

Page 4	Mark Scheme	Syllabus	Paper
	Cambridge International AS/A Level – October/November 2015	9709	61

1	$p = 0.76$ $P(\text{fewer than } 10) = 1 - P(10, 11)$ $= 1 - (0.76)^{10}(0.24)^{11}C_{10} - (0.76)^{11}$ $= 1 - 0.219$ $= 0.781$	M1 M1 M1 A1 [4]	Any binomial term ${}^{11}C_x p^x (1-p)^{11-x}, 0 < p < 1$ Any binomial term ${}^n C_x (0.76)^x (0.24)^{n-x}$ $1 - P(10, 11)$ oe binomial expression Correct answer
2	$\mu = 54.1$ $z = -1.11$ $-1.11 = \frac{50.9 - 54.1}{\sigma}$ $\sigma = 2.88$	B1 B1 M1 A1 [4]	Stated or evaluated Accept rounding to ± 1.1 Standardising no cc no sq rt Correct answer
3 (i)	$a = 9/cw$ $= 9/2 = 4.5$ $1.5 = b/4$ so $b = 6$	M1 A1 A1 [3]	Using $fd = f/cw$ Correct a Correct b
(ii)		B1 ^h B1 B1 [3]	Correct heights fit their b Correct widths, ie 3, 2, 3, 4 starting either 60 or 59.5 Labels fd, time or minutes and squiggle and bars from 59.5 to 71.5
4 (i)	$\bar{x} = 80 - 147/30 = 80 - 4.9$ $= 75.1$ $sd = \sqrt{\left(\frac{952}{30} - \left(\frac{147}{30}\right)^2\right)} = \sqrt{7.72\dots}$ $sd = 2.78$	M1 A1 M1 A1 [4]	For $-147/30$ oe seen Correct answer $952/30 - (\pm \text{their coded mean})^2$ Correct answer
(ii)	$P(x > 160) = P\left(z > \frac{160 - 148.6}{18.5}\right)$ $= P(z > 0.616)$ $= 1 - 0.7310$ $= 0.269$	M1 M1 A1 [3]	Standardising no cc no sq rt $1 - \Phi$ Correct answer

5 (i)	<p>5 (i) eg ** (EEEE) ***</p> <p>Number of ways = $\frac{6!}{2!2!} = 180$</p>	<p>M1 M1 A1 [3]</p>	<p>Mult by 6! oe Dividing by 2!2! oe Correct answer</p>										
(ii)	<p>S*****T or T*****S</p> <p>Number of ways = $\frac{7!}{4!2!} \times 2$ = 210</p>	<p>M1 M1 A1 [3]</p>	<p>Mult by 7! Or dividing by one of 2! or 4! Mult by 2 Correct answer</p>										
(iii)	<p>exactly one E in 6C_3 ways = 20</p>	<p>M1 M1 A1 [3]</p>	<p>6C_x as a single answer xC_3 as a single answer correct answer</p>										
6 (i)		<p>M1 A1 A1 [3]</p>	<p>3 pairs S (bank, log in, success oe) and F oe seen no extra bits. Exactly 3 pairs, must be labelled Correct diagram with all probs correct</p>										
(ii)	<table border="1"> <tr> <td>x</td> <td>0</td> <td>1</td> <td>2</td> <td>3</td> </tr> <tr> <td>Prob</td> <td>0.4</td> <td></td> <td>0.144</td> <td>0.216</td> </tr> </table>	x	0	1	2	3	Prob	0.4		0.144	0.216	<p>B1 M1 A1 B1 [4]</p>	<p>P(0) correct Multiplying two of more factors of 0.4 and 0.6 One more correct prob One more correct prob</p>
x	0	1	2	3									
Prob	0.4		0.144	0.216									
(iii)	<p>$E(X) = 0.24 + 2 \times 0.144 + 3 \times 0.216$ = 1.176 (1.18)</p>	<p>M1 A1 [2]</p>	<p>Using $\sum p_i x_i$ Correct answer</p>										
7 (i)	<p>let P(2, 4, 6) all = p then P(1, 3, 5) all = $2p$ $3p + 6p = 1$ $p = 1/9$ so prob (3) = $2/9$ (0.222)</p>	<p>M1 M1 A1 [3]</p>	<p>Using P(even) = 2P(odd) or vice versa oe Summing P(odd+ even) or P(1, 2, 3, 4, 5, 6) = 1 Correct answer</p>										
(ii)	<p>$P(5, 5, 6) = 2/9 \times 2/9 \times 1/9 \times {}^3C_2$ = $4/243$ (0.0165)</p>	<p>M1 M1 A1 [3]</p>	<p>Mult three probs together Mult by 3 oe ie summing 3 options Correct answer</p>										
(iii)	<p>$\mu = 100 \times 1/3 = 33.3, \sigma = 100 \times 1/3 \times 2/3 = 22.2$</p> <p>$P(x \leq 37) = P\left(z \leq \frac{37.5 - \frac{100}{3}}{\sqrt{\frac{200}{9}}}\right) = P(z \leq 0.8839)$</p> <p>= 0.812</p>	<p>B1 M1 M1 M1 A1 [5]</p>	<p>Unsimplified 100/3 and 200/9 seen Standardising need sq rt 36.5 or 37.5 seen correct area using their mean Correct answer</p>										