

GCE 2004

November Series



Mark Scheme

Mathematics A

(MAM1/W)

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

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Dr Michael Cresswell Director General

Key to Mark Scheme

M	mark is for	method
m	mark is dependent on one or more M marks and is for.....	method
A	mark is dependent on M or m marks and is for	accuracy
B	mark is independent of M or m marks and is for	method and accuracy
E	mark is for	explanation
✓ or ft or F	follow through from previous	incorrect result
CAO	correct answer only	
AWFW	anything which falls within	
AWRT	anything which rounds to	
AG	answer given	
SC	special case	
OE	or equivalent	
A2,1	2 or 1 (or 0) accuracy marks	
-x EE	deduct x marks for each error	
NMS	no method shown	
PI	possibly implied	
SCA	substantially correct approach	
c	candidate	
SF	significant figure(s)	
DP	decimal place(s)	

Abbreviations used in Marking

MC – x	deducted x marks for mis-copy
MR – x	deducted x marks for mis-read
ISW	ignored subsequent working
BOD	given benefit of doubt
WR	work replaced by candidate
FB	formulae booklet

Application of Mark Scheme

No method shown:

Correct answer without working.....	mark as in scheme
Incorrect answer without working	zero marks unless specified otherwise

More than one method/choice of solution:

2 or more complete attempts, neither/none crossed out	mark both/all fully and award the mean mark rounded down
1 complete and 1 partial attempt, neither crossed out	award credit for the complete solution only

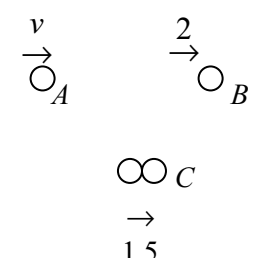
Crossed out work

do not mark unless it has not been replaced

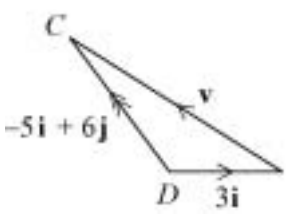
Alternative solution using a correct or partially
correct method

award method and accuracy marks as
appropriate

MAM1/W

Q	Solution	Marks	Total	Comments
1(a)	$a = \text{change in velocity / time or}$ $v = u + at$ $a = 2 \text{ m s}^{-2}$	M1 A1	2	used
(b)	distance = $\frac{1}{2} \times 5 \times 6$ 15 metres	M1 A1F A1F	3	Full method
(c)	acceleration not likely to be constant initial acceleration unrealistic change in velocity at $t = 3$ will be smoother	B1	1	
Total			6	
2				
(a)	$3mv + 2m = 4m \times 1.5$ $v = \frac{4}{3}$	M1A1 A1	3	
(b)	$v^2 = u^2 + 2as$ $0 = (1.5)^2 + 2 \times a \times 3$ retardation = 0.375 m s^{-2}	M1A1 A1	3	Full method, accept \pm Magnitude required
Total			6	
3(a)	Sum of vertical forces = zero $4 \cos 60^\circ + 8 \cos 60^\circ - q = 0$ $q = 6$	M1 M1 A1 A1	4	used M1 for equation, 3 forces cao
(b)	horizontal: $R = 3 + 8 \cos 30^\circ - 4 \cos 30^\circ$ $R = 6.46 \text{ or } 6.47$	M1A1 A1F	3	
Total			7	

MAM1/W (cont)

Q	Solution	Marks	Total	Comments
4(a)	$\mathbf{r} = \int (4\mathbf{i} - 2t\mathbf{j}) dt$ $= 4t\mathbf{i} - t^2\mathbf{j} \quad (+ c)$ $t = 0, \mathbf{r} = 8\mathbf{j}$ $\mathbf{r} = 4t\mathbf{i} + (8 - t^2)\mathbf{j}$	M1 A1 m1 A1F	4	attempted used
(b)	$t = 2, \mathbf{r} = 8\mathbf{i} + 4\mathbf{j}$	B1F	1	
(c)	$8 - t^2 = 0$ $t = 2\sqrt{2} \quad \text{or} \quad t = 2.83$	M1 A1	2	
Total			7	
5(a)	$\mathbf{v}_1 = 5\mathbf{i} - 6\mathbf{j}$	B1	1	
(b)(i)	$\mathbf{v}_2 = -5\mathbf{i} + 6\mathbf{j}$	B1F	1	
(ii)	 <p style="text-align: center;">$\mathbf{v} = -8\mathbf{i} + 6\mathbf{j}$</p> <p style="text-align: center;">$\mathbf{v} = 10 \text{ ms}^{-1}$</p>	B1F M1 A1F M1 A1F	5	Diagram possibly implied
Total			7	

MAM1/W (cont)

Q	Solution	Marks	Total	Comments
6(a)(i)	$B: T = mg = 0.1 \times 9.8 = 0.98\text{N}$	B1	1	cao
(ii)	$A: F = T (= 0.98) \quad R = 0.5 \times 9.8$ $\mu \times 0.5 \times 9.8 = 0.98$ $\mu = 0.2$	B1 M1 A1	3	Condone inequality cao
(iii)		B1	1	Must label T or 0.98 N
(iv)		M1 A1	2	
	$R = \sqrt{(T^2 + T^2)} \text{ or } 2T \cos 45^\circ$ $R = 1.39\text{N}$			
(b)(i)	$A: T - 0.98 = 0.5a$ $B: 2 \times 0.1 \times 9.8 - T = 0.2a$ $0.98 = 0.7a$ $a = 1.4$	M1A1 A1 m1 A1	5	Either equation for M1 cao
(ii)	$T = 0.98 + 0.5 \times 1.4, \quad T = 1.68$	A1F	1	ft accuracy error in equation
(iii)	$s = ut + \frac{1}{2}at^2$ $0.7 = 0 + \frac{1}{2} \times 1.4t^2$ $t = 1$	M1 A1	2	
Total			15	

MAM1/W (cont)

Q	Solution	Marks	Total	Comments
7(a)(i)	vertical: $s = ut + \frac{1}{2}at^2$ $0 = 7t - 4.9t^2$ $0 = t(7 - 4.9t)$ $0 = 7 - 4.9t$ $t = \frac{10}{7} \text{ sec (1.43)}$	M1 m1 A1	3	Full method
(ii)	$OF = 21 \times \frac{10}{7}$ $= 30 \text{ m}$	M1 A1F	2	
(b)	vert: $0 = 3.5t - 4.9t^2$ $t = \frac{3.5}{4.9}$ $FG = 21 \times \frac{3.5}{4.9}$ $= 15 \text{ m}$	M1 m1 M1 A1	4	Full method required
(c)	$GH = \frac{1}{2} \times 15 = 7.5$ $OH = 30 + 15 + 7.5$ $= 52.5 \text{ m}$	B1F M1 A1F	3	
	Total		12	
	Total		60	