1	**(i)**	$(3.6\times 9+64)\ /\ 24$ $= 4.02$ years	M1 A1 **[2]**	Mult by 9, adding 64 then dividing by 24 Correct answer
	(ii)	$\frac{\Sigma x_A^{\ 2}}{9} - 3.6^2 = 1.925^2$ $\Sigma x_A^{\ 2} = 150$ $\frac{150.0+352}{24} - 4.017^2 = 4.780$ sd = 2.19	M1 A1 M1 A1 **[4]**	Attempt to find $\Sigma x_A^{\ 2}$ using correct variance formula Correct $\Sigma x_A^{\ 2}$ Using 352 + their 150 in correct variance formula Correct answer
2	**(i)**	$4\times 3\times 7$ $= 84$	B1 **[1]**	Correct answer
	(ii)	$10! - 9! \times 2$ $= 2903040$ (2900000) *OR* $8! \times 9 \times 8$ $= 2903040$ (2900000)	B1 B1 **[2]** B1 B1	$10! - k \times 9!$ seen oe Correct answer $8! \times 9 \times l$ seen oe Correct answer
	(iii)	${}^9C_1 + {}^9C_2 + ... + {}^9C_9$ $= 511$ *OR* $2^9 - 1$ $= 511$	M1 M1 A1 **[3]** M1 M1 A1	Using combinations Adding 9 combinations Correct answer 2^9 seen Subtracting 1 Correct answer
3	**(i)**	$\text{median}_A < 35$ or $20 \le \text{median}_A < 35$ or $\text{median}_A = 33.0/33.1/33.5/33.6$ or $\text{median}_B \ge 50$ or $50 \le \text{median}_B < 70$ or $\text{median}_B = 51.7/51.9/52.2/52.4$ $\text{median}_B > \text{median}_A$ *OR A* has 66 cand $50 < \text{mark} < 100$, so $\text{med}_A < 50$ or *B* has 156 cand $50 < \text{mark} < 100$, so $\text{med}_B > 50$ $\text{median}_B > \text{median}_A$	B1 B1 **[2]** B1 B1	Correct numerical statement re median_A or median_B Correct numerical statement re other median and a conclusion As before As before
	(ii)	$159 - 68 = 91$	B1 **[1]**	Correct final answer
	(iii)	$\text{mean} = \begin{pmatrix} 4.5\times 25 + 14.5\times 43 + 27\times 91 \\ + ... + 84.5\times 40 \end{pmatrix} / 300$ $= 11270 / 300 = 37.6$	M1 M1 M1 A1 **[4]**	Using an attempt at mid-points, not end points or class widths Using an attempt at frequencies, not cum freqs Sum of 6 prods, correct freqs, divided by 300 Correct answer

4 **(i)** **(a)**	P(final score is 12) = P(6, 6) = 1/36	B1 **[1]**	Correct answer
(b)	P[(1,5) + (1,4) + (2,3) + (3,2) + (4,1)]	M1	Considering P(1, 5)
		M1	Considering P[(1,4) + (2,3) + (3,2) + (4,1)]
	= 5/36	A1 **[3]**	Correct answer
(ii)	P(A) = 1/6 P(B) = P[(1,5) + (2,4) + (3,3) + (4, 2) + (5,1)] = 5/36	B1	Any two of P(A), P(B) and P(C) correct
	P(C) = 1 – P(O, O) = 3/4	B1	Third probability correct
	P(A and B) = P(1 and 5) = 1/36 ≠ P(A) × P(B) P(A and C) = P[(2,5) + (4,5) + (6,5)] = 3/36 ≠ P(A) × P(C) P(B and C) = P[(2,4) + (4,2)] = 2/36 ≠ P(B) × P(C)	M1	Numerical attempt to compare P(X and Y) with P(X) × P(Y), must be three positive probs
	None are independent.	A1√	One correct comparison and conclusion, ft their probabilities
		A1 **[5]**	Correct conclusion(s) following legitimate working
5 **(i)**	$z = \pm 1.751$	B1	Correct z
	$\pm \dfrac{20-\mu}{\mu/4} = 1.751$	M1	Standardising no cc, no sqrt, must be a z-value
	$\mu = 13.9$	A1 **[3]**	Correct answer
(ii)	$P(X < 10) = P\left(z < \pm \dfrac{10-13.91}{13.91/4}\right)$	M1	Standardising attempt with 10, their μ and their μ/4, no cc, no sqrt
	= P(z < −1.124) = 1− 0.8694 = 0.131	M1	"$\Phi_1 + \Phi_2 - 1$", ft their mean
	P(10 < X < 20) = 0.96 – 0.131 = 0.829 or 0.830	A1 **[3]**	Correct answer
(iii)	$\mu = 250 \times 0.96 = 240$ $\sigma^2 = 250 \times 0.96 \times 0.04 = 9.6$	B1	240 and 9.6 or sq rt 9.6 seen unsimplified
	$P(\geq 235) = 1 - \Phi\left(\pm \dfrac{234.5-240}{\sqrt{9.6}}\right)$	M1	Standardising, with or without cc, must have sq rt in denom
		M1	Continuity correction 234.5 or 235.5 only
	= Φ (1.775)	M1	Correct region > 0.5, ft their mean
	= 0.962	A1 **[5]**	Correct answer

6 **(i)**	$(0.75)^n < 0.06$	M1*	Equation or inequality with 0.75^n and 0.06 or 0.94 seen
	$n > 9.78$	M1dep*	Attempt at solving by trial and error (can be implied) or using logarithms correctly
	$n = 10$	A1 **[3]**	Correct answer
(ii)	$E(X) = 14 \times 0.75$ or 10.5 Try $P(10) = {}^{14}C_{10}(0.75)^{10}(0.25)^4 = 0.220$	M1	Evaluating binomial probability for an integer value directly above or below their mean
	$P(11) = {}^{14}C_{11}(0.75)^{11}(0.25)^3 = 0.240$	M1	Evaluating the other binomial probability
	(mode is) 11	A1 **[3]**	Correct answer
	OR	M1	Evaluating binomial $P(n)$ and $P(n + 1)$
		M1	Evaluating binomial P(10), P(11) and P(12)
		A1	Correct answer
(iii)	P(> 11) $= {}^{14}C_{12}(0.75)^{12}(0.25)^2 + {}^{14}C_{13}(0.75)^{13}(0.25)^1 + (0.75)^{14}$	M1	A binomial term of the form ${}^{14}C_n p^n(1-p)^{14-n}$ seen, $n \neq 0$ or 14
		M1	Summing binomial P(12, 13, 14) or P(11, 12, 13, 14,)
	$= 0.281$	A1	Correct answer 0.280 – 0.282
	$P(3) = {}^5C_3\ (0.2811)^3(0.7189)^2$	M1	A binomial term of the form ${}^5C_3 p^3(1-p)^2$ seen, any p
	$= 0.115$	A1 **[5]**	Correct answer