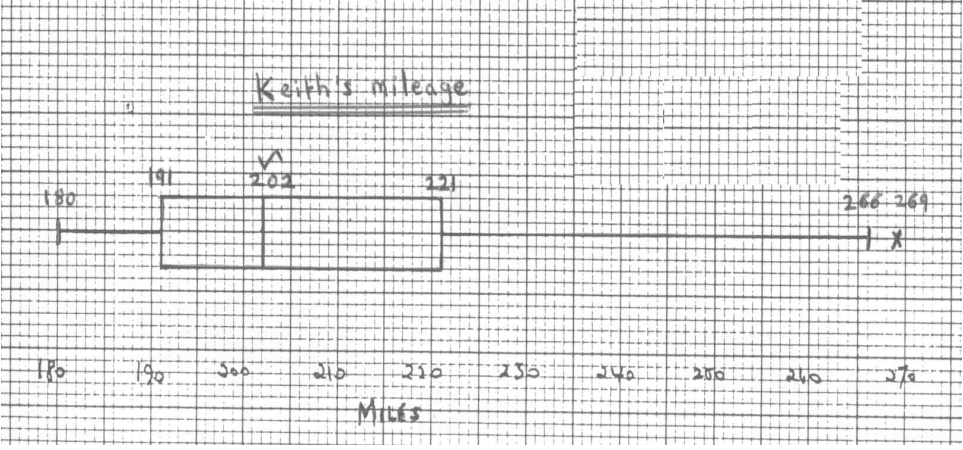
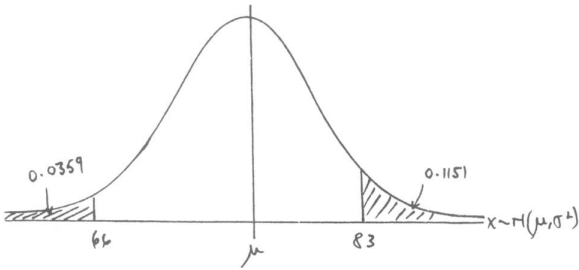
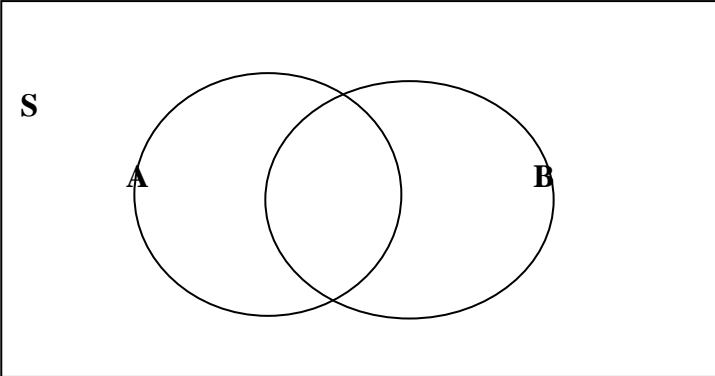


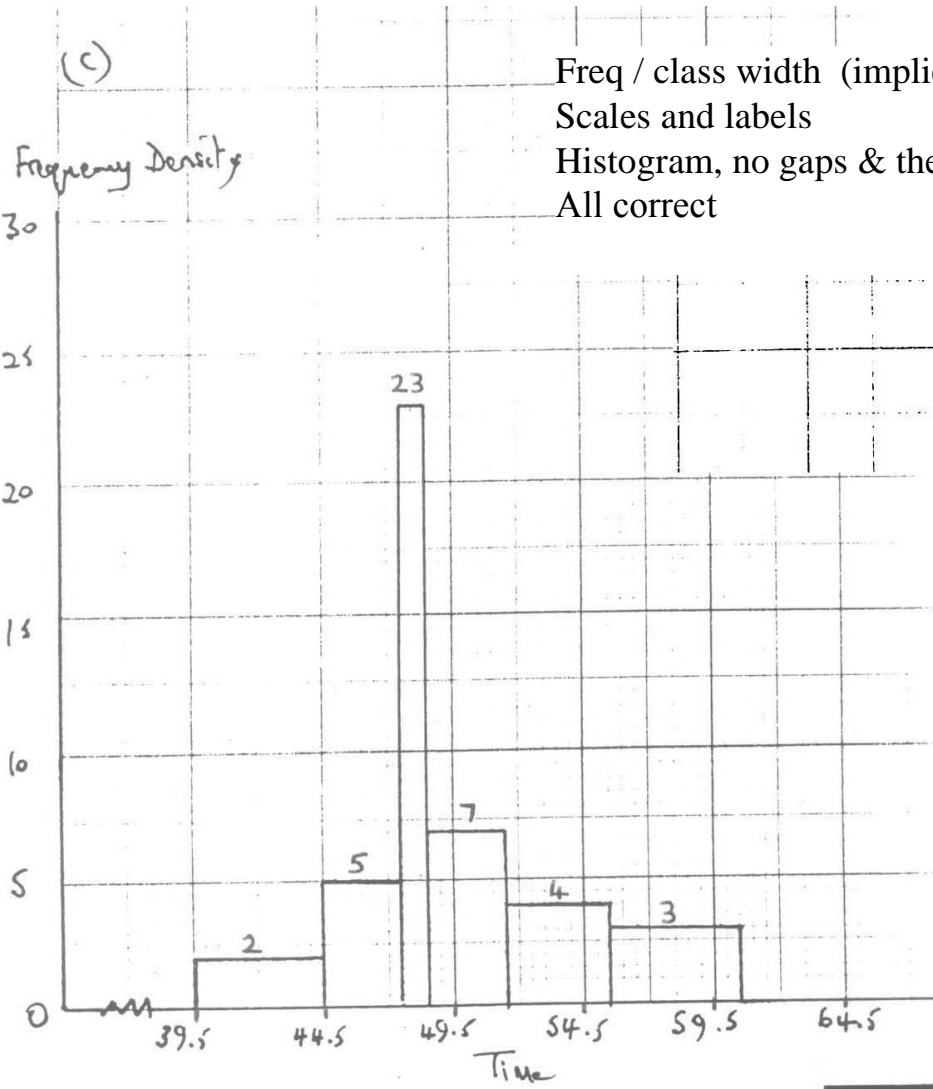
Question number	Scheme	Marks
1 (a)	$a = 202, b = 202, c = 233$	B1,B1,B1 (3)
(b)	$Q_1 - 1.5(Q_3 - Q_1) = 191 - 1.5(221 - 191) = 146,$ $Q_3 + 1.5(Q_3 - Q_1) = 221 + 1.5(221 - 191) = 266$ attempt at one calculation, 146, 266 $\Rightarrow 269$ is an outlier	M1A1A1 269 A1dep 
(c)	Keith: $Q_2 - Q_1 = 11, Q_3 - Q_2 = 19 \Rightarrow$ 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 (8) (3)
(Total 14 marks)		

Question number	Scheme	Marks
2(a)	$b = \frac{S_{xy}}{S_{xx}} = \frac{3477.6}{4402} = 0.7900\dots$ $a = \bar{y} - b\bar{x} = 28.6 - (0.7900\dots) \times 36 = 0.159836\dots$ $y = 0.16 + 0.79x$	awrt0.79 B1 awrt 0.16 B1 or equivalent B1f
(b)	OR just answer B1 ONLY $y = 0.16 + 0.79 \times 45 = 35.71$	(3) awrt 35.7 B1 (1) (Total 4 marks)
3 (a)		
(b)	Bell shaped curve & 4 values	B1 (1)
(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* $\mu = 66 + 1.8 \times 5 = 75$	Clear attempt to solve, cso M1A1 75 B1 (8)
(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)	<p style="text-align: center;">2 intersecting closed curves in a box M1</p> 	<p>both $\frac{1}{4}, \frac{1}{12}$ B1,B1 $\frac{5}{12}$ B1f (4)</p>
(b)	$P(A \cup B) = \frac{7}{12}$	<p>0.583 or 0.583 or $\frac{7}{12}$ B1f (1)</p>
(c)	$P(A B) = \frac{P(A \cap B)}{P(B)} = \frac{\frac{1}{4}}{\frac{3}{8}} = \frac{2}{3}$	<p>or 0.375 their fractions divided, cao M1,A1 (2)</p>
(Total 7 marks)		

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

Question number	Scheme	Marks
7(a)	Time data is a continuous variable	B1 (1)
(b)	39.5, 44.5	both B1 (1)
(c)	<p data-bbox="363 495 424 544">(c)</p>  <p data-bbox="863 506 1385 678"> Freq / class width (implied) M1 Scales and labels B1 Histogram, no gaps & their fd M1 All correct A1 </p>	(4)
<p>(Total 6 marks) 6 mark</p>		