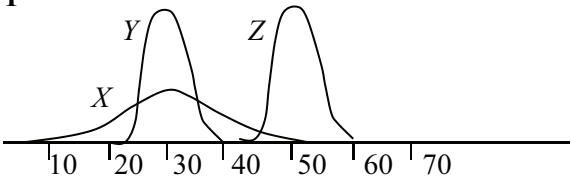
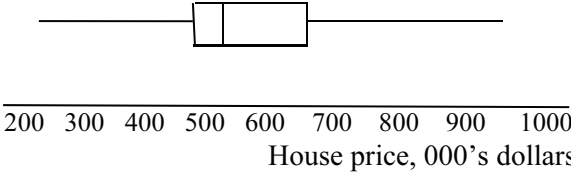


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<p>1</p> 	<p>B1 B1 B1ft</p>	<p><i>X</i> mean at 30, roughly from 10 to 50 or 15 – 45</p> <p><i>Y</i> same mean as <i>X</i> but higher and thinner</p> <p><i>Z</i> same shape as <i>Y</i> but mean at 50 ft wrong <i>Y</i></p>
<p>2 either 55/90 (11/18) or 95/160 (19/32) seen</p> <p>$P(M \text{ and } 18 - 60) = 0.6 \times 55/90$ $= 0.367$ (11 / 30)</p> <p>$P(18 - 60) = 0.6 \times 55/90 + 0.4 \times 95/160$ (= 29/48 or 0.604)</p> <p>$P(M \mid 18 - 60) = \frac{P(M \cap 18 - 60)}{P(18 - 60)}$</p> <p>$= 88/145$ (0.607)</p>	<p>B1 M1 M1 A1 A1</p>	<p>oe</p> <p>0.6 mult by 55/90 seen as num / denom of a fraction</p> <p>Summing 2 two-factor products seen anywhere</p> <p>Correct unsimplified answer seen as num/denom of a fraction</p> <p>Correct answer</p>
<p>3 $\Sigma(x - 5) = 116 - 18 \times 5$ $= 26$</p> <p>$\frac{\Sigma(x - 5)^2}{18} - \left(\frac{26}{18}\right)^2 = \frac{967}{18} - \left(\frac{58}{9}\right)^2$</p> <p>$\Sigma(x - 5)^2 = 257$</p> <p>OR coded mean = $58/9 - 5 = 1.444$ $\Sigma(x - 5) = 1.444 \times 18 = 26$</p> <p>$\Sigma(x - 5)^2 = \Sigma x^2 - 10\Sigma x + 25 \times 18$ $= 967 - 1160 + 450 = 257$</p>	<p>M1 A1 M1 M1 A1 M1 A1 A1</p>	<p>Obtaining Σx and subtracting 18×5 Correct answer</p> <p>Subst in correct var formula all coded vals Subst in correct var formula all uncoded</p> <p>Correct answer</p> <p>Subtracting 5 from true mean and mult by 18 Correct answer</p> <p>Expanding $\Sigma(x-5)^2$ 3 terms needed Any 2 terms correct Correct answer</p>
<p>4 (i)</p> 	<p>B1 B1 B1 B1</p>	<p>Linear scale or 5 values shown and labels or in heading, need thousands of dollars, Correct median Correct quartiles</p> <p>Correct end points of whiskers not through box</p>
<p>(ii) $1.5 \times 170 = 255$</p> <p>Expensive houses above $690 + 170 \times 1.5 = 945$ i.e. 957 and 986 thousands of dollars</p>	<p>M1 A1</p>	<p>Mult their IQ range by 1.5</p> <p>Correct answers from correct wkg need thousands of dollars</p>
<p>(iii) doesn't show all the data items</p>	<p>B1</p>	<p>Need to see 'individual items' oe</p>

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<p>5 (i) $z = -1.406$ $\frac{c-14.2}{3.6} = -1.406$ $c = 9.14$</p>	<p>B1 M1 A1</p>	<p>Rounding to ± 1.41 seen Standardising allow sq rt no cc Correct answer</p>
<p>(ii) $P\left(\frac{15-14.2}{3.6}\right) < z < \left(\frac{16-14.2}{3.6}\right)$ $= \Phi(0.5) - \Phi(0.222)$ $= 0.6915 - 0.5879$ $= 0.1036$ $P(\text{at least } 2) = 1 - P(0, 1)$ $= 1 - (0.8964)^7 - (0.8964)^6(0.1036)$ $= 1 - 0.8413$ $= 0.159$</p>	<p>M1 M1 A1 M1 M1 A1</p>	<p>2 attempts at standardising no cc no sq rt Subt two Φs (indep mark) Needn't be entirely accurate, rounding to 0.10 Binomial term with ${}^7C_r p^r (1-p)^{7-r}$ seen $r \neq 0$ any $p < 1$ $1 - P(0), 1 - P(1), 1 - P(0, 1)$ seen their p Correct answer accept 3sf rounding to 0.16</p>
<p>6 (i) M R O 3 1 $2 = {}^7C_3 \times {}^5C_1 \times {}^8C_2 = 4900$ 3 2 $1 = {}^7C_3 \times {}^5C_2 \times {}^8C_1 = 2800$ 2 2 $2 = {}^7C_2 \times {}^5C_2 \times {}^8C_2 = 5880$ Total = 13580</p>	<p>M1 M1 A1 A1</p>	<p>Summing more than one 3term option involving combs (can be added) Mult 3 combs only (indep) 1 option correct unsimplified Correct answer</p>
<p>(ii) 4 groups in 4! ways 3 mountain in 3! ways 2 ordinary in 2! ways $4! \times 3! \times 2 = 288$</p>	<p>M1 M1 A1</p>	<p>4! seen mult by something Mult by 3! for racing or 2! for ordinary Correct answer</p>
<p>(iii) e.g. s O x x x x O s s s Ordinary in 2! Rest of bikes in 4! Bikes and spaces 5 groups in 5 ways $2! \times 4! \times 5 = 240$</p>	<p>M1 M1 A1</p>	<p>2! or 4! seen mult Mult by 5 (sssb) Correct answer</p>

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7	(i) if throw H then smallest score is 2 $P(T, 1) = 1/2 \times 1/4 = 1/8$ AG	B1 B1	2	Or equivalent																		
	(ii) $P(3)$ from two dice = $2/16$ seen $P(H, 3) = 1/2 \times 2/16 = 2/32$ $P(T, 3) = 1/2 \times 1/4 = 1/8$ So $P(3) = 6/32 = 3/16$ AG	B1 M1 A1 A1	4	From (1, 2) and (2, 1) Summing $P(H, 3)$ and $P(T, 3)$ One correct Correct answer must see clear reasoning																		
	(iii) <table border="1" style="margin-left: 20px;"> <tr> <td>X</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>6</td> <td>7</td> <td>8</td> </tr> <tr> <td>Prob</td> <td></td> <td>$5/32$</td> <td></td> <td>$7/32$</td> <td></td> <td>$3/32$</td> <td></td> <td></td> </tr> </table>	X	1	2	3	4	5	6	7	8	Prob		$5/32$		$7/32$		$3/32$			B1 B1 B1	3	One correct prob A second correct prob A third correct prob
	X	1	2	3	4	5	6	7	8													
Prob		$5/32$		$7/32$		$3/32$																
(iv) $P(Q \cap R) = 0$ or 'if you throw a tail you can't get a 7' Yes they are exclusive	M1 A1dep	2	Stating $P(Q \cap R) = 0$ or implying by words Dep on previous M																			