

2004 Mathematics

Higher

Finalised Marking Instructions

- 1. Marks must be assigned in accordance with these marking instructions. In principle, marks are awarded for what is correct, rather than marks deducted for what is wrong.
- 2. Award one mark for each 'bullet' point. Each error should be underlined in RED at the point in the working where it first occurs, and not at any subsequent stage of the working.
- 3. The working subsequent to an error must be followed through by the marker with possible full marks for the subsequent working, provided that the difficulty involved is approximately similar. Where, subsequent to an error, the working is eased, a deduction(s) of mark(s) should be made. This may happen where a question is divided into parts. In fact, failure to even answer an earlier section does not preclude a candidate from assuming the result of that section and obtaining full marks for a later section.
- 4. Correct working should be ticked (✓). This is essential for later stages of the SQA procedures. Where working subsequent to an error(s) is correct and scores marks, it should be marked with a crossed tick (✗). In appropriate cases attention may be directed to work which is not quite correct (e.g. bad form) but which has not been penalised, by underlining with a dotted or wavy line.

Work which is correct but inadequate to score any marks should be corrected with a double cross tick (\mathbf{X}).

- 5. The total mark for each section of a question should be entered in red in the **outer** right hand margin, opposite the end of the working concerned.
 - Only the mark should be written, not a fraction of the possible marks.
 - These marks should correspond to those on the question paper and these instructions.
- 6. It is of great importance that the utmost care should be exercised in adding up the marks. Where appropriate, all summations for totals and grand totals must be carefully checked.

Where a candidate has scored zero marks for any question attempted, "0" should be shown against the answer.

7. As indicated on the front of the question paper, full credit should only be given where the solution contains appropriate working. Accept answers arrived at by inspection or mentally where it is possible for the answer so to have been obtained. Situations where you may accept such working will be indicated in the marking instructions.

cont/

Mathematics Higher: Instructions to Markers

- 8. Do not penalise:
 - working subsequent to a correct answer
 - omission of units
 - bad form
 - legitimate variations in numerical answers
 - correct working in the "wrong" part of a question
- 9. No piece of work should be scored through even where a fundamental misunderstanding is apparent early in the answer. Reference should always be made to the marking scheme answers which are widely off-beam are unlikely to include anything of relevance but in the vast majority of cases candidates still have the opportunity of gaining the odd mark or two provided it satisfies the criteria for the mark(s).
- 10. If in doubt between two marks, give an intermediate mark, but without fractions. When in doubt between consecutive numbers, give the higher mark.
- 11. In cases of difficulty covered neither in detail nor in principle in the Instructions, attention may be directed to the assessment of particular answers by making a referal to the P.A. Please see the general instructions for P.A. referrals.
- 12. No marks should be deducted at this stage for careless or badly arranged work. In cases where the writing or arrangement is very bad, a note may be made on the upper left-hand corner of the front cover of the script.
- 13 **Do not write any comments on the scripts**. A summary of acceptable notation is given on page 4.

Summary

Throughout the examination procedures many scripts are remarked. It is essential that markers follow common procedures:

- 1 Tick correct working.
- 2 Put a mark in the right-hand margin to match the marks allocations on the question paper.
- 3 Do **not** write marks as fractions.
- 4 Put each mark at the end of the candidate's response to the question.
- 5 Follow through errors to see if candidates can score marks subsequent to the error.
- 6 Do not write any comments on the scripts.

Higher Mathematics : A Guide to Standard Signs and Abbreviations

Remember - No comments on the scripts. Please use the following and nothing else.

Signs

- The tick. You are not expected to tick every line \checkmark but of course you must check through the whole of a response.
- Х The cross and underline. Underline an error and place a cross at the end of the line.
 - \checkmark The tick-cross. Use this to show correct work where you are following through subsequent to an error.
 - X The double cross-tick. Use this to show correct work but which is inadequate to score any marks.
 - \wedge The roof. Use this to show something is missing such as a crucial step in a proof or a 'condition' etc.

The tilde. Use this to indicate a minor transgression which is not being penalised (such as bad form).

- Ε Eased. Where working is found correct whilst following through subsequent to an error, the working has been eased sufficiently for a mark not to be awarded.
- BOD Benefit of Doubt. Use this where you have to decide between two consecutive marks and award the higher.

Marks being allo	tted e.g. (•) w	ould not
normally be show	vn on scripts	
du		margins
$\frac{dy}{dx} = 4x - 7$	~ •	
4x - 7 = 0	X	
$x = \frac{7}{4}$		
$y = 3\frac{7}{8}$	ו	2
C = (1, -1) = -3 - (-1)	×	
$m = \frac{1}{4 - 1}$ $m_{rad} = \frac{4}{3}$ $m_{tot} = \frac{-1}{4}$	∢• follow t	hrough
$m_{igt} = -\frac{3}{4}$ $y - 3 = -\frac{3}{4}(x - 2)$	ו ו	3
$x^2 - 3x = 28$	✓•	
x=7	*	1
$\sin(x) = 0.75 = inv\sin^2 x$	(0.75) =48.6°	
	v.	1
$\log (r, 2) = 1$		
$\log_3(x-2) = 1$	X	
(x-2) = 3 x-2 = 3	× -	
x = 5	ЖЕ	1

All of these are to help us be more consistent and accurate.

It goes without saying that however accurate you are in marking, it is to no avail unless you have added the marks up correctly. Please double check totals!!

5

1 The point A has coordinates (7, 4). The straight lines with equations x + 3y + 1 = 0 and

2x + 5y = 0 intersect at B.

- (a) Find the gradient of AB.
- (b) Hence show that AB is perpendicular to only one of these two lines.

partmarksGradeSyllabus CodeCalculator classSoura3C1.1.1CN04/15b5C1.1.9, 1.1.10
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Notes

1 For \bullet^1

Elimination may be used instead of substitution

Evidence of a start to elimination would be the appearance of equal coefficients of x or y.

- 2 For (a) equating the zeros, neither of the first two marks are available.
- 3 (5,-2) may be obtained by inspection or trial and improvement. If it is justified by checking in both equations, •¹ and •² may be awarded. If is not justified in both equations, award neither of the first two marks.
- 4 A general statement about perpendicular lines must have $m_1 \cdot m_2 = -1$ earns no marks
- 5 Candidates who make a mistake in (a) may have to show in (b) that neither line is perpendicular to AB. All five marks are available.

1 Alternative Method for •4 to •8 • $y = -\frac{1}{3}x...$ may be implied by •⁵ • $m_{l_1} = -\frac{1}{3}$ • $m_{l_2} = -\frac{2}{5}$ • $l_1 : 3 \times -\frac{1}{3} = -1$ so $AB \perp l_1$ • and AB is not $\perp l_2$ 5 marks

2 Alternative Method for •4 to •8 • $m_{AB} = 3 \Rightarrow m_{perp} = -\frac{1}{3}$ • $y = -\frac{2}{5}x$ stated / implied by • • $m_{l_1} = -\frac{2}{5}$ • $m_{l_2} = -\frac{1}{3}$ • s so only the 2nd line is perpendicular to AB 5 marks

Continued on page 6

1 The point A has coordinates (7, 4). The straight lines with equations x + 3y + 1 = 0 and 2x + 5y = 0 intersect at B. Find the gradient of AB. (a)3 (*b*) Hence show that AB is perpendicular to only one of these two lines. 5 Qu. part marks Grade Syllabus Code Calculator class Source C C 1 a 1.1.1 CN 04/15 3 1.1.9, 1.1.10 b 5

continued from page 5



4 Alternative Method for •4 to •8
•
$$y = -\frac{1}{3}x...$$
 may be implied by •⁵
• $m_{l_1} = -\frac{1}{3}$
• $m_{l_2} = -\frac{2}{5}$
• $l_1: 3 \times -\frac{1}{3} = -1$ so AB is the ONLY line $\perp l_1$
• m_{l_2} implied by the "ONLY" at •⁷.
5 marks



5 A "Poor" illustration	
$y = -\frac{1}{3}x$ $y = -\frac{2}{5}x$] 1st equ is perp. to AB 2nd equ is not perp to AB]	1 mark 1 mark



a b

The Primary Method m/s is based on the following generic m/s. THIS GENERIC M/S MAY BE USED AS AN EQUIVALENCE GUIDE	Primary Method : Give 1 mark for each •
BUT ONLY WHERE A CANDIDATE DOES NOT USE THE PRIMARY METHOD OR ANY ALTERNATIVE METHOD SHOWN IN DETAIL IN THE MARKING SCHEME.	• 1 know to find $f(-1)$
• ¹ ss : know to find $f(-1)$	$\bullet -1 \qquad 1 -1 -5 -3 \\ -1 \qquad $
\bullet^2 ss : start eg synthetic division	. 1
\bullet^3 pd : complete to zero remainder	\bullet^3 -1 1 -1 -5 -3
\bullet^4 ic : extract quadratic	-1 2 3
• ⁵ ic : fully factorise	$x^4 r^2 - 2r - 3$
\bullet^6 ic : state coordinates	• $5(x+1)(x+1)(x-3)$
	5 marks
	• $^{6}(-1,0)$

- know to find f(-1) \bullet^1
- $f(-1) = (-1)^3 (-1)^2 5(-1) 3 = 0$ \bullet^2
- a strategy for finding the quadratic factor \bullet^3 eg inspection, long division, synthetic division

1 mark

Notes

1 Treat f(x) = (x+1), (x+1), (x-3) as bad form

2 \bullet^6 is not available for

"(-1,0) or (3, 0)"
"
$$x = -1$$
"
an unsupported "(0,-1)"
Treat $\begin{array}{c} x = -1 \\ y = \dots = 0 \\ \text{so point} = (0,-1) \end{array}$ as bad form

3

3 Find all the values of x in the interval
$$0 \le x \le 2\pi$$
 for which $\tan^2(x) = 3$.

Qu.partmarksGradeSyllabus CodeCalculator classSource34C1.2.9, 1.2.11NC04/85

The Primary Method m/s is based on the following generic m/s. THIS GENERIC M/S MAY BE USED AS AN EQUIVALENCE GUIDE BUT ONLY WHERE A CANDIDATE DOES NOT USE THE PRIMARY METHOD OR ANY ALTERNATIVE METHOD SHOWN IN DETAIL IN THE MARKING SCHEME.

 \bullet^1 ss : know to get the square root

 $\bullet^2 \, \mathrm{pd}$: solve trig equation

 \bullet^3 pd : solve trig equation

•⁴ ic : know there is
$$+\sqrt{}$$
 and $-\sqrt{}$

Prima	Primary Method : Give 1 mark for each •				
\bullet^1 ta	$\operatorname{an} x = \sqrt{3}$				
\bullet^2 x	$c = \frac{\pi}{3}$				
\bullet^3 x	$c = \frac{4\pi}{3}$				
\bullet^4 ta	an $x = -\sqrt{3}$ stated explicitly				
a	and $x = \frac{2\pi}{3}, \frac{5\pi}{3}$				
	4	marks			



Notes

- Candidates must produce final answers in radians.
 If their final answer(s) are in degrees then deduct one mark.
- 2 Cave

Candidates who produce the four correct answers

from $tan(x) = \sqrt{3}$ can only be awarded \bullet^1 and \bullet^2 . Do not penalise "correct" answers outside the range

3 Do not penalise "correct" answers outside the range $0 \le x \le 2\pi$

4 Do **NOT** accept
$$\pi + \frac{\pi}{3}$$
 for $\frac{4\pi}{3}$.



- (a) Sketch the graph of y = -g(x).
- (b) On the same diagram sketch the graph of y = 3 g(x).



Syllabus Code 1.2.4 1.2.4	Grade C C	marks 2 2	part a b	Qu. 4
	Syllabus Code 1.2.4 1.2.4	Grade Syllabus Code C 1.2.4 C 1.2.4	marks Grade Syllabus Code 2 C 1.2.4 2 C 1.2.4	partmarksGradeSyllabus Codea2C1.2.4b2C1.2.4

The Primary Method m/s is based on the following generic m/s. THIS GENERIC M/S MAY BE USED AS AN EQUIVALENCE GUIDE BUT ONLY WHERE A CANDIDATE DOES NOT USE THE PRIMARY METHOD OR ANY ALTERNATIVE METHOD SHOWN IN DETAIL IN THE MARKING SCHEME.

- \bullet^1 ic : sketch transformed graph
- \bullet^2 ic : show new coordinates
- \bullet^3 ic : sketch transformed graph
- •⁴ ic : show new coordinates

solution



Primary Method : Give 1 mark for each • •¹ reflection in x-axis and any one from (0,-1),(a,2),(b,-3) clearly annotated •² the remaining two from the above list •³ translation and any one from (0,2),(a,5),(b,0) clearly annotated •⁴ the remaining two from the above list 2 marks

Notes

3

4

5

- 1 For (a), reflection in the *y*-axis earns a maximum of 1 out of 2 with all 3 points clearly annotated
- 2 For (b), a translation of $\begin{pmatrix} \mathbf{0} \\ -\mathbf{3} \end{pmatrix}$ earns a maximum

of 1 out of 2 with all 3 points clearly annotated

For (b), a translation of $\begin{pmatrix} \pm 3 \\ 0 \end{pmatrix}$ earns no marks.

For the annotated points in (a) and (b), accept a superimposed grid.

- g(x) needs to retain its cubic shape for \bullet^1 and \bullet^2
- 6 In (b) \bullet^3 and \bullet^4 are only available for applying the translation to the resulting graph from (a).

 $\mathbf{2}$

5 A,B, and C have coordinates (-3, 4, 7), (-1, 8, 3), and (0, 10, 1) respectively.

- (a) Show that A, B, and C are collinear.
- (b) Find the coordinates of D such that AD = 4AB.

Qu.partmarksGradeSyllabus CodeCalculator classSource5a3C3.1.7CN04/nb2B3.1.6



Notes

1 Treat D= $\begin{pmatrix} 5\\20\\-9 \end{pmatrix}$ as bad form.

2 For \bullet^3 accept **ONLY** "parallel" in lieu of "common direction"

3 marks

6 Given that
$$y = 3\sin(x) + \cos(2x)$$
, find $\frac{dy}{dx}$.

s Sourc 04/n	is Code C	Grade S B C	marks 3	part	Qu. 6
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•¹ pd : process simple derivative

 $\bullet^2 \, \mathrm{pd}$: start to process compound derivative

 \bullet^3 ic : complete compound derivative

Primary Method : Give 1 mark for each • • $3\cos(x)$ • $2\cos(x)$ • $3\cos(x)$ • $3\cos(x)$ • $3\cos(x)$ • $3\cos(x)$

1 A	Iternative Methods	
e.g.		
$y = 3$ $\bullet^1 3$ $\bullet^2 4$	$3\sin(x) + 2\cos^2(x) - 1$ $3\cos(x)$ $4\cos(x)$	
\bullet^3 >	$\langle -\sin(x) $ and no further terms	0 1
●°×	$\langle -\sin(x) \rangle$ and no further terms	0 1
		5 marks

Notes

1 For differentiating incorrectly: For $y' = -3\cos(x) + 2\sin(2x)$, only \bullet^3 may be awarded.

- 2 For $y' = 3\cos(x) 2\sin(2x) + c$, treat the "+c" as bad form.
- 3 For clearly integrating correctly or otherwise: Award no marks.
- 4 If you cannot decide whether a candidate has attempted to differentiate or integrate, assume they have attempted to differentiate.

7
 Find
$$\int_{0}^{2} \sqrt{4x+1} dx$$
.
 5

 Qu.
 part
 marks
 Grade
 Syllabus Code
 Calculator class
 Source

 7
 5
 AB
 3.2.3
 Calculator class
 Source
 04/52

 The Primary Method m/s is based on the following generic m/s.

 THIS GENERIC M/S MAY BE USED AS AN EQUIVALENCE GUIDE

THIS GENERIC M/S MAY BE USED AS AN EQUIVALENCE GUIDE BUT ONLY WHERE A CANDIDATE DOES NOT USE THE PRIMARY METHOD OR ANY ALTERNATIVE METHOD SHOWN IN DETAIL IN THE MARKING SCHEME.

- •¹ ic : express in integrable form
- $\bullet^2 \, \mathrm{pd}$: integrate a composite fractional power
- \bullet^3 ic : interpret the '4'
- \bullet^4 ic : substitute limts
- \bullet^5 pd : evaluate



Primary Method : Give 1 mark for each • • $(4x + 1)^{\frac{1}{2}}$ • $\frac{1}{\frac{3}{2}}(4x + 1)^{\frac{3}{2}}$ • $\frac{3}{2} \div 4$ • $\frac{1}{6}(4 \times 2 + 1)^{\frac{3}{2}} - \frac{1}{6}(4 \times 0 + 1)^{\frac{3}{2}}$ • $\frac{1}{3}$ or equivalent fraction or mixed number 5 marks

Notes

eg

 $1 \bullet^4$ is available for substituting the limits correctly into any function except the original one.

$$\int_{0}^{2} (4x+1)^{\frac{1}{2}} dx$$

= $\left[(4x+1)^{\frac{1}{2}} \right]_{0}^{2}$
= $(4 \times 2 + 1)^{\frac{1}{2}} - (4 \times 0 + 1)^{\frac{1}{2}}$
= $3 - 1$
= 2

may be awarded \bullet^1 , not \bullet^2 (no integration) not \bullet^3 (not dealing with f(g(x))) not \bullet^4 (original function) not \bullet^5 (working eased) 2 For \bullet^5 , **DO NOT accept** answers like $\frac{\sqrt{729}}{6} - \frac{1}{6}$.

8	(<i>a</i>)	(a) Write $x^2 - 10x + 27$ in the form $(x+b)^2 + c$.					
(b) Hence show that the function $g(x) = \frac{1}{3}x^3 - 5x^2 + 27x - 2$ is always increasing.							
Qu. 8	part a b	marks 2 4	Grade C B	Syllabus Code 1.2.8 1.3.11	Calculator class NC	Source 04/37	
The Prir	nary Meth	od m/s is ba	sed on the follo	wing generic m/s.	Primary Method	: Give 1 mark for each •	
METHO THE MA	ILY WHEN D OR AN RKING S	RE A CANDIE Y ALTERNAT CHEME.	OSED AS AN E DATE DOES NO TIVE METHOD	SHOWN IN DETAIL IN	• $(x-5)^2 \dots$	0	
$\bullet^1 \operatorname{pd}$:	deal w	ith the 'b'			• $(x-5)$ +	2	2 marks
• ² pd : • ³ ss :	deal w use dif	ith the 'c' ferentiatic	on		• ³ $g'(x) =$ • ⁴ $x^2 - 10x +$	STATED EXF - 27	PLICITLY

 \bullet^4 pd : differentiate

 \bullet^5 ss : use previous working

•⁶ ic : complete proof

I	Primary Method : Give 1 mark	for each •		
\bullet^1 \bullet^2	$ (x-5)^2 \dots (x-5)^2 + 2 $		0 1	
			2 mark	s
\bullet^3	g'(x) =	STATED EXPLICITLY	7	
\bullet^4	$x^2 - 10x + 27$			
• ⁵	$\left(x-5\right)^2+2$			
\bullet^6	g'(x) > 0 for all x			
	and so $g(x)$ increasing	ıg		
			4 mark	s

1	Alternative Method for •3 to	•6	
• ³	g'(x) =	STATED EXPLICITLY	7
\bullet^4	$x^2 - 10x + 27$		
\bullet^5	$b^2 - 4ac = 100 - 108$	= -8	
\bullet^6	no roots, concave up	g, g'(x) > 0	
	and thus $g(x)$ increases	sing	
			4 marks

Notes

- For \bullet^6 , accept g'(x) > 2 in lieu of g'(x) > 01
- Evaluating $g(1), g(2) \ etc \ or \ g'(1), g'(2) \ etc$ gains no 2credit.

9 Solve the equation
$$\log_2(x+1) - 2\log_2(3) = 3$$
.

Qu. 9	part	marks 4	Grade AB	Syllabus Code 3.3.4	Calculator class NC	Source 04/57
The Primary Method m/s is based on the following generic m/s.					Primary Method	: Give 1 mark for each •
BUT ON METHO THE MA	ILY WHEF D OR AN RKING S	RE A CANDII Y ALTERNA CHEME.	DATE DOES NO	OT USE THE PRIMARY SHOWN IN DETAIL IN	$\bullet^1 -\log_2 3^2$	

- 1				1	1
•	1C	:	use	log	laws

- \bullet^2 ic : use log laws
- \bullet^3 ic : express in exponential form
- \bullet^4 pd : process

Primary Method : Give 1 mark for each • •¹ $-\log_2 3^2$ •² $\log_2 \left(\frac{x+1}{3^2}\right) = 3$ •³ $\frac{x+1}{3^2} = 2^3$ •⁴ x = 714 marks

1 Alternative Method • $\log_2(x+1) - 2\log_2 3 = 3\log_2 2$ • $\log_2(x+1) = \log_2 2^3 + \log_2 3^2$ • $\log_2(x+1) = \log_2(2^3 \times 3^2)$ • x = 714 marks



The Primary Method m/s is based on the following generic m/s. THIS GENERIC M/S MAY BE USED AS AN EQUIVALENCE GUIDE	Primary Method : Give 1 mark for each •
BUT ONLY WHERE A CANDIDATE DOES NOT USE THE PRIMARY METHOD OR ANY ALTERNATIVE METHOD SHOWN IN DETAIL IN THE MARKING SCHEME.	• $D\hat{E}A = (2x^{\circ} + 90^{\circ})$ • $\cos(2x^{\circ})\cos(90^{\circ}) - \sin(2x^{\circ})\sin(90^{\circ})$
\bullet^1 ic : interpret diagram	• ³ $-\sin(2x^\circ)$ • ⁴ $-2\sin(x^\circ)\cos(x^\circ)$
\bullet^2 pd : expand trig expression	• $-2\sin(x)\cos(x)$ • $CE = \sqrt{1^2 + 3^2} = \sqrt{10}$ stated / implied by •6
\bullet^3 pd : simplify	• $\sin(x^\circ) = \left(\frac{1}{\frac{1}{1-x}}\right)$
• ⁴ ss : use appropriate formula	and $\cos(x^{\circ}) = \frac{3}{\sqrt{10}}$
• ^o pd : process ⁶ · · · · · · · · · · · · · · · · · · ·	• ⁷ $\cos D\hat{E}A = -2\left(\frac{1}{\sqrt{10}}\right)\left(\frac{3}{\sqrt{10}}\right) = -\frac{6}{10}$
• ⁷ pd : simplify	7 marks

Note

1 Although unusual, it would be perfectly acceptable for a candidate to go from \bullet^1 to \bullet^3 without expanding (via knowledge of transformations). In this case \bullet^2 would awarded by default.





	Source 04/57	Calculator class CN	Syllabus Code 2.1.10 2.2.8	Grade B A	marks 3 5	part a b	Qu. 11
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The Primary Method m/s is based on the following generic m/s. THIS GENERIC M/S MAY BE USED AS AN EQUIVALENCE GUIDE BUT ONLY WHERE A CANDIDATE DOES NOT USE THE PRIMARY METHOD OR ANY ALTERNATIVE METHOD SHOWN IN DETAIL IN THE MARKING SCHEME.

- \bullet^1 ss : use parabolic form
- \bullet^2 pd : substitute
- \bullet^3 pd : process
- •⁴ ss : know to integrate
- •⁵ pd : express in integrable form
- \bullet^6 pd : integrate
- $\bullet^7 \, \mathrm{ss}$: introduce constant and substitute
- \bullet^8 pd : process

Notes

1 In the primary method, •3 must be justified.

A "guess and check" would be acceptable ie guess a = 6 then check that (1, -6) fits the equation.

- 2 In the primary method, •5 is only available if an intention to integrate has been indicated.
- For candidates who fail to complete (a)
 but produce values for a and b ex nihilo, 5
 marks are available in (b). A deduction of
 1 mark may be made if their choice eases
 the working.
- 4 For candidates who retain "a" and "b" in part (b), marks \bullet^4 to \bullet^7 are available.
- 5 **CAVE**

$$\int_{0}^{2} 6x(x-2)dx = \left[2x^{3} - 6x^{2}\right]_{0}^{2} = -8 \text{ may be}$$

awarded •⁴, •⁵ and •⁶.

Primary Method : Give 1 mark for each • • b = 2 or y = ax(x - 2)• substitute (1, -6)• a = 6• $f(x) = \int (6x(x - 2)) dx$ • $f(x) = \int (6x(x - 2)) dx$ • $\int (6x^2 - 12x) dx$ • $\int (6x^2 - 12x) dx$ • $f(x) = 2 \times 1^3 - 6 \times 1^2 + c$ • a = 85 marks

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1 Alternative Method for •1 to •3
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2 Alternative Method for •1 to •3
•
$$y = k(x-1)^2 - 6$$

• $0 = k(2-1)^2 - 6 \Rightarrow k = 6$
• $y = 6(x-1)^2 - 6 \Rightarrow y = 6x(x-2)$
3 marks

						I	Qs of	a gro	oup	of s	tude	ent	s	
S1	The	IQs of a g	group of st	udents were meas	ured and the		10	2 3	3 5	5	6	8	8	
	score	es recorde			9									
	Iden	tify any o	utliers.				11	0 () 2	3	5	6	7	4
								9						
repla	cing q	u.5 (in po	sition 1)				12	1 :	3					
							13	2 (6					
						n=20	10	2	m	ean	is 1	02		
Qu. S1	part	marks 4	Grade C	Syllabus Code 4.1.2, 4.1.3	Calculator class CN	Source 04/61								
				•										

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- \bullet^1 pd : calculate quartiles
- \bullet^2 ss : know how to calculate fences
- ${\ensuremath{\bullet}}^3~{\rm pd}$: calculate fence/interpret outlier
- \bullet^4 pd : calculate fence/interpret outlier

Primary Method : Give 1 mark for each •

- $\label{eq:q1} \begin{array}{ll} \bullet^1 & Q_1 = 107, Q_3 = 118 \\ \bullet^2 & eg \ lower \ fence = Q_1 1 \cdot 5(Q_3 Q_1) \end{array}$
- \bullet^3 fence = 90.5
- \bullet^4 fence = 134.5 & 136 is outlier

4 marks

S2 Calculate the mean and variance of the discrete random variable X whose probability distribution is as follows:

<i>x</i>	0	1	2	3	
$\mathbf{P}(X=x)$	0.4	0.3	0.2	0.1	6

replacing qu.6

Qu. S2	part	marks 6	Grade C	Syllabus Code 4.2.12	Calculator class NC	Source 04/66	
The Prin	narv Meth	nod m/s is ba	ased on the follo	owing generic m/s.	Priman/ Mothod	I · Give 1 mark for each .	
THIS GE BUT ON METHO THE MA	ENERIC N LY WHEF D OR AN RKING S	//S MAY BE RE A CANDII Y ALTERNAT	USED AS AN E DATE DOES NO TIVE METHOD	EQUIVALENCE GUIDE OT USE THE PRIMARY SHOWN IN DETAIL IN			
• ¹ ss : • ² pd : • ³ ss :	know a calcula know/	and state : ate mean state rule	rule for mea for variance	.n	• ¹ $E(X) = \Sigma$ • ² $\Sigma xp(x) =$ • ³ $V(X) = E$	$\Sigma xp(x)$ = 1 $E(X^2) - (E(X))^2$	
• ⁴ ss : • ⁵ pd :	know l calcula	how to fin ate $E(X^2)$	d $E(X^2)$			$\sum x^2 p(x) = 2$	
⁶ nd ·	calculs	te varian	/ Ce			6 mark	cs

4 marks

- S3The committee of New Tron Golf Club consists of 15 men and 10 women which reflects the proportions of men and women who are members of the club.
 - It is agreed to send a delegation of 10 committee members to a local planning meeting. The members of the delegation are to be chosen at random and will consist of 6 men and 4 women.
 - What is the probability that both committee members Mr Hook and Miss Green will be selected?

replacing qu.7

Qu. S3	part	marks 4	Grade C	Syllabus Code 4.2.3, 4.2.7	Calcu NC	lator class	Source 04/67	
The Prim THIS GE	ary Meth	od m/s is ba //S MAY BE	sed on the follo USED AS AN E	owing generic m/s. EQUIVALENCE GUIDE	F	rimary Method	: Give 1 mark for each •	
BUT ON				OT USE THE PRIMARY				
THE MA	RKING S	CHEME.		SHOWIN IN DETAIL IN	, I		e	
					•	P(man) =	: <u>6</u> <u>15</u>	
\bullet^1 ic :	interpr	et probab	ility		\bullet^2	P(lady) =	$\frac{4}{10}$	
\bullet^2 ic :	interpr	et probab	ility		• ³	multiply		
\bullet^3 ss :	know t	o multiply	v for indepe	ndent events	\bullet^4	$\frac{6}{15} \times \frac{4}{10} = \frac{4}{2}$	<u> </u> 5	

- \bullet^3 ss : know to multiply for independent events
- \bullet^4 pd : process



S4 The cumulative distribution function for a random variable X is given by

$$F(x) = \begin{cases} \frac{1}{32} x^2 (6-x) & 0 \le x \le 4\\ 0 & \text{otherwise} \end{cases}$$

Show that the median is 2.

 $replacing \ qu.9$

Qu. S4	part	marks 3	Grade AB	Syllabus Code 4.3.3, 4.3.5, 2.1.3	Calculator class NC	Source 04/70	
[
The Prin THIS GE	ary Metho	od m/s is base /S MAY BE US	d on the followi SED AS AN EQ	ng generic m/s. UIVALENCE GUIDE	Primary Method : 0	Give 1 mark for each •	
BUT ONLY WHERE A CANDIDATE DOES NOT USE THE PRIMARY METHOD OR ANY ALTERNATIVE METHOD SHOWN IN DETAIL IN THE MARKING SCHEME.					• ¹ $F(median) =$ • ² $F(2) = \frac{1}{32} \times \frac{1}{32}$ • ³ $F(2) = \frac{1}{2}, he$	$= \frac{1}{2}$ $2^{2} \times (6-2)$ ence median = 2	
\bullet^2 pd :	substitu	ute					3 marks
• ³ ic :	interpre	et result			<u></u>		