EDEXCEL FOUNDATION

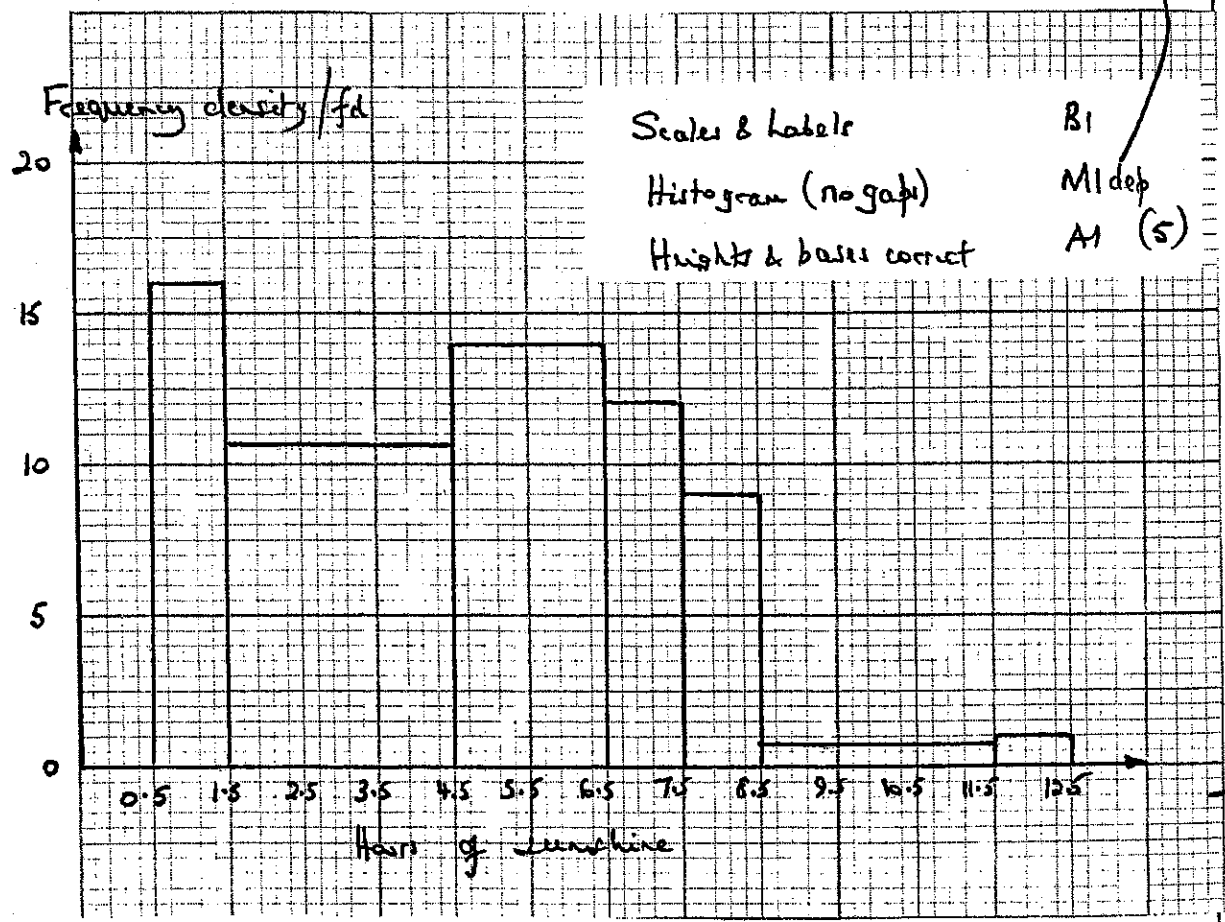
Stewart House 32 Russell Square London WC1B 5DN

January 2002

Advanced Supplementary/Advanced Level

General Certificate of Education

Subject **STATISTICS 6683** Paper No. **S1**

Question number	Scheme	Marks
1.	(a)(i) A test/investigation/process adopted for collecting data to provide evidence for or against a hypothesis	B1 (1)
	(ii) Sub-set of possible outcomes of an experiment.	B1 (1)
	(b) Advantage — Quick, cheap, vary parameters/predict	B1
	Disadvantage — Does not replicate real-world situation in every detail.	B1 (2)
2.	(a) Frequency densities: 16, $10\frac{2}{3}$, 14, 12, 9, $\frac{2}{3}$, 1 can be implied	M1 A1
	 Scales & Labels B1 Histogram (no gaps) M1 dep Heights & bases correct A1 (5)	
	(b) No. of days = $(14 \times \frac{1}{2}) + (12 \times 1) + (9 \times 1) + (\frac{1}{2} \times \frac{2}{3})$	M1
	$= 28\frac{1}{3}$ Allow $28\frac{1}{3}$; 28.3; 28.3	A1 (2)

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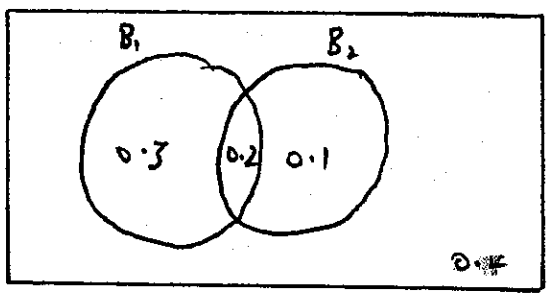
3.	(a) $a + 2(\frac{2}{3} - a) = \frac{5}{6}$	Use of $E(X)$ M1
	$\therefore \quad a = \frac{1}{2}$	correct equation A1
		cao A1 (3)
	(b) $\text{Var}(X) = 1^2 \times \frac{1}{2} + 2^2 \times \frac{1}{6} - \left(\frac{5}{6}\right)^2$	Use of $\sum x^2 P(X=x)$ M1
		$-\mu^2$ M1
	$= \frac{17}{36} = 0.47\dot{2}$	allow ISW; cao A1 (3)
	(c) $P(X \leq 1.5) = P(0) + P(1) = \frac{1}{3} + \frac{1}{2} = \frac{5}{6}$	B1√ (1)
4.		Venn diagram M1
		0.3, 0.2, 0.1 A1
	(a) $P(\text{Does not win either}) = 0.4$	A1 (1)
	(b) $P(\text{Wins exactly one}) = 0.3 + 0.1$	M1
	$= 0.4$	A1√ (2)
	(c) $P(B_2 \mid B_1') = \frac{P(B_2 \cap B_1')}{P(B_1')} = \frac{0.1}{0.5}$	Use of cond^{n} prob. M1
	$= 0.2$	A1 (2)
	(d) For independence $P(B_1 \cap B_2) = P(B_1) \times P(B_2)$	M1
	$P(B_1 \cap B_2) = 0.2$; $P(B_1) \times P(B_2) = 0.15$	0.2; 0.15 A1
	LHS $\neq$ RHS $\Rightarrow$ events not independent	A1 (3)
	NB: Accept alternative correct solutions.	

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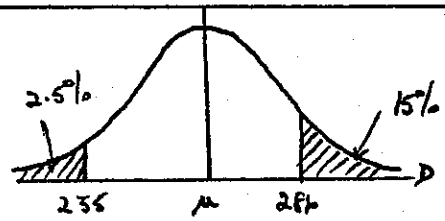
4.	Alter: (a) $P(\text{Does not win either}) = 1 - P(B_1 \cup B_2)$	M1
	$= 1 - (0.5 + 0.3 - 0.2)$	A1
	$= \underline{0.4}$	A1 (3)
	(b) $P(\text{Win exactly one}) = P(B_1 \cap B_2') + P(B_1' \cap B_2)$	M1
	$= 0.3 + 0.1$	
	$= \underline{0.4}$	A1 (2)
5.	(a)  $P(D < 235) = 0.025$	
	$\therefore \frac{235-\mu}{\sigma} = -1.96$	$\frac{235-\mu}{\sigma} = -k_\alpha$ M1
	$\ast \therefore \underline{\mu - 235 = 1.96\sigma} \ast$	A1 (2)
	(b) $P(D > 286) = 0.15$	$\frac{286-\mu}{\sigma} = k_\alpha$ M1
	$\therefore \frac{286-\mu}{\sigma} = 1.0364$ $\therefore \underline{286-\mu = 1.0364\sigma}$	1.0364 B1
		A1√ (3)
	(c) Solving for μ or σ	M1
	Substituting for other unknown	M1
	$\mu = 268.360\ldots$ $\sigma = 17.0204\ldots$	AWRT 268 A1
		AWRT 17 A1 (4)
	(d) $\mu \pm \sigma = 268.36 \pm 17.02$	μ + their σ M1
	$= (251, 285)$	3sf A1√ (2)

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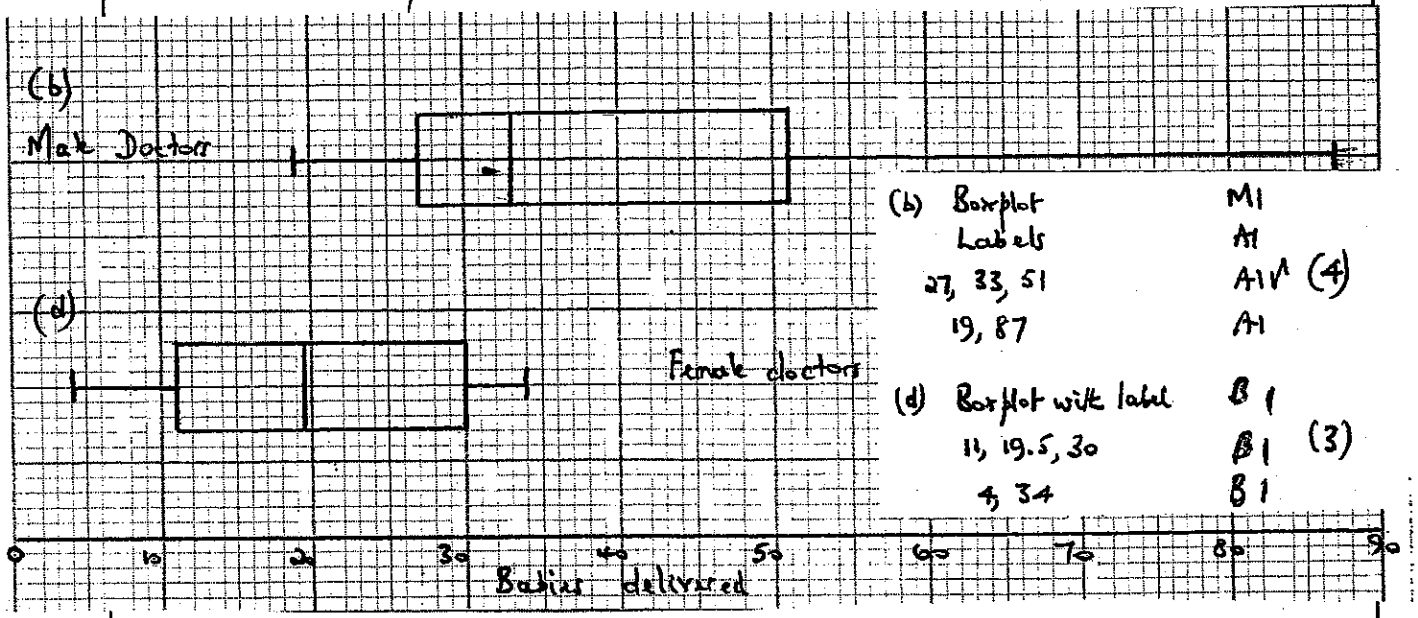
6.	(a) $Q_2 = 33$	B1
	$Q_1 = 27$; $Q_3 = 51$ both	B1
	$IQR = 51 - 27 = 24$	B1 (3)
	(b) Boxplot	M1
	Labels	A1
	27, 33, 51	A1 A1 (4)
	19, 87	A1
	(d) Boxplot with label	B1
	11, 19.5, 30	B1 (3)
	4, 34	B1
	(c) $\mu = \frac{618}{15}$	$\Sigma x / 15$ M1
	$= 41.2$	41.2 cao A1
	$\sigma^2 = \frac{31864}{15} - 41.2^2$	$\frac{\Sigma x^2}{15} - \mu^2$ M1
	SR: $s_{n-1} = 21.38\ldots$ B1 only	A1✓
	$\Rightarrow \sigma = 20.65978\ldots$	20.7 A1 (5)
	NB $\Sigma (x - \bar{x})^2 = 6403.4$	
	(e) Median male > Median female	Any Two sensible independent comments B1
	IQR male > IQR female	B1 (2)
	Range male > Range female etc.	
	Males: +ve skew; Females: slight +ve skew/almost symmetrical	



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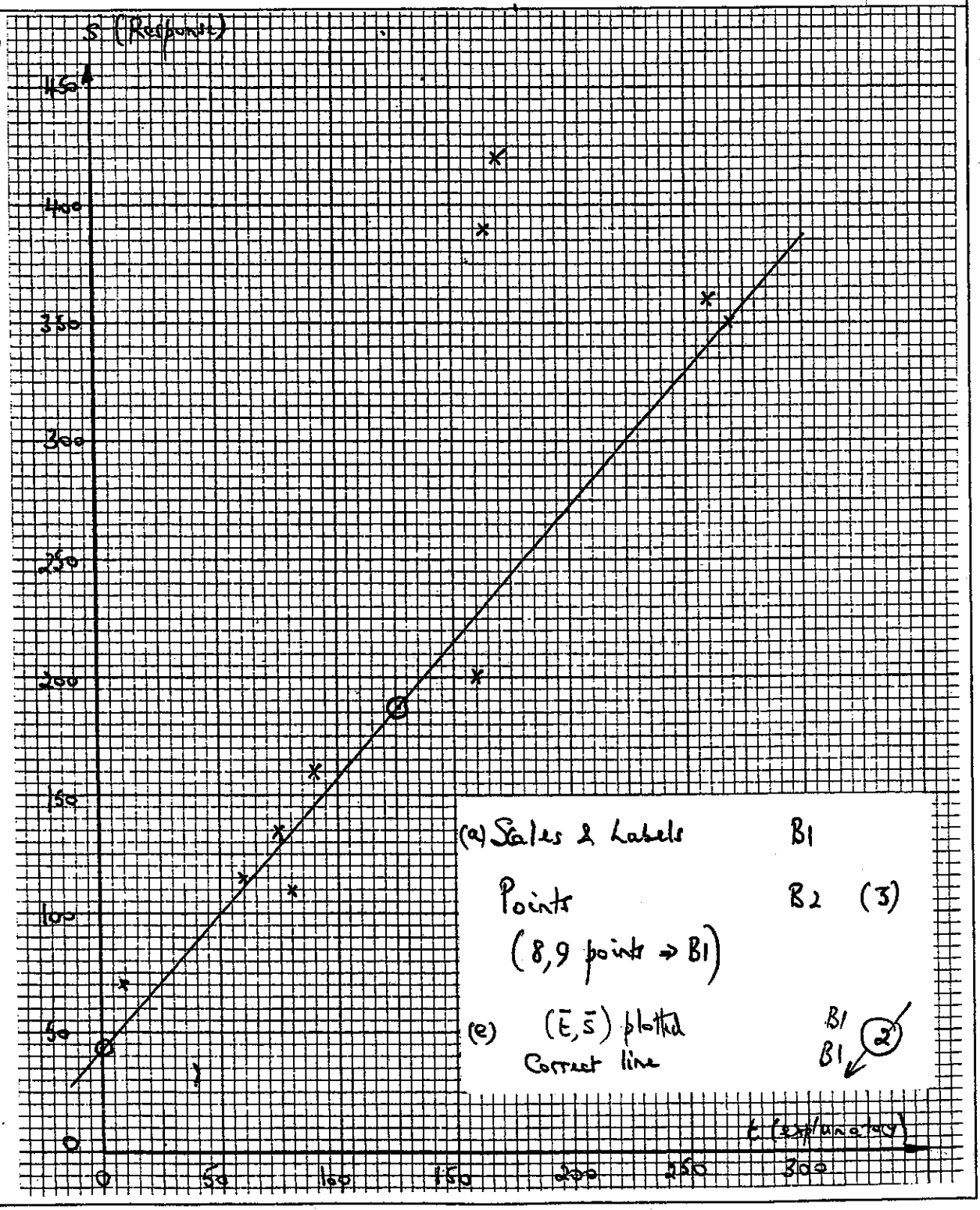
7.	(a) 	

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7.	(b) $S_{ss} = 694650 - \frac{2310^2}{10} = 161040$	M1 A1
	$S_{tt} = 66490$, $S_{st} = 87235$	A1 A1
	$r = \frac{87235}{\sqrt{66490 \times 161040}}$ $S_{st}/\sqrt{(S_{ss} \times S_{tt})}$	M1 A1√
	$= 0.843035....$ 0.843	A1 (7)
	SR: 0.843 without working ⇒ B1 only	B1; B1 (2)
	(c) No change; coding does not affect pmcc.	
	(d) $\hat{\beta} = \frac{72587.5}{63671.875} = 1.140024....$	M1
	$\hat{\alpha} = 187.5 - (1.140024... \times 125.625) = 44.2844...$	M1
	$\therefore s = 44.3 + 1.14t$ must use s & t	A1 (3)
	(e) Graph (2)	
	(f) Both points above the line, so more line up	B1
	Predictions of s from t less accurate	B1 (2)
	)	