



Mark Scheme (Results)

Summer 2022

Pearson Edexcel GCE
A Level Further Mathematics (9FM0)
Paper 3B -Further Statistics 1

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

EDEXCEL GCE MATHEMATICS

General Instructions for Marking

1. The total number of marks for the paper is 80.
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 $\checkmark$ 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. 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.
 5. Where a candidate has made multiple responses and indicates which response they wish to submit, examiners should mark this response.
If there are several attempts at a question which have not been crossed out, examiners should mark the final answer which is the answer that is the most complete.
 6. Ignore wrong working or incorrect statements following a correct answer.

7. Mark schemes will firstly show the solution judged to be the most common response expected from candidates. Where appropriate, alternatives answers are provided in the notes. If examiners are not sure if an answer is acceptable, they will check the mark scheme to see if an alternative answer is given for the method used.

Qu	Scheme	Marks	AOs												
1(a)	$r = P(X = 3) \times 100$ or $r = P(X = 1) \times 100$ or $s = P(X = 2) \times 100$ $r = \underline{25}$ (value may be in table) $s = \underline{37.5}$ (value may be in table)	M1 A1 A1 (3)	3.4 1.1b 1.1b												
(b)	Ho: B(4,0.5) is a suitable model (o.e.) Condone B(0.5, 4) H1: B(4,0.5) is not a suitable model (o.e.)	B1	2.5												
	<table border="1"><tr><td>$\frac{(O_i - E_i)^2}{E_i}$</td><td>2.25</td><td>2.56</td><td>0.54</td><td>4</td><td>1.21</td></tr><tr><td>$\frac{O_i^2}{E_i}$</td><td>16</td><td>43.56</td><td>29.04</td><td>9</td><td>12.96</td></tr></table>	$\frac{(O_i - E_i)^2}{E_i}$	2.25	2.56	0.54	4	1.21	$\frac{O_i^2}{E_i}$	16	43.56	29.04	9	12.96	M1	1.1b
	$\frac{(O_i - E_i)^2}{E_i}$	2.25	2.56	0.54	4	1.21									
	$\frac{O_i^2}{E_i}$	16	43.56	29.04	9	12.96									
	$\sum \frac{(O_i - E_i)^2}{E_i} = 10.56$ or $\sum \frac{O_i^2}{E_i} - N = 110.56 - 100 = 10.56 \left(= \frac{264}{25} \right)$ $\nu = 5 - 1 = 4$ CV = 9.488 (Calc 9.487729035...) Significant so there is evidence that the researcher's model is not suitable	A1 B1 B1ft A1	1.1b 1.1b 1.1b 2.2b												
	(6)														

Total 9

(a)	M1 1stA1 2ndA1	Using the Binomial model to expected value. Allow if <u>both</u> probs 0.25 and 0.375 seen May be implied by a correct value of r or s . Alternatives $r = 6.25 \times 4$ or $s = 6.25 \times 6$ for $r = 25$ for $s = 37.5$
SC	“B1”	If M0 scored but their values of r and s satisfy $2r + s = 87.5$ score as M0A0A1
(b)	1st B1 M1 1st A1 2nd B1 3rdB1ft 2ndA1	Both hypotheses correct using the correct notation in at least one <u>or</u> written in full e.g. binomial with $n = 4$ and $p = 0.5$ Calculating either $\frac{(O_i - E_i)^2}{E_i}$ or $\frac{O_i^2}{E_i}$ at least 4 correct. Implied by sight of awrt 10.6 Allow 10.6 (from correct working) Correct dof May be implied by CV of 9.48 or 9.49 or better For 9.488 or better. Can ft their dof NB $\chi_3^2(5\%) = 7.815$ (allow awrt 7.815) Indep’ of hypotheses but dep on 1st A1 Evaluating the outcome by drawing a correct inference. Compatible with comparison of 10.56 or 10.6 with their CV (which must be > 1) They must say model not suitable (o.e.) They do not need to state the comparison or say reject H_0 etc No need to explicitly see B(4, 0.5) mentioned here

Question	Scheme	Marks	AOs
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2(a)	$\left[E(X) = \right] 0.2b - 1$						B1 (1)	1.1b																																										
(b)	$E(X^2) = 25 \times 0.3 + 1 \times 0.25 [+0 \times 0.1] + 25 \times 0.15 + 0.2b^2 [= 11.5 + 0.2b^2]$ "11.5 + 0.2b^2" - ("0.2b - 1")^2 [= 34.26] $0.16b^2 + 0.4b - 23.76 [= 0]$ <u>or</u> $\frac{4}{25}b^2 + \frac{2}{5}b - \frac{594}{25} [= 0]$ $b = \underline{11}$ [since $b > 5$]						M1 M1 M1 A1 (4)	1.1b 3.1a 1.1b 2.2a																																										
(c)	<table><tr><td>X</td><td>-5</td><td>-1</td><td>0</td><td>5</td><td>"11"</td></tr><tr><td>X^2</td><td>25</td><td>1</td><td>0</td><td>25</td><td>"121"</td></tr><tr><td>$2 - 3X$</td><td>17</td><td>5</td><td>2</td><td>-13</td><td>"-31"</td></tr><tr><td>$X^2 - 2$</td><td>23</td><td>-1</td><td>-2</td><td>23</td><td>"119"</td></tr><tr><td>$-3X$</td><td>15</td><td>3</td><td>0</td><td>15</td><td>"-33"</td></tr><tr><td>$X^2 + 3X$</td><td>10</td><td>-2</td><td>0</td><td>40</td><td>"154"</td></tr><tr><td>$X^2 + 3X - 2$</td><td>8</td><td>-4</td><td>-2</td><td>38</td><td>"152"</td></tr></table> $P(X^2 < 2 - 3X) = P(X = -1) + P(X = 0)$ $= \underline{0.35}$						X	-5	-1	0	5	"11"	X^2	25	1	0	25	"121"	$2 - 3X$	17	5	2	-13	"-31"	$X^2 - 2$	23	-1	-2	23	"119"	$-3X$	15	3	0	15	"-33"	$X^2 + 3X$	10	-2	0	40	"154"	$X^2 + 3X - 2$	8	-4	-2	38	"152"	M1 A1ft M1 A1 (4)	2.1 1.1b 2.2a 1.1b
X	-5	-1	0	5	"11"																																													
X^2	25	1	0	25	"121"																																													
$2 - 3X$	17	5	2	-13	"-31"																																													
$X^2 - 2$	23	-1	-2	23	"119"																																													
$-3X$	15	3	0	15	"-33"																																													
$X^2 + 3X$	10	-2	0	40	"154"																																													
$X^2 + 3X - 2$	8	-4	-2	38	"152"																																													
Total 9																																																		
(a)	B1	Correct expression for $E(X)$																																																
(b)	1 st M1 2 nd M1 3 rd M1 A1	Correct attempt at $E(X^2)$ using $\sum x^2 P(X = x)$ at least 3 correct non-zero products Allow $(-5)^2$ etc Realising that $\text{Var}(X) = E(X^2) - [E(X)]^2$ needs to be used Reducing their equation to a 3 term quadratic. At least 2 terms correct. Allow e.g. $0.16b^2 + 0.4b = 23.76$ Condone missing "=0" For 11 only (from the correct equation) so -13.5 must be eliminated Correct answer with no incorrect working seen scores 4/4																																																
(c)	1 st M1 1 st A1ft 2 nd M1 2 nd A1	At least 4 values correct for $(X^2 \text{ and } 2 - 3X)$ <u>or</u> for $(X^2 - 2 \text{ and } -3X)$ <u>or</u> $X^2 + 3X$ <u>or</u> $X^2 + 3X - 2$ (o.e.) Allow for solving equation with one sign error All correct or correct ft with their b but must have $b > 5$ (accurate to 1 sf) Allow solving equation to get awrt -3.6 and awrt 0.56 <u>or</u> $\frac{-3 \pm \sqrt{17}}{2}$ (ft their $b > 5$) If there are omissions but no errors in the lists of values then if 2 nd M1 and 2 nd A1 are scored then the 1 st M1 and 1 st A1 can be given by implication. For identifying the correct values of X required i.e. $X = -1$ and $X = 0$ 0.35 NB It is possible to score M0A0M1A1 here if their table of values is incorrect Correct answer with no incorrect working seen scores 4/4 (Allow correct use of their $b > 5$)																																																

Qu	Scheme		Marks	AOs
3(a)	$W \sim \text{Po}(11.2)$ and $P(W \leq 19) = 1 - P(W \geq 18)$ <u>or</u> suitable 3sf probs $P(W \leq 19) = 0.020776...$ awrt <u>0.021</u>		M1 A1 (2)	3.4 1.1b
(b)	$[S = \# \text{ calls per day}, S \sim \text{Po}(0.4)] \quad P(S > 1) = 0.061551...$ awrt 0.0616 $X \sim B(250, "0.061551...")$ $Y \sim \text{Po}("15.3879...")$ [Accept $\text{Po}(15.4)$ or better] <u>or</u> suitable 3sf probs $= 0.14751...$ awrt <u>0.148</u>		B1 M1 M1 A1 (4)	1.1b 3.3 3.4 1.1b
(c)	$H_0: \lambda = 16.8 \quad H_1: \lambda < 16.8$ $U \sim \text{Po}(16.8)$ $P(U \geq 8) = 0.014$ [0.014 < 0.05 or there is sufficient evidence to reject H_0] There is sufficient evidence at the 5% level of significance that the <u>number of calls received per day is lower in winter</u> <u>or rate of calls is lower in winter or less calls per day in winter (o.e.)</u>		B1 B1 M1 A1 (4)	2.5 3.3 1.1b 2.2b
(d)	$C \sim \text{Po}(0.4 \times n + 0.2 \times n) [= \text{Po}(0.6n)]$ <u>or</u> $D \sim B(n, e^{-0.6})$ or awrt 0.549) $e^{-0.6n} < 0.001$ <u>or</u> $-0.6n < \ln(0.001)$ <u>or</u> $n > 11.5...$ $n = \underline{12}$		M1 M1 A1 (3)	3.1b 1.1b 1.1b
(e)	The <u>rate of calls per day is constant</u> <u>or</u> the <u>number of calls occurring in non-overlapping time intervals is independent</u> . <u>or</u> <u>number of calls per day is independent (o.e.)</u>		B1 (1)	2.4
Total 14				
(a)	M1 A1	For using the model $\text{Po}(11.2)$ implied by sight of: 0.02077... or 0.9889.. or 0.9792.. awrt 0.021		
(b)	B1 1 st M1 2 nd M1 A1	awrt 0.0616 Setting up a new model $B(250, "0.0616")$ [condone $B("0.0616", 250)$] Seeing the model $\text{Po}(\text{their } np)$ implied by sight of: 0.1475.. or 0.89975 or 0.8524.. awrt 0.148		
SC		if no approximation used (and 1 st M1 not seen) an answer of awrt 0.140 could get B1M1M0A0		
(c)	1 st B1 2 nd B1 M1 A1	Both hypotheses correct using λ or μ and 16.8 or 0.4 [Accept their ans to 0.4×42] Realising $\text{Po}(16.8)$ needs to be used. Sight or use of, implied by correct prob or CR For 0.014 or better (0.0141..) or CR $X \geq 9$ oe must be CR and not probability. [Allow CR $X \geq 10$ with probability $P(X \geq 10) = 0.054$ or better] Indep of 1st B1 (must see 2 nd B1 and M1 scored) for a correct inference in context		
(d)	1 st M1 2 nd M1 A1	Selecting a suitable model. Sight of $\text{Po}(0.6n)$ <u>or</u> $B(n, e^{-0.6})$ or implied by 2 nd M1 For a correct inequality or equality involving n [Condone slips in solving] Allow MR i.e. misread of 0.01 for 0.001 (or similar) to score M1M1A0 $n = 12$ cao [Correct answer with no incorrect working seen scores 3/3]		
(e)	B1	Allow equivalent statements. Underlined words required.		

Question		Scheme		Marks	AOs
4(a)	(i)	$[W \sim \text{Geo}(0.11)] \quad P(W = 6) = (0.89)^5 (0.11)$ $= 0.06142\dots$ awrt 0.0614		M1 A1 (2)	3.3 1.1b
	(ii)	$P(W, 5) = 1 - (0.89)^5$ $= 0.44159\dots$ awrt 0.442		M1 A1 (2)	3.1b 1.1b
	(iii)	$X \sim B(6, 0.11)$ $P(X = 4) = 0.001739\dots$ awrt 0.00174		M1 A1 (2)	3.3 1.1b
	(iv)	$[Y \sim \text{NB}(4, 0.11)]$ using a neg bin $P(Y, 6) = P(Y = 4) + P(Y = 5) + P(Y = 6)$ $= (0.11)^4 + \binom{4}{3} (0.11)^3 (0.89)^1 \times 0.11 + \binom{5}{3} (0.11)^3 (0.89)^2 \times 0.11$ $= 0.001827$	or $V \sim B(6, 0.11)$ and $P(V \dots 4)$ for M2 		

Question	Scheme	Marks	AOs
5	Geo (0.3) $\mu = \frac{1}{0.3} \left[\text{or exact equivalent e.g. } \frac{10}{3} \right]$ $\sigma^2 = \frac{1-0.3}{0.3^2} \left[\text{or exact equivalent e.g. } \frac{70}{9} \right]$ CLT $\Rightarrow \bar{X} \approx N\left(\frac{10}{3}, \dots\right)$ oe $\Rightarrow \bar{X} \approx N\left(\frac{10}{3}, \frac{7}{135}\right)$ and attempt (sight of) $P(\bar{X} < 3.45)$ = 0.69579... awrt 0.696	B1 B1 M1 M1 A1 (5)	1.1b 1.1b 2.1 3.4 1.1b
Total 5			
1st B1 2nd B1 1st M1 2nd M1 A1	correct mean correct Var may be implied by sight of $\frac{7}{135}$ in distribution of $\bar{X}$ For use of CLT (must see $\bar{X}$ and Normal with mean correct ft) <u>or</u> sight of $N\left(\frac{10}{3}, \frac{7}{135}\right)$ <u>or</u> $N\left(\frac{10}{3}, \frac{70}{9 \times 150}\right)$ with any letter Allow 3.33 or better for $\frac{10}{3}$ and 7.78 or better for $\frac{70}{9}$ May be implied by 2nd M1 Using the normal distribution to find $P(\bar{X} < 3.45)$ ft their "$\frac{10}{3}$" and "$\frac{70}{150}$" May be implied by correct answer. awrt 0.696 Correct answer with no incorrect working scores 5/5		
	Alternative (Use of $Y = \sum X$) $\mu = \frac{150}{0.3} [= 500]$ $\sigma^2 = \frac{150 \times 0.7}{0.3^2} \left[\frac{3500}{3} \right] = 1166.\dot{6}$ $\Rightarrow Y \approx N\left(500, \frac{3500}{3}\right)$ $P(Y < 517.5)$ = 0.69579...	B1 B1 M1 M1 A1	

Question	Scheme	Marks	AOs
6(a)	$G_v(t) = \frac{9}{25}t^2 + \frac{12}{25}t^3 + \frac{4}{25}t^4 \quad \text{or} \quad t^2 \left(\frac{9}{25} + \frac{12}{25}t + \frac{4}{25}t^2 \right)$ $= t^2 \left(\frac{2}{5}t + \frac{3}{5} \right)^2 *$	M1 A1* cso (2)	1.1b 2.1
(b)(i)	$G_w'(t) = 2t \left(\frac{2}{5}t + \frac{3}{5} \right)^4 + \left(\frac{2}{5}t + \frac{3}{5} \right)^5$	M1	2.1
	$\left[G_w'(1) = \right] \quad \underline{3}$	A1	1.1b
	$G_w''(t) = 2 \left(\frac{2}{5}t + \frac{3}{5} \right)^4 + \frac{16}{5}t \left(\frac{2}{5}t + \frac{3}{5} \right)^3 + 2 \left(\frac{2}{5}t + \frac{3}{5} \right)^4$ oe	M1	2.1
	$G_w''(1) = \frac{36}{5}$	A1	1.1b
	$\text{Var}(W) = \frac{36}{5} - \left(\frac{3}{5} \right)^2$	M1	2.1
	$= \frac{6}{5}$	A1	1.1b
		(6)	
(c)	$G_x(t) = t^2 \left(\frac{2}{5}t + \frac{3}{5} \right)^2 \times t \left(\frac{2}{5}t + \frac{3}{5} \right)^5$	M1	3.1a
	$= t^3 \left(\frac{2}{5}t + \frac{3}{5} \right)^7$	A1	1.1b
		(2)	
(d)	$G_Y(t) = t^3 \times \left(t^2 \right)^3 \times \left(\frac{2}{5}t^2 + \frac{3}{5} \right)^7$	M1	3.1a
	$= t^9 \left(\frac{2}{5}t^2 + \frac{3}{5} \right)^7$	A1	1.1b
		(2)	
(e)	$P(Y = 15)$ is coefficient of t^{15} ie $\dots + t^9 \times {}^7C_3 \left(\frac{2}{5}t^2 \right)^3 \left(\frac{3}{5} \right)^4 + \dots$ or $P(X = 6)$ need coefficient of t^6 i.e. $\dots + t^3 \times {}^7C_3 \left(\frac{2}{5}t \right)^3 \left(\frac{3}{5} \right)^4 + \dots$	M1	1.1b
	$\left[P(Y = 15) = \right] \frac{22680}{78125} = \frac{4536}{15625} = 0.290304$	A1	1.1b
		(2)	
(14 marks)			

Notes:		
(a)	M1 A1*	A correct un-simplified pgf based on $\sum t^v P(V=v)$ cso must see an un-simplified version i.e. M1 scored and no incorrect working seen
(b) (i)	M1 A1	Differentiating using the product rule to find $G_w'(t)$ Allow un-simplified e.g. $5 \times \frac{2}{5}t$ Need two terms added and at least one correct. If they expand we need 3 correct. 3 from a correct derivative
(ii)	1stM1 1stA1 2ndM1 2ndA1	Attempt $G_w''(t)$ ft their $G_w'(t)$ [must be at least 2 terms or a product], one correct ft term, same rule for differentiating a product $\frac{36}{5}$ or 7.2 from a correct derivative $G_w''(1) + G_w'(1) - (G_w'(1))^2$ ft their $G_w''(t)$ if different from $G_w'(t)$ and $G_w(t)$ Dep on M3A2 $\frac{6}{5}$ or 1.2
(c)	M1 A1	Realising the need to use $G_x(t) = G_v(t) \times G_w(t)$ $t^3 \left(\frac{2}{5}t + \frac{3}{5} \right)^7$
(d)	M1 A1	Realising the need to multiply through by t^3 or substitute t^2 for t or sight of $t^3 G_x(t^2)$ $t^9 \left(\frac{2}{5}t^2 + \frac{3}{5} \right)^7$ oe Need not be in its simplest form
(e)	M1 A1	Attempting to find correct coefficient of t^n or identify $Y = 2J + 9$ where $J \sim B(7, 0.4)$ Need an expression can ft their $G_Y(t)$ or $G_X(t)$ of the form $t^n (at^m + b)^k$ Allow a statement that $P(Y=15) = 0$ if it follows from their pgf For a correct exact answer or allow awrt 0.2903 Allow 0.29 from correct expression

Alternative for (b)

(b)	$W = P + 1$ where $P \sim B(5, 0.4)$ so $\text{Var}(W) = \text{Var}(P)$		
(i)	$G_p'(t) = 2 \left(\frac{2}{5}t + \frac{3}{5} \right)^4$	M1	2.1
	$G_w'(1) = 2 + 1 = 3$	A1	1.1b
(ii)	$G_p''(t) = \frac{16}{5} \left(\frac{2}{5}t + \frac{3}{5} \right)^3$; $G_p''(1) = \frac{16}{5}$	M1; A1	2.1 1.1b
	$\text{Var}(W) = \frac{16}{5} - 2^2 - (2^2)^2$; $= \frac{6}{5}$	M1; A1	2.1 1.1b
SC	MR They use $G_v(t)$ instead of $G_w(t)$ Provided some correct differentiation seen: Award B1 for $E(V) = \frac{14}{5}$ and B1 for $\text{Var}(V) = \frac{12}{25}$ score as M0A1M0A0M0A1		

Question	Scheme	Marks	Aos
7(a)	$\bar{X} \sim N(1000, 90)$ (May be implied by correct prob or z value seen) $P(\bar{X} > 1020) = 0.0175...$ or $z = 2.108$ $0.0175... < 0.025$ or $z = 2.108... > 1.96$ therefore reject H_0 . There is evidence that the <u>mean weight</u> of the <u>flour</u> in a bag is <u>not 1000 g</u> or evidence of a <u>change</u> in <u>mean weight</u> of <u>flour</u> in a bag	M1 A1 M1 A1 cso (4)	3.3 3.4 1.1b 2.2b
(b)	$\left[\bar{Y} \sim N\left(1000, \frac{900}{n}\right) \Rightarrow \frac{c-1000}{30/\sqrt{n}} = 1.6449 \right]$ $c = 1000 + \frac{49.347}{\sqrt{n}}$	M1 A1 (2)	3.4 1.1b
(c)	$\frac{1000 + \frac{49.347}{\sqrt{n}} - 1020}{30/\sqrt{n}} = -2.5758$ $\frac{126.621}{\sqrt{n}} = 20 \quad \text{or} \quad \frac{49.34...}{c-1000} = \frac{-77.274}{c-1020} \quad (\text{Allow 2sf accuracy})$ $n = \underline{40}$ $c = 1007.8...$ awrt 1010	M1 A1ft dM1 A1 A1 (5)	3.4 1.1b 1.1b 2.1 1.1b

(11 marks)

Notes:

(a)	1st M1 1st A1 2nd M1 2nd A1	Setting up the correct model. Normal with $\mu = 1000, \sigma^2 = 90$ or $\sigma = \sqrt{90}$ or awrt 9.49 Using the model to find the correct z value or $P(\bar{X} > 1020) = \text{awrt } 0.0175$ Allow CR $\bar{C} \dots 1018.59..$ awrt 1019 [$>$ is OK] Ignore lower CR provided < 1000 Correct comparison <u>or</u> non-contextual conclusion. Allow comparison of 1020 with critical region. Dep on $P(\bar{X} > 1020)$ M0 if there are contradictory statements. cso dep on M1A1M1 for a correct conclusion in context with underlined words Do NOT accept “mean weight has <u>increased</u> ”
(b)	M1 A1	For Finding the CR using the Normal distribution. Condone $\sigma = \sqrt{\frac{30}{n}}$ to score M1 $\frac{c-1000}{30/\sqrt{n}} = z$ where $ z > 1.5$ Allow any inequality or = for M1 in (b) and M1 A1ft M1 in (c) A correct equation in the form $c = \dots$ and for use of awrt 1.6449 (implied by awrt 49.3[4]) Condone $\bar{X}$ used for c (o.e.)
(c)	1st M1 1st A1ft 2nd dM1 2nd A1 3rd A1	Standardising using their c (letter or expression) and equating to z ($ z > 2$) to form an equation in n or n and c . Can ft their σ used in (b) for M1A1ft here Ft their “ c ” for a correct equation with -2.58 (or 1.64 or 1.65 used in (b)) Dependent 1st M1. Isolating or eliminating either $\sqrt{n}$ or n <u>or</u> eliminating c leading to an equation for n or c For 40 (allow 41) Must be an integer. With correct working. For awrt 1010 from correct working

e.g. Check correct σ has been used