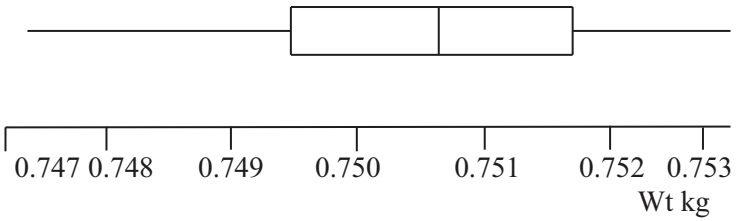
Question	Answer	Marks	Guidance
1	1.6 –1.5 2.3 1.4 –0.6 –0.9 2.5 1.9 2.4 1.9 2.8 1.0	**M1**	Subtracting 1760, allow max 2 slips
	Mean = 1.23	**A1**	
	sd = 1.39	**A1**	
	Mean of x = 1761.23 , sd of x = 1.39	**A1**√	ft their coded mean and sd.
			SR B1 correct mean and sd without use of coded process
	Total:	**4**	

Question	Answer	Marks	Guidance
2	$\frac{{}^{12}C_3 \times {}^{28}C_4}{{}^{40}C_7}$	**M1**	Using combinations with attempt to evaluate 2 terms in num. and 1 in denom.
		M1	Correct numerator or denominator unsimplified
	= 0.242	**A1**	
	OR		
	P(GGG) $= \frac{12}{40} \times \frac{11}{39} \times \frac{10}{38} \times \frac{28}{37} \times \frac{27}{36} \times \frac{26}{35} \times \frac{25}{34} \times {}^{7}C_3$	**M1**	Multiplying 3 green probs with 4 non-green probs, without replacement
		M1	Multiplying by ${}^{7}C_3$
	= 0.242	**A1**	
	Total:	**3**	

Question	Answer	Marks	Guidance
3	$np = 160\times0.1$ (16) $npq = 160\times0.1\times0.9$ (14.4)	**B1**	Correct unsimplified np and npq
	$P(> 17) = P\left(z > \frac{17.5-16}{\sqrt{14.4}}\right) = P(z > 0.3953)$	**M1**	Standardising need √
		M1	16.5 or 17.5 seen in standardised eqn for continuity correction
	$= 1 - 0.6536$	**M1**	Correct area from their mean $(1 - \Phi)$, final solution
	$= 0.346$	**A1**	
	Total:	**5**	

Question	Answer	Marks	Guidance
4(i)	LQ = 0.7495 Med = 0.7507 UQ = 0.7517	**M1**	Attempt to find all 3 quartiles can be implied, Condone LQ=0.7496, Med=0.7506, UQ=0.7515
		**B1**	Correct median line in box using their scale
		A1	Correct quartiles in box
		B1	Correct end whiskers(not dots or boxes), lines not through box,
		B1	Correct uniform scale from at least 0.7473 to 0.7532, and label (wt) kg oe can be seen in title or scale
	Total:	**5**	

Question	Answer	Marks	Guidance
4(ii)	Normal	**B1**	
	Symmetrical/peaks in middle or tails off quickly	**B1**	Need symm + another reason
	Total:	**2**	

Question	Answer	Marks	Guidance
5(i)	${}^{12}C_1 + {}^{12}C_3 + {}^{12}C_5 + {}^{12}C_7 + {}^{12}C_9 + {}^{12}C_{11}$	**M1**	Summing at least 4 ${}^{12}C_x$ combinations with x = odd numbers
		A1	Correct unsimplified answer (can be implied by final answer)
	= 2048	**A1**	Correct answer
	Total:	**3**	
5(ii)	$7! \times {}^{8}P_4$	**B1**	7! seen alone or multiplied only (cupcakes ordered)
		M1	multiplying by ${}^{8}P_4$ o.e (placing brownies)
	= 8467200	**A1**	correct answer
	Total:	**3**	
5(iii)	9! / (6! × 2!)	**B1**	9! oe seen alone or as numerator
		M1	dividing by at least one of 6!,2! (removing repeated shortbread or gingerbread biscuits) ignore 4! if present
	= 252	**A1**	correct answer
	Total:	**3**	

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Question	Answer	Marks	Guidance
6(i)	P(2) = P(0,2) = $2/10 \times 4/6$	**M1**	Mult 2 probs seen (or complete listing of all options)
	= 2/15 **AG**	**A1**	Correct answer legit obtained
	Total:	**2**	
6(ii)	x: 0, 1, 2, 3, 5 P(X=x): 2/30, 5/30, 4/30, 13/30, 6/30	**B1**	Correct values for x in table. Any additional values must have P(x)=0 stated
		B1	One correct prob other than P(2) or P(3)
		B1	Correct P(3)
		B1	All correct
	Total:	**4**	
6(iii)	$P(A1 \mid \text{Sum } 3) = \frac{P(A1 \cap \text{Sum3})}{P(\text{Sum3})} = \frac{5/10 \times 4/6}{13/30}$	**M1**	Attempt at P(A1∩ Sum 3) as num or denom of a fraction, can be by counting
		M1	Their P(3) from **(ii)** as num or denom of a fraction
	= 10/13(0.769)	**A1**	
	Total:	**3**	

Question	Answer	Marks	Guidance
7(a)(i)	$0.674 = \frac{8.8 - \mu}{\sigma} \Rightarrow 0.674\sigma = 8.8 - \mu$	**B1**	±0.674 seen
	$-0.935 = \frac{7.7 - \mu}{\sigma} \Rightarrow -0.935\sigma = 7.7 - \mu$	**B1**	±0.935 seen (condone ±0.934)
		M1	An eqn with a z-value, μ and σ allow sq rt, sq cc
		M1	sensible attempt to eliminate μ or σ by substitution or subtraction
	$\sigma = 0.684$ $\mu = 8.34$	**A1**	correct answers (from –0.935)
	Total:	**5**	
7(a)(ii)	$P(< 8.2) = P\left(z < \frac{8.2 - 7.9}{0.44}\right)$	**M1**	Standardising no cc no sq rt no sq
		M1	Correct area ie Φ, final solution
	$= P(z < 0.6818) = 0.7524$	**A1**	Correct prob rounding to 0.752
	$P(3) = {}^5C_3\,(0.7524)^3(0.2476)^2$	**M1**	Binomial ${}^5C_x$ powers summing to 5, any p, $\Sigma p = 1$
	$= 0.261$	**A1**	
	Total:	**5**	

Question	Answer	Marks	Guidance
7(b)	$P(< 1.5\mu) = P\left(z < \frac{1.5\mu - \mu}{\mu}\right) = P(z < 0.5)$	***M1**	standardising with μ and σ (σ may be replaced by μ)
		DM1	just one variable
	= 0.692	**A1**	
	Total:	**3**	