

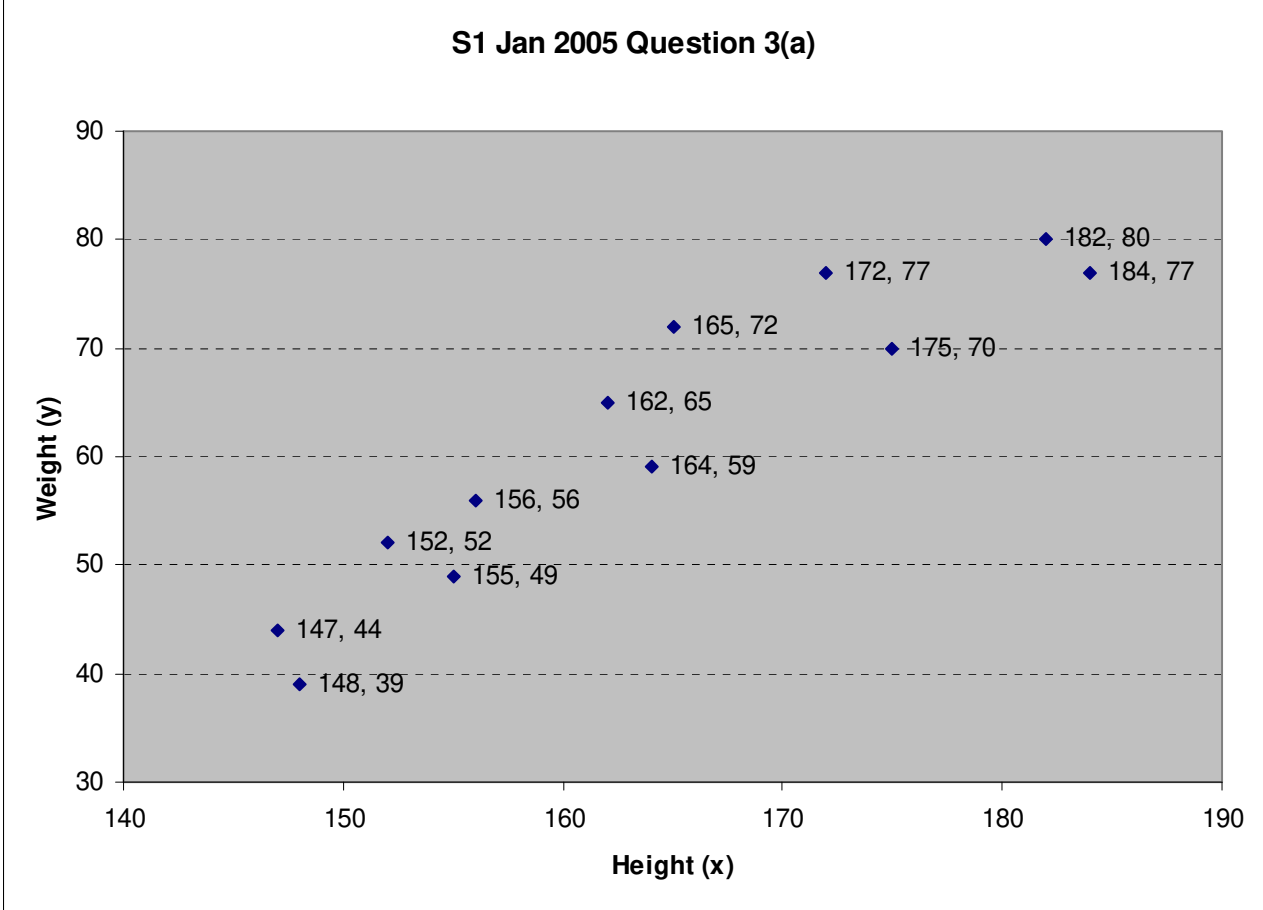
January 2005

6683 Statistic S1

Mark Scheme

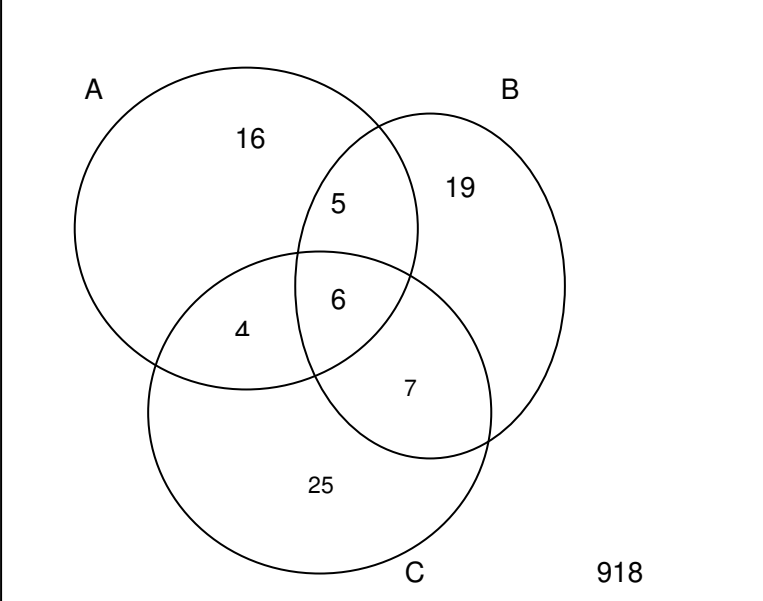
Question Number	Scheme	Marks
1 (a)	<p style="text-align: right;">Tree (both sections) labels & 0.85,0.15 or equiv. 0.03,0.97,0.06,0.94</p>	<p>M1 A1 A1</p> <p style="text-align: right;">(3)</p>
(b)	<p>$P(\text{Not faulty}) = (0.85 \times 0.97) + (0.15 \times 0.94)$ valid path & their values, correct $= 0.9655$ % or 1931/2000 or equiv. or awrt 0.966</p>	<p>M1, A1 \int A1</p> <p style="text-align: right;">(3) (Total 6 marks)</p>

Question Number	Scheme	Marks
2 (a)	$Q_1 = 33, Q_2 = 41, Q_3 = 52$	B1B1B1
(b)		(3)
(c)	<p>Median of Northcliffe is greater than median of Seaview. Upper quartiles are the same IQR of Northcliffe is less than IQR of Seaview Northcliffe positive skew, Seaview negative skew Northcliffe symmetrical, Seaview positive skew (quartiles) Range of Seaview greater than range of Northcliffe</p> <p style="text-align: right;">any 3 acceptable comments B1B1B1</p>	(6)
(d)	<p>On 75% of the nights that month both had no more than 52 caravans on site.</p>	<p>B1 B1</p> <p style="text-align: right;">(2)</p> <p style="text-align: right;">(Total 14 marks)</p>

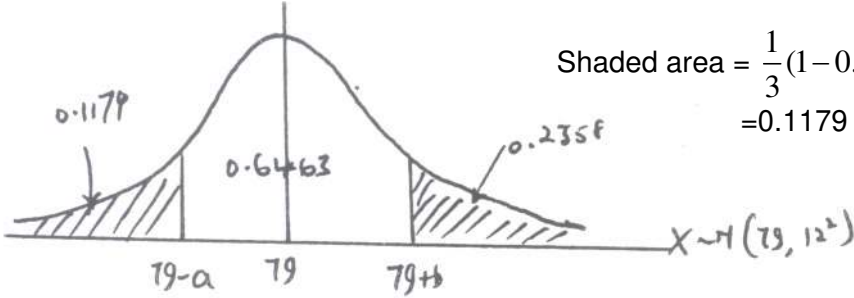
Question Number	Scheme	Marks
3(a)	<p style="text-align: center;">S1 Jan 2005 Question 3(a)</p>  <p style="text-align: right;"> sensible scales B1 labels B1 shape B1 </p>	(3)

Question Number	Scheme		Marks
(b)	Positive; as x increases, y increases	context OK	B1;B1g (2)
(c)	$S_{xy} = 122783 - \frac{1962 \times 740}{12} = 1793$ (1793 only M1A1)	use of formula, cao	M1A1 (2)
(d)	$b = \frac{S_{xy}}{S_{xx}} = \frac{1793}{1745} = 1.027507\dots$ (SR 1.028 B1 only)	division, 1.028	M1A1 (2)
(e)	$\bar{y} = \frac{740}{12} = 61\frac{2}{3}$ $s = \sqrt{\frac{47746}{12} - \left(\frac{740}{12}\right)^2} = 13.26859\dots$ (SR 13.3 or 13.9 B1 only)	$61\frac{2}{3}$ or 61.6 or 61.7 Use of formula including root, 13.3 or 13.9	B1 M1A1 (3)
(f)	34-36, 87-89	strict limits, 3sf or better	B1B1 (2)
(g)	All values between their 35.7 and their 87.7 so could be normal. Reason required		B1 (1) (Total 15 marks)

Question Number	Scheme	Marks
4 (a)	$k + 2k + 3k + 4k + 5k = 1$ $15k = 1$ $** k = \frac{1}{15} **$	verification / use of $\sum P(X = x) = 1$ M1 cso A1 (2)
(b)	$P(X < 4) = P(1) + P(2) + P(3) = \frac{1}{15} + \frac{2}{15} + \frac{3}{15}$ $= \frac{2}{5}$	sum of 3 probabilities M1 0.4 or $\frac{6}{15}$ or $\frac{2}{5}$ A1 seen (2) (2)
(c)	$E(X) = 1 \times \frac{1}{15} + 2 \times \frac{2}{15} + 3 \times \frac{3}{15} + 4 \times \frac{4}{15} + 5 \times \frac{5}{15}$ $= \frac{11}{3}$	use of $\sum xP(X = x)$ M1 $\frac{55}{15}$ or $\frac{11}{3}$ or $3\frac{2}{3}$ or $3.\dot{6}$ or 3.67 A1 (2)
(d)	$E(3X - 4) = 3E(X) - 4 = 11 - 4$ $= 7$ <p>(OR)</p> $E(3X - 4) = -1 \times \frac{1}{15} + 2 \times \frac{2}{15} + 5 \times \frac{3}{15} + 8 \times \frac{4}{15} + 11 \times \frac{5}{15}$ $= 7$	$3x$ theirs-4 M1 A1 seen (2) $\sum (3x - 4)kx$ M1 cao A1 (2) (Total 8 marks)

Question Number	Scheme	Marks
5 (a)		<p>6 B1 subtract M1 4,5,7 A1 subtract M1 16,19,25 A1 box & 918 B1</p> <p style="text-align: right;">(6)</p>
(b)	$P(\text{No defects}) = \frac{918}{1000} = 0.918$	<p style="text-align: right;">B1 ✓</p> <p style="text-align: right;">(1)</p>
(c)	$P(\text{No more than 1}) = \frac{918+16+19+25}{1000} \quad \text{OR} \quad 1 - \frac{5+6+4+7}{1000}$ $= 0.978$	<p style="text-align: right;">M1</p> <p style="text-align: right;">0.978 A1 ✓</p> <p style="text-align: right;">(2)</p>
(d)	$P(B \text{Only 1 defect}) = \frac{P(B \text{ and 1 defect})}{P(1 \text{ defect})} = \frac{\frac{19}{1000}}{\frac{16+19+25}{1000}}$ $= \frac{19}{60}$	<p style="text-align: right;">conditional prob M1</p> <p style="text-align: right;">$\frac{19}{60}$ or 0.316 or 0.317 A1 ✓</p> <p style="text-align: right;">(2)</p>
(e)	$P(\text{Both had type B}) = \frac{37}{1000} \times \frac{36}{999}$ $= \frac{37}{27750} \text{ or } 0.001\dot{3} \text{ or } 0.00133 \text{ or equivalent}$	<p style="text-align: right;">theirs from B x M1</p> <p style="text-align: right;">cao A1</p> <p style="text-align: right;">(2)</p> <p style="text-align: right;">(Total 13 marks)</p>

Question Number	Scheme	Marks
6(a)	(Discrete) Uniform	B1 (1)
(b)	e.g. Tossing a fair dice / coin	B1g (1)
(c)	Useful in theory – allows problems to be modelled not necessarily true in practice	B1g B1h (2)
(d)	Carry out an experiment to establish probabilities	B1g B1h (2)
		(Total 6 marks)

Question Number	Scheme	Marks
7 (a)	$P(X < 70) = P\left(Z < \frac{70-79}{12}\right)$ $= P(Z < -0.75) = 0.2266$	standardise 79, 12 or 79, 144 M1 + or -0.75, 0.2266 A1A1
(b)	$P(64 < X < 96) = P\left(\frac{64-79}{12} < Z < \frac{96-79}{12}\right)$ $+ \text{ or } -1.25 \& 1.42, 0.8166$	standardise both, 79 & 12 only M1 Accept 0.8160-0.8170 A1,A1
(c)		$\text{Shaded area} = \frac{1}{3}(1 - 0.6463)$ $= 0.1179 \quad \text{cso}$
(d)	$P(X \leq 79 + b) = 0.7642$ $\Rightarrow \frac{b}{12} = 0.72$ $b = 8.64$	0.7642 B1 implied standardise LHS = z-value, all correct M1A1 3sf A1

(3)

(3)

(3)

(4)

(Total 13 marks)