

CAMBRIDGE
INTERNATIONAL EXAMINATIONS

November 2003

**GCE A AND AS LEVEL
AICE**

MARK SCHEME

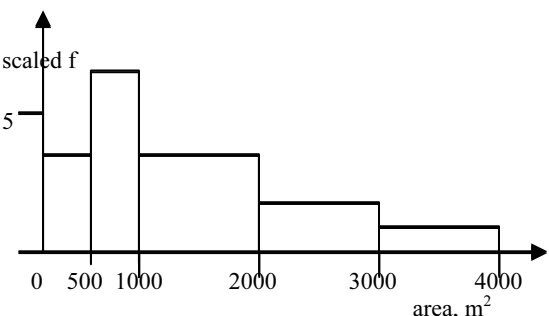
MAXIMUM MARK: 50

SYLLABUS/COMPONENT: 9709/06, 0390/06

**MATHEMATICS
Paper 6 (Probability and Statistics 1)**



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	AICE AND A AND AS LEVEL – NOVEMBER 2003	9709/0390	6

1 x 0 2 freq 23 17 OR $P(0) = 23/40$, $P(2) = 17/40$ Mean = $34/40 = 0.850$ Variance = $(4 \times 17) / 40 - (0.85)^2$ = 0.978 (exact answer 0.9775) (391/400)	M1 A1 M1 A1ft 4	For reasonable attempt at the mean using freqs or probs but not using prob=0.5 For correct mean For correct variance formula For correct answer
frequencies: 3, 7, 6, 3, 1 scaled frequencies: 3, 7, 3, 1.5, 0.5 or 0.006, 0.014, 0.006, 0.003, 0.001 	M1 A1 B1 B1 4	For frequencies and attempt at scaling, accept cw/freq but not cw × freq, not cw/mid point For correct heights from their scaled frequencies seen on the graph For correct widths of bars, uniform horiz scale, no halves or gaps or less-than-or-equal to's Both axes labelled, fd and area or m². Not class width
3 28 - $\mu = 0.496\sigma$ (accept 0.495 or in between) 35 - $\mu = 1.282\sigma$ (accept 1.281 or in between, but not 1.28) $\sigma = 8.91$ (accept 8.89 to 8.92 incl) $\mu = 23.6$	M1 A1 A1 M1 A1 A1 6	For any equation with μ and σ and a reasonable z value not a prob. Allow cc, $\sqrt{\sigma}$, σ^2 , or – and give M1 A0A1ft for these four cases For 2 correct equations For solving their two equations by elim 1 variable sensibly For correct answer For correct answer
4 (i) $(0.95)^5$ = 0.774 (ii) $(0.95)^4 \times (0.05)^1 \times {}_5C_1$ = 0.204 (iii) $(0.95)^2 \times (0.05)$ = 0.0451(361/8000)	M1 A1 2 M1 A1 2 M1 A1 2	For 0.95 seen, can be implied For correct final answer For any binomial calculation with 3 terms, powers summing to 5 For correct answer For no Ps, no Cs, and only 3 terms of type $p^2(1-p)$ For correct answer

Page 2	Mark Scheme	Syllabus	Paper
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5 OR $P(M C) = \frac{0.54 \times 0.05}{0.54 \times 0.05 + 0.46 \times 0.02}$ $= 0.746 \text{ (135/181)}$	M1		For correct shape ie <i>M</i> and <i>F</i> first
	A1		All correct, ie labels and probabilities, no labels gets M1 only for (implied)correct shape
	M1		For finding $P(M \text{ and } C)$ and $P(F \text{ and } C)$
	A1		For using 4 correct probs
	M1		For correct conditional probability
	B1		For correct numerator
	M1		For summing two two-factor 'terms'
	A1	6	For correct answer
6 (a) (i) 18564 (ii) ${}_{17}C_5$ or $6/18 \times$ their (i) or ${}_{18}C_6 - {}_{17}C_6$ $= 6188$ (b) (i) 40320 (ii) $5! \times 3! \times {}_4C_1$ $= 2880$	B1	1	For correct final answer
	M1		For using 17 and 5 as a perm or comb
	A1	2	For correct answer
	B1	1	For correct final answer
	B1		For 5! or ${}_5P_5$ used in a prod or quotient with a term $\neq 5!$
	B1		For 3!
	B1		For ${}_4C_1$, may be implied by 4!
	B1	4	For correct final answer
7 (i) $z = \pm 1.143$ $P(7.8 < T < 11) = \Phi(1.143) - 0.5$ $= 0.8735 - 0.5$ $= 0.3735$ (accept ans rounded to 0.37 to 0.374) (ii) $(0.1265)^2 \times (0.8735) \times {}_3C_2$ $= 0.0419$ (iii) Not symmetric so not normal Does not agree with the hospital's figures	M1		For standardising, can be implied, no cc, no σ^2 but accept $\sqrt{\sigma}$
	A1		For seeing 0.8735
	M1		For subtracting two probs, $p_2 - p_1$ where $p_2 > p_1$
	A1	4	For correct answer
	M1		For any three term binomial-type expression with powers summing to 3
	A1ft	2	For correct answer ft on their 0.8735/0.1265
	B1		For any valid reason
	B1dep	2	For stating it does not agree, with no invalid reasons
8 (i) $18c = 1$ $c = 1/18 = 0.0556$ (ii) $E(X) = 2.78$ ($= 25/9$) ($= 50c$) $\text{Var}(X) = 1.17$ ($= 95/81$) ($= 160c - 2500c^2$) (iii) $P(X > 2.78) = 11c$ $= 0.611$ ($= 11/18$)	M1		For $\sum p_i = 1$
	A1	2	For correct answer
	M1		Using correct formula for $E(X)$
	A1ft		For correct expectation, ft on their <i>c</i>
	M1		For correct variance formula
	A1ft	4	For correct answer ft on their <i>c</i>
	M1		For using their correct number of discrete values of <i>X</i>
	A1	2	For correct answer