

<b>1</b> <b>(i)</b>	<p>(A) <math>P(\text{Avoided air travel}) = \frac{7}{100} = 0.07</math></p> <p>(B) <math>P(\text{At least two}) = \frac{11+2+1+4}{100} = \frac{18}{100} = \frac{9}{50} = 0.18</math></p>	<p>B1 aef isw</p> <p>M1 for <math>(11+2+1+4)/100</math>  A1 aef isw</p>	<p><b>1</b></p> <p>For M1 terms must be added must be as above or better with no extra terms (added or subtracted) for M1</p> <p><b>2</b></p> <p>Must simplify to <math>18/100</math> or <math>9/50</math> or <math>0.18</math> for A1  SC1 for <math>18/58</math>  Or <math>1 - (14+26+0+42)/100 = 0.18</math> gets M1A1</p>
<b>(ii)</b>	$P(\text{Reduced car use} \mid \text{Avoided air travel}) = \frac{6}{7} = 0.857$	<p>M1 for denominator 7 or <math>7/100</math> or <math>0.07</math> FT  their (i)A  A1 CAO</p>	<p><b>2</b></p> <p>Allow 0.86</p>
<b>(iii)</b>	$P(\text{None have avoided air travel}) = \frac{93}{100} \times \frac{92}{99} \times \frac{91}{98} = 0.8025$	<p>M1 for <math>93/100 \times</math> (triple product)  M1 for product of remaining fractions  A1</p>	<p><b>3</b></p> <p>Fuller answer 0.802511, so allow 0.803 without working, but 0.80 or 0.8 only with working .  <math>(93/100)^3</math> scores M1M0A0 which gives answer 0.804357 so watch for this.  M0M0A0 for binomial probability including <math>0.93^{100}</math> but <math>{}^3C_0 \times 0.07^0 \times 0.93^3</math> still scores M1  <math>(k/100)^3</math> for values of <math>k</math> other than 93 scores M0M0A0  <math>\frac{k}{100} \times \frac{(k-1)}{99} \times \frac{(k-2)}{98}</math> for values of <math>k</math> other than 93 scores M1M0A0  Correct working but then multiplied or divided by some factor scores M1M0A0  <math>{}^{93}P_3 / {}^{100}P_3 = 0.803</math> <math>{}^{93}P_3</math> seen M1 divided by <math>{}^{100}P_3</math>  M1 0.803 A1  <math>{}^{93}C_3 / {}^{100}C_3 = 0.803</math>  Allow unsimplified fractional answer <math>778596/970200 = 9269/11550</math></p>
	<b>TOTAL</b>	<b>8</b>	

<b>2</b> <b>(i)</b>	$1 \times \frac{1}{5} = \frac{1}{5}$	M1 A1	<b>2</b>
<b>(ii)</b>	$1 \times \frac{4}{5} \times \frac{3}{5} \times \frac{2}{5} \times \frac{1}{5} = \frac{24}{625} = 0.0384$	M1 For $1 \times \frac{4}{5} \times$ or just $\frac{4}{5} \times$ M1 <i>dep</i> for fully correct product A1	<b>3</b>
<b>(iii)</b>	$1 - 0.0384 = 0.9616$ or 601/625	B1	<b>1</b>
		<b>TOTAL</b>	<b>6</b>

<p><b>3</b> <b>(i)</b></p>		<p>G1 first set of branches G1 <i>indep</i> second set of branches G1 <i>indep</i> third set of branches G1 labels</p>	<p><b>4</b></p>
<p><b>(ii)</b></p>	<p>(A) <math>P(\text{all on time}) = 0.95^3 = 0.8574</math></p> <p>(B) <math>P(\text{just one on time}) = 0.95 \times 0.05 \times 0.4 + 0.05 \times 0.6 \times 0.05 + 0.05 \times 0.4 \times 0.6 = 0.019 + 0.0015 + 0.012 = 0.0325</math></p> <p>(C) <math>P(1200 \text{ is on time}) = 0.95 \times 0.95 \times 0.95 + 0.95 \times 0.05 \times 0.6 + 0.05 \times 0.6 \times 0.95 + 0.05 \times 0.4 \times 0.6 = 0.857375 + 0.0285 + 0.0285 + 0.012 = 0.926375</math></p>	<p>M1 for <math>0.95^3</math> A1 CAO</p> <p>M1 first term M1 second term M1 third term A1 CAO</p> <p>M1 any two terms M1 third term M1 fourth term A1 CAO</p>	<p><b>2</b> <b>4</b> <b>4</b></p>
<p><b>(iii)</b></p>	<p><math>P(1000 \text{ on time given } 1200 \text{ on time}) = \frac{P(1000 \text{ on time and } 1200 \text{ on time})}{P(1200 \text{ on time})} = \frac{0.95 \times 0.95 \times 0.95 + 0.95 \times 0.05 \times 0.6}{0.926375} = \frac{0.885875}{0.926375} = 0.9563</math></p>	<p>M1 either term of numerator M1 full numerator M1 denominator A1 CAO</p>	<p><b>4</b></p>
	<p>Total</p>	<p><b>18</b></p>	

4	(i)		<p>G1 for two labelled intersecting circles</p> <p>G1 for at least 2 correct probabilities</p> <p>G1 for remaining probabilities</p>	[3]
	(ii)	$P(G) \times P(R) = 0.24 \times 0.13 = 0.0312 \neq P(G \cap R)$ or $\neq 0.06$ So not independent.	<p>M1 for <math>0.24 \times 0.13</math></p> <p>A1</p>	[2]
	(iii)	$P(R G) = \frac{P(R \cap G)}{P(G)} = \frac{0.06}{0.24} = \frac{1}{4} = 0.25$	<p>M1 for numerator</p> <p>M1 for denominator</p> <p>A1 CAO</p>	[3]
<b>TOTAL</b>				<b>[8]</b>

5	(i)	$P(\text{Guess correctly}) = 0.1^4 = 0.0001$	B1 CAO	[1]
	(ii)	$P(\text{Guess correctly}) = \frac{1}{4!} = \frac{1}{24}$	<p>M1</p> <p>A1 CAO</p>	[2]
<b>TOTAL</b>				<b>[3]</b>

<b>6</b> <b>(i)</b>	(A) $P(\text{at most one}) = \frac{83}{100} = 0.83$	B1 aef	<b>1</b>
	(B) $P(\text{eactly two}) = \frac{10+2+1}{100} = \frac{13}{100} = 0.13$	M1 for $(10+2+1)/100$ A1 aef	<b>2</b>
<b>(ii)</b>	$P(\text{all at least one}) = \frac{53}{100} \times \frac{52}{99} \times \frac{51}{98} = \frac{140556}{970200} = 0.145$	M1 for $\frac{53}{100} \times$ M1 dep for product of next 2 correct fractions A1 CAO	<b>3</b>
		<b>TOTAL</b>	<b>6</b>