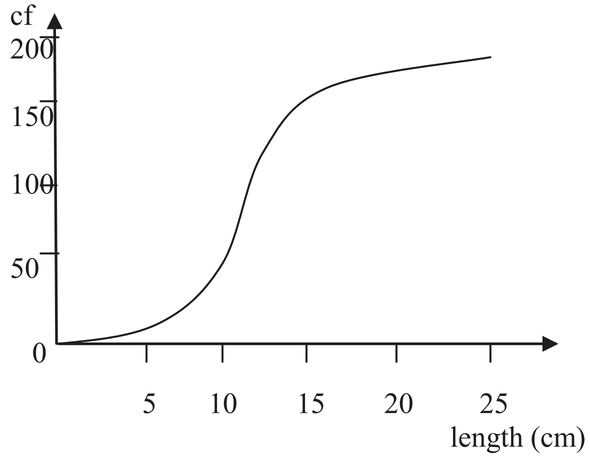
Question	Answer	Marks	Guidance
1	P(6) = 0.3	B1	SOI
	P(sum is 9) = P(3, 6) + P(4, 5) + P(5, 4) + P(6, 3)	M1	Identifying the four ways of summing to 9 (3,6), (6,3) (4,5) and (5,4)
	= (0.03 + 0.02) × 2	M1	Mult 2 probs together to find one correct prob of (3,6), (6,3) (4,5) or (5,4) unsimplified
	= 0.1	A1	OE
	Total:	**4**	
2	$np = 270 \times 1/3 = 90$, $npq = 270 \times 1/3 \times 2/3 = 60$	B1	Correct unsimplified np and npq, SOI
	$\mathrm{P}(x > 100) = \mathrm{P}\left(z > \frac{99.5 - 90}{\sqrt{60}}\right) = \mathrm{P}(z > 1.2264)$	M1 M1	±Standardising using 100 need sq rt Continuity correction, 99.5 or 100.5 used
	= 1 – 0.8899	M1	Correct area 1 – Φ implied by final prob. < 0.5
	= 0.110	A1	
	Total:	**5**	
3(i)	P(S) = 0.65 × 0.6 + 0.35 × 0.75	M1	Summing two 2-factor probs or 1 – (sum of two 2-factor probs)
	= 0.653 (261/400)	A1	
	Total:	**2**	

Question	Answer	Marks	Guidance
3(ii)	$\mathrm{P}\left(Std \mid L\right) = \dfrac{P(Std \cap L)}{P(L)} = \dfrac{0.35 \times 0.25}{1 - 0.6525} = 0.0875/0.3475$	M1	'P(Std)' × 'P(L/Std)'as num of a fraction. Could be from tree diagram in 3(i).
		M1	Denominator (1 - their (i)) or their (i) **or** 0.65 × 0.4(or 0.6) + 0.35 × 0.25(or 0.75) = 0.26+0.0875 **or** P(L) from their tree diagram
	= 0.252 (35/139)	A1	
	Total:	**3**	
4(a)	$\mathrm{P}(x > 0) = \mathrm{P}\left(z > \pm\dfrac{0-\mu}{\sigma}\right)$ $= \mathrm{P}\left(z > \dfrac{-\mu}{\mu/1.5}\right)$ or $\mathrm{P}\left(z > \dfrac{-1.5\sigma}{\sigma}\right)$	M1	±Standardising, in terms of μ and/or σ with 0 - …. in numerator, no continuity correction, no √
	= P(z > -1.5)	A1	Obtaining z value of ±1.5 by eliminating μ and σ, SOI
	= 0.933	A1	
	Total:	**3**	
4(b)	$z = -1.151$	B1	± z value rounding to 1.1 or 1.2
	$-1.151 = \dfrac{70-120}{s}$	M1	± Standardising (using 70) equated to a z-value, no cc, no squaring, no √
	σ = 43.4 or 43.5	A1	
	Totals:	**3**	

Question	Answer	Marks	Guidance
5(i)	constant probability (of completing)	**B1**	Any one condition of these two
	independent trials/events	**B1**	The other condition
	Totals:	**2**	
5(ii)	P(5, 6, 7) = $^7C_5(0.7)^5(0.3)^2 + {}^7C_6(0.7)^6(0.3)^1 + (0.7)^7$	**M1** **A1**	Bin term $^7C_x(0.7)^x(0.3)^{7-x}$, $x \neq 0, 7$ Correct unsimplified answer (sum) OE
	= 0.647	**A1**	
	Total:	**3**	
5(iii)	P(0, 1, 2, 3, 4) = 1 – their '0.6471' = 0.3529	**M1**	Find P($\leqslant 4$) either by subtracting their (ii) from 1 or from adding Probs of 0,1,2,3,4 with n=7 (or 10) and p = 0.7
	P(3) = $^{10}C_3(0.3529)^3(0.6471)^7$	**M1**	$^{10}C_3$ (their $0.353)^3(1$ – their $0.353)^7$ on its own
	= 0.251	**A1**	
6(a)(i)	First digit in 2 ways. 2 × 4 × 3 × 2 or 2 × 4P3	**M1**	1, 2 or 3 × 4P3 OE as final answer
	Total = 48 ways	**A1**	
	Total:	**2**	
6(a)(ii)	2 × 5 × 5 × 3	**M1** **M1**	Seeing 5^2 mult; this mark is for correctly considering the middle two digits with replacement Mult by 6; this mark is for correctly considering the first and last digits
	= 150 ways	**A1**	
	Totals:	**3**	

Question	Answer	Marks	Guidance
6(b)(i)	OO**** in $^{18}C_4$ ways	**M1**	$^{18}C_x$ or the sum of five 2-factor products with n = 14 and 4, may be × by 2C2: 4C0 × 14C4 + 4C1 × 14C3 + 4C2 × 14C2 + 4C3 × 14C1 + 4C4 (× 14C0)
	= 3060	**A1**	
	Totals:	**2**	

Question	Answer	Marks	Guidance
6(b)(ii)	Choc — Not Choc 0 — 6= $1 \times {}^{16}C_6 = 8008$ 0.2066 1 — 5= ${}^{4}C_1 \times {}^{16}C_5 = 17472$ 0.4508 2 — 4= ${}^{4}C_2 \times {}^{16}C_4 = 10920$ 0.2817 OR Choc — Oats — Ginger 0 — 0 — 6 0 — 1 — 5 0 — 2 — 4 1 — 0 — 5 1 — 1 — 4 1 — 2 — 3 2 — 0 — 4 2 — 1 — 3 2 — 2 — 2	B1	The correct number of ways with one of 0, 1 or 2 chocs , unsimplified **or** any three correct number of ways of combining choc/oat/ginger, unsimplified
	Total = 36400 ways	M1	sum the number of ways with 0, 1 and 2 chocs and two must be totally correct, unsimplified OR sum the nine combinations of choc, ginger, oats, six must be totally correct, unsimplified
	Probability = $36400/{}^{20}C_6$	M1	dividing by ${}^{20}C_6$ (38760) oe
	= 0.939 (910/969)	A1	
	Totals:	**4**	
7(i)	freq = fd × cw 10, 40, 120, 30	M1 A1	Attempt to multiply at least 3 fds by their 'class widths'
	Totals:	**2**	

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td rowspan="2">7(ii)</td><td>
<table>
<tr><td>length</td><td>< 5</td><td>< 10</td><td>< 20</td><td>< 25</td></tr>
<tr><td>cf</td><td>10</td><td>50</td><td>170</td><td>200</td></tr>
</table>


</td><td>B1

B1

M1

A1</td><td>3 or more correct cfs heights on graph 10, 50, 170, 200

Labels correct cf and length(cm), linear scales from zero (allow 0.5 on horizontal axis)

Attempt (at least three) at plotting at upper end points (either 5 or 5.5, 10 or 10.5 etc.)

Starting at (0, 0) polygon or smooth curve increasing with plotted points at lengths 5, 10, 20 and 25</td></tr>
<tr><td>Totals:</td><td>4</td><td></td></tr>
<tr><td rowspan="4">7(iii)</td><td>median = 14.2</td><td>B1</td><td>Median (accept 13.2 – 15.2)</td></tr>
<tr><td>‘18.5’ – ‘10’</td><td>M1</td><td>Subt their LQ from their UQ if reasonable from their graph</td></tr>
<tr><td>IQ range = 8.5</td><td>A1FT</td><td>Correct FT using LQ = 10 and UQ between 17.5 and 19.5</td></tr>
<tr><td>Totals:</td><td>3</td><td></td></tr>
<tr><td rowspan="3">7(iv)</td><td>mean = (2.5×10 + 7.5×40 + 15×120 + 22.5×30) / 200</td><td>M1</td><td>Using mid points (± 0.5) and their frequencies from 7(i) in correct formula</td></tr>
<tr><td>= 14</td><td>A1</td><td></td></tr>
<tr><td>Totals:</td><td>2</td><td></td></tr>
</table>