Oxford Revise | Edexcel A Level Maths | Answers

- Method (**M**) marks are awarded for showing you know a method and have attempted to apply it.
- Accuracy (**A**) marks should only be awarded if the relevant M marks have been awarded.
- Unconditional accuracy (**B**) marks are awarded independently of M marks. They do not rely on method.
- The abbreviation **o.e.** means 'or equivalent (and appropriate)'.

Please note that:

- efficient use of advanced calculators is expected
- inexact numerical answers should be given to three significant figures unless the question states otherwise; values from statistical tables should be quoted in full
- when a value of g is required, it is taken as $g = 9.8\ \text{m s}^{-2}$ unless stated otherwise in the question.

Chapter 30 Probability

Question	Answer	Extra information	Marks
30.1 (a)	Estimated number of days less than 15°C $= 4 + \frac{1}{3} \times 12$	Use of proportional reasoning to estimate frequency less than 15	M1
	P(less than 15 °C) $= \frac{8}{31}$	Correct answer	A1
30.1 (b)	P(A and B) $= \frac{8}{31} \times \frac{27}{31}$	Multiplying answer from (a) by P(B)	M1
	$= 0.225$	Correct answer	A1
30.1 (c)	Assumption is reasonable since Perth and Hurn are very far apart.	Conclusion and reason	B1

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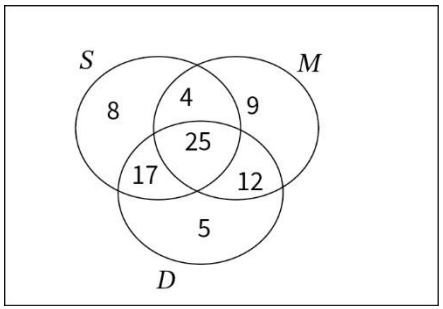
Question	Answer	Extra information	Marks
	Total		**5 marks**
30.2 (a)		Three intersecting circles with 25 in correct place 4 values in correct places – circles must be labelled Completely correct diagram	B1 B1 B1
30.2 (b)	$P(S \cup D) = \frac{71}{80}$	Allow follow through from answer in (a)	B1
30.2 (c)	$P(M \cap D') = \frac{13}{80}$	Allow follow through from answer in (a)	B1
30.2 (d)	$P[S \cap (M \cap D')] = \frac{4}{80}$ $P[S \mid (M \cap D')] = \frac{\frac{4}{80}}{\frac{13}{80}}$ $= \frac{4}{13}$	Writing or using probability of $\frac{4}{80}$ or frequency of 4 Calculating a conditional probability with $\frac{13}{80}$ or 13 in denominator Correct answer	M1 M1 A1
	Total		**8 marks**

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Question	Answer	Extra information	Marks
30.3 (a)	$0.8 \times 0.012 + 0.2x = 0.02$	Using information on faulty processors to form and solve equation involving x	M1
	$x = 0.052 = 5.2\%$	Correct answer	A1
30.3 (b)	The probability of a processor being faulty is different depending on which type it is.	Can use probabilities to justify, for example $P(F \mid B) = 0.052 \neq 0.02$	B1
30.3 (c)	P(A and not faulty) $= 0.8 \times 0.988$ (= 0.7904)	Writing or using information	M1
	$P(A \mid \text{not faulty}) = \frac{\text{'0.7904'}}{0.98}$	Calculating a conditional probability with 0.98 in denominator	M1
	$= 0.807$	Correct answer	A1
	Total		**6 marks**
30.4	$z = 0$	Correct answer	B1
	$(0.05 + x)(0.6 + x) = x$	Using fact that A and C are independent to form a quadratic in x	M1
	$x^2 - 0.35x + 0.03 = 0$	Solving quadratic	M1
	$x = 0.15$	Specifying 0.15 only (0.2 gives sum of probabilities greater than 1)	A1
	$y = 1 - (0.05 + 0.25 + 0.35 + 0.18 + 0.15)$	Using the fact that probabilities sum to 1	M1
	$y = 0.02$	Correct answer	A1
	Total		**6 marks**

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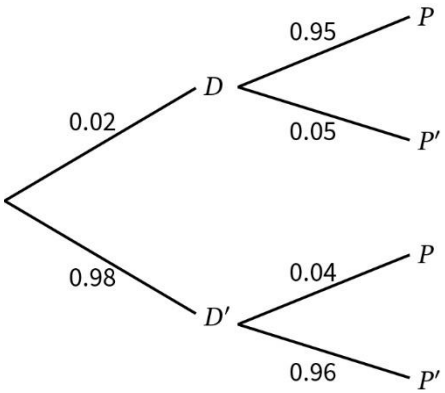
Question	Answer	Extra information	Marks
30.5 (a)		Tree diagram with branches as shown and 0.02 on correct branch 0.95 and 0.04 in correct places Completely correct tree diagram	B1 B1 B1
30.5 (b)	$P(P) = 0.02 \times 0.95 + 0.98 \times 0.04 \ (= 0.0582)$ $P(D \mid P) = \dfrac{0.02 \times 0.95}{'0.0582'}$ $= 0.326$	Calculating probability of a positive result Calculating a conditional probability with answer for probability of a positive result as denominator Correct answer	M1 M1 A1
	Total		**6 marks**
30.6 (a)	$P(A' \cup B) = \dfrac{42}{49}$	Correct answer	B1
30.6 (b)	$P(A \mid B') = \dfrac{\frac{7}{49}}{\frac{24}{49}}$ $= \dfrac{7}{24}$	Using probability of $\frac{7}{49}$ or frequency of 7 and probability of $\frac{24}{49}$ or frequency of 24 Correct answer	M1 A1

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Question	Answer	Extra information	Marks
	Total		**3 marks**
30.7 (a)	$P(A \cap B) = \frac{2}{7} \times \frac{7}{20} \left(= \frac{1}{10} \right)$	Calculating probability of A and B	M1
	$P(A) = \frac{'\frac{1}{10}'}{\frac{3}{13}}$	Calculating probability with $\frac{3}{13}$ as denominator	M1
	$= \frac{13}{30}$	Correct answer	A1
30.7 (b)	$P(A' \cap B') = \frac{7}{20} - '\frac{1}{10}'$	Method for finding probability use probability of intersection found in (a)	M1
	$= \frac{1}{4}$	Correct answer	A1
	Total		**5 marks**
30.8 (a)	4.3	Correct answer. Allow value greater than 4.2 and less than 4.4	B1
30.8 (b)	8.2 – 0.7 = 7.5	At least one correct then subtracting Allow value in range 7.4–7.6	M1 A1
30.8 (c)	October	Also allow September	B1
	Total		**4 marks**
30.9 (a)	8300	Correct answer	B1

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Question	Answer	Extra information	Marks
30.9 (b)	The coded data lies close to a straight line.	Must specify it is the coded data. Also allow 'the coded data has a PMCC close to 1'	B1
30.9 (c)	$\log a = 0.594$ or $\log b = 0.055$ $a = 10^{0.594}$ or $b = 10^{0.055}$ $P = 3.93 \times 1.14^t$	Use of laws of logarithms or exponential rules to simplify. Can be implied by correct answer. Correct method for finding constants Correct equation	M1 M1 A1
30.9 (d)	$P = 3.93 \times 1.14^{15}$ $= 28.05$ Population = 28 100	Substituting into equation found in (c) Correct answer	M1 A1
30.9 (e)	It is extrapolation/the population cannot continue to increase exponentially without any limit.	Also allow 'it is outside the range of the data'	B1
	Total		**8 marks**

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