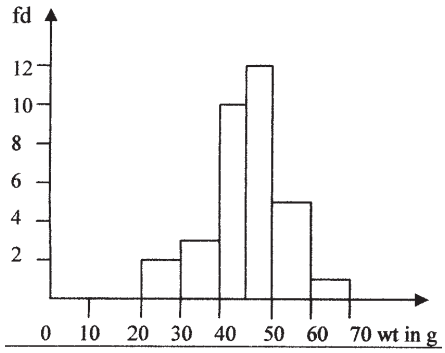
1	$\bar{x} = 59.4$	B1		
		M1		Correct method (can be implied by correct answer)
	$\sigma = 7.68$	A1	[3]	Correct answer
2	**(i)** each in 2 ways = 2^{12}	M1		2^{12} seen
	= 4096	A1	[2]	Correct answer
	(ii) $\frac{12!}{7!5!}$	B1	[1]	
	= 792			
3	**(a)** *G R L*			
	11 7 7 = 15C11 × 10C7 × 8C7 = 1310400	M1		Multiplying 3 combinations
	13 6 6 = 15C13 × 10C6 × 8C6 = 617400	A1		One of 1310400, 617400, 14112 seen
	15 5 5 = 15C15 × 10C5 × 8C5 = 14112	M1		Adding 3 options
	Total = 1941912 (1940000)	A1	[4]	Correct answer
	(b) e.g. * E * R * E (GG) N * A * E * gives 6 ways for G	B1		7! / 3! Or 7!/3!3! seen oe
	$\frac{7!}{3!} \times 6$ or 8!/3! – 2 × 7!/3!	B1		Multiplying by 6 (gaps) oe
	= 5040 ways.	B1	[3]	Correct final answer
4	**(i)** 45 – 50 g	B1	[1]	
	(ii) LQ in 40 – 45			
	UQ in 50 – 60	M1		Considering groups containing LQ and UQ (can be implied)
	Smallest IQ range could be 5			
	Largest IQ range could be 20	A1	[2]	Correct answer
	(iii) 50	B1	[1]	
	(iv) freqs 0, 20, 30, 50, 60, 50, 10			
	fd 0, 2, 3, 10, 12, 5, 1	M1		Attempt at frequencies and fd
		B1		Correct labels and scales with a histogram-type shape
		B1		Correct bar widths starting at 20
		A1	[4]	Correct heights of bars
5	**(i)** $4p + p + 3p = 1$ so P(blue) = 1/8 AG	B1	[1]	Must show something
	(ii) P(*R*) = ½, P(*B*) = 1/8, P(*G*) = 3/8	M1	[3]	Multiplying P (*R*, *B*, *G*) together
	P(all different) = ½ × 1/8 × 3/8 × 3!	M1		Mult by 3!
	=9/64 (0.141)	A1		Correct answer

	(iii)	mean = 136 × 1/8 = 17, var = 14.875	B1		Unsimplified mean and variance correct
		$P(<20) = P\left(z < \frac{19.5-17}{\sqrt{14.875}}\right)$	M1		Standardising, need sq rt
			M1		Cont correction 19.5 or 20.5
		$= \Phi(0.648)$	M1		Correct area, > 0.5 legit
		$= 0.742$	A1	[5]	Correct answer
6	**(i)**	P(0, 1, 2)	B1		0.15 and 0.85 seen
		$=(0.85)^6 + (0.15)(0.85)^5{}_6C_1 +$	M1		Any binomial expression Σpowers = 6, Σ p = 1
		$(0.15)^2(0.85)^4{}_6C_2$			
		$= 0.953$	A1	[3]	Correct answer
	(ii)	$P(D) = 0.6 \times 0.1 + 0.4 \times 0.55 = 0.28$	M1		Attempt to find P(*D*)
			A1		0.28 seen
		$P(B\|D) = \frac{P(B \cap D)}{P(D)}$	M1		Using cond prob formula to find P(*B*|*D*)
		$0.06/0.28 = 0.2143$	√A1		Correct unsimplified answer
		$P(> 1) = 1 - P(0)$	M1		Binomial expression 1 –P(0) or 1 –P(0, 1) Σ p = 1
		$= 1 - (0.7857)^5$			
		$= 1 - 0.7078$	A1	[6]	Correct answer accept 0.700
		$= 0.701$			
7	**(i)**	$z_1 = \frac{12-8}{\sqrt{24}} = 0.816$ $\Phi_1(0.816) = 0.7926$	M1		Standardising any one, sq rt, no cc
		$z_2 = \frac{7-8}{\sqrt{24}} = -0.204$ $\Phi_2(-0.204) = 1 - 0.5808$	M1		Correct area $\Phi_1 + \Phi_2 - 1$
		Prob = 0.7926 – (1 – 0.5808) = 0.373	A1	[3]	Correct answer
	(ii)	$z = \frac{0-\mu}{2\mu} = -0.5$	M1		Standardising, no cc no sq rt, one variable
		$P(z < -0.5) = 1 - 0.6915$			
		= 0.309 or 30.9%	A1	[2]	Correct answer oe
	(iii)	$z = \frac{3\mu-\mu}{2\mu} = 1$	M1		Standardising and eliminating μ
		$P(z > 1) = 1 - 0.8413 = 0.1587$	M1		Subt from 1 and multiplying by 70
		$70 \times 0.1587 = 11.1$	A1	[3]	Correct answer accept 11 or 12
	(iv)	$z = 1.45$	B1		± 1.45 seen
		$1.45 = \frac{6-\mu}{2\mu}$	M1		Solving for μ with 6, 2 μ , μ and their z
		$\mu = 1.54$	A1	[3]	Correct answer