1	$4p + 5p^2 + 1.5p + 2.5p + 1.5p = 1$ $10p^2 + 19p - 2 = 0$	M1	Summing 5 probs to = 1 can be implied
	$p = 0.1$ or -2	A1	For 0.1 seen with or without –2
	$p = 0.1$	A1 [3]	Choosing 0.1 must be by rejecting –2
2	**(i)** $\Sigma(x - 50) = 824 - 16 \times 50 = 24$	B1	Correct answer
	$\frac{\Sigma(x-50)^2}{16} - \left(\frac{\Sigma(x-50)}{16}\right)^2 = 6.5^2$	M1	Consistent substituting in the correct coded variance formula OR valid method for Σx^2 then expanding $\Sigma(x - 50)^2$, 3 terms at least 2 correct
	$\Sigma(x - 50)^2 = 712$	A1 [3]	Correct answer
	(ii) new mean = 896/17 (= 52.7)	B1	Correct answer
	new var = $\frac{712 + 22^2}{17} - \left(\frac{24 + (72 - 50)}{17}\right)^2$	M1	Using the correct coded variance formula with $n = 17$ and new coded mean^2 OR their $(\Sigma x^2 + 72^2)/17$ – their new mean^2
	new sd = 7.94	A1 [3]	Rounding to correct answer, accept 7.95 or 7.98 or 7.91

3	P(E and 12) $= \frac{2}{5} \times \frac{4}{36} = \frac{8}{180}$ (2/45)	M1	2/5 or 3/5 mult by dice-related probability seen anywhere
		A1	$\frac{2}{5} \times \frac{4}{36}$ seen oe
	P(12) $= \frac{3}{5} \times \frac{1}{36} + \frac{8}{180} = \frac{11}{180}$ (0.0611)	M1	Summing two 2-factor probs involving 2/5 and 3/5
		A1ft	3/5 × 1/36 + their P(E and 12), ft their P(E 12)
	$P(E \mid 12) = \frac{P(E \text{ and } 12)}{P(12)}$	M1dep	Subst in condit prob formula, must have a fraction
	$= \frac{8}{11}$ (0.727)	A1 [6]	Correct answer
	OR list		
	Even: 2 and (4,3) or (3,4) or (2,6) or (6,2) 4 and ditto Gives 8 options	M1 A1	List attempt evens 8 options
	Odd: 1 and (6,6) or 3 and (6,6) or 5 and (6,6) Gives 3 options	M1 A1	List attempt odds 3 options
	Prob($E \mid 12$) = 8/11	M1 A1	(Their even)/(their total) Correct answer
4	**(i)**		
	sugar | | flour 194 | 1 5 9 195 | 3 8 1 | 196 | 2 4 7 | 197 | 7 9 4 3 | 198 4 | 199 8 | 200 7 4 1 | 201	B1 B1 B1	Correct stem must be integers. (stem and leaves can be in reverse order) Correct leaves flour must be single and ordered Correct leaves sugar must be single and ordered
	key 1 | 196 | 2		
	means 1.961 kg for sugar and 1.962 kg for flour	B1ft [4]	Correct key needs all this, ft if single leaves and 1.96 etc in stem
	(ii) med = 1.989 kg	B1	correct median
	IQ range = 2.011 – 1.977	M1	subt their LQ from their UQ, UQ > med, LQ < med
	= 0.034 kg	A1 [3]	Correct answer

5	**(i)**	Zotoc: $z = \dfrac{367 - 320}{21.6} = 2.176$ Ganmor: $z = \dfrac{367 - 350}{7.5} = 2.267$	M1	Standardising either car's fuel, no cc, no sq, no √
		P(Zotoc) = 0.985	A1	Correct answer
		P(Ganmor) = 0.988	A1 [3]	Correct answer
	(ii)	$z = 0.23$ $0.23 = \dfrac{x - 320}{21.6}$	B1 M1	± 0.23 seen Standardising either car, no cc, no sq rt, no sq
		$x = 324.968$	M1ind	320 + d – 320 i.e. just d on num
		$d = 4.97$	A1 [4]	Correct answer, –4.97 gets A0
6	**(i)**	constant/given prob, independent trials, fixed/given no. of trials, only two outcomes	B1 B1 [2]	One option correct Three options correct
	(ii)	P(8, 9, 0, 1) =	M1	One term seen involving $(0.3)^x(0.7)^{9-x}({}^9C_x)$
		${}^9C_8(0.3)^8(0.7) + (0.3)^9 + (0.7)^9 + {}^9C_1(0.3)(0.7)^8$	A1	Correct unsimplified expression
		= 0.196	A1 [3]	Correct answer
	(iii)	mean = 90 × 0.3 = 27 var = 18.9	B1	Expressions for 27 and 18.9 (4.347) seen
		$P(X > 35) = 1 - \Phi\left(\dfrac{35.5 - 27}{\sqrt{18.9}}\right)$	M1	Standardising one expression, must have sq rt in denom, cc not necessary
		= 1 – Φ(1.955) = 0.0253	M1	Continuity correction applied at least once
		$P(X < 27) = \Phi\left(\dfrac{26.5 - 27}{\sqrt{18.9}}\right) = 1 - \Phi(0.115)$	M1	$(1 - \Phi_1) + (1 - \Phi_2)$ accept (0.0329 + 0.5) if no cc
		= 0.4542 Total prob = 0.480 accept 0.48	A1 [5]	Rounding to correct answer

7	**(i)**	4M 2W or 5M 1W chosen in $^{10}C_4 \times {}^9C_2 + {}^{10}C_5 \times {}^9C_1$ = 9828	M1 A1 A1 [3]	At least 1 of $^{10}C_4 \times {}^9C_2$ *and* $^{10}C_5 \times {}^9C_1$ seen Correct unsimplified expression Correct answer
	(ii)	$^9C_3 \times {}^8C_1 + {}^9C_4 = 798$ Prob = 798/9828 = 0.0812	M1 A1 [2]	One of $^9C_3 \times {}^8C_1$ *and* $^9C_4 \times ({}^8C_0)$ seen Correct answer
	(iii)	Albert + not T... $^9C_3 \times {}^8C_2 + {}^9C_4 \times {}^8C_1$ = 3360 Tracey + not A... $^9C_4 \times {}^8C_1 + {}^9C_5$ = 1134 Number of ways = 4494	M1 A1 A1 [3]	One of $^9C_3 \times {}^8C_2$ or $^9C_4 \times {}^8C_1$ or $^9C_5 \times ({}^8C_0)$ seen Unsimplified 3360 or 1134 seen Correct final answer
	(iv)	6! – 4! × 5 × 2 or 6! – 5! × 2 (= 480) OR 4! × 5 × 4 or 4! × $^5P_2$ (= 480) prob = 480/6! = 2/3 (0.667) OR using probabilities…as above OR Women together 5!/4! (= 5) Women not together = 15 – 5 = 10 total ways MMMMWW = 6!/4!2! = 15 prob = 2/3	 B1 M1 A1 [3] B1 M1 A1	 6! – 4! × 5 × 2 or 6! – 5! × 2 or 4! × 5 × 4 or 4! × $^5P_2$ dividing by 6! correct answer 5 or 10 seen Dividing by 15 Correct answer