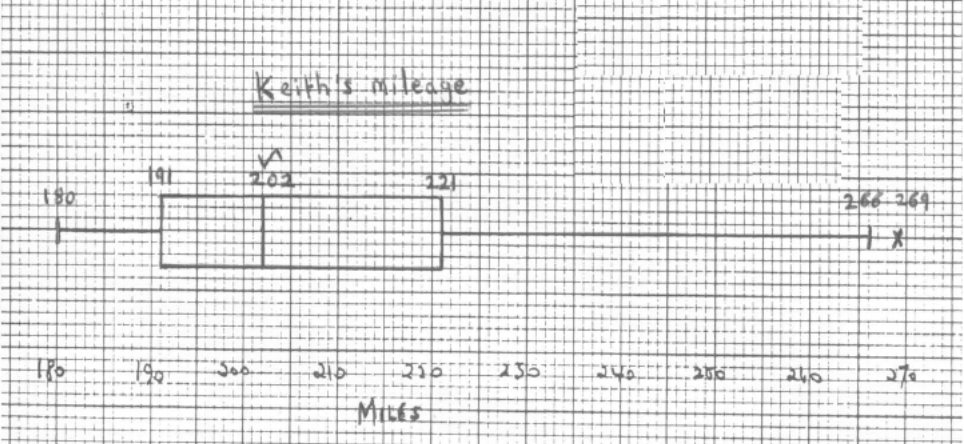
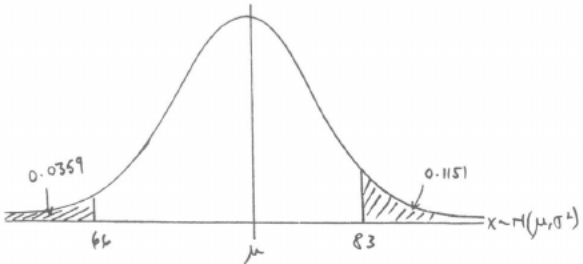
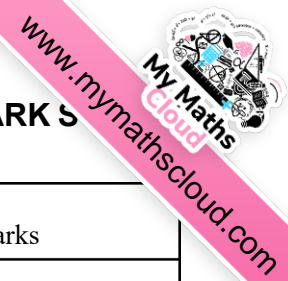
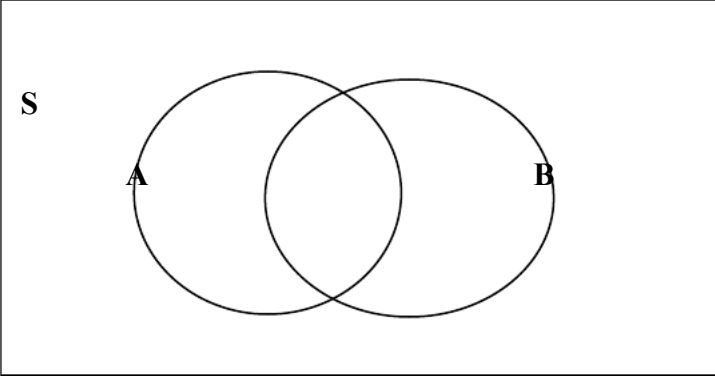


Question number	Scheme	Marks
1 (a)	$a = 202, b = 202, c = 233$	B1, B1, B1 (3)
(b)	$Q_1 - 1.5(Q_3 - Q_1) = 191 - 1.5(221 - 191) = 146,$ $Q_3 + 1.5(Q_3 - Q_1) = 221 + 1.5(221 - 191) = 266$ attempt at one calculation, 146, 266 $\Rightarrow 269$ is an outlier	M1A1A1 269 A1dep 
(c)	Keith: $Q_2 - Q_1 = 11, Q_3 - Q_2 = 19 \Rightarrow$ 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 Scale and 'miles' B1 Box with two whiskers M1 191, their median, 221 A1f 180, 266 or 263, 269 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)	$P\left[Z \leq \frac{66 - \alpha}{\sigma}\right] = 0.0359 \Rightarrow 66 - \alpha = -1.80\sigma$ <p>Clear attempt including standardization either way, or equivalent</p> $81 - \alpha = 1.20\sigma \quad 1.20, \text{ or equivalent}$	B1 seen M1,A1 B1A1
(ii)	Subtracting $15 = 1.20\sigma + 1.80\sigma \Rightarrow \sigma = 5$ **given answer* Clear attempt to solve, cso	M1A1 75 B1 (8)
(c)	$P(69 < X < 83) = P\left[\frac{69-75}{5} < Z < \frac{83-75}{5}\right]$ <p>standardize both either way</p> $= P(-1.20 < Z < 1.60)$ $= 0.8301$	M1 -1.20, 1.60 A1 seen 4 dp A1 (3) (Total 12 marks)



Question number	Scheme	Marks
4	$x \quad -3 \quad -2 \quad -1 \quad 0 \quad 1 \quad 2$ $P(X = x) \quad 0.2 \quad 0.2 \quad a \quad a \quad 0.1 \quad 0.1$	
(a)	$2a + 0.6 = 1 \Rightarrow a = 0.2$	linear function of $a = 1, 0.2$ M1A1 (2)
(b)	$P(-1 < X < 2) = P(-1) + P(0) + P(1) = 0.5$	B1 (1)
(c)	$F(0.6) = 0.8$	B1 (1)
(d)	$E(X) = (-3 \times 0.2) + \dots + (2 \times 0.1) = -0.9$ $aE(X) + 3 = 1.2 \Rightarrow a(-0.9) = -1.8$ $a = 2$	<ul style="list-style-type: none"> • $xP(X = x), -0.9$ M1A1 $aE(X) + 3$ M1 A1 (4)
(e)	$E(X^2) = (-3^2 \times 0.2) + \dots + (2^2 \times 0.1) = 3.3$ $\text{Var}(X) = 3.3 - (-0.9)^2 = 2.49$	<ul style="list-style-type: none"> • $x^2P(X = x), 3.3$ M1A1 • $x^2P(X = x) - (E(X))^2, 2.49$ 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 $\frac{5}{12}$ B1 J (4)</p>
(b)	$P(A \cup B) = \frac{7}{12}$	<p>0.583 or 0.583 or $\frac{7}{12}$ B1 J (1)</p>
(c)	$P(A B) = \frac{P(A \cap B)}{P(B)} = \frac{\frac{1}{4}}{\frac{2}{3}} = \frac{3}{8}$	<p>or 0.375 their fractions divided, cao M1, A1 (2)</p>
<p>(Total 7 marks)</p>		



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>	Any one method, cao M1,A1 cao A1 cao A1 (4)
(b)	$r = \frac{342}{\sqrt{916 \times 664}} = 0.43852\dots$	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)	$\bar{x} = \frac{272}{8} = 34$ $s = \sqrt{\frac{10164}{8} - 34^2} = \sqrt{114.5} = 10.700\dots$ <p>OR divisor (n-1) awrt 11.4</p>	M1A1 method includes $\sqrt{\quad}$, awrt 10.7 M1A1 (4)
(e)	$a = 1.96 \times 10.700\dots = 20.9729\dots$ (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)	<p>(c)</p> <p>Freq / class width (implied) M1 Scales and labels B1 Histogram, no gaps & their fd M1 All correct A1</p>	(4)

(Total 6 marks)
6 mark