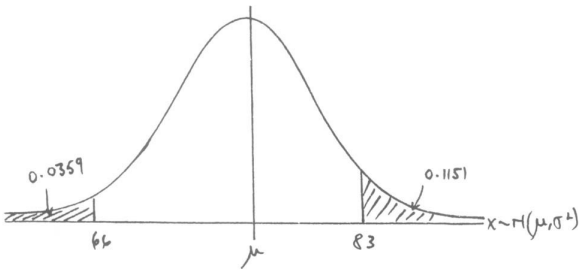
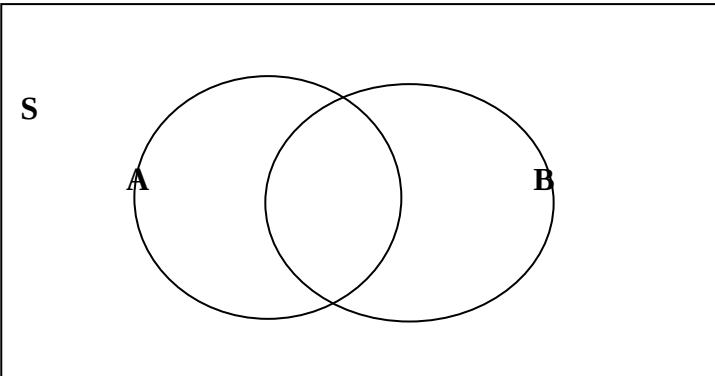


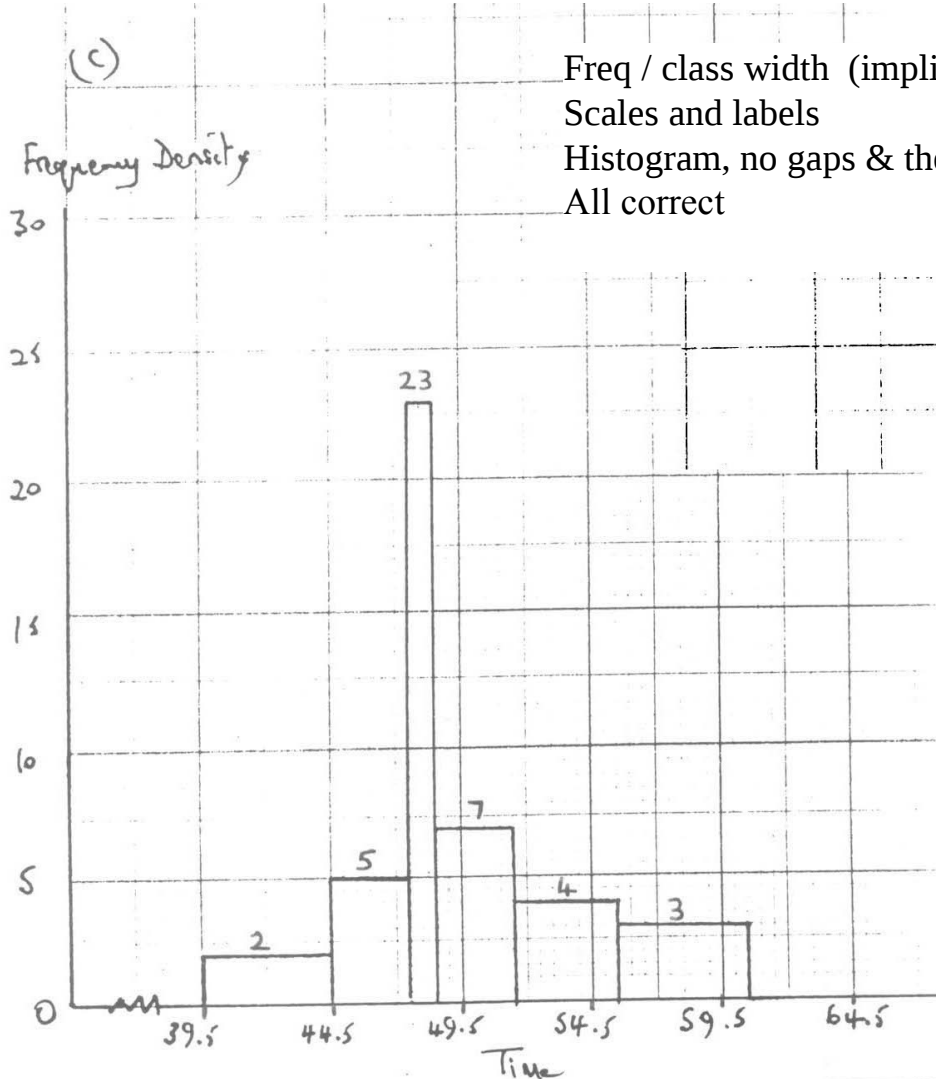
Question number	Scheme	Marks
1 (a)	$a = 202, b = 202, c = 233$	B1,B1,B1
(b)	$Q_1 - 1.5(Q_3 - Q_1) = 191 - 1.5(221 - 191) = 146,$ $Q_3 + 1.5(Q_3 - Q_1) = 221 + 1.5(221 - 191) = 266$ attempt at one calculation, 146, 266 $\Rightarrow 269$ is an outlier	(3) M1A1A1 269 A1dep
	Scale and 'miles' B1 Box with two whiskers M1 191, their median, 221 A1f 180, 266 or 263, 269 A1	(8)
(c)	Keith: $Q_2 - Q_1 = 11, Q_3 - Q_2 = 19 \Rightarrow$ positive skew one calc, +ve skew Asif: $Q_2 - Q_1 = 16, Q_3 - Q_2 = 15 \Rightarrow$ almost symm or slight -ve skew	M1,A1 A1 (3) (Total 14 marks)

Question number	Scheme	Marks
2(a)	$b = \frac{S_{xy}}{S_{xx}} = \frac{3477.6}{4402} = 0.7900\dots$ $a = \bar{y} - b\bar{x} = 28.6 - (0.7900\dots) \times 36 = 0.159836\dots$ $y = 0.16 + 0.79x$	awrt 0.79 B1 awrt 0.16 B1 or equivalent B1f
(b)	OR just answer B1 ONLY $y = 0.16 + 0.79 \times 45 = 35.71$	awrt 35.7 B1 (3) (Total 4 marks)
3 (a)		
(b)		Bell shaped curve & 4 values B1
(i)	$P\left(Z \leq \frac{66 - \mu}{\sigma}\right) = 0.0359 \Rightarrow 66 - \mu = -1.80\sigma$	-1.80 B1 seen
	Clear attempt including standardization either way, or equivalent	M1,A1
	$81 - \mu = 1.20\sigma$	1.20, or equivalent B1A1
(ii)	Subtracting $15 = 1.20\sigma + 1.80\sigma \Rightarrow \sigma = 5$ **given answer*	
	Clear attempt to solve, cso	M1A1
	$\mu = 66 + 1.8 \times 5 = 75$	75 B1
(c)	$P(69 \leq X \leq 83) = P\left(\frac{69-75}{5} \leq Z \leq \frac{83-75}{5}\right)$ $= P(-1.20 \leq Z \leq 1.60)$ $= 0.8301$	standardize both either way M1 -1.20, 1.60 A1 seen 4 dp A1 (3) (Total 12 marks)

Question number	Scheme	Marks
4	$x \quad -3 \quad -2 \quad -1 \quad 0 \quad 1 \quad 2$ $P(X = x) \quad 0.2 \quad 0.2 \quad \alpha \quad \alpha \quad 0.1 \quad 0.1$	
(a)	$2\alpha + 0.6 = 1 \Rightarrow \alpha = 0.2$ linear function of $\alpha = 1, 0.2$	M1A1 (2)
(b)	$P(-1 \leq X < 2) = P(-1) + P(0) + P(1) = 0.5$	B1 (1)
(c)	$F(0.6) = 0.8$	B1 (1)
(d)	$E(X) = (-3 \times 0.2) + \dots + (2 \times 0.1) = -0.9$ $aE(X) + 3 = 1.2 \Rightarrow a(-0.9) = -1.8$ $a = 2$	$\sum xP(X = x), -0.9$ M1A1 $aE(X) + 3$ M1 A1 (4)
(e)	$E(X^2) = (-3^2 \times 0.2) + \dots + (2^2 \times 0.1) = 3.3$ $\text{Var}(X) = 3.3 - (-0.9)^2 = 2.49$	$\sum x^2P(X = x), 3.3$ M1A1 $\sum x^2P(X = x) - (E(X))^2, 2.49$ M1A1 (4)
(f)	$\text{Var}(3X - 2) = 9\text{Var}(X)$ $= 9 \times 2.49 = 22.41$	M1 A1 (2)
		(Total 14 marks)

Question number	Scheme	Marks
5 (a)	2 intersecting closed curves in a box M1 	both $\frac{1}{4}, \frac{1}{12}$ B1, B1 $\frac{5}{12}$ B1f (4)
	(b) $P(A \cup B) = \frac{7}{12}$ 0.583 or 0.58\dot{3} or $\frac{7}{12}$ B1f (1)	
	(c) $P(A B) = \frac{P(A \cap B')}{P(B')} = \frac{\frac{1}{4}}{\frac{2}{3}} = \frac{3}{8}$ or 0.375 their fractions divided, cao M1, A1 (2)	
	(Total 7 marks)	

Question number	Scheme	Marks
6 (a)	$S_{xx} = 10164 - \frac{272^2}{8} = 916$ $S_{yy} = 13464 - \frac{320^2}{8} = 664$ $S_{xy} = 11222 - \frac{272 \times 320}{8} = 342$ (Or 114.5, 83 & 42.75)	Any one method, cao M1,A1 cao A1 cao A1 (4)
(b)	$r = \frac{342}{\sqrt{916 \times 664}} = 0.43852....$	formula, all correct ($\sqrt{608224}$), 0.439 M1A1fA1 (3)
(c)	Slight / weak evidence, students perform similarly in pressups and situps context for +ve	B1 B1 (2)
(d)	$\bar{x} = \frac{272}{8} = 34$ $s = \sqrt{\frac{10164}{8} - 34^2} = \sqrt{114.5} = 10.700...$ OR divisor (n-1) awrt 11.4	M1A1 method includes $\sqrt{}$, awrt 10.7 M1A1 (4)
(e)	$a = 1.96 \times 10.700... = 20.9729... \text{ (or 22.4 divisor (n-1))}$	1.96 B1 1.96 $\times$ s, 21.0 or 22.4 M1A1 (3)
(f)	Pressups discrete, Normal continuous Not a very good assumption	B1 B1 dep (2) (Total 18 marks)

Question number	Scheme	Marks
7(a)	Time data is a continuous variable	B1 (1)
(b)	39.5, 44.5	both B1 (1)
(c)	(c)  Freq / class width (implied) M1 Scales and labels B1 Histogram, no gaps & their fd M1 All correct A1	(4)

(Total 6 marks)
6 mark