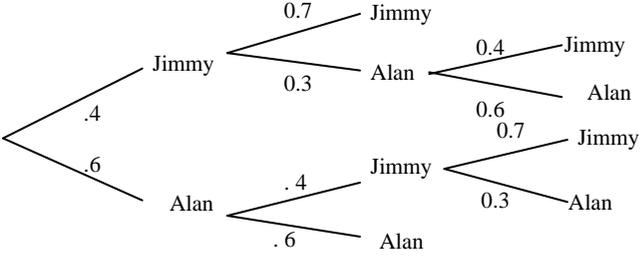
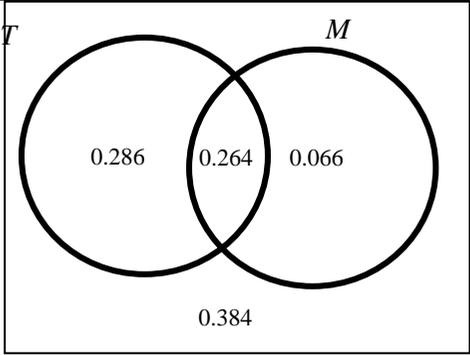
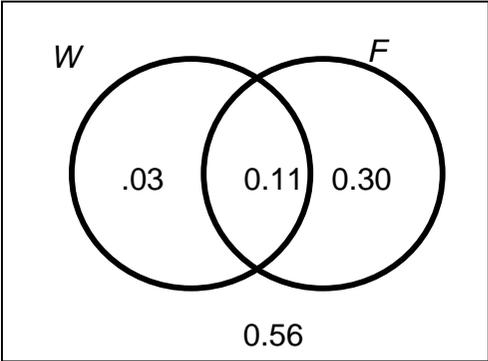


Question			Answer	Marks	Guidance
1	(i)	(A)	$P(\text{third selected}) = 0.92^2 \times 0.08 = 0.0677$ Or = 1058/15625	M1 M1 A1 [3]	For $0.92^2$ For $p^2 \times q$ CAO SC1 for 'without replacement' method $92/100 \times 91/99 \times 8/98 = 0.0690$ With $p + q = 1$ With no extra terms Allow 0.068 but not 0.067 nor 0.07
	(i)	(B)	$P(\text{second}) + P(\text{third})$ $= (0.92 \times 0.08) + (0.92^2 \times 0.08)$ $= 0.0736 + 0.0677 = 0.1413$ $= 2208/15625$	M1 A1 [2]	For $0.92 \times 0.08$ FT their 0.0677 SC1 for answer of 0.143 from 'without replacement' method With no extra terms Allow 0.141 to 0.142 and allow 0.14 with working
	(ii)		$P(\text{At least one of first 20}) = 1 - P(\text{None of first 20})$  $= 1 - 0.92^{20} = 1 - 0.1887 = 0.8113$	M1  M1 A1 [3]	$0.92^{20}$  $1 - 0.92^{20}$ CAO Accept answer of 0.81 or better from $P(1) + P(2) + \dots$ , or SC2 if all correct working shown but wrong answer No marks for 'without replacement' method' Allow 0.81 with working but not 0.812

2	(i)		<p>G1 G1 G1</p> <p>[3]</p>	<p>Do a vertical scan and give:</p> <p>First column Second column Final column</p>	<p>All indep All probs must be correct</p> <p>Without extra branches in final column Ignore anything before third set Allow labels 'win' and 'lose' in place of Jimmy and Alan respectively <b>but if no labels, no marks</b></p>
	(ii)	<p>P(Alan wins)</p> $= (0.4 \times 0.3 \times 0.6) + (0.6 \times 0.4 \times 0.3) + (0.6 \times 0.6) = 0.504$	<p>M1 M1 A1</p> <p>[3]</p>	<p>For any one 'correct' product For all three 'correct' products <b>and no extras</b> CAO</p>	<p>FT their tree for both M marks Provided <b>correct number of terms in product(s) for both M1's</b></p>
	(iii)	$P(\text{Ends after 4}) = (0.4 \times 0.7) + (0.6 \times 0.6) = 0.28 + 0.36 = 0.64$	<p>M1 A1</p> <p>[2]</p>	<p>For both products CAO</p>	<p>FT their tree for M mark but not for A mark Provided <b>two terms in each product</b></p>

3	(i)	Because $P(T/M) \neq P(T)$	E1 [1]	Or $0.8 \neq 0.55$	Or $P(T \cap M) (= 0.264) \neq P(T) \times P(M)$ , <b>provided 0.264 in (ii)</b> Or $0.264 \neq 0.55 \times 0.33 (=0.1815)$ Look out for complement methods, etc
	(ii)	$P(T \cap M) = P(T/M) \times P(M) = 0.80 \times 0.33 = 0.264$	M1 A1 [2]	For product CAO	<b>A0 for 0.26</b>
	(iii)		[3]	G1 For two labelled intersecting circles G1 For at least 2 correct probabilities. FT their $P(T \cap M)$ G1 For remaining probabilities. FT their $P(T \cap M)$ , <b>providing probabilities between 0 and 1</b>	Allow labels such as $P(T)$ etc Allow other shapes in place of circles <b>No need for 'box'</b> <b>FT from 0.1815 in (ii) gives 0.3685, 0.1815, 0.1485, 0.3015</b>

<b>4</b> <b>(i)</b>	$P(X = 0) = 0.75^6 = 0.178$	M1 for $0.75^6$ A1 CAO	<b>2</b>	Or from tables 0.1780 Or 729/4096 Allow 0.18 with working
<b>(ii)</b>	$E(X) = np = 50 \times 0.178 = 8.9$	M1 for product A1 FT	<b>2</b>	FT their answer to (i) providing it's a probability NB A0 if subsequently rounded
		TOTAL	<b>4</b>	

<p><b>5</b> <b>(i)</b></p>		<p>G1 for two labelled intersecting circles</p> <p>G1 for at least 2 correct probabilities.</p> <p>G1 for remaining correct probabilities</p>	<p><b>3</b></p>	<p>Allow labels such as <math>P(W)</math> and <math>P(F)</math></p> <p>Allow other sensible shapes in place of circles</p>
<p><b>(ii)</b></p>	<p><math>P(W) \times P(F) = 0.14 \times 0.41 = 0.0574 \neq P(W \cap F) = 0.11</math></p> <p>So not independent.</p>	<p>M1 for <math>0.41 \times 0.14</math></p> <p>A1 Condone dependent</p> <p>Must have full method</p> <p>www</p> <p>Must have either <math>P(W \cap F)</math> or 0.11</p>	<p><b>2</b></p>	<p>Answer of 0.574 gets Max M1A0</p> <p>Omission of 0.0574 gets M1A0 Max</p> <p>Or:</p> <p><math>P(W F) = 0.11/0.41 = 0.268 \neq P(W) (= 0.14)</math> M1 for full working</p> <p><math>P(F W) = 0.11/0.14 = 0.786 \neq P(F) (= 0.41)</math> M1 for full working</p> <p>No marks without correct working</p>
<p><b>(iii)</b></p>	$P(W   F) = \frac{P(W \cap F)}{P(F)} = \frac{0.11}{0.41} = \frac{11}{41} = 0.268$ <p>This is the probability that a randomly selected respondent works (part time), given that the respondent is female.</p>	<p>M1 for correct fraction</p> <p>A1</p> <p>E1</p> <p>For E1 must be in context – not just talking about events <math>F</math> and <math>W</math></p>	<p><b>3</b></p>	<p>Allow 0.27 with working</p> <p>Allow 11/41 as final answer</p> <p>Condone ‘if’ or ‘when’ for ‘given that’ but not the words ‘and’ or ‘because’ or ‘due to’ for E1.</p> <p>E1 (independent of M1): the order/structure must be correct i.e. no reverse statement</p> <p>Allow ‘The probability that a randomly selected female respondent works part time’ oe</p>
		<p>TOTAL</p>	<p><b>8</b></p>	

<b>6</b> <b>(i)</b>	$P(\text{product of two scores} < 10) = \frac{13}{16} = 0.8125$	B1	<b>1</b>	Allow 0.813 or 0.812
<b>(ii)</b>	$P(\text{even}) \times P(< 10) = 0.5 \times \frac{13}{16} = \frac{13}{32} = 0.40625$ $P(\text{even} \cap < 10) = \frac{6}{16} = 0.375$ <p>So not independent.</p>	M1 for $0.5 \times \frac{13}{16}$ or $\frac{13}{32}$ FT their answer to (i) M1 for $\frac{6}{16}$ A1	<b>3</b>	Do not allow these embedded in probability formulae  Also allow $P(\text{even} <10) = 6/13 \neq P(\text{even}) = 1/2$ Or $P(<10 \text{even}) = 6/8 \neq P(<10) = 13/16$ Or $P(\text{even} <10) = 6/13 \neq P(\text{even} <10') = 2/3$ Or $P(<10 \text{even}) = 6/8 \neq P(<10 \text{even}') = 7/8$ For all of these alternatives allow M2 for both probabilities. (M1 not available except if they correctly state both probabilities EG $P(\text{even} <10)$ and $P(\text{even})$ and get one correct) If they do not state what probabilities they are finding, give M2 for one of the above pairs of probabilities with $\neq$ symbol
		TOTAL	<b>4</b>	

7 <b>(i)</b>	$P(\text{Wet and bus}) = 0.4 \times 0.7$ $= 0.28$	M1 for multiplying probabilities A1 CAO	<b>2</b>	Fractional answer = 7/25 (Allow 28/100)
<b>(ii)</b>	$P(\text{Walk or bike}) =$ $0.6 \times 0.5 + 0.6 \times 0.4 + 0.4 \times 0.2 + 0.4 \times 0.1 \text{ or}$ $0.3 + 0.24 + 0.08 + 0.04$ $= 0.66$	M1 for any two correct pairs M1 for sum of all four correct terms With no extra terms for second M1 A1 CAO	<b>3</b>	Or = $0.6 \times 0.9 + 0.4 \times 0.3$ gets M1 for either term = $0.54 + 0.12$ gets M1 for sum of both  A1 CAO Or = $1 - 0.6 \times 0.1 - 0.4 \times 0.7 = 0.66$ . M1 for 1 – one correct term, M1 for complete correct expression and A1 for correct evaluation.
<b>(iii)</b>	$P(\text{Dry given walk or bike}) = \frac{P(\text{Dry and walk or bike})}{P(\text{Walk or bike})}$ $= \frac{0.6 \times 0.9}{0.66} = \frac{0.54}{0.66} = \frac{9}{11} = 0.818$	M1 for numerator leading to 0.54 M1 for denominator Ft their P(Walk or bike) from (ii) provided between 0 and 1 A1 FT	<b>3</b>	Allow 0.82, not 0.819 More accurate answer = 0.81818 Fractional answer = $54/66 = 27/33 = 9/11$ Condone answer of 0.8181 Do not give final A1 if ans $\geq 1$
		TOTAL	<b>8</b>	