

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 31 Discrete probability distributions

Question	Answer	Extra information	Marks
31.1 (a)	$0.2 + 0.1 + k + k + 0.1 + 0.3 = 1$ $k = 0.15$	Using the fact that probabilities sum to 1 Correct answer	M1 A1
31.1 (b)	$P(10 < X < 40) = 0.1 + '0.15'$ $= 0.25$	$P(20) + P(30)$ Correct answer	M1 A1
31.1 (c)	$0.2^2 + 0.1^2 + k^2 + (k + 0.1)^2 + 0.3^2$ $= 0.225$	Or using their value of k Correct answer	M1 A1
	Total		6 marks

Question	Answer	Extra information	Marks
31.2 (a)	$k + 3k + 5k + k + 3k + 5k = 1$	Using the fact that probabilities sum to 1	M1
	$18k = 1$ $k = \frac{1}{18}$	Correct method for given conclusion	A1
31.2 (b)	$P(W > 4) = P(W = 5) + P(W = 6)$	Adding two probabilities. At least one probability correct.	M1
	$= \frac{5}{18} + \frac{5}{18}$ $= \frac{5}{9}$	Correct answer	A1
	Total		4 marks
31.3 (a)	$P(X = 12) = 0.0595$	Correct answer	B1
31.3 (b)	$P(X \geq 8) = 1 - P(X \leq 7)$	Method can be implied by value of 0.3672 or by a correct final answer	M1
	$= 1 - 0.3672$ $= 0.633$	Correct answer	A1
31.3 (c)	$P(10 < X < 15) = P(X \leq 14) - P(X \leq 10)$	Method can be implied by values of 0.9836 and 0.7797, or by a correct final answer	M1
	$= 0.9836 - 0.7797$ $= 0.204$	Correct answer	A1
	Total		5 marks

Question	Answer	Extra information	Marks
31.4	$\frac{1}{5} \times \frac{1}{2}$ or $\frac{4}{5} \times \frac{1}{4}$ $P(B = 1 \text{ and } Y = 2) + P(B = 2 \text{ and } Y = 1)$ $= \frac{1}{5} \times \frac{1}{2} + \frac{4}{5} \times \frac{1}{4}$ $= \frac{3}{10}$	Multiplying to find either combined probability Method can be implied by a sum of any two products or by sum of fractions $\frac{1}{10}$ or $\frac{1}{5}$ Correct answer	B1 M1 A1
	Total		3 marks
31.5 (a)	The lifetimes of each phone are independent of each other. The probability that a phone has a battery life of more than 30 hours is constant for each phone.	One reason Both reasons	B1 B1
31.5 (b)	$X \sim B(20, 0.23)$ $P(X = 7) = 0.0883$	Writing or using a binomial with $p = 0.23$ Also allow 0.0882	M1 A1
31.5 (c)	$P(X > 7) = 1 - P(X \leq 7)$ $= 1 - 0.9325$ $= 0.0675$	Method can be implied by value of 0.9325 or by a correct final answer Also allow 0.0674	M1 A1
	Total		6 marks
31.6 (a)	$P(13 \leq X < 20) = P(X \leq 19) - P(X \leq 12)$ $= 0.9937 - 0.5772$ $= 0.417$	Method can be implied by values of 0.9937 and 0.5772, or by a correct final answer Also allow 0.416	M1 A1
31.6 (b)	$P(X \leq a) > 0.4$ $a = 11$	Method can be implied by a correct answer Correct answer	M1 A1

Question	Answer	Extra information	Marks
	Total		4 marks
31.7 (a)	Discrete uniform	Also allow just ‘uniform’	B1
31.7 (b)(i)	$X \sim B(26, \frac{1}{3})$ $P(X < 8) = P(X \leq 7)$ $= 0.321$	Writing or using a binomial with $p = \frac{1}{3}$ Method can be implied by a correct answer Correct answer	B1 M1 A1
31.7 (b)(ii)	$P(6 < X \leq 12) = P(X \leq 12) - P(X \leq 6)$ $= 0.9417 - 0.1850$ $= 0.757$	Method can be implied by values of 0.9417 and 0.1850, or by a correct answer Correct answer	M1 A1
	Total		6 marks
31.8 (a)(i)	$X \sim B(20, \frac{5}{6})$ $P(X = 15) = 0.129$	Writing or using a binomial with $p = \frac{5}{6}$ in either part of the question Correct answer	M1 A1
31.8 (a)(ii)	$P(X > 13) = 1 - P(X \leq 13)$ $= 1 - 0.0371$ $= 0.963$	Method can be implied by a value of 0.0259 or by a correct answer Correct answer	M1 A1
31.8 (b)	$P(X \leq a - 1) > 0.5$ $a - 1 = 7$ $a = 8$	Method can be implied by a value of 7 or 8 Correct answer	M1 A1
	Total		6 marks

Question	Answer	Extra information	Marks
31.9 (a)(i)	$P(A \cap B') = 0.33$	Correct answer	B1
31.9 (a)(ii)	$P(A \cup B) = 0.33 + 0.22 + 0.15 + 0.03$ $= 0.73$	Allow alternative method $1 - 0.27$ Correct answer	M1 A1
31.9 (a)(iii)	$P(C B) = \frac{0.03}{0.03 + 0.15 + 0.22}$ $= 0.075$	Use of conditional probability with correct denominator Correct answer	M1 A1
31.9 (b)	A and C since $P(A \cap C) = 0$	Correct answer and reason	B1
31.9 (c)	$P(A) \times P(B) = 0.55 \times 0.4 (= 0.22)$ $P(A \cap B) = 0.22$ $P(A) \times P(B) = P(A \cap B)$ so they are independent	Calculating $P(A) \times P(B)$ Correct value for $P(A) \times P(B)$ and $P(A \cap B)$ Conclusion	M1 M1 A1
	Total		9 marks
31.10 (a)	$Q_1 = 2.5 + \frac{4.5}{20} \times 0.5$ or $Q_3 = 2.5 + \frac{19.5}{20} \times 0.5$ $Q_1 = 2.61$ or $Q_3 = 2.99$ IQR = '2.99 – 2.61' $= 0.375$ (kg)	Method correct for Q_1 or Q_3 Q_1 or Q_3 correct Subtracting with at least one correct value Also allow answers that round to 0.38	M1 A1 M1 A1
31.10 (b)	$Q_1 - 1.5(Q_3 - Q_1) = '2.61' - 1.5('0.375')$ $= 2.05$ $2 < 2.05$ so both honeydew melons in the class $1.5 < m \leq 2.0$ are outliers.	Substituting into given rule Conclusion. Must see 2.05	M1 A1

Question	Answer	Extra information	Marks
31.10 (c)	There is no reason to believe these are errors so should include to ensure that calculations are more accurate.	Valid reason	B1
	Total		7 marks