allow SC1	M1 for sum A1 cao 2150 or 2150 thousand but not 215000 B1 for 1 385 (000) or 1385.5 M1 for attempt to interpolate $\frac{\mathbf{145}k}{\mathbf{570}k} \times 10$ (2.54 or better suggests this) A1 cao min 1dp	**2** **3**
		(iv)	Frequency densities: 56, 65, 77, 59, 45, 17 *(accept 45.33 and 17.43 for 45 and 17)* 	B1 for any one correct B1 for all correct (soi by listing or from histogram) **Note: all G marks below *dep* on attempt at frequency density, NOT frequency** G1 Linear scales on both axes (no inequalities) G1 Heights FT their listed fds or all must be correct. **Also widths. All blocks joined** G1 Appropriate label for vertical	 **5**

				scale eg 'Frequency density (thousands)', 'frequency (thousands) per 10 years', 'thousands of people per 10 years'. (allow key). **OR f.d.**	
		(v)	Any two suitable comments such as: Outer London has a greater proportion (or %) of people under 20 (or almost equal proportion) The modal group in Inner London is 20-30 but in Outer London it is 30-40 Outer London has a greater proportion (14%) of aged 65+ **All** populations in **each** age group are higher in Outer London Outer London has a more evenly spread distribution or balanced distribution (ages) o.e.	E1 E1	**2**
		(vi)	Mean increase ↑ median unchanged (-) midrange increase ↑ standard deviation increase ↑ interquartile range unchanged. (-)	Any one correct B1 Any two correct B2 Any three correct B3 All **five** correct B4	**4**
				TOTAL	**20**

G242 Statistics 2

1		(i)	Scots pine seedlings occur randomly and independently with uniform mean rate.	B1 B1	**2**
1	*A* *B*	(ii)	$e^{-8}\times 8^7 \div 7!$ (0.4530-03134 from tables) 0.1396 $1 - P(X \le 7)$ 1 – 0.4530 0.547	M1 A1 M1 A1	 **2** **2**
1		(iii)	$(1 - (\text{ii})B)^5$ [$= 0.453^5$] $1 - 0.453^5$ 0.9809	M1 M1 A1	 **3**
1		(iv)	$P(\text{height} > 70) = P(Z > \frac{70-56}{20}) = P(Z > 0.7)$ $= 1 - \Phi(0.7) = 1 - 0.7580$ (= 0.242 (answer given))	M1 A1	 **2**
1		(v)	z = 1.645 -1.645×20 + 56 23.1	B1 (±) M1 (-ive z) A1	 **3**
2		(i)	Mean = 185 Variance = 210.727	B1 B1	 **2**
2		(ii)	$H_0 : \mu = 175$ & $H_1 : \mu > 175$ Where μ represents the mean decrease for the underlying population. $t = \frac{185-175}{SD/\sqrt{12}} = 2.39$ (3s.f.) 11 degrees of freedom At 5% level, critical value of *t* is 1.796 2.39 > 1.796 so the result is significant. Evidence suggests the mean decrease in cholesterol level is more than 175.	B1 B1 M1 A1 FT B1 B1 M1A1 A1	 **9**
2		(iii)	The decrease in cholesterol level in the underlying population follows a Normal distribution. The sample is assumed to be random.	E1(Normal) E1(Random)	**2**

<table>
<tr><td>3</td><td></td><td>(i)</td><td>H_0: there is no association between gum disease and coronary artery disease
H_1: there is an association between gum disease and coronary artery disease

Expected frequencies
<table><tr><td></td><td>With g.d.</td><td>Without g.d.</td></tr><tr><td>With c.a.d</td><td>48.62</td><td>36.38</td></tr><tr><td>Without c.a.d.</td><td>94.38</td><td>70.62</td></tr></table>
Contributions to X^2 (without Yates' correction)
<table><tr><td></td><td>With g.d.</td><td>Without g.d.</td></tr><tr><td>With c.a.d</td><td>1.52827</td><td>2.04245</td></tr><tr><td>Without c.a.d.</td><td>0.78729</td><td>1.05217</td></tr></table>
Contributions to X^2 (with Yates' correction)
<table><tr><td></td><td>With g.d.</td><td>Without g.d.</td></tr><tr><td>With c.a.d</td><td>1.35612</td><td>1.81238</td></tr><tr><td>Without c.a.d.</td><td>0.69861</td><td>0.93365</td></tr></table>
$X^2 = 5.4102$ (or 4.8008 with Yates' correction)
1 degree of freedom
Critical value at 5% level is 3.841
As 5.4102 (or 4.8008) > 3.841 the result is significant
There is evidence of an association between gum disease and coronary artery disease</td><td>B1

M1
A1

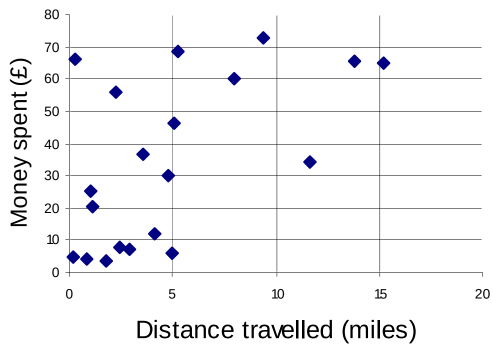
M1
M1 (summation)

A1 CAO
B1
B1
M1
A1(in context)</td><td>10</td></tr>
<tr><td>3</td><td></td><td>(ii)</td><td>2 degrees of freedom
Critical value at 5% level is 5.991
8.2808 > 5.991 the result is significant
There is evidence of an association between age and coronary artery disease</td><td>B1
B1
M1
A1(in context)</td><td>4</td></tr>
<tr><td>3</td><td></td><td>(iii)</td><td>Suitable comments (in context)</td><td>E1
E1</td><td>2</td></tr>
</table>

4		(i)	H_0: population median = 26 H_1: population median < 26 Actual differences -3 17 -10 -11 -4 7 1 -15 -8 -2 -16 -6 Associated ranks 3 12 8 9 4 6 1 10 7 2 11 5 $T^- = 3 + 8 + 9 + 4 + 10 + 7 + 2 + 11 + 5 = 59$ $T^+ = 12 + 6 + 1 = 19$ $\therefore T = 19$ From tables – at the 5% level of significance in a one-tailed Wilcoxon signed rank test, the critical value of T is 17 $19 > 17 \therefore$ the result is not significant The evidence does not suggest a decrease in the numbers of ants this year.	B1 B1 B1 M1 A1 B1 B1 B1 B1 M1 A1 E1	**12**
4		(ii)	Variable - symmetry Sample - random	E1 E1	**2**

5		(i)	If hamsters choose their bedding randomly then the three options will be equally likely to occur. Hence the probability that a hamster chooses the new material will be ⅓.	E1	**1**
5		(ii)	0.0390, 0.1561, 0.2731, 0.2732, 0.1707, 0.0682, 0.0197 5.85, 23.415, 40.965, 40.98, 25.605, 10.23, 2.955	M1 A2 M1 A1	**5**
5		(iii)	H_0: B(8, ⅓) is a good model H_1: B(8, ⅓) is not a good model Merge final two cells. $X^2 = \frac{(10-5.85)^2}{5.85} + \frac{(31-23.415)^2}{23.415} + \frac{(42-40.965)^2}{40.965} + \frac{(34-40.98)^2}{40.98} + \frac{(19-25.605)^2}{25.605} + \frac{(14-13.185)^2}{13.185}$ = 8.370 5 degrees of freedom (6-1) Critical value at 5% level is 11.07 (FT their dof) 8.370 < 11.07 the result is not significant. No evidence to suggest the binomial distribution is not a good model.	B1 M1 M1 [$(o-e)^2/e$] M1 [sum] A1 B1 B1 M1 A1	**9**

G243 Statistics 3

1		(i)	Quota sampling. **Advantage** – probably the only realistic way to get a reasonably 'representative' sample in these circumstances. **Disadvantage** – non-random, so statistical analysis is complicated.	B1 E1 E1	Or other sensible comments. Eg cost or time effective as an advantage	3
	(a)	(ii)		G1 G1 G1	Axes, including labels. Correct zero. All points correct (allow 2 errors).	3
	(b)		Ranks: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 3 18 1 9 8 2 14 6 5 12 7 10 4 13 19 15 20 11 17 16 $\|d\|$ 2 16 2 5 3 4 7 2 4 2 4 2 9 1 4 1 3 7 2 4 $r_s = 1 - \frac{6 \times 584}{20 \times 399} = 1 - 0.4391 = 0.5609$ Critical point for *n*=20 at two-sided 5% level is 0.4466 Significant. Seems there is an association between distance travelled and money spent.	B2 M1 A1 B1 E1 E1	Allow B1 if one or two errors. CAO. No FT if wrong. No access to these marks if value of r_s is nonsense.	7
	(c)		Some sensible explanation of "no". Scatter diagram does not suggest bivariate Normality.	M1 A1	SC1. Allow 1 out of 2 if "bivariate" missing. SC2. Allow 1 out of 2 for sensible comment re "outliners". No marks for "data not linear".	2
2						
		(i)	$H_0 : \mu_A = \mu_B$ $H_1 : \mu_A \neq \mu_B$ Where μ_A, μ_B are the population mean lengths for the machines.	B1 B1 B1	Do not allow $\bar{A}, \bar{B}$ or similar unless they are clearly and explicitly stated to be population means. Hypotheses in words must include "population".	

			$\bar{x}_1 = \frac{184.5}{90} = 2.05$, $\bar{x}_2 = \frac{156.0}{75} = 2.08$	B1	For adequate verbal definition. Allow absence of "population" here if correct notation μ has been used.	
			$s_1^2 = \frac{1}{89}(396.94 - \frac{184.5^2}{90}) = \frac{18.715}{89} = 0.2103$ $s_2^2 = \frac{1}{74}(334.19 - \frac{156.0^2}{75}) = \frac{9.71}{74} = 0.1312$	M1 A1	M0 A0 for divisor *n*, but FT.	
			Because the samples are large, the values of s_1^2 and s_2^2 are taken as σ_1^2 and σ_2^2.	M1	Accept as implicit if s_1^2 and s_2^2 are <u>correctly</u> used in sequel.	
			Two-sample test based on N(0,1).	M1		
			Test statistic is: $\frac{2.05 - 2.08\ (-0)}{\sqrt{\frac{0.2103}{90} + \frac{0.1312}{75}}} = -\frac{0.03}{\sqrt{0.004086}} = -\frac{0.03}{0.0639} = -0.46\,(93)$	M1 A1	Accept usual alternatives.	
			Double-tailed 10% point of N(0,1) is 1.645. Not significant. No reason to suppose mean lengths differ.	A1 E1 E1	No FT if wrong.	13
		(ii)	Samples are large, so by the Central Limit Theorem the underlying distribution of the sample means will be approximately Normal.	E2	(2, 1, 0)	2
3						
		(i)	Differences are: 14 16 6 -8 -24 12 2 -15 10 -1 Ranks of $\|d\|$ 7 9 3 4 10 6 2 8 5 1	B1 M1 A1	FT if M1 earned or if d (not |d|) ranked.	
			Test statistic is 4+10+8+1=23 (or 7+9+3+6+2+5=32)	M1 A1	FT if M1 earned.	
			Refer to paired Wilcoxon table with *n*=10.	M1	No FT if wrong.	
			Need lower 2½% point which is 8 (or, if 32 used, upper 2½% point which is 47).	A1	No FT if wrong.	
			Not significant.	E1		
			Seems underlying median total journey times may be assumed equal.	E1		9
		(ii)	The "pairing" will eliminate any differences between the weeks - so can compare the two airlines.	E1 E1		2

		(iii)	Two sensible comments such as: - check-in and waiting times not in airlines' control - time for collecting luggage not in airlines' control - other journey criteria might be of importance (e.g. departure time, on-board service, fares).	E2 E2	Reward any two sensible comments for (E2 each) (2,1,0). For 2 marks there must be some comment to the effect of <u>comparison</u>, not merely that a factor might affect both airlines.	4
4						
		(i)	Randomisation: to guard against possible unsuspected sources of bias - caused by fertility patterns among the plots.	E1 E1	Or equivalent comments.	2
		(ii)	Replication: so that natural variation can be measured, so that any observed inter-variety variation can be compared with it.	E1 E1	Or equivalent comments.	2
		(iii)	Normality of <u>both populations,</u> equal <u>population</u> variances. $H_0 : \mu_A = \mu_B$ $H_1 : \mu_A \neq \mu_B$ where μ_A, μ_B are the population means for varieties A and B. $A : \bar{x} = 23.50$, $s_{n-1} = 0.9529$ $B : \bar{y} = 21.94$, $s_{n-1} = 0.8649$ Pooled $s^2 = \frac{(5\times 0.908)+(4\times 0.748)}{9} = \frac{7.532}{9} = 0.836\dot{8}$ Test statistic is $\frac{23.50 - 21.94(-0)}{\sqrt{0.836\dot{8}}\sqrt{\frac{1}{6}+\frac{1}{5}}}$ $= \frac{1.56}{0.5539(5)} = 2.816$ Refer to t_9. Double-tailed 5% point is 2.262.	B1 B1 B1 B1 B1 M1 A1 M1 M1 M1 A1	Do not allow $\overline{A}, \overline{B}$ or similar unless they are clearly and explicitly stated to be <u>population</u> means. Hypotheses in words must include "population". Do not allow s_n: 0.8699,0.7736 For any reasonable attempt at pooling. If correct. For numerator. For $\sqrt{0.836\dot{8}}$ (or cand's value). For $\sqrt{\frac{1}{6}+\frac{1}{5}}$. FT from here if all M marks earned.	

			Significant. Appears that population mean yields are different.	M1 A1 E1 E1	No FT if wrong. [accept usual No FT if wrong. [alternatives.]	15
		(iv)	The pairing will eliminate differences around the field. - can compare the plots within the pairs.	E1 E1		2
		(v)	Refer to t_4. Single-tailed 5% point is 2.132. Not significant. No evidence to reject NH that population mean yields of A and V are the same. Normality of underlying population of differences.	M1 A1 E1 E1 B1 B1	No FT if wrong. No FT if wrong.	6

Grade Thresholds

Advanced Subsidiary GCE Statistics MEI (H132)
June 2008 Examination Series

Unit Threshold Marks

Unit		**Maximum Mark**	**a**	**b**	**c**	**d**	**e**	**u**
G241	Raw	72	53	45	38	31	24	0
	UMS	100	80	70	60	50	40	0
G242	Raw	72	56	49	42	35	28	0
	UMS	100	80	70	60	50	40	0
G243	Raw	72	56	48	40	33	26	0
	UMS	100	80	70	60	50	40	0

Specification Aggregation Results

Overall threshold marks in UMS (ie after conversion of raw marks to uniform marks)

	Maximum Mark	**A**	**B**	**C**	**D**	**E**	**U**
H132	300	240	210	180	150	120	0

The cumulative percentage of candidates awarded each grade was as follows:

	A	**B**	**C**	**D**	**E**	**U**	**Total Number of Candidates**
H132	9.7	12.9	35.5	51.6	64.5	100	31

For a description of how UMS marks are calculated see: http://www.ocr.org.uk/learners/ums_results.html

Statistics are correct at the time of publication.

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