CAMBRIDGE
International Education

Cambridge O Level

ADDITIONAL MATHEMATICS **4037/11**

Paper 1 Non-calculator **May/June 2025**

MARK SCHEME

Maximum Mark: 80

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the May/June 2025 series for most Cambridge IGCSE, Cambridge International A and AS Level components, and some Cambridge O Level components.

Generic Marking Principles

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptions for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently, e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

GENERIC MARKING PRINCIPLE 5:

Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).

GENERIC MARKING PRINCIPLE 6:

Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

Mathematics-Specific Marking Principles

1 Unless a particular method has been specified in the question, full marks may be awarded for any correct method. However, if a calculation is required then no marks will be awarded for a scale drawing.

2 Unless specified in the question, non-integer answers may be given as fractions, decimals or in standard form. Ignore superfluous zeros, provided that the degree of accuracy is not affected.

3 Allow alternative conventions for notation if used consistently throughout the paper, e.g. commas being used as decimal points.

4 Unless otherwise indicated, marks once gained cannot subsequently be lost, e.g. wrong working following a correct form of answer is ignored (isw).

5 Where a candidate has misread a number or sign in the question and used that value consistently throughout, provided that number does not alter the difficulty or the method required, award all marks earned and deduct just 1 A or B mark for the misread.

6 Recovery within working is allowed, e.g. a notation error in the working where the following line of working makes the candidate's intent clear.

Annotations guidance for centres

Examiners use a system of annotations as a shorthand for communicating their marking decisions to one another. Examiners are trained during the standardisation process on how and when to use annotations. The purpose of annotations is to inform the standardisation and monitoring processes and guide the supervising examiners when they are checking the work of examiners within their team. The meaning of annotations and how they are used is specific to each component and is understood by all examiners who mark the component.

We publish annotations in our mark schemes to help centres understand the annotations they may see on copies of scripts. Note that there may not be a direct correlation between the number of annotations on a script and the mark awarded. Similarly, the use of an annotation may not be an indication of the quality of the response.

The annotations listed below were available to examiners marking this component in this series.

Annotations

Annotation	Meaning
^	More information required
A0	Accuracy mark awarded zero
A1	Accuracy mark awarded one
A2	Accuracy mark awarded two
A3	Accuracy mark awarded three
B0	Independent mark awarded zero
B1	Independent mark awarded one
B2	Independent mark awarded two
B3	Independent mark awarded three
BOD	Benefit of the doubt
C	Communication mark
✗	Incorrect
FT	Follow through
Highlighter	Highlight a key point in the working
ISW	Ignore subsequent work
M0	Method mark awarded zero
M1	Method mark awarded one
M2	Method mark awarded two

Annotation	Meaning
M3	Method mark awarded three
MR	Misread
O	Omission
Off-page comment	Allows comments to be entered at the bottom of the RM marking window and then displayed when the associated question item is navigated to.
On-page comment	Allows comments to be entered in speech bubbles on the candidate response.
Pre	Premature rounding/approximation
SC	Special case
SEEN	Indicates that work/page has been seen
TE	Transcription error
✓	Correct
XP	Correct answer from incorrect working

MARK SCHEME NOTES

The following notes are intended to aid interpretation of mark schemes in general, but individual mark schemes may include marks awarded for specific reasons outside the scope of these notes.

Types of mark

M Method marks, awarded for a valid method applied to the problem.

A Accuracy mark, awarded for a correct answer or intermediate step correctly obtained. For accuracy marks to be given, the associated Method mark must be earned or implied.

B Mark for a correct result or statement independent of Method marks.

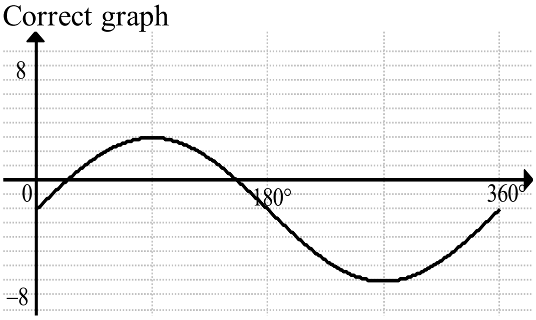
When a part of a question has two or more 'method' steps, the M marks are in principle independent unless the scheme specifically says otherwise; and similarly where there are several B marks allocated. The notation 'dep' is used to indicate that a particular M or B mark is dependent on an earlier mark in the scheme.

Abbreviations

awrt answers which round to
cao correct answer only
dep dependent
FT follow through after error
isw ignore subsequent working
nfww not from wrong working
oe or equivalent
rot rounded or truncated
SC Special Case
soi seen or implied

Question	Answer	Marks	Partial Marks
1(a)	$\begin{pmatrix} -2.5 \\ 5 \end{pmatrix}$ oe	**B2**	**B1** for $-\frac{1}{4}\begin{pmatrix} -2 \\ 8 \end{pmatrix}\left[+\begin{pmatrix} -3 \\ 7 \end{pmatrix}\right]$ oe, soi
1(b)	$3\alpha - 8 = 2\alpha + 5\beta$ or $18 - 2\beta = 20$	**M1**	Equates like vectors at least once
	$\alpha = 3$ $\beta = -1$	**A2**	**A1** for either value correct
2	$5x^2 - 10x - 15 * 0$ oe	**M1**	where * is any inequality sign or =
	Factorises *their* 3-term quadratic expression or solves *their* 3-term quadratic equation	**M1**	
	Critical values –1 and 3	**A1**	
	$-1 \leqslant x \leqslant 3$	**A1**	Do not accept separate inequalities unless connected with 'and'
3(a)	$(3-4)^2 + (-1+3)^2 = 5$ or showing that distance between point A and centre of circle = radius e.g. $\sqrt{(3-4)^2 + (-1+3)^2} = \sqrt{5}$	**B1**	Accept if x-coordinate substituted to find y- coordinate
3(b)	$\begin{pmatrix} 4 \\ -3 \end{pmatrix} + \begin{pmatrix} 1 \\ -2 \end{pmatrix}$ oe, soi or using centre and point A e.g. $\frac{3+x}{2} = 4$ and $\frac{-1+y}{2} = -3$ or solve simultaneously the line $y = -2x + 5$ with the circle leading to 3 term quadratic $x^2 - 8x + 15[=0]$ with an attempt to solve	**M1**	Award **M1** for the 2 equations Award the **M1** for the quadratic
	(5, –5)	**A1**	

Question	Answer	Marks	Partial Marks
3(c)	gradient of radius $= \dfrac{-3+1}{4-3} = -2$ soi by gradient of tangent	**M1**	
	gradient of tangent = $\dfrac{-1}{their(-2)}$	**M1**	**FT** *their* –2 Allow if differentiation is used e.g.:
	$y + 1 = \dfrac{1}{2}(x-3)$ oe	**A1**	**FT** $\dfrac{-1}{their - 2}$ ISW from a correct unsimplified answer
	Alternative		
	use of differentiation e.g.: $(y+3)^2 = 5-(x-4)^2$ $y = \sqrt{-x^2+8x-11} - 3$ $\dfrac{dy}{dx} = \dfrac{-2x+8}{2\sqrt{-x^2+8x-11}}$	**(M1)**	allow one error or use of implicit differentiation (not on syllabus) e.g.: $2x + 2y\dfrac{dy}{dx} - 8 + 6\dfrac{dy}{dx} = 0$ leading to $\dfrac{dy}{dx} = \dfrac{8-2x}{2y+6}$
	Substitute $(3,-1)$ in *their* $\dfrac{dy}{dx}$ to get gradient $= \dfrac{1}{2}$	**(M1)**	**Dep** on first **M1**
	$y + 1 = \dfrac{1}{2}(x-3)$ oe	**(A1)**	ISW from a correct unsimplified answer
4(a)	Solves or factorises $x^{\frac{1}{3}} - x^{\frac{1}{6}} - 2 = 0$ oe: $\left(x^{\frac{1}{6}}+1\right)\left(x^{\frac{1}{6}}-2\right)$ or when substituting $y = x^{\frac{1}{3}}$ factorises to $\left(y^{\frac{1}{2}}+1\right)\left(y^{\frac{1}{2}}-2\right)$	**M1**	A substitution may be used $\left(x^{\frac{1}{3}}\right)^6 - \left(x^{\frac{1}{6}}\right)^6 = 2^6$ scores 0 marks $\left(x^{\frac{1}{3}}\right) - \left(x^{\frac{1}{6}}\right) = x^{\log_x 2}$ then $\dfrac{1}{3} - \dfrac{1}{6} = \log_x 2$ scores 0 marks
	$\left[x^{\frac{1}{6}} = -1\right]$, $x^{\frac{1}{6}} = 2$	**A1**	
	$x = 64$ [$x = 1$]	**A1**	
	Rejects $x^{\frac{1}{6}} = -1$ or $x = 1$ ignored at some stage, soi	**B1**	

Question	Answer	Marks	Partial Marks
4(b)	$x+2y=1$	B1	
	Correctly eliminates one unknown	M1	**Dep** on **B1** allow unsimplified e.g. $x=1-2y$ or $y=\frac{1-x^2}{4x+1}$
	Correct quadratic in solvable form: $y-4y^2[=0]$ oe or $2x^2-3x+1[=0]$ oe	A1	
	Factorises or solves *their* quadratic to get two solutions	M1	**Dep** on previous **M1**
	$y=0$, $x=1$ and $y=\frac{1}{4}$, $x=\frac{1}{2}$	A1	
5(a)	$2x-1=-3$ and $2x-1=3$	M1	
	$x=2$, $x=-1$	A2	**A1** for either correct
	Alternative		
	$4x^2-4x-8=0$ oe	(B1)	
	Solves or factorises *their* 3-term quadratic	(M1)	
	$x=-1, 2$	(A1)	
5(b)	Correct graph 	2	**B1** for a correct sine curve one cycle **and** with correct amplitude at 3 and –7 **B1** for a correct sine curve one cycle **and** with correct midline $y=-2$

Question	Answer	Marks	Partial Marks
6(a)	Correct derivative $\frac{\mathrm{d}}{\mathrm{d}x}\left(\frac{x^2-1}{x^2+1}\right)=\frac{(x^2+1)(2x)-(x^2-1)(2x)}{(x^2+1)^2}$ or $2x\left(x^2+1\right)^{-1}-2x\left(x^2-1\right)\left(x^2+1\right)^{-2}$	2	**M1** for an attempt at the quotient or product rule **A1** fully correct
	Correct derivative $\frac{\mathrm{d}y}{\mathrm{d}x}=4\left(\frac{x^2-1}{x^2+1}\right)^3\left(\frac{(x^2+1)(2x)-(x^2-1)(2x)}{(x^2+1)^2}\right)$ or $4\left(\frac{x^2-1}{x^2+1}\right)^3\left(2x\left(x^2+1\right)^{-1}-2x\left(x^2-1\right)\left(x^2+1\right)^{-2}\right)$	2	**Dep M1** for $\frac{\mathrm{d}y}{\mathrm{d}x}=k\left(\frac{x^2-1}{x^2+1}\right)^3\times\mathrm{f}(x)$ where $\mathrm{f}(x)$ is *their* attempt to differentiate **A1** fully correct
	Correct completion to $\frac{16x(x^2-1)^3}{(x^2+1)^5}$	A1	
	Alternative		
	Correct derivatives $u=(x^2-1)^4$ $\mathrm{d}u=4(x^2-1)^3\times(2x)$ oe and $v=(x^2+1)^4$ $\mathrm{d}v=4(x^2+1)^3\times(2x)$ oe	(2)	**M1** for either correct OR for $\mathrm{d}u=4(x^2-1)^3\times\mathrm{g}(x)$ where $\mathrm{g}(x)$ is an attempt to differentiate x^2-1 and $\mathrm{d}v=4(x^2+1)^3\times\mathrm{h}(x)$ where $\mathrm{h}(x)$ is an attempt to differentiate x^2+1
	Correct derivative $\frac{\mathrm{d}y}{\mathrm{d}x}=$ $\frac{(x^2+1)^4\times4(x^2-1)^3(2x)-(x^2-1)^4\times4(x^2+1)^3(2x)}{\left((x^2+1)^4\right)^2}$ or $4(2x)\left(x^2-1\right)^3\left(x^2+1\right)^{-4}-$ $4(2x)\left(x^2-1\right)^4\left(x^2+1\right)^{-5}$	(2)	**M1** for an attempt at the product or quotient rule
	Correct completion to $\frac{16x(x^2-1)^3}{(x^2+1)^5}$	(A1)	

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Partial Marks</th></tr>
<tr><td>6(b)(i)</td><td>their $16x(x^2-1)^3=0$
therefore $x = 0$, $x^2-1=0 \rightarrow x = \pm 1$ oe</td><td>B1</td><td>FT their 16
Allow for their $16x(x^2-1)=0$</td></tr>
<tr><td rowspan="2">6(b)(ii)</td><td>Any two of
<table>
<tr><td>x</td><td>$-1 < x < 0$</td><td>0</td><td>$0 < x < 1$</td></tr>
<tr><td>$\frac{dy}{dx}$</td><td>positive</td><td>0</td><td>negative</td></tr>
</table>
<table>
<tr><td>x</td><td>$0 < x < 1$</td><td>1</td><td>$x > 1$</td></tr>
<tr><td>$\frac{dy}{dx}$</td><td>negative</td><td>0</td><td>positive</td></tr>
</table>
<table>
<tr><td>x</td><td>$x < -1$</td><td>-1</td><td>$-1 < x < 0$</td></tr>
<tr><td>$\frac{dy}{dx}$</td><td>negative</td><td>0</td><td>positive</td></tr>
</table></td><td>M1</td><td>or equivalent. Must show change in the sign of first derivative around the stationary points

M0 only if second derivative is used</td></tr>
<tr><td>$x = 1$ and $x = -1$ are minimum points</td><td>A1</td><td></td></tr>
</table>

Question	Answer	Marks	Partial Marks
7	$2x^3 - 9x^2 + 10x - 3[=0]$	**B1**	
	Finds a correct linear factor $x - 1$ or $x - 3$ or $2x - 1$	**M1**	
	Finds the correct corresponding quadratic factor For $(x - 1)$ gives $2x^2 - 7x + 3$ or For $(x - 3)$ gives $2x^2 - 3x + 1$ or For $(2x - 1)$ gives $x^2 - 4x + 3$	**2**	**M1** for a corresponding quadratic factor with 2 terms correct
	Factorises *their* 3-term quadratic factor or solves *their* 3-term quadratic equation	**M1**	
	$x = \frac{1}{2}$, 1, 3	**A1**	
	Alternative		
	$2x^3 - 9x^2 + 10x - 3 = 0$	**(B1)**	
	Finds a correct linear factor $x - 1$ or $x - 3$ or $2x - 1$	**(M1)**	
	Finds a second correct linear factor $x - 1$ or $x - 3$ or $2x - 1$	**(M1)**	
	Finds a third correct linear factor $x - 1$ or $x - 3$ or $2x - 1$	**(M1)**	
	$x - 1$, $x - 3$ and $2x - 1$	**(A1)**	
	$x = \frac{1}{2}$, 1, 3	**(A1)**	
8(a)	$x > \frac{4}{12}$ oe	**B1**	allow $0.\dot{3}$ for $\frac{4}{12}$

Question	Answer	Marks	Partial Marks
8(b)	$\log_x 125 = \frac{\log_5 125}{\log_5 x} = \frac{3}{\log_5 x}$ $\frac{1}{\log_x 125} = \log_{125} x$ or $\log_5(12x-4) = \frac{\log_x(12x-4)}{\log_x 5}$	**B1**	for a correct and relevant change of base seen
	$\log_5(12x-4) = 2\log_5 x + 1$ or $\log_x(12x-4) = 2 + \log_x 5$	**B1**	**Dep** on correct change of base
	$\log_5 \frac{12x-4}{x^2} = 1$ oe or $\log_x \frac{12x-4}{5} = 2$ oe or $\log_5(12x-4) = \log_5(5x^2)$	**B1**	**Dep** on correct change of base
	$5x^2 - 12x + 4 = 0$	**B1**	**Dep** on correct change of base
	$(5x-2)(x-2) = 0$ oe	**M1**	**dep** on at least one previous **B1** awarded
	$x = 0.4, 2$	**A1**	

Question	Answer	Marks	Partial Marks
9	[When $x = 2$] $y = 3$	**B1**	
	$\frac{dy}{dx} = \frac{1}{2}(4x+1)^{-\frac{1}{2}} \times 4$	**M1**	for $\left[\frac{dy}{dx} =\right] \frac{1}{2}(4x+1)^{-\frac{1}{2}} \times k$, $k \neq 0$
	[gradient of tangent =] $\frac{1}{2}(4(2)+1)^{-\frac{1}{2}} \times 4$ soi	**M1**	**FT** *their* $\frac{dy}{dx}$ must be in the form $k(4x+1)^{-\frac{1}{2}}$, $k \neq 0$
	$y - their\ 3 = their \frac{2}{3}(x-2)$	**M1**	**Dep** on first **M1**
	[x-intercept for tangent =] $-\frac{5}{2}$ soi	**A1**	Must be from correct straight line equation
	$\frac{1}{2} \times \left(\frac{5}{2} + 2\right) \times 3$ soi	**B1**	For area of triangle – allow unsimplified
	[x-intercept for curve =] $-\frac{1}{4}$ soi	**B1**	
	Area below curve: $\left[\frac{(4x+1)^{\frac{3}{2}}}{\frac{3}{2} \times 4}\right]_{-0.25}^{2}$ oe	**M1**	**M1** for integration in the form of $k(4x+1)^{\frac{3}{2}}$, $k \neq 0$ or 4
	correct use of upper and lower limits: $\left(\frac{(4(2)+1)^{\frac{3}{2}}}{6} - \frac{(4(-0.25)+1)^{\frac{3}{2}}}{6}\right)$ oe	**M1**	**Dep** on previous M1 for area under the curve Allow if using wrong limits but must see correct substitution
	Shaded area = $\frac{27}{4} - \frac{9}{2} = \frac{9}{4}$ oe	**A1**	

Question	Answer	Marks	Partial Marks
10(a)	$\frac{\sin\theta}{\sqrt{\cot^2\theta}}+\frac{1}{\sqrt{\sec^2\theta}}$	B1	for correct use of the trigonometry identity $\mathrm{cosec}^2\theta-1=\cot^2\theta$
	$\sin\theta\tan\theta+\cos\theta$ oe	B1	
	$\sin\theta\times\frac{\sin\theta}{\cos\theta}+\cos\theta$	B1	
	$\frac{\sin^2\theta+\cos^2\theta}{\cos\theta}=\frac{1}{\cos\theta}=\sec\theta$	B1	**Dep** on all 3 previous marks Last mark is not available if persistent missing of θ
	Alternative		
	$\frac{\sin\theta}{\sqrt{\cot^2\theta}}+\frac{1}{\sqrt{\sec^2\theta}}$	(B1)	for correct use of the trigonometry identity $\mathrm{cosec}^2\theta-1=\cot^2\theta$
	$\frac{\sec\theta\sin\theta+\cot\theta}{\cot\theta\sec\theta}$	(B1)	
	$\frac{\frac{\sin\theta}{\cos\theta}+\frac{\cos\theta}{\sin\theta}}{\frac{\cos\theta}{\sin\theta}\times\frac{1}{\cos\theta}}$	(B1)	
	$\frac{\frac{\sin^2\theta+\cos^2\theta}{\cos\theta\sin\theta}}{\frac{1}{\sin\theta}}$ leading to $\frac{1}{\cos\theta}$	(B1)	**Dep** on all 3 previous marks Last mark is not available if persistent missing θ

Question	Answer	Marks	Partial Marks
10(b)	$\cos x = \frac{1}{\alpha}$	B1	could be implied by $\frac{1}{\alpha^2} = 1 - \sin^2 x$
	$\sin^2 x + \left(\frac{1}{\alpha}\right)^2 = 1$ oe OR [opposite ^{2}=] $\alpha^2 - 1$ soi and use of $\sin x = \frac{\text{opposite}}{\text{hypotenuse}}$ at some stage leading to $\sin x = [\pm]\sqrt{1 - \frac{1}{\alpha^2}}$ oe	M1	
	$\sin x = -\sqrt{1 - \frac{1}{\alpha^2}}$ oe	A1	
11(a)	10 – 2*d* and 10 – *d*	B2	**B1** for either ignore labels
11(b)	Squares each term and forms a sum e.g. $100 - 40d + 4d^2 + 100 - 20d + d^2 + 100$ $[= 140]$ or $100 - 40d + 4d^2 + 100 - 20d + d^2 [= 40]$ $a^2 + \frac{a^2 + 20a + 100}{4} = 40$ oe	M1	**FT** from *their* two terms in **(a),** must be both 2 terms expression in terms of *d* only or Correct expressions in terms of *a* only, must see substitution and expansion
	Correct equation in solvable form $5d^2 - 60d + 160 = 0$ $5a^2 + 20a - 60 = 0$ oe	A1	
	Factorises *their* 3-term quadratic expression or solves *their* 3-term quadratic equation	M1	
	$d = 8$ $d = 4$	A1	
	Finds the first term when *d* = 4: *a* = 2	M1	**FT** 10 – 2(*their d*)
	$[S_{200} =] \frac{200}{2}\{4 + 199 \times 4\}$ oe	M1	**FT** *their a* and *their d*
	80 000	A1	

Question	Answer	Marks	Partial Marks
12	$\dfrac{n!}{(n-5)!5!}-\dfrac{(n-1)!}{(n-6)!5!}$ $\dfrac{(n-1)!\ \times[n-(n-5)]}{(n-5)!5!}$	M1	For substituting ${}^{n}C_5$ and ${}^{n-1}C_5$
	$\dfrac{(n-1)!}{(n-6)!5!}\left(\dfrac{n}{n-5}-1\right)$ oe	M1	**dep** on previous **M1** awarded For Factorising $\dfrac{(n-1)!}{(n-6)!5!}$ or $\dfrac{(n-1)!}{(n-5)!5!}$ Do not allow if using ${}^{n-1}C_4$ to simplify the left-hand side
	$\dfrac{(n-1)!}{(n-6)!5!}\left(\dfrac{5}{n-5}\right)$ oe	M1	**dep** on at least one previous **M1** awarded Simplifying fraction
	Completes argument: $\dfrac{(n-1)!}{(n-6)!5!}\left(\dfrac{5}{n-5}\right)=\dfrac{(n-1)!}{(n-1-4)!4!}={}^{n-1}C_4$	A1	
	Alternative 1		
	$\dfrac{n!}{(n-5)!5!}-\dfrac{(n-1)!}{(n-6)!5!}$	(M1)	For substituting ${}^{n}C_5$ and ${}^{n-1}C_5$
	$\dfrac{1}{(n-6)!}=\dfrac{n-5}{(n-5)!}$ or $n!=n\times(n-1)!$	(B1)	**dep** on previous **M1** awarded
	$\dfrac{(n-1)!\ \times[n-(n-5)]}{(n-5)!5!}$	(M1)	**dep** on previous **M1** awarded factorising $(n-1)!$ in the fraction
	$\dfrac{(n-1)!\ \times 5}{(n-5)!5!}=\dfrac{(n-1)!}{(n-5)!4!}={}^{n-1}C_4$	(A1)	
	Alternative 2		
	$\dfrac{n!}{(n-5)!5!}-\dfrac{(n-1)!}{(n-6)!5!}$	(M1)	For substituting ${}^{n}C_5$ and ${}^{n-1}C_5$ could be implied by expansions of the factorial
	$\dfrac{n(n-1)(n-2)(n-3)(n-4)}{5!}-\dfrac{(n-1)(n-2)(n-3)(n-4)(n-5)}{5!}$	(B1)	**dep** on previous **M1** awarded
	$\dfrac{(n-1)(n-2)(n-3)(n-4)[n-(n-5)]}{5!}$	(M1)	**dep** on previous **M1** awarded factorising $(n-1)(n-2)(n-3)(n-4)$ in the fraction

Question	Answer	Marks	Partial Marks
12	Completes argument: $\frac{(n-1)(n-2)(n-3)(n-4)}{4!} = \frac{(n-1)!}{4!(n-5)!} = {}^{n-1}C_4$	(A1)	