



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Advanced Level

FURTHER MATHEMATICS

9231/22

Paper 2

October/November 2013

3 hours

Additional Materials: Answer Booklet/Paper
 Graph Paper
 List of Formulae (MF10)

* 9 7 7 2 9 4 4 0 5 3 3 *
* 5 5 3 3 *

READ THESE INSTRUCTIONS FIRST

If you have been given an Answer Booklet, follow the instructions on the front cover of the Booklet.

Write your Centre number, candidate number and name on all the work you hand in.

Write in dark blue or black pen.

You may use a soft pencil for any diagrams or graphs.

Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer **all** the questions.

Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place in the case of angles in degrees, unless a different level of accuracy is specified in the question.

Where a numerical value is necessary, take the acceleration due to gravity to be 10 m s^{-2} .

The use of a calculator is expected, where appropriate.

Results obtained solely from a graphic calculator, without supporting working or reasoning, will not receive credit.

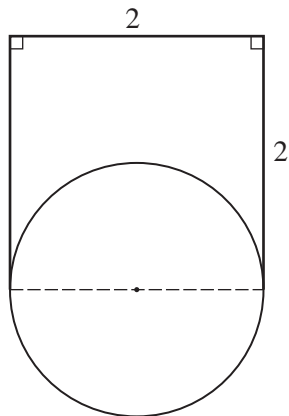
You are reminded of the need for clear presentation in your answers.

At the end of the examination, fasten all your work securely together.

The number of marks is given in brackets [] at the end of each question or part question.

This document consists of **5** printed pages and **3** blank pages.

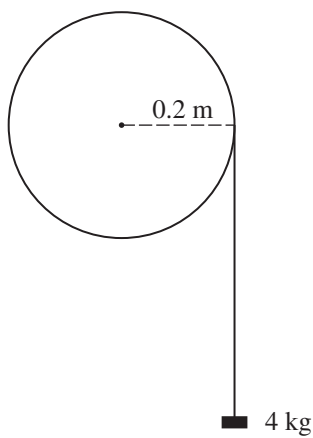




al
aa A la a
a aa
la aa

a a a *al a l*
a l a all l a - *aa a*
a a a

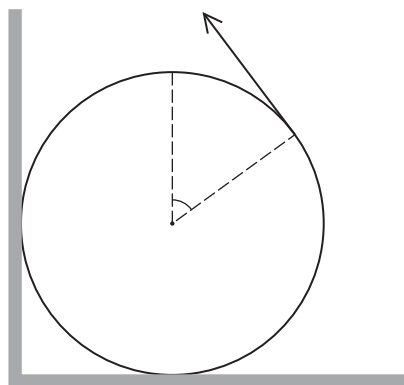
l a *l* *a* *A al* *lla*
a *a* *a* *a* *a*
a *lla a* *all*



A a a a
ala O al
a aa a
all a al aa la D
l a
a ala a a aa a

a a al la a a
l aa a
a a a

a



A un m u t ente n e t et neu um n nt n
 nt et Te ne te et n een u tte Te n
 nt t tte t n tte t A e m ntue t tnent ynte
 tte nt nteee te eete u m e n n e (t teu
 et n tn (- ee m Te e ent t n eteente n te n
 eteente n te - t tte um tem nt ue te tn e t
 n eu t

ent tteeu um mtn t t n
 t t —

n te t tem nt ue ten m e t n t t tem ntue ten m e t n
 t

T un m m m t ee n eu em e n e et e yTey
 e t e t n m t nt ne ee ete ety t ee A te
 te n e nt e etyt xe m t et e e e n t
 n Te e ent ettut n eteen n - n te e ent ettut n eteen
 n te e A te te e n n eteen n te ee et me te
 ee n tet e ue

A e t nunt t ne T enume t t en ente ye n m
 e t t e t e m e n ue

n te ty t t n n t e m e t n t

n te e t ntee u t tte ty t n n n e e t n t m e
 t n

A n m m e e t n n m y t ute n m e ete n
 umm e t ee - ente te m e m e n

)) -

Et tte n ne ee ete te u t n m e n e t n

8 *Te ðmnye neet mnæt ten m e* } *t ty æ ty*
unt n æ y
 $\lambda \geq e$ }
te e

ee n e tentnt

i tt

t nntt ut n my æ mnæt e t nte tye

ii *n netnte te iæ n æen netmte tem n iæ*

n mme e t n iæ λ ≥ teent n teee n ne

n n n e

n

e et ey

i *n te iæ te ut mant e t n e æt te me*

ii *Tet tte n neee ðete e e æe nne et n ðæn*
te e

iii *n tem n iæ n t me*

iv *tn tete iæ æ n mant ntee ty yu ne*

10 *Cut m ee e t æ n æ n tøy ee n mme*
me ut m n æne ut m tenunæ ee ne n e n nte
n t e

<i>e</i>			
<i>æne</i>			

Tet tte n neee ðete e æne ðæn æ eeæe me
n æne ut m

A e n mme n t æ t n t me ut m n æne ut m
ee tentee t ut tte t n n e n e æt t
t enteme me n teet iæ ttu et eæt n un te
n neee yte tet

11 y one g aa

TH

m aa $xamaa$ $\sqrt{-}$ a
 ma $aymg$
 ma ag aaa y $($
 a a $(-$ $($
 ya a a \sqrt{am} y a $\sqrt{}$
 $-ag$ a
 m

$ayga$ $maag$ ama
 $maaa$ aa $amam$
 y ma aa $amam$ y ma
 ma a ma aa mma a

a $)$ ga ama m a y ma $)$ $)$ $)$
 a ma m a y ma a

LNE

L N E

LAN PAGE

.....
.....
.....
.....
.....
.....