

Please check the examination details below before entering your candidate information

Candidate surname

Other names

**Pearson Edexcel  
Level 3 GCE**

Centre Number

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Candidate Number

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**Thursday 11 June 2020**

Afternoon (Time: 1 hour 30 minutes)

Paper Reference **9FM0/3C**

**Further Mathematics**

**Advanced**

**Paper 3C: Further Mechanics 1**

**You must have:**

Mathematical Formulae and Statistical Tables (Green), calculator

Total Marks

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**Candidates may use any calculator permitted by Pearson regulations. Calculators must not have the facility for symbolic algebra manipulation, differentiation and integration, or have retrievable mathematical formulae stored in them.**

### Instructions

- Use **black** ink or ball-point pen.
- If pencil is used for diagrams/sketches/graphs it must be dark (HB or B).
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions and ensure that your answers to parts of questions are clearly labelled.
- Answer the questions in the spaces provided  
– *there may be more space than you need.*
- You should show sufficient working to make your methods clear. Answers without working may not gain full credit.
- Unless otherwise indicated, whenever a numerical value of  $g$  is required, take  $g = 9.8 \text{ m s}^{-2}$  and give your answer to either 2 significant figures or 3 significant figures.

### Information

- A booklet 'Mathematical Formulae and Statistical Tables' is provided.
- There are 7 questions in this question paper. The total mark for this paper is 75.
- The marks for **each** question are shown in brackets  
– *use this as a guide as to how much time to spend on each question.*

### Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ►

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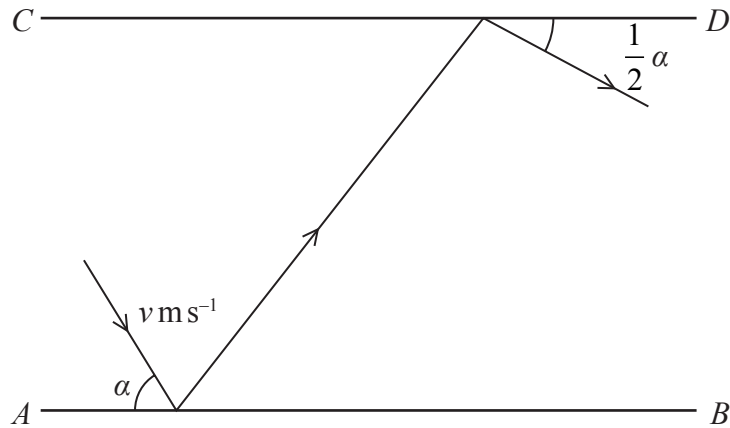


Figure 2

Figure 2 represents the plan view of part of a horizontal floor, where  $AB$  and  $CD$  represent fixed vertical walls, with  $AB$  parallel to  $CD$ .

A small ball is projected along the floor towards wall  $AB$ . Immediately before hitting wall  $AB$ , the ball is moving with speed  $v \text{ m s}^{-1}$  at an angle  $\alpha$  to  $AB$ , where  $0 < \alpha < \frac{\pi}{2}$

The ball hits wall  $AB$  and then hits wall  $CD$ .

After the impact with wall  $CD$ , the ball is moving at angle  $\frac{1}{2}\alpha$  to  $CD$ .

The coefficient of restitution between the ball and wall  $AB$  is  $\frac{2}{3}$

The coefficient of restitution between the ball and wall  $CD$  is also  $\frac{2}{3}$

The floor and the walls are modelled as being smooth. The ball is modelled as a particle.

(a) Show that  $\tan\left(\frac{1}{2}\alpha\right) = \frac{1}{3}$  (7)

(b) Find the percentage of the initial kinetic energy of the ball that is lost as a result of the two impacts. (4)











