



Mark Scheme (Results)

Summer 2022

Pearson Edexcel International A Level
in Statistics S2 (WST02/01)

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1. The total number of marks for the paper is 75.
2. The Edexcel Mathematics mark schemes use the following types of marks:
 - **M** marks: method marks are awarded for ‘knowing a method and attempting to apply it’, unless otherwise indicated.
 - **A** marks: Accuracy marks can only be awarded if the relevant method (M) marks have been earned.
 - **B** marks are unconditional accuracy marks (independent of M marks)
 - Marks should not be subdivided.

3. Abbreviations

These are some of the traditional marking abbreviations that will appear in the mark schemes.

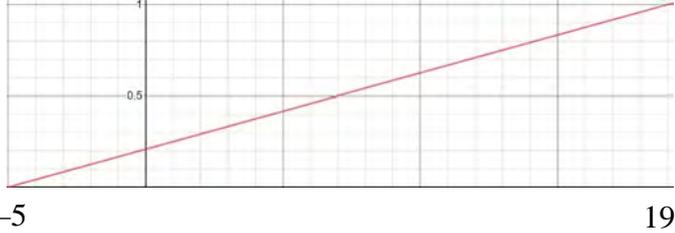
- bod – benefit of doubt
 - ft – follow through
 - the symbol \surd will be used for correct ft
 - cao – correct answer only
 - cso - correct solution only. There must be no errors in this part of the question to obtain this mark
 - isw – ignore subsequent working
 - awrt – answers which round to
 - SC: special case
 - oe – or equivalent (and appropriate)
 - dep – dependent
 - indep – independent
 - dp decimal places
 - sf significant figures
 - * The answer is printed on the paper
 - \square The second mark is dependent on gaining the first mark
4. All A marks are ‘correct answer only’ (cao.), unless shown, for example, as A1 ft to indicate that previous wrong working is to be followed through. After a misread however, the subsequent A marks affected are treated as A ft, but manifestly absurd answers should never be awarded A marks.
 5. For misreading which does not alter the character of a question or materially simplify it, deduct two from any A or B marks gained, in that part of the question affected.
 6. If a candidate makes more than one attempt at any question:
 - If all but one attempt is crossed out, mark the attempt which is NOT crossed out.
 - If either all attempts are crossed out or none are crossed out, mark all the attempts and score the highest single attempt.
 7. Ignore wrong working or incorrect statements following a correct answer

Special notes for marking Statistics exams (for AAs only)

- If a method leads to “probabilities” which are greater than 1 or less than 0 then M0 should be awarded unless the mark scheme specifies otherwise.
- Any correct method should gain credit. If you cannot see how to apply the mark scheme but believe the method to be correct then please send to review.
- For method marks, we generally allow or condone a slip or transcription error if these are seen in an expression. We do not, however, condone or allow these errors in accuracy marks.

Question	Scheme	Marks
1. (a)	4	B1 (1)
(b)	$P(X = 2) = 3 \times 0.2 \times 0.8^2 \left[= \frac{48}{125} = 0.384 \right]$ or $P(X = 3) = 0.8^3 \left[= \frac{64}{125} = 0.512 \right]$ [X =] 3 is the mode	M1 A1 (2)
(c)	$P(W_1 = 2) = \frac{e^{-4}4^2}{2} [=0.1465]$ and $P(X_1 = 2) = 3 \times 0.2 \times 0.8^2 [= \frac{48}{125} = 0.384]$ $P(W_1 \text{ and } X_1 = 2) = \frac{e^{-4}4^2}{2} \times (3 \times 0.2 \times 0.8^2) [= 0.1465 \times 0.384]$ $= 0.05626564\dots$ awrt 0.0563	M1 M1 A1 (3)
(d)	$X_1 = 0 \text{ and } W_1 > 0, X_1 = 1 \text{ and } W_1 > 1, X_1 = 2 \text{ and } W_1 > 2, X_1 = 3 \text{ and } W_1 > 3$ $0.008 \times (1 - 0.0183) + 0.096 \times (1 - 0.0916) + 0.384 \times (1 - 0.2381) + 0.512 \times (1 - 0.4335)$ $= 0.677677\dots$ awrt 0.678	M1 M1M1 A1 (4)
[10 marks]		
Notes		
(a)	B1 cao	
(b)	M1 valid attempt at either probability. A1 3 (M1 must be scored) NB answer only with no method is M0A0	
(c)	1 st M1 both $P(W_1 = 2)$ Allow (0.2381 – 0.0916) and $P(X_1 = 2)$ 2 nd M1 Poisson probability \times binomial probability. If no working shown these probabilities must be correct A1 awrt 0.0563	
(d)	1 st M1 for listing at least 3 combinations. Implied by 2 nd M1. 2 nd M1 for sum of at least 3 correct products Condone consistent use of the tables for 3.5 or 4.5 rather than 4 3 rd M1 for a fully correct expression eg $0.008 \times (0.9817) + 0.096 \times (0.9084) + 0.384 \times (0.7619) + 0.512 \times (0.5665)$ condone 0.9816 and 0.7618 Allow figures to 3sf for method or awrt 0.00785 + awrt 0.0872 + awrt 0.293 + awrt 0.290 (allow 0.29) A1 awrt 0.678	
	Alternative: $W_1 = 1 \text{ and } X_1 = 0, W_1 = 2 \text{ and } X_1 < 2, W_1 = 3 \text{ and } X_1 < 3, W_1 \geq 4$ $0.0733 \times 0.008 + 0.1465 \times 0.104 + 0.1954 \times 0.488 + (1 - 0.4335)$ awrt 0.000586 + awrt 0.0152 + awrt 0.0954 + awrt 0.567	

Question	Scheme	Marks
<p>2. (a)</p>	$E(T) = \int_0^4 \frac{1}{192} t(t^3 - 48t + 128) dt$	M1
	$= \frac{1}{192} \left[\frac{t^5}{5} - 16t^3 + 64t^2 \right]_0^4 \text{ or } \left[\frac{t^5}{960} - \frac{1}{12}t^3 + \frac{1}{3}t^2 \right]_0^4 \text{ oe}$	dM1
	$= \frac{1}{192} \left(\frac{4^5}{5} - 16(4^3) + 64(4^2) - 0 \right) = \frac{16}{15} \text{ min} \rightarrow 1 \text{ minute } 4 \text{ seconds}$	A1
	(3)	
<p>(b)</p>	$P(\text{call takes between 1 and 3 minutes}) = \int_1^3 \frac{1}{192} (t^3 - 48t + 128) dt$	
	$\text{or } \left[\frac{t^4}{768} - \frac{1}{8}t^2 + \frac{2}{3}t \right]_1^3 \text{ oe}$	M1
	$= \frac{1}{192} \left(\left(\frac{3^4}{4} - 24(3^2) + 128(3) \right) - \left(\frac{1^4}{4} - 24(1^2) + 128(1) \right) \right) = \frac{7}{16} *$	dM1 A1*cso
	(3)	
<p>(c)</p>	$C \sim B(256, \frac{7}{16}) \approx N(112, 63)$	M1 A1
	$P(C > 125) \approx P\left(Z > \frac{125.5 - 112}{\sqrt{63}}\right)$	M1M1
	$P(Z > 1.70) = 1 - 0.9554 = 0.0446$	A1
	(5)	
Notes		[11 marks]
<p>(a)</p>	<p>1st M1 for using $\int tf(t) dt$ ignore limits. $t^4 \rightarrow t^5$ or $t^2 \rightarrow t^3$ or $t \rightarrow t^2$ for at least one term, ignore coefficients. Implied by an answer of $\frac{16}{15}$ or 1 minute 4 seconds (allow 64) or awrt 1.067</p>	
	<p>2nd dM1 dep on previous M1 fully correct integration with limit of 4 and 0 or 4 substituted (204.8) This mark is not implied by a correct answer</p>	
	<p>A1 the second M1 mark must be awarded 1 min 4 s (accept 64)</p>	
	<p>NB an answer of $\frac{16}{15}$ or 1 minute 4 seconds or 64 or awrt 1.067 with no working gains M1M0A0.</p>	
<p>(b)</p>	<p>1st M1 attempt to integrate $\int f(t) dt$ $t^n \rightarrow t^{n+1}$ for at least one term. Ignore limits. If they have integrated $f(t)$ in part (a) and used this in part (b) we will allow this mark.</p>	
	<p>2nd M1 (dep on 1st M1) for use of correct limits. Must see substitution into their expression. If integration correct allow $\frac{1}{192} \left(\left(\frac{81}{4} - 216 + 384 \right) - \left(\frac{1}{4} - 24 + 128 \right) \right)$ or $\frac{1}{192} \left(\frac{753}{4} - \frac{417}{4} \right)$ or $\frac{251}{256} - \frac{139}{256}$</p>	
	<p>1st A1*cso $\frac{7}{16}$ [= 0.4375] fully correct solution (correct integration and substitution) . Answer is given so both method marks must be awarded.</p>	
<p>(c)</p>	<p>1st M1 use or sight of Normal approximation with mean 112</p>	
	<p>1st A1 correct mean and variance (condone 63² if used $\sqrt{63}$ in the standardisation)</p>	
	<p>2nd M1 standardising using their mean and variance. Allow use of 124.5, 125, 125.5, 126, 126.5 or on the numerator 12.5, 13, 13.5, 14, 14.5</p>	
	<p>3rd M1 use of continuity correction 125 ± 0.5 Implied by numerator of 12.5 or 13.5</p>	
	<p>2nd A1 awrt 0.0445/0.0446 [calc 0.0444865...] [Exact binomial gives 0.0448518... and gains no marks]</p>	

Question	Scheme	Marks
3. (a)	$\frac{19}{24}$	B1
		(1)
(b)	$P(R > 3.5) = \frac{-3.5 - (-5)}{19 - (-5)} + \frac{19 - 3.5}{19 - (-5)} = \frac{17}{24}$	M1, A1
		(2)
(c)		M1 A1
		(2)
(d)(i)	$P(R_1 > 10) = \frac{19 - 10}{19 - (-5)} \left[= \frac{9}{24} = 0.375 \right]$	M1
	$[P(R > 10)]^3 = \left(\frac{9}{24} \right)^3 = \frac{27}{512}$	M1 A1
		(3)
(ii)	$1 - [P(R < 10)]^3 = \frac{387}{512}$	M1 A1
		(2)
Notes		
[10 marks]		
(a)	B1 allow awrt 0.792	
(b)	M1 sum of two regions from uniform distribution or $1 - \frac{3.5 - (-3.5)}{19 - (-5)} \left[= 1 - \frac{7}{24} \right]$ oe You may ft their denominator from (a) A1 allow awrt 0.708	
	SC M1A0 for $P(-3.5 < R < 3.5) = \frac{7}{24}$ (awrt 0.292) or for finding $P(R > 3.5) = \frac{31}{48}$ (awrt 0.646) and $P(R < -3.5) = \frac{1}{16}$ (0.0625)	
(c)	M1 straight line with increasing gradient. Allow a horizontal line to the right of 19 and/or a horizontal line to the left of -5 A1 starting at (-5, 0) and finishing at (19, 1) Need to be clear labels for -5, 19 and 1. 0 may be labelled or implied by the x-axis	
(d) (i)	1 st M1 for $P(R > 10)$ eg $1 - \frac{10 - (-5)}{19 - (-5)}$ no need to simplify. Implied by 0.375 or $\frac{27}{512}$ You may use their denominator from (a) 2 nd M1 ["their $P(R > 10)$ "] ³ They may use their denominator from (a) otherwise ft their $P(R > 10)$ only if it is clearly labelled. A1 allow awrt 0.0527	
(ii)	M1 Use of $1 - p^3$ $0 < p < 1$ (none are greater than 10cm from origin) or $3p^2(1 - p) + 3p(1 - p)^2 + (1 - p)$ $0 < p < 1$ working needs to be shown A1 allow awrt 0.756	
SC M1A0 for finding the P (exactly 1 is > 10cm) = $\frac{225}{512} = (0.439\dots)$		

Question	Scheme	Marks
4. (a)	$P(Y = 0) < 0.05$ $(1 - 0.07)^n < 0.05$	M1
	$n \log(0.93) < \log(0.05)$	M1
	$n > 41.28 \dots \quad n = 42$	A1
		(3)
(b)	$H_0: p = 0.08 \quad H_1: p \neq 0.08$	B1
	$X \sim B(75, 0.08) \rightarrow Po(6)$	M1
	$P(X \leq 11) = 1 - P(X \geq 10)$	M1
	$= 1 - 0.9574 = 0.0426 [> 0.025]$	A1
	Do not Reject H_0 or not significant or 11 does not lie in the CR	dM1
	There is not significant evidence to suggest that the proportion of pears weighing more than 180g has changed	A1
		(6)
		[9 marks]
Notes		
(a)	1 st M1 For 0.93^n or 0.93^{42} or 0.93^{41}	
	2 nd M1 for $n \log(0.93) < \log(0.05)$ or $\log_{0.93} 0.05$, n Allow = or ,, condone > or ... or $0.93^{42} = 0.0474 \dots$ or 0.0475 (min 4 dp) Implied by 41.28... or awrt 41.3	
	A1 42 cao NB An answer of 42 gains 3/3	
	SC condone for M1 M0 A0 ($[e^{-3}] = 0.04978 \dots$ (min 4dp) and $-0.07n = -3$)	
(b)	B1 both hypotheses correct (may use p or π but do not allow $p(x)$) Allow 8% connected to H_0 and H_1 correctly	
	1 st M1 writing or using Poisson approximation with mean 6.	
	2 nd M1 for writing or using $1 - P(X \geq 10)$ or for a CR method (must give a CR) giving $P(X \geq 11) = 0.9799$ or $P(X \leq 12) = 0.0201$ Implied by awrt 0.0426 or correct CR	
	1 st A1 for 0.0426 or CR: $X \leq 12$ ignore lower CR. NB M1A1 for $P(X \geq 10) = 0.9574$ on its own	
	3 rd dM1 Independent of their hypotheses dependent on 2 nd M1 but A correct statement i.e. not significant/do not reject H_0 /Not in CR/reject H_1 Do not allow non-contextual conflicting statements.	
	2 nd A1 For a correct contextual statement. Need proportion oe and changed oe Allow the farmers belief (oe) is not supported (bold words) Do not accept contradicting statements. No hypotheses is A0	
	NB Award d M1A1 for a correct contextual statement on its own	
	SC1: Use of one-tailed test may score B0M1M1A1M1A0 for rejecting H_0	
	SC2: Use of Binomial throughout max (3/6) B1M0M1A0dM1A0	
	SC3: normal approximation prob = 0.0277 (maximum 3 out of 6) B1 M0 M1 for writing or using $1 - P(X \geq 10.5)$ allow < implied by awrt 0.027/0.028 A0 dM1A0	

Question	Scheme	Marks
5. (a)	$X \sim \text{Po}(7.5)$	B1
(i)	$P(X = 10) [= 0.8622 - 0.7764 = \frac{e^{-7.5}(7.5)^{10}}{10!}] = 0.0858\dots$ awrt 0.0858	B1
(ii)	$P(6 \leq X \leq 11) = P(X \leq 11) - P(X \leq 5) [= 0.9208 - 0.2414]$	M1
	$= 0.6794$ awrt 0.679	A1
		(4)
(b)	$Y =$ number of samples that contain 0 particles	
	$Y \sim B(12, p)$ or $B(12, e^{-0.15m})$ or $B(12, e^{-\lambda})$	M1
	$[P(Y \leq 2) =] 1 - P(Y \leq 1) = 0.1184$	M1
	$P(Y \leq 1) = 0.8816 \rightarrow$ from tables $[p =] 0.05$	A1
	$S =$ number of particles per m millilitres	
	$S \sim \text{Po}(0.15m)$	M1
	$P(S = 0) = 0.05$ or $e^{-0.15m} = "0.05"$	M1
	$-0.15m = \ln(0.05) \rightarrow m = 19.9715\dots$ awrt 20.0	A1
		(6)
		[10 marks]
Notes		
(a)	1 st B1 writing or using $\text{Po}(7.5)$ May be implied by a correct probability	
(i)	2 nd B1 awrt 0.0858 [calc = 0.0858303...]	
(ii)	M1 writing or using $P(X \leq 11) - P(X \leq 5)$	
	A1 awrt 0.679 [calc = 0.06793222...]	
(b)	1 st M1 writing or using $B(12, p)$ Allow Binomial with $n = 12$ or $B(12, \dots)$ May be implied by 0.05	
	2 nd M1 for $1 - P(Y \leq 1) = 0.1184$ (or better) or $P(Y \leq 1) = 0.8816$ oe eg $(1 - p)^{12} + 12p(1 - p)^{11} = 0.8816$ Implied by 0.05	
	1 st A1 0.05(seen)	
	3 rd M1 writing or using $\text{Po}(0.15m)$ May be implied by $e^{-0.15m}$	
	4 th M1 ft their p ($0 < p < 1$) for an equation of the form $e^{-0.15m} = "0.05"$ (allow $e^{-\lambda} = "0.05"$) Allow $0.15m = 3$	
	2 nd A1 Allow 20 or awrt 20.0 Allow trial and error to solve their equation	

Question	Scheme	Marks
6. (a)	$\int_0^2 0.1x dx + \int_2^4 kx(8-x) dx = \frac{31}{45}$	M1
	$\left[\frac{0.1x^2}{2} \right]_0^2 + k \left[4x^2 - \frac{x^3}{3} \right]_2^4 = \frac{31}{45}$	M1
	$0.2 + k \left(64 - \frac{64}{3} - \left(16 - \frac{8}{3} \right) \right) = \frac{31}{45} \rightarrow k = \frac{1}{60}$	dM1 A1
		(4)
(b)(i)	$a = \left[\left(1 - \frac{31}{45} \right) \div 2 \right] \frac{7}{45}$	B1
(ii)	$P(0 \leq X \leq 5.5) = \frac{31}{45} + a \times 1.5 = \frac{83}{90}$	M1 A1
		(3)
(c)	$\int_0^x 0.1t dt = \frac{0.1x^2}{2}$	B1
	$\int_0^2 0.1t dt + \int_2^x \frac{1}{60} t(8-t) dt, \quad \frac{31}{45} + \int_4^x \frac{7}{45} t dt$	M1, M1
(c)	$[F(x)] = \begin{cases} 0 & x < 0 \\ 0.05x^2 & 0 \leq x < 2 \\ \frac{1}{60} \left(4x^2 - \frac{x^3}{3} - \frac{4}{3} \right) & 2 \leq x < 4 \\ \frac{7}{45}x + \frac{1}{15} & 4 \leq x < 6 \\ 1 & x \geq 6 \end{cases}$	B1 A1 A1 (6)
Notes		[13 marks]
(a)	1 st M1 sum of two integrals = 31/45 (ignore limits) It may be equated to 31/45 later in their working. Condone missing dx 2 nd M1 attempt at integration $x \rightarrow x^2$ or $x^2 \rightarrow x^3$ for at least one 3 rd dM1 dep on 1 st M1 being awarded for use of correct limits A1 $k = \frac{1}{60}$ cao Allow 0.016 or equivalent exact value $k = \frac{1}{60}$ with no working gains 4/4 $k = \frac{1}{60}$ from $0.2 = 2k(8-2)$ gains M0M0M0A0	
(b)(i)	B1 $a = \frac{7}{45}$ cao allow 0.15 or equivalent exact value	
(ii)	M1 ft "their value of a" for $\frac{31}{45} + 1.5 \times a$ or $1 - 0.5 \times a$ A1 $\frac{83}{90}$ cao Allow 0.92 or equivalent exact value	
(c)	1 st B1 a correct integration of 2nd line of pdf if have + C must get C = 0 1 st M1 a correct method to find 3rd line of cdf Condone incorrect integration (allow k) Allow $0.2 + \int_2^x \frac{1}{60} t(8-t) dt$ or $\int \frac{1}{60} t(8-t) dt + C$ and $F(2) = 0.2$ 2 nd M1 a correct method to find 4th line of cdf Condone incorrect integration (allow a) Allow $\int \frac{7}{45} t dt + C$ and $F(6) = 1$ but do not allow their $F(4) + \int_4^x \frac{7}{45} t dt$ For the next 3 marks limits condone < for „ and „ for < and ..for > 2 nd B1 1 st and 5 th lines correct with correct limits. Allow 1 range to be otherwise for the limits, Must have consistent use of letter throughout for this mark 1 st A1 3 rd line correct with correct limits Allow equivalent un-simplified expressions 2 nd A1 4 th line correct with correct limits Allow equivalent un-simplified expressions	

Question	Scheme	Marks									
<p>7. (a)</p> <p>(i)</p> <p>(ii)</p>	<p>$Y \sim B(20, p)$ $p = P(\text{sample contains counter with a 9 on it})$</p> <p>$p = \left(1 - \frac{9}{10} \times \frac{8}{9} \times \frac{7}{8}\right)$ oe or $\left(\frac{1}{10} \times \frac{9}{9} \times \frac{8}{8} \times 3\right)$ oe</p> <p>or $\left(\frac{6}{10} \times \frac{5}{9} \times \frac{1}{8} \times 3 + \frac{6}{10} \times \frac{3}{9} \times \frac{1}{8} \times 6 + \frac{3}{10} \times \frac{2}{9} \times \frac{1}{8} \times 3\right)$ oe $\left[= \frac{3}{10} \right]$</p> <p>$E(Y) = 20 \times \frac{3}{10} [= 6]$</p> <p>$\text{Var}(Y) = 20 \times \frac{3}{10} \times (1 - \frac{3}{10}) = 4.2$</p>	<p>M1A1</p> <p>B1</p> <p>M1A1</p> <p>(5)</p>									
<p>(b)</p>	<p>(7,7,7)</p> <p>(7,7,8), [(7,8,7), (8,7,7)]</p> <p>(7,7,9), [(7,9,7), (9,7,7)]</p>	<p>B2</p> <p>(2)</p>									
<p>(c)</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">m</th> <th style="width: 45%;">7</th> <th style="width: 40%;">8</th> </tr> </thead> <tbody> <tr> <td>$P(M = m)$</td> <td>$\frac{6}{10} \times \frac{5}{9} \times \frac{4}{8} + 3 \times \frac{6}{10} \times \frac{5}{9} \times \frac{3}{8} + 3 \times \frac{6}{10} \times \frac{5}{9} \times \frac{1}{8}$</td> <td>$1 - P(M = 1)$</td> </tr> <tr> <td></td> <td>$= \frac{2}{3}$</td> <td>$= \frac{1}{3}$</td> </tr> </tbody> </table> <p style="text-align: center;">Notes</p>	m	7	8	$P(M = m)$	$\frac{6}{10} \times \frac{5}{9} \times \frac{4}{8} + 3 \times \frac{6}{10} \times \frac{5}{9} \times \frac{3}{8} + 3 \times \frac{6}{10} \times \frac{5}{9} \times \frac{1}{8}$	$1 - P(M = 1)$		$= \frac{2}{3}$	$= \frac{1}{3}$	<p>B1</p> <p>M1 M1</p> <p>A1 A1</p> <p>(5)</p> <p>[Total 12]</p>
m	7	8									
$P(M = m)$	$\frac{6}{10} \times \frac{5}{9} \times \frac{4}{8} + 3 \times \frac{6}{10} \times \frac{5}{9} \times \frac{3}{8} + 3 \times \frac{6}{10} \times \frac{5}{9} \times \frac{1}{8}$	$1 - P(M = 1)$									
	$= \frac{2}{3}$	$= \frac{1}{3}$									
<p>(a)</p> <p>(i)</p> <p>and (ii)</p>	<p>1st M1 For all methods condone missing $\times 3$ and /or $\times 6$ Allow $\frac{{}^1C_1 {}^9C_2}{{}^{10}C_3}$ oe</p> <p><i>Condone with replacement - condone missing $\times 3$ and /or $\times 6$</i></p> <p>$1 - \left(\frac{9}{10}\right)^3$ or $\left(\frac{6}{10}\right)^2 \times \frac{1}{10} \times 3 + \frac{6}{10} \times \frac{3}{10} \times \frac{1}{10} \times 6 + \left(\frac{3}{10}\right)^2 \times \frac{1}{10} \times 3 + \dots [= 0.271]$</p> <p>1st A1 A fully correct expression without replacement or 0.3</p> <p>NB $E(Y) = 6$ implies the 1st M1 1st A1</p> <p>B1 for $20 \times$ probability – no need to calculate</p> <p>2nd M1 Use of $np(1 - p)$ or $np\left(1 - \frac{np}{20}\right)$</p> <p>2nd A1 variance = 4.2</p>										
<p>(b)</p>	<p>B1B1 all 3 correct (with none incorrect – ignore arrangements of the correct numbers)</p> <p>(B1B0 any one correct and no incorrect or 2 or 3 correct and only one incorrect) These can be awarded in part (c) provided that they are clearly identified as having a median of 7</p> <p>More than one incorrect is BOB0</p>										
<p>(c)</p>	<p>B1 for identifying that the only possible medians are 7 and 8.</p> <p>Allow 9 if it has a probability of 0</p> <p>1st M1 correct expression for $P(M = 7)$ Implied by $2/3$ or $P(M = 8)$ Implied by $1/3$</p> <p>$P(M = 8) = \frac{3}{10} \times \frac{2}{9} \times \frac{1}{8} + 3 \times \frac{6}{10} \times \frac{3}{9} \times \frac{2}{8} + 3 \times \frac{3}{10} \times \frac{2}{9} \times \frac{1}{8} + 6 \times \frac{6}{10} \times \frac{3}{9} \times \frac{1}{8}$</p> <p><i>Condone with replacement</i> $P(M = 7) = \left(\frac{6}{10}\right)^3 + 3 \times \left(\frac{6}{10}\right)^2 \times \frac{3}{10} + 3 \times \left(\frac{6}{10}\right)^2 \times \frac{1}{10} \left[= \frac{81}{125} = 0.648 \right]$ or</p> <p>$P(M = 8) = \left(\frac{3}{10}\right)^3 + 3 \times \frac{6}{10} \times \left(\frac{3}{10}\right)^2 + 3 \times \left(\frac{3}{10}\right)^2 \times \frac{1}{10} + 6 \times \frac{6}{10} \times \frac{3}{10} \times \frac{1}{10} \left[= \frac{81}{250} = 0.324 \right]$</p> <p>2nd M1 Total of the 2 probabilities for 7 and 8 = 1 or a correct expression without replacement for both $P(M = 7)$ and $P(M = 8)$ condone with replacement</p> <p>1st A1 $P(M = 7) = \frac{2}{3}$ oe 2nd A1 $P(M = 8) = \frac{1}{3}$ oe</p>										

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