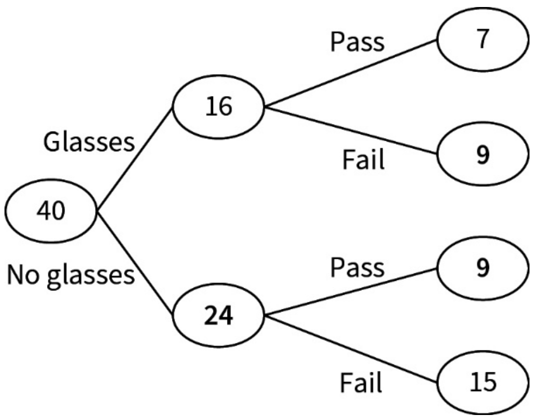
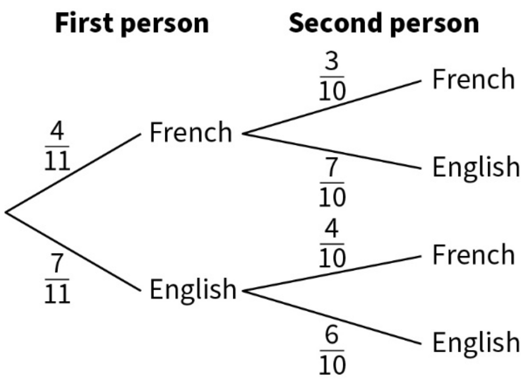
Oxford Revise | Edexcel GCSE Maths Higher | Answers

Chapter 28 Probability

Question	Answer	Extra information	Marks
28.1 (a)	P(not white or orange) = P(yellow or pink) The events are mutually exclusive so we can add the probabilities. P(yellow or pink) $= 0.15 + 0.26 = 0.41$	$0.15 + 0.26$ Correct answer, in decimal, fraction, or percentage form	1 1
28.1 (b)	P(orange) $= 1 - (0.3 + 0.15 + 0.26) = 0.29$ Number of orange counters = 200 × 0.29 = 58	1 – (0.3 + 0.15 + 0.26) Correct answer	1 1
28.2	There are $6 + 5 = 11$ non-red cubes. For the probability of choosing a red cube to be 0.5, there must be a total of 11 red cubes, which means Grace must have added 7 red cubes to the original 4.	Determining the number of red counters required in total Correct answer	1 1
28.3 (a)	There are eight faces, three of which show the number 4. Therefore, the probability of the dice landing on a 4 is P(4) $= \frac{3}{8}$		1
28.3 (b)	P(3) $= \frac{1}{4}$, so if the dice is thrown 40 times, we would expect it to land on 3: $40 \times \frac{1}{4} = 10$ times	$\frac{2}{8} \times 40$ or $\frac{10}{40}$ Correct answer	1 1
28.3 (c)	P(4) $= \frac{3}{8} = \frac{36}{\text{number of times thrown}}$ Number of times thrown $= \frac{36 \times 8}{3} = 96$ This is an estimate.	$\frac{36 \times 8}{3}$ or $\frac{36}{96}$ Correct answer	1 1

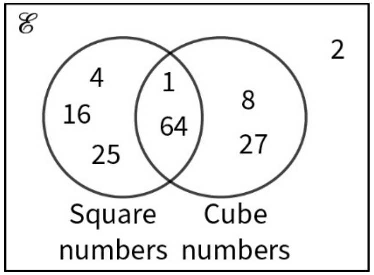
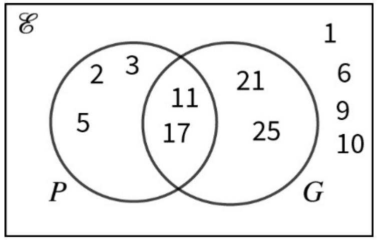
Question	Answer	Extra information	Marks
28.4	In one pack: P(exactly one bulb $< 25\ 000$) $=$ P(bulb $1 > 25\ 000$ and bulb $2 \leq 25\ 000$) $+$ P(bulb $1 \leq 25\ 000$ and bulb $2 > 25\ 000$) $= 0.92 \times 0.08 + 0.08 \times 0.92 = 0.1472$ $500 \times 0.1472 = 73.6$ In 500 packs, you would expect 74 packs to have exactly 1 bulb that lasted longer than $25\ 000$ hours	Finding the probability of getting 1 bulb that lasts longer and 1 that doesn't Calculating this probability for a pack of 2 bulbs Correct answer	1 1 1
28.5 (a)		No more than one error Fully correct	1 1
28.5 (b)	From the top branch, far right: $\frac{7}{40}$		1

Question	Answer	Extra information	Marks
28.6 (a)	Frequency On its side $= 22$ Frequency Upside down $= 20$ Relative frequency Right way up $= 0.16$ Relative frequency Upside down $= 0.4$	One value correct All values correct	1 1
28.6 (b)	Probability in the first experiment $= 0.4$ Probability in the second experiment = $\frac{36}{100} = 0.36$ Probability was higher in the first experiment	Attempting to find probabilities for "upside down" in both experiments Correct answer with comparison	1 1
28.7 (a)	P(WinWin) = $\frac{1}{2} = \frac{2}{3} \times$ P(Win backgammon) P(Win backgammon) = $\frac{1}{2} \times \frac{3}{2} = \frac{3}{4}$ Thus, P(Lose backgammon) = $\frac{1}{4}$	$\frac{1}{2} = \frac{2}{3} \times$ P(Win backgammon) $\frac{1}{4}$ on the correct branch Fully correct	1 1 1
28.7 (b)	Nasim's friend winning means Nasim losing. Winning "at most one of the two games" is equivalent to saying "does not win both games". And this means Nasim does not win both games. P(Nasim Lose Lose) = $\frac{1}{3} \times \frac{3}{5} = \frac{1}{5}$ Therefore P(Nasim does not lose both games) = $1 - \frac{1}{5} = \frac{4}{5}$	Multiplying along at least two sets of branches and adding Multiplying along three sets of branches Correct answer	1 1 1

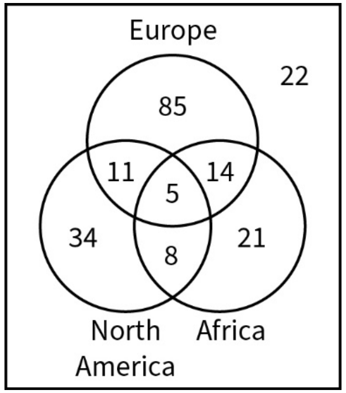
<table>
<tr><th>Question</th><th>Answer</th><th>Extra information</th><th>Marks</th></tr>
<tr><td>28.8</td><td>


Probability of one French and one English speaker:
$\frac{4}{11}\times\frac{7}{10}+\frac{7}{11}\times\frac{4}{10}=0.509...$ = 50.9%
</td><td>Correct first set of branches
Correct second set of branches
Adding the correct probabilities
Fully correct</td><td>1
1
1
1</td></tr>
<tr><td>28.9</td><td>
Draw a two-way table and use arithmetic to fill in the cells:
<table>
<tr><th></th><th>Y9</th><th>Y10</th><th>Total</th></tr>
<tr><td>French</td><td>35</td><td>52</td><td>87</td></tr>
<tr><td>German</td><td>34</td><td>17</td><td>51</td></tr>
<tr><td>Italian</td><td>7</td><td>5</td><td>12</td></tr>
<tr><td>Total</td><td>76</td><td>74</td><td>150</td></tr>
</table>
P(Y9 | Italian) = $\frac{7}{12}$
</td><td>1 mark for each correct process to arrive at, in any order, the four Year and Subject totals.</td><td>4</td></tr>
</table>

Question	Answer	Extra information	Marks
28.10	Missing values in the table: Heads + Even number = 27 Tails + Odd number = 26	27 or 26 correctly placed Both correct	1 1
28.11 (a)	Scores on 2nd penalty shot: $0.5\times 0.7+0.5\times 0.4=0.55$	$0.5\times 0.7+0.5\times 0.4$ Correct answer	1 1
28.11 (b)	Probability of missing 2^{nd} penalty = 1 – 0.55 = 0.45 (Using the result from part (a)) P(score on 1^{st} | missed on 2^{nd}) = $\frac{0.5\times 0.3}{0.45}=\frac{1}{3}$	1 – 0.55 = 0.45 $\frac{0.5\times 0.3}{0.45}$ Correct answer or equivalent	1 1 1
28.12	$P(A\|B)=\frac{P(A \text{ and } B)}{P(B)}$ $0.45=\frac{0.375}{P(B)}$ $P(B)=0.375\div 0.45=\frac{5}{6}$ $P(\text{not } B)=1-\frac{5}{6}=\frac{1}{6}$	Attempt to use conditional probability formula $0.375 \div 0.45$ 1 – P(B) Correct answer or equivalent	1 1 1 1

Question	Answer	Extra information	Marks
28.13 (a)		Venn diagram with 1 mark for each of the following: 2 clearly outside the union of the two sets 1 and 64 exclusively in the intersection 4, 16 and 25 exclusively in the square numbers Fully correct	1 1 1 1
28.13 (b)	$\text{P}(F \cap G) = \frac{2}{8} = \frac{1}{4}$		1
28.14 (a)		Venn diagram with 1 mark for each of the following: 1, 6, 9 and 10 clearly outside the two sets 11 and 17 exclusively in the intersection 2, 3 and 5 exclusively in the set *P* or 21 and 25 exclusively in the set *G* Fully correct	1 1 1 1
28.14 (b) (i)	$\text{P}(P \cap G) = \frac{2}{11}$		1

 ISBN 9781382039857

Question	Answer	Extra information	Marks
28.14 (b) (ii)	P$(G') = \frac{7}{11}$		1
28.14 (b) (iii)	P(*P* not *G*) = $\frac{3}{11}$		1
28.15 (a)	P(not apples) = $\frac{11+8+14}{88} = \frac{3}{8}$	$11 + 8 + 14$ Correct answer	1 1
28.15 (b)	P(apples | bananas) = $\frac{12+13}{12+13+8+14} = \frac{25}{47}$	Identifying the two subsets that make up the conditional probability Fully correct answer	1 1
28.16 (a)	 P(Europe) = $\frac{85+11+5+14}{200} = \frac{115}{200} = \frac{23}{40}$	Attempting to draw an appropriate Venn diagram (i.e. three intersecting circles inside a rectangle) 85 for Europe only, or at least 6 of the 8 entries correctly placed Numerator of 115 Correct answer or equivalent, e.g. 0.575 Full marks can be awarded for any working that doesn't include a diagram but does demonstrate a correct method	1 1 1 1

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Question	Answer	Extra information	Marks
28.16 (b)	North America = $34 + 11 + 5 + 8 = 58$ North America and Africa = $5 + 8 = 13$ P(Africa | North America) = $\frac{13}{58}$	Denominator of 58 Fully correct answer	1 1
28.17	P(Green) = 0.4, so P(Yellow or Pink) = $1 - 0.4 = 0.6$ The ratio $7 : 11$ tells us that 0.6 is divided into two parts, those being $0.6\times\frac{7}{18}$ and $0.6\times\frac{11}{18}$, the latter being the probability of taking a pink disc $0.6\times\frac{11}{18}=\frac{11}{30}$	P(Yellow or Pink) = $1 - 0.4 = 0.6$ Dividing the 0.6 by the ratio $7 : 11$ Fully correct answer	1 1 1
28.18	$\frac{b}{b+w}=\frac{4}{9}$ $9b=4b+4w$ $5b-4w=0 \quad (1)$ $\frac{b+4}{b+4+w+8}=\frac{5}{12}$ $12b+48=5b+5w+60$ $7b-5w=12 \quad (2)$ Solve (1) and (2) simultaneously to get $w=20$, $b=16$	$\frac{b}{b+w}=\frac{4}{9}$ $\frac{b+4}{b+4+w+8}=\frac{5}{12}$ Attempt to solve simultaneous equations Solves for either b or w Both values correct	1 1 1 1 1

Question	Answer	Extra information	Marks
28.19 (a)	$3\begin{pmatrix}3\\-5\end{pmatrix}+2\begin{pmatrix}9\\4\end{pmatrix}=\begin{pmatrix}9\\-15\end{pmatrix}+\begin{pmatrix}18\\8\end{pmatrix}$ $=\begin{pmatrix}27\\-7\end{pmatrix}$	$\begin{pmatrix}9\\-15\end{pmatrix}+\begin{pmatrix}18\\8\end{pmatrix}$ Fully correct answer	1 1
28.19 (b)	$\begin{pmatrix}9\\4\end{pmatrix}-3\begin{pmatrix}x\\y\end{pmatrix}=\begin{pmatrix}3\\-5\end{pmatrix}$ $9-3x=3$ $4-3y=-5$ $x=2, y=3$	Set up the equation $\begin{pmatrix}9\\4\end{pmatrix}-3\begin{pmatrix}x\\y\end{pmatrix}=\begin{pmatrix}3\\-5\end{pmatrix}$ Solve for either x or y. Solve for both	1 1 1
28.20	$2\sqrt{80}+3\sqrt{50}+4\sqrt{45}$ $=2\sqrt{16\times5}+3\sqrt{25\times2}+4\sqrt{9\times5}$ $=2\times4\sqrt{5}+3\times5\sqrt{2}+4\times3\sqrt{5}$ $=8\sqrt{5}+15\sqrt{2}+12\sqrt{5}$ $=20\sqrt{5}+15\sqrt{2}$	Identify the square number factor of each surd Factor it out Fully correct answer, in simplest terms	1 1 1