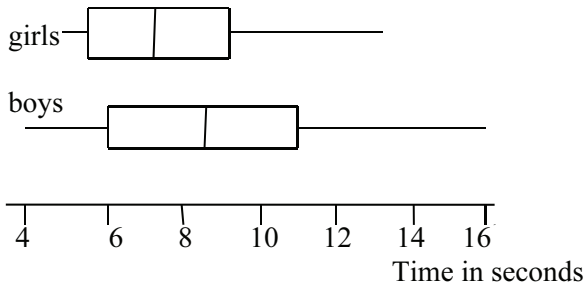
Qu	Answer	Marks	Guidance
1 (i)	<table><tr><td></td><td>Wears specs</td><td>Not wears specs</td><td>Total</td></tr><tr><td>RH</td><td>6</td><td>19</td><td>25</td></tr><tr><td>Not RH</td><td>2</td><td>3</td><td>5</td></tr><tr><td>Total</td><td>8</td><td>22</td><td></td></tr></table>	**B1** **B1** [2]	One correct row or col including total other than the Total row/column All correct
(ii)	P(X) = 25/30, P(Y) = 8/30	**M1**	P(X) or P(Y) from their table or correct from question (denom 30) oe
	P(X) × P(Y) = 25/30 × 8/30 = 200/900 = 2/9 P($X \cap Y$) = 6/30 = 1/5 ≠ P(X) × P(Y)	**M1**	Comparing their P(X) × P(Y) (values substituted) with their evaluated P($X \cap Y$) – not P(X)×P(Y)
	Not independent	**A1** [3]	
2 (i)		**B1** **B1** **B1** [3]	Labels 'time' **and** 'seconds', 'boys' and 'girls' on correct plots and scaled line One box and whisker all correct on graph paper – ignore boy or girl label Second box and whisker all correct (on graph paper and ignore boy/girl label) on SAME scaled line.
(ii)	girls smaller range or IQ range than boys /girls less spread out oe girls generally quicker than boys or girls median<boys median (not mean) oe boys almost symmetrical, girls +vely skewed oe	**B1** **B1** [2]	Any 2 comments – MUST be a comparison
3 (i)	P(0) = 6/36, P(1) = 10/36, P(2) = 8/36 P(3) = 6/36, P(4) = 4/36, P(5) = 2/36	**B1** **B1** **M1** **A1** [4]	Table oe seen with 0, 1, 2, 3, 4, 5 (6 if P(6) = 0) Any three probs correct $\Sigma p = 1$ and at least 3 outcomes All probs correct
(ii)	mean score = (0×6+1×10 +16 +18 +16+10)/36 = 70/36 (35/18, 1.94)	**M1** **A1** [2]	Using Σxp (unsimplified) on its own – condone Σp not =1

Qu	Answer	Marks	Guidance
4 (i)	1845/9 (= 205) c = 2205 - 205 = 2000	**M1** **A1**	Accept (1845± anything)/ 9
	OR $\Sigma x = 2205 \times 9$ (= 19845) $\Sigma x - \Sigma c = 1845$ Σc = 19845 -1845 = 18000 c = 2000	**M1** **A1** [2]	For 2205×9 seen
(ii)	var = $\frac{477450}{9} - 205^2$ = 11025	**M1** **A1**	For $\frac{477450}{9}$ – (their coded mean)^2
	OR var = $\frac{43857450}{9} - 2205^2$ = 11025	**M1** **A1** [2]	For their $\Sigma x^2/9 - 2205^2$ where Σx^2 is obtained from expanding $\Sigma(x-c)^2$ with $2c\Sigma x$ seen
(iii)	new total = 2120.5×10 = 21205 new price = 21205 – 19845 = 1360	**M1** **A1** [2]	Attempt at new total
5 (i)	z = 1.015 $1.015 = \frac{70-69}{\sigma}$ σ = 0.985 (200/203)	**B1** **M1** **A1** [3]	Accept z between ±1.01 and 1.02 Standardising
(ii)	58 + 9 = 67 $P(>67) = P\left(z > \frac{67-69}{0.9852}\right)$	**M1** **M1**	58 + 9 seen or implied (or 69-58 or 69-9) Standardising ± z no cc allow their sd (must be +ve) Alt. 1 69-58 =11, $P(>9) = P\left(z > \frac{9-11}{0.9852}\right)$ Alt.2 69-9 =60, $P(>58) = P\left(z > \frac{58-60}{0.9852}\right)$
	= P(z > – 2.03) = 0.9788	**M1**	Correct prob area
	300 × 0.9788 = 293.6 so 293	**M1** **A1** [5]	Multiply their prob (from use of tables) by 300 – accept 293 or 294 from fully correct working

Qu	Answer	Marks	Guidance
6 (i)	7560 ways	**B1** [1]	
(ii)	RxxxxxxxG in $\frac{7!}{4!}$	**B1**	7! alone seen in num or 4! alone in denom Must be in a fraction. $\frac{7!\times 2}{4!\times 2}$ gets full marks
	= 210 ways	**B1** [2]	
(iii)	eg EEEExxxxx in $\frac{6!}{2!}$	**B1**	6! or 5! × 6 seen in numerator or on own Can be 6! × k but not 6! ± k
	= 360 ways	**B1** [2]	
(iv)	1 R eg RVG or RVN or RGN = 3	**B1** [1]	
(v)	no Rs eg VGN or 3C3 ways = 1 2 Rs eg RRV or 3C1 ways = 3	**M1**	Summing at least 2 options for R
	Total = 7	**A1** **A1** [3]	Correct outcome for no Rs or 2 Rs – evaluated
7 (i)	${}^{12}C_8\ (0.65)^8(0.35)^4 + {}^{12}C_9\ (0.65)^9(0.35)^3 + {}^{12}C_{10}\ (0.65)^{10}(0.35)^2$	**M1**	Bin term with ${}^{12}C_r p^r (1-p)^{12-r}$ seen $r\neq 0$ any $p<1$
		M1	Summing 2 or 3 bin probs p = 0.65 or 0.35, n = 12
	= 0.541	**A1** [3]	
(ii)	$P(\bar{R}\bar{R}\bar{R}R) = 0.35\times 0.35\times 0.35\times 0.65$	**M1**	Mult 4 probs either $(0.35)^3(0.65)$ or $(0.65)^3(0.35)$
	= 0.0279	**A1** [2]	
(iii)	P(7) = 0.2039 (unsimplified)	**B1**	${}^{12}C_7\ (0.65)^7(0.35)^5$
	Mean = 250×'0.2039' (= 50.9798) Var = 250×'0.2039' × '(1 – 0.2039)' (= 40.5851)	**B1**	Correct unsimplified np and npq using 'their 0.2039' but not 0.65 or 0.35
	P(> 54) = $P\left(\frac{54.5-50.9798}{\sqrt{40.5851}}\right)$	**M1**	Standardising need sq rt – must be from working with 54
	= P(z > 0.5526)	**M1**	cc either 53.5 or 54.5
	= 1 – Φ(0.5526) = 1 – 0.7098	**M1**	correct area < 0.5 i.e. 1 – Φ - must be from working with 54
	= 0.290	**A1** [6]	