



Rewarding Learning

ADVANCED
General Certificate of Education
2019

Centre Number

--	--	--	--	--

Candidate Number

--	--	--	--

Mathematics

Assessment Unit A2 2

assessing

Applied Mathematics

MV18

[AMT21]

WEDNESDAY 5 JUNE, MORNING

Time

1 hour 30 minutes, plus your additional time allowance.

Instructions to Candidates

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

You must answer the questions in the spaces provided.

Do not write on blank pages or tracing paper.

Complete in black ink only. Questions which require drawing or sketching should be completed using an H.B. pencil.

Candidates must answer **all** questions from sections A and B.

Show clearly the full development of your answers.

Answers without working may not gain full credit.

Answers should be given to three significant figures unless otherwise stated.

You are permitted to use a graphic or scientific calculator in this paper.

Information for Candidates

The total mark for this paper is 100

The total available mark for each section of this paper is 50

Figures in brackets printed at the end of each question indicate the marks awarded to each question or part question.

Answers should include diagrams where appropriate and marks may be awarded for them.

Take $g = 9.8 \text{ m s}^{-2}$, unless specified otherwise.

A copy of the **Mathematical Formulae and Tables** booklet is provided.

Throughout the paper the logarithmic notation used is $\ln z$ where it is noted that $\ln z \equiv \log_e z$

Blank Page
(Questions start overleaf)

Answer all questions.

Section A

Mechanics

- 1 A uniform rod AB, of mass 15 kg, is held horizontally in equilibrium by two strings attached at C and D as shown in **Fig. 1** below.

The strings hang vertically and are light and inextensible.

$AB = 6\text{ m}$, $BD = 1\text{ m}$ and $CD = 2.5\text{ m}$.

- (i) Complete the diagram below showing all the external forces acting on the rod. [1 mark]

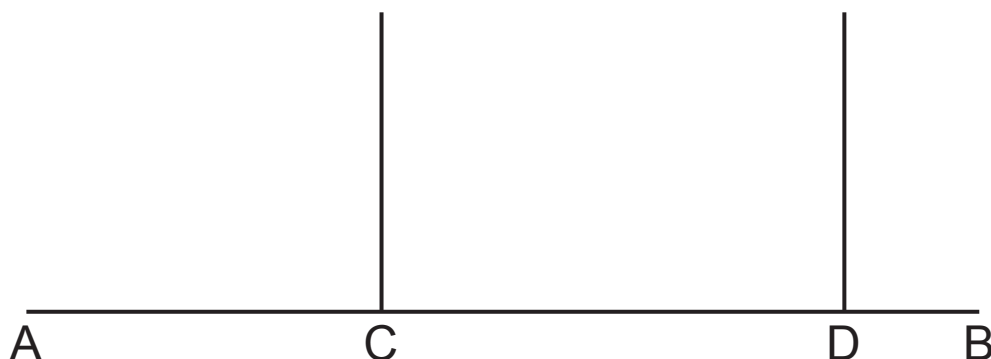


Fig. 1

- 4 A footballer taking a free kick strikes the ball and it leaves the horizontal ground with speed $u \text{ ms}^{-1}$ at an angle α to the horizontal. The ball is projected from O, as shown in **Fig. 2** below, and is modelled as a particle. The ball remains in the same vertical plane and experiences no air resistance.

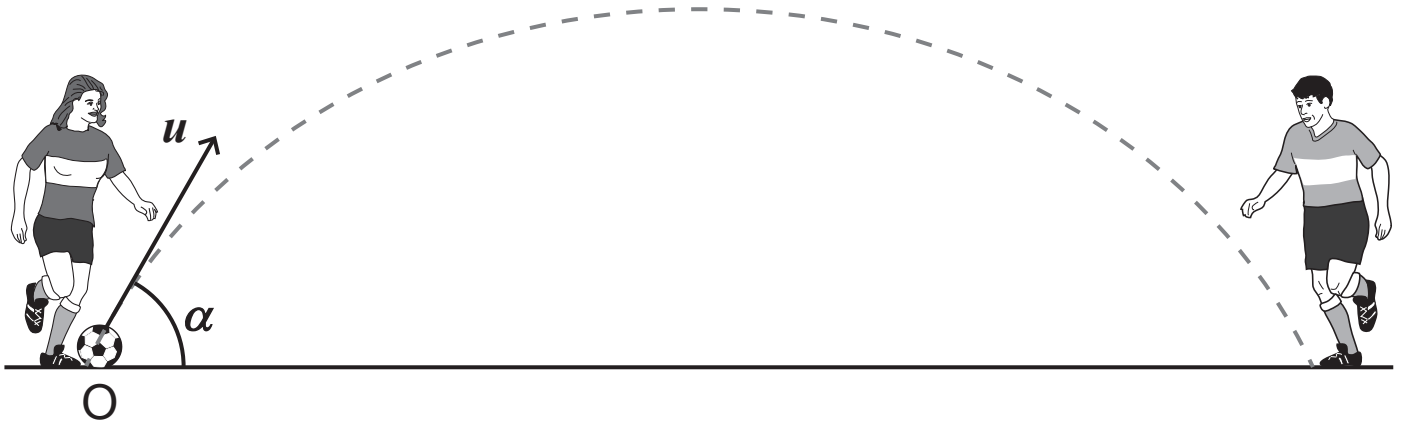


Fig. 2

- (i) Show that the equation of trajectory for the ball is

$$y = x \tan \alpha - \frac{gx^2}{2u^2} (1 + \tan^2 \alpha)$$

where x and y are the horizontal and vertical displacements of the ball from O. [7 marks]

(ii) Calculate the probability that a customer selected at random bought bread given that they bought milk.
[2 marks]

(ii) Find the probability that the second marble is white.
[2 marks]

(b) Give a reason why the normal distribution is important in statistics. [1 mark]

(ii) In this context, give a reason why the new organiser's belief could be true. [1 mark]

This is the end of the question paper

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
Total Marks	

Examiner Number

Permission to reproduce all copyright material has been applied for. In some cases, efforts to contact copyright holders may have been unsuccessful and CCEA will be happy to rectify any omissions of acknowledgement in future if notified.