Question	Answer	Marks	Guidance
1	${}^{9}C_{4} \times {}^{5}C_{3} \times {}^{2}C_{2}$	B1	${}^{9}C_{4} \text{ or } {}^{9}C_{3} \text{ or } {}^{9}C_{2} \text{ seen } (1st group)$
	$=126 \times 10 \times 1$	B1	${}^{5 \text{ or } 7}\text{C}_3$ or ${}^{6 \text{ or } 7}\text{C}_4$ or ${}^{6 \text{ or } 5}\text{C}_2$ times an integer (2nd group)
	=1260	B1	Correct answer
		3	

Question	Answer	Marks	Guidance
2(i)	6p + 0.1 = 1 p = 0.15	B1	Correct answer
		1	
2(ii)	$Var(X) = 1 \times p + 1 \times 2p + 4 \times 2p + 16 \times 0.1 - 1.15^{2}$	M1	Correct unsimplified formula, <i>their p</i> substituted (allow 1 error)
	$0.15 + 0 + 0.3 + 1.2 + 1.6 - 1.15^{2}$ = 1.9275 = 1.93 (3sf)	A1	Correct answer
		2	

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Question	Answer	Marks	Guidance
3(i)	Scenarios are: 4V + 1C + 1DB: $^{11}C_4 \times {}^5C_1 \times {}^4C_1$	M1	$^{11}C_a \times ^5C_b \times ^4C_c$, $a+b+c=6$,
	$\begin{array}{cccc} 4V + 2C: & {}^{11}C_4 \times {}^5C_2 \\ 5V + 1C: & {}^{11}C_5 \times {}^5C_1 \end{array}$	B1	2 correct unsimplified options
	6600 + 3300 + 2310	M1	Add 2 or 3 correct scenarios only
	= 12210	A1	Correct answer
		4	
3(ii)	4! × 3!	M1	<i>k</i> multiplied by 3! or 4!, <i>k</i> an integer ≥ 1
		A1	Correct unsimplified expression
	= 144	A1	Correct answer
		3	

Question	Answer	Marks	Guidance
4(a)	$P(X < 29.4) = P(Z < \frac{29.4 - 31.4}{\sqrt{3.6}})$ = P(Z < -1.0541)	M1	Standardise, no cc, must have sq rt.
	= 1 - 0.8540	M1	Obtain 1 – prob
	= 0.146	A1	Correct final answer
		3	

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Question	Answer	Marks	Guidance
4(b)	$P(X < 12) = \frac{42}{400} = 0.105 \text{ and } P(X > 19) = \frac{58}{400} = 0.145$	M1	Eqn with μ, σ and a <i>z</i> -value. Allow cc, wrong sign, but not $\sqrt{\sigma}$ or σ^2
	$\frac{12-\mu}{\sigma} = -1.253$	B1	Any form with z value rounding to ± 1.25
	$\frac{19-\mu}{\sigma} = 1.058$	B1	Any form with z value rounding to ± 1.06
	$12 - \mu = -1.253\sigma$ $19 - \mu = 1.058\sigma$ $7 = 2.307\sigma \text{ or } 36.455 + 2.307\mu = 0 \text{ oe}$	M1	Solve 2 equations in μ , σ eliminating to 1 unknown
	$\mu = 15.8, \sigma = 3.03$	A1	Correct answers
	$\mu = 15.0, 0 = 5.05$	5	

Question	Answer	Marks	Guidance
5(i)	1 - (P(7) + P(8) + P(9)) = 1 - (⁹ C ₇ 0.8 ⁷ × 0.2 ² + ⁹ C ₈ 0.8 ⁸ × 0.2 ¹ + ⁹ C ₉ 0.8 ⁹ × 0.2 ⁰)	M1	Any binomial term of form ${}^{9}C_{x}p^{x}(1-p)^{9-x}, x \neq 0$
		M1	Correct unsimplified expression
	= 1 - (0.3019899 + 0.3019899 + 0.1342177) = 0.262	A1	Correct answer
		3	

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Question	Answer	Marks	Guidance
5(ii)	Mean = $200 \times 0.8 = 160$: var = $200 \times 0.8 \times 0.2 = 32$	B1	Both unsimplified
	$P(X > 166) = P(Z > \frac{166.5 - 160}{\sqrt{32}})$	M1	Standardise, $z = \pm \frac{x - their 160}{\sqrt{their 32}}$ with square root
		M1	166.5 or 165.5 seen in attempted standardisation expression
	= P(Z > 1.149) = 1 - 0.8747	M1	$1 - a \Phi$ -value, correct area expression, linked to final answer
	= 0.125	A1	Correct final answer
		5	
5(iii)	np = 160, nq = 40: both > 5 (so normal approx. holds)	B1	Both parts required
		1	

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Question	Answer	Marks	Guidance
6(i)	300 250 200 150 100 50 0 20 40 60 80 100 120 RAINFALL (MM)	B1	Appropriate linear scales starting at (0,0), axes labelled cf and Rainfall, mm
		B1	Correct graph, points plotted at ucb, allow straight lines or curve
		2	
6(ii)		M1	Read off from increasing graph at $cf = 150$
	42	A1	Correct answer $(41 \le r \le 43)$
		2	

Question	Answer	Marks	Guidance
6(iii)	Frequencies 52, 42, 48, 30, 50, 28	B1	Correct frequencies
	Mean age = $(10 \times 52 + 25 \times 42 + 35 \times 48 + 45 \times 30 + 60 \times 50 + 85 \times 28) / 250$	B1	Correct midpoints (allow one error)
	=9980/250	M1	Using $\Sigma fx/250$ with mid-points attempt, not cf, cw, lb, ub
	= 39.9(2) oe	A1	Correct answer
	Variance = $10^2 \times 52 + 25^2 \times 42 + 35^2 \times 48 + 45^2 \times 30 + 60^2 \times 50 + 85^2 \times 28) / 250 - $ mean ² = 539.59	M1	Attempt at variance using their midpoints and their mean
	$\sigma = 23.2$	A1	Correct answer for sd
		6	

Question	Answer	Marks	Guidance
7(i)	52/160 = 13/40, 0.325	B1	oe
		1	
7(ii)	P(boy) = 96/160: P(Music) = 52/160 P(boy and Music) = 40/160	M1	Use of $P(B) \times P(M) = P(B \cap M)$, appropriate probabilities used
	$96/160 \times 52/160 \neq 40/160$: Not independent	A1	Numerical comparison and conclusion stated
		2	

Question	Answer	Marks	Guidance
7(iii)	Method 1		
	P(not Music/girl) = P(not Music and girl)/P(girl) $(27/160) / (64/160)$	M1	Appropriate probabilities in a fraction
	$=\frac{27}{64}$	A1	Correct answer www implies method
	Method 2		
	Direct from table	M1	27/a or b/64, a ≠ 160
	$\frac{27}{64}$	A1	Correct answer www implies method
		2	
7(iv)	$P(B M) \times P(B NM) \times P(G NM)$ or $P(G M) \times P(B NM) \times P(B NM)$	M1	One scenario identified with 3 probs multiplied
	40/160 × 56/159 × 52/158 or 12/160 × 56/159 × 55/158	A1	One scenario correct (ignore multiplying factor)
	× 3! × 3!/2!	B1	Both multiplying factors correct
	$\begin{array}{c} 0.17387 \\ P = 0.17387 + 0.02759 \end{array} 0.02759 \end{array}$	M1	Both cases attempted and added (multiplying factor not required), accept unsimplified
	= 0.201	A1	Correct answer, oe
	Note: If score in this part is 0, award SCB1 for $\frac{1}{160} \times \frac{1}{159} \times \frac{1}{158} \times k$, for positive integer <i>k</i> , seen		

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Question	Answer	Marks	Guidance
7(iv)	Method 2		
	$\frac{\begin{pmatrix} 40\\1 \end{pmatrix} \times \begin{pmatrix} 56\\1 \end{pmatrix} \times \begin{pmatrix} 52\\1 \end{pmatrix} + \begin{pmatrix} 12\\1 \end{pmatrix} \times \begin{pmatrix} 56\\2 \end{pmatrix}}{\begin{pmatrix} 160\\3 \end{pmatrix}}$	M1	One scenario identified with 2 or 3 combination multiplied
		A1	One scenario correct
		B1	Denominator correct
	$\frac{116480 + 18480}{669920}$	M1	Both scenarios attempted, and added, seen as a numerator of a fraction
	$\frac{1687}{8374}$	A1	Correct answer, oe
		5	