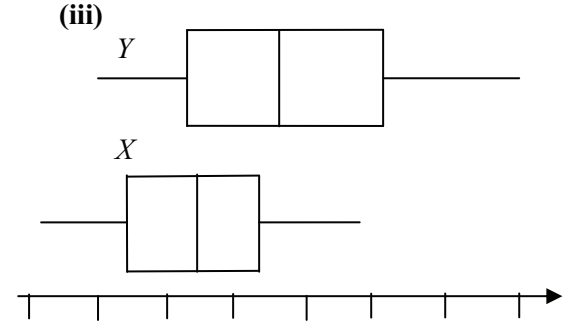
1	$\frac{{}^{13}C_3 \times {}^{39}C_4}{{}^{52}C_7}$	M1	Using combinations with attempt to evaluate product of 2 in num and only 1 in denom
		M1	Correct numerator or denominator
	$= 0.176$	A1	Correct answer
	OR P(RRR) = $\frac{13}{52} \times \frac{12}{51} \times \frac{11}{50} \times \frac{39}{49} \times \frac{38}{48} \times \frac{37}{47} \times \frac{36}{46} \times {}^{7}C_3$	M1	**OR** Multiplying 3 unequal red probs with 4 unequal non-red probs
		M1	Multiplying a probability by ${}^{7}C_3$
	$= 0.176$	A1 [3]	Correct answer
2	**(i)** $\bar{x} = 130 - 287/82$	M1	287/82 seen added or subt to 130 OR 287 seen added or subt to 82 × 130
	$= 126.5$ (126, 127) cm	A1 [2]	Correct answer
	(ii) $\frac{\Sigma(x-130)^2}{82} - (-3.5^2) = 6.9^2$	M1	6.9^2 + (±their coded mean)^2 seen or implied
	$\Sigma(x - 130)^2 = 4908.5$ cm (4910)	A1 [2]	correct answer
3	**(i)** P(> 5) = ${}^{7}C_6(0.6)^6(0.4) + (0.6)^7$ $= 0.1306 + 0.02799$ $= 0.159$	M1	Summing 2 or 3 binomial probs of the form ${}^{7}C_r(0.6)^r(0.4)^{7-r}$
		A1 [2]	Correct answer
	(ii) P(bark) = P(park, bark) + P(not park, bark) $= 0.6 \times 0.35 + 0.4 \times 0.75$ $= 0.51$	M1	Summing two appropriate 2-factor probabilities
		A1 [2]	Correct answer
	(iii) Variance (number of times) = 7.2	B1 [1]	Correct final answer

© UCLES 2010

4	**(i)** ends cola, 5!/2!2! = 30 ends green tea, 5!/3!2! = 10 ends orange juice, 5!/3!2! = 10 total = 50 ways	M1 A1 A1	Considering all three options Any one option correct Correct answer
	OR P(ends same) $= \frac{3}{7}\times\frac{2}{6}+\frac{2}{7}\times\frac{1}{6}+\frac{2}{7}\times\frac{1}{6}$	M1	OR Considering all three options
	$= \frac{5}{21}$	A1	Correct fraction
	$\frac{5}{21}\times\frac{7!}{3!2!2!} =$ 50 ways	A1 [3]	Correct answer
	(ii) colas together, no restrictions, 5!/2!2! = 30 ways colas together and green tea together, 4!/2!	M1 A1 M1	Considering all colas together, or 5! seen Correct answer Considering all colas tog and all green tea tog, or 4! seen
	= 12 ways 30 – 12 = 18 ways.	A1 A1	Correct answer Correct final answer
	OR$_1$ Attempt to list	M1A1 M1A1 A1	**OR$_1$** 10 or more, 12 or more correct 14 or more, 16 or more correct 18 correct
	OR$_2$ $3\times\frac{4\times3}{2}=18$	M1 A1 M1 A1 A1 [5]	**OR$_2$** Considering all colas together, or 3! seen 3 ways for colas and orange juice Considering green teas not together 4 × 3 or (4 × 3)/2 Correct final answer
5	**(i)** P(2) = P(0,2) + P(2,0) = 6/10 × 3/7 + 3/10 × 4/7 = 30/70 = 3/7 AG	M1 A1 [2]	Summing two 2-factor probabilities Correct answer legit obtained
	(ii) x | 0 | 2 | 4 | 6 P($X = x$) | 24/70 | 30/70 | 13/70 | 3/70	B1 B1 [2]	Correct values for rv X Correct probs
	(iii) E(X) = 13/7 Var(X) = 120/70 + 208/70 + 108/70 – $(13/7)^2$ = 2.78	B1ft M1 A1 [3]	Using variance formula correctly with mean^2 subtracted numerically, no extra division Correct final answer
	(iv) $P(A2 \mid \text{Sum } 2) = \frac{3/10\times4/7}{30/70}$ = 0.4	M1 A1 [2]	Correct numerator with a 0 < denom < 1 Correct answer

© UCLES 2010

6	**(i)** for X: Median = 0.825 cm IQ range = 0.019 cm (0.833 – 0.814)	B1 B1 [2]	Correct median Correct IQ range
	(ii) $q = 4$ $r = 2$ **SR** $q = 0.824$ and $r = 0.852$	B1 B1 [2] B1	 Must be 4 and 2 not 3 and 1
	(iii) 	B1 B1ft B1ft B1 [4]	Labels X, Y and length/cm, linear scale from 0.80 to 0.87 and both on one diagram Correct median and quartiles for X ft theirs must be a box Correct median and quartiles for Y ft theirs must be a box Whiskers correct no line through middle
	(iv) Y has longer insects on average Y has larger range	B1 B1 [2]	Correct statement about lengths Correct statement about spreads
7	**(i)** $0.431 = \dfrac{135-\mu}{\sigma}$ $-0.842 = \dfrac{127-\mu}{\sigma}$ $\sigma = 6.29$ $\mu = 132$	B1 B1 M1 A1 A1 [5]	One $\pm z$-value correct, accept 0.430 A second $\pm z$-value correct Solving two equations relating μ, σ, 135, 127 and their z-values (must be z-values) Correct answer accept 6.28 Correct answer
	(ii) $P(X < 145) = P\left(z < \dfrac{145-132.3}{6.284}\right)$ $= P(z < 2.023)$ $= 0.978$	M1 M1 A1 [3]	Standardising no sq rt no cc Correct use of normal tables Answer rounding to 0.978 or 0.979
	(iii) $p = 1/3$ P(at least 2) = 1 – P(0, 1) $= 1 - [(2/3)^8 + {}^8C_1 \times (1/3)^1 (2/3)^7]$ $= 0.805$	 M1 A1 A1 [3]	 Binomial expression with powers summing to 8 and ${}^8C_{\text{something}}$. (any p) Correct unsimplified expression Answer rounding to 0.805

© UCLES 2010