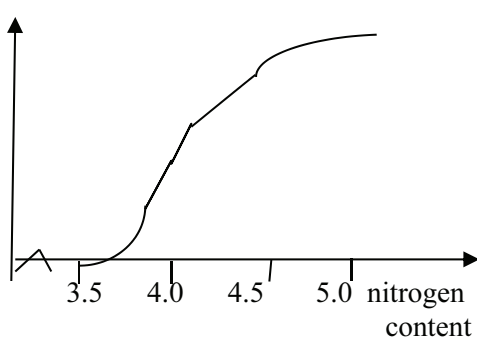


<b>Page 4</b>	<b>Mark Scheme</b>	<b>Syllabus</b>	<b>Paper</b>
	<b>Cambridge International AS/A Level – May/June 2015</b>	<b>9709</b>	<b>63</b>

<b>1</b>	$z = 1.136$ $1.136 = \frac{195 - \mu}{22}$ $\mu = 170$	B1 M1 A1 <b>[3]</b>	$\pm 1.136$ seen, not $\pm 1.14$ , Standardising, no cc no sq rt, equated to their z not 0.128 or 0.872 Correct answer, nfw																
<b>2 (i)</b>	<table border="1"> <thead> <tr> <th></th> <th>Kitchen mess</th> <th>Kitchen not mess</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td>On time</td> <td>1/10</td> <td>1/10</td> <td></td> </tr> <tr> <td>Not on time</td> <td>1/2</td> <td></td> <td>4/5</td> </tr> <tr> <td>Total</td> <td>3/5</td> <td>4/10</td> <td></td> </tr> </tbody> </table>		Kitchen mess	Kitchen not mess	Total	On time	1/10	1/10		Not on time	1/2		4/5	Total	3/5	4/10		B1 B1 B1 <b>[3]</b>	All values may be decimals or % 2 probabilities correct 2 further probabilities correct 2 further probabilities correct
	Kitchen mess	Kitchen not mess	Total																
On time	1/10	1/10																	
Not on time	1/2		4/5																
Total	3/5	4/10																	
<b>(ii)</b>	$P(\text{not on time given kitchen mess}) = \frac{1/2}{3/5}$ $= 5/6 \text{ o.e.}$	M1 A1 <b>[2]</b>	A cond prob fraction seen (using corresponding combined outcomes and total) FT from their values, 3sf or better, $<1, 3/5 < 1$																
<b>3</b>	$\mu = 300 \times 0.072 = 21.6, \sigma^2 = 20.0448$ $P(x < 18) = P\left(z < \frac{17.5 - 21.6}{\sqrt{20.0448}}\right)$ $= P(z < -0.9157)$ $= 1 - 0.8201$ $= 0.180$	B1 M1 M1 M1 A1 <b>[5]</b>	$300 \times 0.072$ seen and $300 \times 0.072 \times 0.928$ seen or implied $(\sigma = 4.4771, \sigma^2 = 20(.0))$ oe $\pm$ Standardising, their mean/var, with sq root Cont corr 17.5 or 18.5 Correct area $1 - \Phi$ Answer wrt 0.180, nfw																
<b>4 (i)</b>	$P(1W) = 6/9 \times 3/8 + 3/9 \times 6/8$ $= \frac{1}{2} \text{ AG}$ OR $\frac{{}^6C_1 \times {}^3C_1}{{}^9C_2}$ $= \frac{1}{2} \text{ AG}$	M1 A1 <b>[2]</b> M1 A1	summing 2 two-factor probs (condone replacement) not $\frac{1}{2} \times \frac{1}{2} + \frac{1}{2} \times \frac{1}{2}$ Correct answer, fully justified Using combinations consistent, correct format Correct answer, fully justified																
<b>(ii)</b>	$P(\overline{W}, \overline{W}) = 3/9 \times 2/8 = 6/72 \text{ (1/12)}$ $P(W, W) = 6/9 \times 5/8 = 30/72 \text{ (5/12)}$ <table border="1"> <thead> <tr> <th>x</th> <th>0</th> <th>1</th> <th>2</th> </tr> </thead> <tbody> <tr> <td>Prob</td> <td>1/12</td> <td>1/2</td> <td>5/12</td> </tr> </tbody> </table>	x	0	1	2	Prob	1/12	1/2	5/12	B1 B1 B1 <b>[3]</b>	Distribution table with 0,1,2 only $P(W, W)$ or $P(\overline{W}, \overline{W})$ correct $P(W, W) + P(\overline{W}, \overline{W}) = 0.5$								
x	0	1	2																
Prob	1/12	1/2	5/12																
<b>(iii)</b>	$E(X) = 16/12 \text{ (4/3) (1.33) isw}$	B1 <b>[1]</b>	Condone 1(.3) if correct working seen, nfw																

Page 5	Mark Scheme	Syllabus	Paper
	Cambridge International AS/A Level – May/June 2015	9709	63

5	(i)	$P(\text{large}) = 1 - \Phi\left(\frac{29 - 21.7}{6.5}\right)$ $= 1 - \Phi(1.123) = 1 - 0.8692$ $= 0.1308$ $P(0,1) = (0.8692)^8 + {}^8C_1(0.1308)(0.8692)^7$ $= 0.718$	M1 M1 A1 M1 M1 A1	[6] Standardising no cc no sq rt Correct area $1 - \Phi$ Rounding to 0.13 Any bin term with ${}^8C_x p^x (1-p)^{8-x}$ $0 < p < 1$ Summing bin $P(0) + P(1)$ only with $n = 8$ , oe Correct ans												
	(ii)	$= 1 - (0.8692)^n > 0.98$ $(0.8692)^n < 0.02$ Least number = 28	M1 M1 A1	[3] eq/ineq involving their $(0.8692)^n$ or $(0.1308)^n$ , 0.02 or 0.98 oe with or without a 1 solving attempt (could be trial and error) – may be implied by their answer correct answer												
6	(i)	cf 	B1 M1 A1	[3] Uniform axes cf and nitrogen content labelled, at least 0 to 70 and 3.5 to 4.8 seen 5 points plotted correctly on graph paper <table border="1" data-bbox="1021 1075 1468 1164"> <tr> <td>3.5</td> <td>3.8</td> <td>4.0</td> <td>4.2</td> <td>4.5</td> <td>4.8</td> </tr> <tr> <td>0</td> <td>6</td> <td>18</td> <td>41</td> <td>62</td> <td>70</td> </tr> </table> All points correct and a reasonable curve (condone 1 missed point) or line segments.	3.5	3.8	4.0	4.2	4.5	4.8	0	6	18	41	62	70
3.5	3.8	4.0	4.2	4.5	4.8											
0	6	18	41	62	70											
	(ii)	$70 - \text{their } 55 = 15$ $= 21.4\%$	M1 A1	[2] Subt a value $> 41$ from 70 (or $n/70$ , $n < 29$ ) Correct ans, accept 18.5 – 22												
	(iii)	median = 4.15	B1	[1] Accept $4.1 < \text{median} < 4.2$ , nfw												

Page 6	Mark Scheme	Syllabus	Paper
	Cambridge International AS/A Level – May/June 2015	9709	63

(iv)	<table border="1"> <tr> <td>nit</td> <td>3.5–</td> <td>3.8–</td> <td>4.0–</td> <td>4.2–</td> <td>4.5–</td> </tr> <tr> <td>cont</td> <td>3.8</td> <td>4.0</td> <td>4.2</td> <td>4.5</td> <td>4.8</td> </tr> <tr> <td>fr</td> <td>6</td> <td>12</td> <td>23</td> <td>21</td> <td>8</td> </tr> <tr> <td>fd</td> <td>20</td> <td>60</td> <td>115</td> <td>70</td> <td>26.7</td> </tr> </table>	nit	3.5–	3.8–	4.0–	4.2–	4.5–	cont	3.8	4.0	4.2	4.5	4.8	fr	6	12	23	21	8	fd	20	60	115	70	26.7	M1	Attempt at freqs, at least 3 correct, ignore labelling
	nit	3.5–	3.8–	4.0–	4.2–	4.5–																					
	cont	3.8	4.0	4.2	4.5	4.8																					
	fr	6	12	23	21	8																					
fd	20	60	115	70	26.7																						
	M1	Attempt at fd as f/cw only at least 3 correct FT (Accept f/cw × k)																									
	A1	Correct heights seen on graph (plot at 4.8, 27 A0) Graph paper must be used (3 correct relative heights implies M1M1)																									
	B1	Correct bar ends seen on graph – graph paper used																									
	B1	[5] Correct linear scale and labels.																									
7	(i)	<p>W S D</p> <p>1 1 3 = <math>6 \times 4 \times 3 C_3 = 24</math></p> <p>1 3 1 = <math>6 \times 4 C_3 \times 3 = 72</math></p> <p>3 1 1 = <math>{}^6C_3 \times 4 \times 3 = 240</math></p> <p>1 2 2 = <math>6 \times 4 C_2 \times 3 C_2 = 108</math></p> <p>2 1 2 = <math>{}^6C_2 \times 4 \times 3 C_2 = 180</math></p> <p>2 2 1 = <math>{}^6C_2 \times 4 C_2 \times 3 = 270</math></p> <p>Total = 894</p>	M1	Listing at least 4 different options																							
			M1	Mult 3 (combs) together assume $6 = {}^6C_1, \Sigma r = 5$																							
			M1	Summing at least 4 different evaluated/unsimplified options > 1																							
			B1	At least 3 correct unsimplified options																							
			A1	[5] Correct answer																							
	(ii)	${}^3P_2 \times {}^{10}P_8$  $= 10886400$	B1	${}^3P_2$ oe seen multiplied either here or in (iii)																							
			B1	$k^{10}P_x$ seen or $k^yP_8$ with no addition, $k \geq 1, y > 8, x < 10$																							
			B1	[3] Correct answer, nfw																							
	(iii)	<p>DSWSWSWD or DWSWSWSWD</p> <p>D in <math>{}^3P_2</math> ways = 6</p> <p>S in <math>{}^4P_4</math> ways = 24</p> <p>W in <math>{}^6P_4</math> = 360</p> <p>Swap SW in 2 ways</p> <p>Total = 103680 ways</p>	B1	If ${}^3P_2$ has not gained credit in (ii) may be awarded																							
			B1	${}^4P_4$ or ${}^6P_4$ oe seen multiplied or common in all terms (no division)																							
			B1	Mult by 2 (condone 2!)																							
			B1	[3] Correct answer, 3sf or better, nfw																							