## S1\_2025\_01\_MS

Question Number	Scheme					
1 (a)	Discrete uniform					
			(1)			
(b)	1		D1			
(0)	$\overline{2}$		DI			
			(1)			
(c)(i)	[E(R) = ]	2.5	B1			
(;;)	$\Gamma(D) = 1$	A	D1			
(11)	$[\mathbb{E}(D)]$	4	D1 (2)			
(1)		$E(R^2) = 1^{\frac{1}{2}} (1^2 + 2^2 + 5^2 + 7^2) = 21$	(2)			
(d)		$[E(B)] = \int \frac{1}{4} (1 + 3 + 3 + 7) = 21$	101 1			
		$\operatorname{Var}(B) = \operatorname{E}(B^2) - (\operatorname{E}(B))^2 = "21" - "4"^2$	M1			
		= 5	A1			
			(3)			
(a)	Possible	combinations $(R, R)$ : (1,1), (1,3), (2,1), (3,1), (4,1), (2,3), or $\frac{1}{1} \times \frac{1}{2} \times 6$	M1			
(e)	1 0551010	$\underbrace{(1,1)}_{(1,2)} \underbrace{(2,1)}_{(2,1)} \underbrace{(3,1)}_{(2,1)} \underbrace{(2,3)}_{(2,3)} \underbrace{(3,1)}_{(4,4)} \underbrace{(4,1)}_{(2,3)} \underbrace{(4,1)}_{(4,4)} (4$	1011			
		$P(R+B \leq 5) = \frac{6}{2}$	A1			
		16				
	<b>D</b> <sup>2</sup>	1 4 0 16	(2)			
(f)	R R	1   4   9   10   10   1				
	Possible	combinations $(R, B)$ : (1,3) (1,5) (1,7) (2 (4),5) (2 (4),7) or $-\times -\times 5$	M1A1			
		$\mathbf{P}(R^2 < B) = \frac{5}{16}$	A1			
			(3)			
(g)	B=5 and	and $R = 1, B = 7$ and $R = 3[\rightarrow D = 4]$ $B = 7$ and $R = 2[\rightarrow D = 5]$	M1			
		$P(D=4) = \frac{1}{4} \times \frac{1}{4} \times 2 = \frac{1}{8}$ $P(D=5) = \frac{1}{4} \times \frac{1}{4} = \frac{1}{16}$	A1			
		$F(4) = \frac{3}{1} + \frac{1}{7}$ $F(5) = P(D - 5) = \frac{15}{1} + \frac{1}{7}$	. 1			
		$p = F(4) = \frac{1}{4} + \frac{1}{8} = \frac{1}{8}$ $p = F(5) - F(D = 5) = \frac{1}{16} - \frac{1}{16} = \frac{1}{8}$	AI			
			(3)			
		Notes	Total 15			
(a)	B1	Must include both words (in either order). Ignore extraneous non-contradictory words.				
(b)	B1 D1					
(c)(1)	DI DI	cao need not be labelled unless done in wrong order (blue then red)				
(11)	DI	Compating the distribution of $E(P^2)$ at least 2 torms compating find by $E(P^2) = 21$ ). Longer	a lahal			
(d)	Correct method to find $E(B^2)$ at least 3 terms correct (implied by $E(B^2) = 21$ ). Ignore label.					
(u)	IVII	$E(B^2) = \frac{21}{4}$ is M0				
	M1	Correct method to find Var(B) ft their $E(B^2)$ and their $E(B)$				
	Al	cao an answer of 5 without working send to review				
		At least 4 correct combinations identified with no incorrect ones given.				
	Ignore duplicates, but do not accept eg $(1, 4)$ as a duplicate of $(4, 1)$ .					
(e)	M1 If not labelled, combinations must be consistently ordered.					
	or if no combinations given, correct probability calculation (implied by correct answer with no obvious incorrect working)					
<u> </u>	A1	0.375 oe must come from correct combinations or correct working				
L						

(f)	M1	At least 3 correct combinations identified with no incorrect ones given.
		Ignore duplicates, but do not accept eg $(1, 4)$ as a duplicate of $(4, 1)$ .
		If not labelled, combinations must be consistently ordered.
		(allow 4, 5 and 4, 7 stated as combinations instead of 2, 5 and 2, 7)
		All 5 correct combinations with no extras or duplicates.
	A1	or if no combinations given, correct probability calculation (M1A1 implied by correct answer
		with no obvious incorrect working)
		5
	A1	$\frac{1}{16}$ oe (accept awrt 0.313) must come from correct combinations or correct working
(g)	M1	Correct combinations identified for $D=4$ or $D=5$
(8)		(may be implied by correct working for 1 <sup>st</sup> A1).
		$P(D=4) = \frac{1}{2}$ or $P(D=5) = \frac{1}{2}$ need not be labelled but working/combinations must imply
		8 16
	A 1	the correct label
	AI	
		do not award this mark for $F(4) = -\frac{1}{8}$ on its own
		These may be seen as part of the probability distribution of D
		0.875 oe Correct answer does not automatically imply 3 out of 3.
	A1	Need to see correct combinations identified or see correct probability calculation/distribution.
		Answer only is 0 out of 3.

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Question		Scheme	Ma	ırks
2(a)	Range =	= 0.87 - 0.21] $= 0.66$	B1	
- ()	[1.001.80	<u></u>		(1)
(b)	Median	$(24^{\text{th}} \text{ value}) = = 0.48$	B1	
	The state			(1)
(c)	$LQ (12^{m})$	Value) = 0.35	B1	
	0.31 - 0	[0Q - 0.55] $[0Q - 0.66]$		
		и <u>в</u>	111	(3)
(d)	$sd = \sqrt{\frac{13}{2}}$	$\frac{5.4228}{47} - \left(\frac{23.72}{47}\right)^2  \text{or}  S_{xx} = 13.4228 - \frac{23.72^2}{47} [= 1.4517] \text{ and } \text{sd} = \sqrt{\frac{S_{xx}}{47}}$	M1	
		= 0.17575 = 0.176*	A1*	(2)
		$\sum y + 23.72$		<u>   (=)</u>
(e)(i)		$\frac{2}{65} = 0.502  \text{or}  0.502 \times 65 = 32.63$	N.	[]
		$32.63 = \sum y + 23.72$ <b>8.91*</b>	A	1*
				(2)
(ii)		$\begin{bmatrix} 13 4228 + \sum v^2 \end{bmatrix}$	M1	
	0.20	$4 = \sqrt{\frac{10002200 + 200}{65}} - 0.502^2  \text{or}  0.204^2 = \frac{10002200 + 200}{65} - 0.502^2$		
		$\sum v^2 = (0.204^2 + 0.502^2) \times 65 = 13.4228$	M1	
		$\sum y = (0.204 + 0.302) \times 03 = 13.4220$	A1	
		-5.0025 awit <u>5.00</u>		(3)
		Notes	Tota	al 12
(a)	B1	0.66 oe		
(b)	B1	0.48 oe (do not accept 4 8)	DO	
(c)	BI	LQ = 0.35 stated or implied allow 35 for this mark (but 35.25 or the UQ = 35 <sup>m</sup> value 1 0.31 = UQ - "0.35" allow any rearrangement of this for M1	s B0).	
	M1	Condone eg $0.6a$ for UQ Also allow use of $35 + 31$ for this mark (implied by 66 c	or 0.66	)
	A1	cao May come from poor notation eg $0.6a = 0.66$ Do not isw. Do not award for 66 or	0.66	
(d)	M1	Use of correct formula (need $\sqrt{}$ ) $\sqrt{\frac{13.4228}{47} - \frac{23.72^2}{47}}$ is M0		
		awrt 0.176 with correct exact working seen		
		allow awrt 0.176 coming from 0.1757or better allow awrt 0.176 with the mean to 0.5046 or better seen		
	A1*			
		Note: Inaccurate working on its own scores M1A0 eg $\sqrt{\frac{15.4220}{47}} - 0.505^2 = 0.176$		
		(note $s = 0.17765$ send to review)		
(e)(i)	M1	For a correct equation for sample mean $\underline{or}$ for $0.502 \times 65$ (implied by 32.63 seen)		
		8.91 cso Correctly rearranging $\sum y$ leading to given answer with 1 line of intermediate	e work	ing.
	A1*	$\sum y = 0.502 \times 65 - 23.72 = 8.91$ is M1A1		
		Condone poor notation for A1 but working must be correct.		
(ii)	M1	For this mark we only require 0.204, 65 and 0.502 in the correct places – allow any nu	merato	or
	M1	Find $\sum y^2$ using correct order of operations on $a = \sqrt{\frac{b + \sum y^2}{65} - c}$ or $m = \frac{n + \sum y^2}{65} - p b$ At least 1 line of rearrangement from <b>variance</b> must be shown to score this mark.	$p \neq 0, r$	ı ≠ 0
		Condone poor notation for $\sum y^2$ (may be implied by awrt 5.66)		
	A1	awrt 5.66 (SC attempting to use <i>s</i> gives 5.62 send to review)		



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Question Number	Scheme				
4(a)		$\begin{array}{ c c c c } \hline & A & 13 & & & & B \\ \hline & & 13 & & & 7 & & 16 \\ \hline & & & 12 & & & 16 \\ \hline & & & & 12 & & & \\ \hline & & & & 10 & & & \\ \hline & & & & & & & \\ \hline & & & & & &$	B1 B1 B1ft B1		
(b)	$P(A) = \frac{4}{1}$	$\frac{40}{00}  P(C) = \frac{50}{100}  P(A \cap C) = \frac{20}{100} \qquad P(A) = \frac{40}{100}  P(A \mid C) = \frac{20}{50}$	(4) M1		
	the	$P(A) \times P(C) = P(A \cap C)$ $P(A) = P(A   C)$ $P(A) = P(A   C)$ $P(A) = P(A   C)$ $P(A) = P(A   C)$	A1 (2)		
	uie	$\begin{bmatrix} 13'+16'+20' \end{bmatrix} 49$	(2)		
(0)(1)			ып		
(ii)	P(likes B	P(likes C) = $\frac{'12'+'10'}{'12'+'10'+'8'+'20'}$ = $\frac{22}{50}$	(1) M1 A1 (2)		
		Notes	Total 9		
(a)		In part (a) allow the numbers in the Venn diagram written as probabilities eg 0.12, 0.02	7. 0.08 etc.		
	B1	12 correct in the centre of the Venn diagram	,		
	B1	At least <b>two</b> of 7, 8 and 10 correct			
	<b>B1ft</b> Any one of 13, 16 or 20 correct ft their 7,8,10 and 12 (must be positive) such that the 4 regions of $A = 40$ or the 4 regions of $B = 45$ or the 4 regions of $C = 50$ Do not accept blank regions as 0 for ft.				
	B1	All correct including the 14			
(b)	M1	M1 Labelling all of the probabilities needed for a test of independence (probabilities must be correct or correct ft from their Venn diagram). Must use A and C Either $P(A), P(C)$ and $P(A \cap C)$ or $eg P(A)$ and $P(A   C)$			
	A1	Stating correct test with correct values $P(A) \times P(C) = P(A \cap C)$ or $eg P(A) = P(A)$ and correct conclusion of independence	( <i>C</i> )		
(c)(i)	B1ft	Ft their "13", "16" and "20" provided the answer is a probability			
(ii)	M1	Correct method for conditional probability using all appropriate regions of their Venn I Condone $\frac{n}{50}$ (provided it does <b>not</b> come from simplification of $\frac{2n}{100}$ ) or $\frac{\frac{n}{100}}{\frac{50}{100}}$ with $\frac{22}{100}$	Diagram $n \leqslant 34$		
	A1	$\frac{50}{100}$ Assuming independence is IVIO eg $\frac{50}{100}$			

Question Number		Scheme	Marks	
5(a)(i)		$P(S > 640) = P\left(Z > \frac{640 - 700}{50}\right)$	M1	
		awrt <u>0.885</u>	A1 (2)	
(ii)		675 < <i>S</i> < 725	M1	
	P(675	$\langle S \langle 725 \rangle = P(S \langle 725 \rangle - P(S \langle 675 \rangle) $ <u>or</u> use of symmetry to find correct area	M1	
	Р	$P(S < 725) = P\left(Z < \frac{725 - 700}{50}\right) \qquad \underline{or} \qquad P(S < 675) = P\left(Z < \frac{675 - 700}{50}\right)$		
	P(-0.:	5 < Z < 0.5 = 0.6915 - (1 - 0.6915) or 1-2×0.3085 or 2×(0.6915-0.5)	A1	
		= 0.383 awrt <b>0.383</b>	Al	
			(5)	
(1,)(1)		$680 - \mu$ 1.5 $599 - \mu$ 0.5244	M1A1	
(0)(1)		$\frac{1}{\sigma} = 1.3  \frac{1}{\sigma} = -0.3244$	A1	
			(3)	
(ii)	(68	$(30 - \mu) - (599 - \mu) = 1.5\sigma - (-0.5244)\sigma$	M1	
		$(81 = 2.0244\sigma)$		
		$\sigma = 40.01185$ $\mu = 619.98$ awrt <u>40</u> (to 2sf) awrt <u>620</u> (to 3sf)	A1A1	
			(3)	
			Total 13	
(a)(i)	M1	Attempt to standardise with 640, 700 and 50 allow $\pm$ ( <b>not</b> implied by $\pm 1.2$ on its own	.)	
	A1	awrt 0.885 (calc gives $0.884930$ ) answer only is M0A0 must see standardisation do not isw if $1 - 0.8849$ is then found		
(ii)	M1	Sight of 675 or 725		
		Use of $P(675 < S < g) = P(S < g) - P(S < 675)$ where $724 \le g \le 725$		
	M1 <u>or</u> correct use of symmetry eg $P(675 < S < 725) = 2(P(S < 725) - 0.5)$ or			
		egP(675 < S < 725) = 1 - 2P(S < 675)		
	M1	One correct standardisation seen of 675 or g with 700 and 50 where $724 \le g \le 723$	5	
	1711	Allow for just $\pm 0.5$ oe seen as a z-value (not a probability)		
	A1	(dep on 3 <sup>rd</sup> M1) sight of awrt 0.69 or awrt 0.31		
	A1	(dep on 3 <sup>rd</sup> M1) awrt 0.383		
		Use of 650 and 750 scores a maximum of 4 out of 5 [Must be 650 and 750 to apply S	C]	
	SC	M0 M1 Use of $P((50 < S < 750)) = P(S < 750) = P(S < 650)$ or use of summetry to find correct	t area	
	Use of 650 and	M1 Use of $F(050 < 5 < 750) = F(5 < 750) - F(5 < 050) of use of symmetry to find correct M1 standardising 650 or 750 with 700 and 50 or just +1 seen as a z value (not a proba$	h alca	
	750	A1 (dep on $3^{rd}$ M1) sight of awrt 0.84 or awrt 0.16	(onity)	
		A1 (dep on 3 <sup>rd</sup> M1) awrt 0.683		
		Mark parts (b)(i) and (b)(ii) together		
(b)(i)	M1	$\pm \frac{680 - \mu}{\sigma} = z \text{ with } 1 <  z  < 2  \underline{\mathbf{or}}  \pm \frac{599 - \mu}{\sigma} = z \text{ with } 0.5 <  z  < 0.6$		
	A1	1 correct equation with $z = 1.5$ or better (calc gives 1.5000556) or $z = -0.5244$ or better (calc gives $-0.5244004$ )		
	A1	Both equations correct require both 1.5 or better <b>and</b> –0.5244 or better		
(ii)	M1	Attempt to eliminate $\mu$ or $\sigma$ from the 2 equations (implied by awrt $\mu = 620$ and awrt	$\sigma = 40)$	
	A1	awrt $\mu = 620 (3sf)$ or awrt $\sigma = 40 (2sf)$		
	A1	awrt $\mu = 620 (3sf)$ and awrt $\sigma = 40 (2sf)$		

Question Number		Scheme	Marks
6 (a)		$S_{tt} = 14837 - \frac{635^2}{30}  \left( = \frac{8377}{6} = 1396.1666 \right)$	M1
		$r = \frac{-1648.83}{\sqrt{2396.97 \times 1396.166}} = -0.9013136*$	A1*
(1.)	D		(2)
(b)	Possible	linear relationship between t and w / points lie close to a (straight) line	BIBI
	a negativ	e gradient/stope / as w increases t decreases	(2)
			(2)
(c)			-
(0)		S 1(40.92	
		$b = \frac{S_{wt}}{2} = \frac{-1048.83}{22046.85}$	M1
		$S_{ww} = 2396.97$	
		= -0.68788 awrt $-0.69$	A1
		$a = \frac{635}{(1 - 0.68788)} + \frac{839}{(1 - 0.68788)} = 40.404$	N/1
		$u = \frac{1}{30} - (-0.06788) \times \frac{1}{30} - 40.404$	
		t = 40.4 - 0.688w	A1
			(4)
(d)	On average	ge as score increases by 1, time decreases by '0.688' minutes	B1ft
			(1)
(e)(i)	(pmcc w	ould) stay the same	B1
(ii)	(Magnit	ide of gradient would) decrease	B1
(111)	(Intercep	of would) stay the same	BI
			(3)
		Notos	Total 12
(a)	M1	Notes	Total 12
(a)	M1	Notes       Use of correct formula to find $S_{tt}$ implied by 1396 or better	Total 12
(a)	M1 A1*	Notes         Use of correct formula to find $S_{tt}$ implied by 1396 or better         Correct calculation shown to find $r$ and answer awrt -0.901         One correct feature       Mention of linear relationship/aloss to a straight line on	Total 12
(a)	M1 A1*	NotesUse of correct formula to find $S_{tt}$ implied by 1396 or betterCorrect calculation shown to find $r$ and answer awrt -0.901One correct feature Mention of linear relationship/close to a straight line oeJust mentioning the word line is not enough – must imply the points/graph form a (st	Total 12
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(a) (b)	M1 A1* B1	NotesUse of correct formula to find $S_{tt}$ implied by 1396 or betterCorrect calculation shown to find $r$ and answer awrt -0.901One correct feature Mention of linear relationship/close to a straight line ofJust mentioning the word line is not enough – must imply the points/graph form a (stor negative gradient/slope oe allow eg downward gradient for negative gradientDo not allow negative correlation/negative trend/negative relationship.	Total 12
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(a) (b)	M1 A1* B1 B1	NotesUse of correct formula to find $S_u$ implied by 1396 or betterCorrect calculation shown to find $r$ and answer awrt -0.901One correct feature Mention of linear relationship/close to a straight line ofJust mentioning the word line is not enough – must imply the points/graph form a (stor negative gradient/slope ofallow eg downward gradient for negative gradientDo not allow negative correlation/negative trend/negative relationship.A single comment eg 'The gradient of the line is negative' scores B1B0 (since the mIne here does not imply that the points form a line)Two correct features Mention of linear relationship/close to a straight line ofJust mentioning the word line is not enough – must imply the points/graph form a (stand negative gradient/slope oeallow eg downward gradient for negative gradientDo not allow negative correlation/negative trend/negative relationship/close to a straight line oeJust mentioning the word line is not enough – must imply the points/graph form a (stand negative gradient/slope oeallow eg downward gradient for negative gradientDo not allow negative correlation/negative trend/negative relationship.A single comment eg 'The gradient of the line is negative' scores B1B0 (since the mDine here does not imply that the points form a line)	raight) line nention of raight) line
(a) (b)	M1 A1* B1 B1 M1	NotesUse of correct formula to find $S_u$ implied by 1396 or betterCorrect calculation shown to find $r$ and answer awrt -0.901One correct feature Mention of linear relationship/close to a straight line oeJust mentioning the word line is not enough – must imply the points/graph form a (stor negative gradient/slope oe allow eg downward gradient for negative gradientDo not allow negative correlation/negative trend/negative relationship.A single comment eg 'The gradient of the line is negative' scores B1B0 (since the nline here does not imply that the points form a line)Two correct features Mention of linear relationship/close to a straight line oeJust mentioning the word line is not enough – must imply the points/graph form a (stand negative gradient/slope oe allow eg downward gradient for negative gradientDo not allow negative correlation/negative trend/negative relationship/A single comment eg 'The gradient of the line is negative' scores B1B0 (since the nline here does not imply that the points form a line)Correct method for b (implied by awrt -0.69)	raight) line nention of nention of
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(a) (b)	M1 A1* B1 B1 B1 M1 A1 M1 A1	NotesUse of correct formula to find $S_{tt}$ implied by 1396 or betterCorrect calculation shown to find $r$ and answer awrt –0.901One correct feature Mention of linear relationship/close to a straight line ofJust mentioning the word line is not enough – must imply the points/graph form a (stor negative gradient/slope oe allow eg downward gradient for negative gradientDo not allow negative correlation/negative trend/negative relationship.A single comment eg 'The gradient of the line is negative' scores B1B0 (since the nline here does not imply that the points form a line)Two correct features Mention of linear relationship/close to a straight line oeJust mentioning the word line is not enough – must imply the points/graph form a (stand negative gradient/slope oe allow eg downward gradient for negative gradientDo not allow negative correlation/negative trend/negative relationship.A single comment eg 'The gradient of the line is negative' scores B1B0 (since the nline here does not imply that the points form a line)Correct method for b (implied by awrt –0.69)awrt –0.69 (may be seen in final equation)Correct method to find a ft their b (implied by awrt 40.4)Fully correct equation must be in terms of t and w with awrt 40.4 and awrt –0.688. NFor a numerical interpretation which is negative predication for height in the predication for height in the points form a line)	raight) line nention of raight) line nention of
(a) (b) (c)	M1 A1* B1 B1 M1 A1 M1 A1	NotesUse of correct formula to find $S_u$ implied by 1396 or betterCorrect calculation shown to find $r$ and answer awrt -0.901One correct feature Mention of linear relationship/close to a straight line ofJust mentioning the word line is not enough – must imply the points/graph form a (stor negative gradient/slope oe allow eg downward gradient for negative gradientDo not allow negative correlation/negative trend/negative relationship.A single comment eg 'The gradient of the line is negative' scores B1B0 (since the nline here does not imply that the points form a line)Two correct features Mention of linear relationship/close to a straight line oeJust mentioning the word line is not enough – must imply the points/graph form a (standnegative gradient/slope oe allow eg downward gradient for negative gradientDo not allow negative correlation/negative trend/negative relationship.A single comment eg 'The gradient of the line is negative' scores B1B0 (since the nline here does not imply that the points form a line)Correct method for b (implied by awrt -0.69)awrt -0.69 (may be seen in final equation)Correct method to find a ft their b (implied by awrt 40.4)Fully correct equation must be in terms of t and w with awrt 40.4 and awrt -0.688. NFor a numerical interpretation which must mention score (oe) and time/minutes (oe)the fast'	raight) line nention of raight) line nention of of fractions. or w and t,
(a) (b) (c) (d)	M1 A1* B1 B1 M1 A1 A1 B1ft	NotesUse of correct formula to find $S_u$ implied by 1396 or betterCorrect calculation shown to find $r$ and answer awrt -0.901One correct feature Mention of linear relationship/close to a straight line oeJust mentioning the word line is not enough – must imply the points/graph form a (stor negative gradient/slope oe allow eg downward gradient for negative gradientDo not allow negative correlation/negative trend/negative relationship.A single comment eg 'The gradient of the line is negative' scores B1B0 (since the nline here does not imply that the points form a line)Two correct features Mention of linear relationship/close to a straight line oeJust mentioning the word line is not enough – must imply the points/graph form a (stand negative gradient/slope oe allow eg downward gradient for negative gradientDo not allow negative correlation/negative trend/negative relationship.A single comment eg 'The gradient of the line is negative' scores B1B0 (since the nline here does not imply that the points form a line)Correct method for b (implied by awrt -0.69)awrt -0.69 (may be seen in final equation)Correct method to find a ft their b (implied by awrt 40.4)Fully correct equation must be in terms of t and w with awrt 40.4 and awrt -0.688. NFor a numerical interpretation which must mention score (oe) and time/minutes (oe)ft heir '-0.688'.Condone eg as score increases by '-0	raight) line nention of raight) line nention of fo fractions. or w and t,
(a) (b) (c) (d)	M1 A1* B1 B1 M1 A1 M1 A1 B1ft	NotesUse of correct formula to find $S_{u}$ implied by 1396 or betterCorrect calculation shown to find $r$ and answer awrt -0.901One correct feature Mention of linear relationship/close to a straight line oeJust mentioning the word line is not enough – must imply the points/graph form a (stor negative gradient/slope oe allow eg downward gradient for negative gradientDo not allow negative correlation/negative trend/negative relationship.A single comment eg 'The gradient of the line is negative' scores B1B0 (since the nline here does not imply that the points form a line)Two correct features Mention of linear relationship/close to a straight line oeJust mentioning the word line is not enough – must imply the points/graph form a (stand negative gradient/slope oe allow eg downward gradient for negative gradientDo not allow negative correlation/negative trend/negative relationship.A single comment eg 'The gradient of the line is negative' scores B1B0 (since the nline here does not imply that the points form a line)Correct method for b (implied by awrt -0.69)awrt -0.69 (may be seen in final equation)Correct method to find a ft their b (implied by awrt 40.4)Fully correct equation must be in terms of t and w with awrt 40.4 and awrt -0.688. NFor a numerical interpretation which must mention score (oe) and time/minutes (oe)ft their '-0.688'.Condone eg as score increases by 1	raight) line nention of raight) line nention of <u>o fractions.</u> <b>or</b> w <b>and</b> t,
(a) (b) (c) (d) (e)(i)	M1 A1* B1 B1 M1 A1 A1 M1 A1 B1ft B1	NotesUse of correct formula to find $S_u$ implied by 1396 or betterCorrect calculation shown to find $r$ and answer awrt -0.901One correct feature Mention of linear relationship/close to a straight line oeJust mentioning the word line is not enough – must imply the points/graph form a (stor negative gradient/slope oe allow eg downward gradient for negative gradientDo not allow negative correlation/negative trend/negative relationship.A single comment eg 'The gradient of the line is negative' scores B1B0 (since the nline here does not imply that the points form a line)Two correct features Mention of linear relationship/close to a straight line oeJust mentioning the word line is not enough – must imply the points/graph form a (stand negative gradient/slope oe allow eg downward gradient for negative gradientDo not allow negative correlation/negative trend/negative relationship.A single comment eg 'The gradient of the line is negative' scores B1B0 (since the nline here does not imply that the points form a line)Correct method for b (implied by awrt -0.69)awrt -0.69 (may be seen in final equation)Correct method to find a ft their b (implied by awrt 40.4)Fully correct equation must be in terms of t and w with awrt 40.4 and awrt -0.688. NFor a numerical interpretation which must mention score (oe) and time/minutes (oe)ft their '-0.688'.Condone eg as score increases by 1,	raight) line nention of raight) line nention of of fractions. or w and t,
(a) (b) (c) (d) (e)(i) (ii)	M1 A1* B1 B1 B1 M1 A1 M1 A1 B1ft B1 B1	NotesUse of correct formula to find $S_u$ implied by 1396 or betterCorrect calculation shown to find $r$ and answer awrt -0.901One correct feature Mention of linear relationship/close to a straight line oeJust mentioning the word line is not enough – must imply the points/graph form a (stor negative gradient/slope oe allow eg downward gradient for negative gradientDo not allow negative correlation/negative trend/negative relationship.A single comment eg 'The gradient of the line is negative' scores B1B0 (since the nline here does not imply that the points form a line)Two correct features Mention of linear relationship/close to a straight line oeJust mentioning the word line is not enough – must imply the points/graph form a (stand negative gradient/slope oe allow eg downward gradient for negative gradientDo not allow negative correlation/negative trend/negative relationship.A single comment eg 'The gradient of the line is negative' scores B1B0 (since the nline here does not imply that the points form a line)Correct method for b (implied by awrt -0.69)awrt -0.69 (may be seen in final equation)Correct method to find a ft their b (implied by awrt 40.4)Fully correct equation must be in terms of t and w with awrt 40.4 and awrt -0.688. NFor a numerical interpretation which must mention score (oe) and time/minutes (oe)ft their '-0.688'.Condone eg as score increases by 1,	raight) line nention of raight) line nention of <u>to fractions.</u> <b>or</b> w <b>and</b> t,

Question Number		Scheme	Mai	rks
7 (a)		$P(C < 570) = 0.5 + \frac{570 - 550}{650 - 550} \times 0.25 \text{ or } \frac{x - 100}{150 - 100} = \frac{570 - 550}{650 - 550}$	M1	
		= 0.55	A1	
				(2)
(b)	$Q_3 + 1.5$	$\times (Q_3 - Q_1) = 650 + 1.5 \times 200$		
		= 950	B1	
				(1)
(c)	Normal	distribution is supported as box plot is reasonably symmetrical oe	B1	
				(1)
(d)	z = 2			
		P(Z > 2)[=1-0.9772]	M1	
		= 0.0228	A1	
				(2)
(e)		$1000 = 560 + 2\sigma$ or $1000 > 560 + 2\sigma$	M1	
		$\sigma = 220$	A1	
				(2)
	Notes			al 8
(a)	M1	Correct method $0.5 + p \times 0.25$ where $0 or attempt to find the number of cabbages weighing less than 570 (implied by x = 110)$		
	A1	0.55 condone awrt 0.55 for 2 out of 2 marks		
(b)	B1	cao		
		Supports Normal/Yes (supports assumption)		
(c)	B1	<b><u>and</u></b> reference to symmetry or no skew eg $Q_3 - Q_2 = Q_2 - Q_1$ oe in words		
		Do not allow mean = median on its own for symmetric		
(d)	M1	Use of $P(Z > 2)$ can be implied by sight of awrt 0.977 or sight of awrt 0.0228		
	A1	awrt 0.0228 (calculator gives 0.0227501)		
(e)	Attempt to use $560 + 2\sigma$ to set up appropriate equation or inequality (allow $\ge$ )			
	Implied by sight of 220			
	A1	allow $\sigma < 220$ or $\sigma \leq 220$ condone 219.999 but eg 219 as final answer is A0		