

Please check the examination details below before entering your candidate information

Candidate surname

Other names

Centre Number

Candidate Number

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Pearson Edexcel Level 3 GCE

Time 1 hour 30 minutes

Paper
reference

9FM0/4C

Further Mathematics

Advanced

PAPER 4C: Further Mechanics 2

You must have:

Mathematical Formulae and Statistical Tables (Green), calculator

Total Marks

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 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 8 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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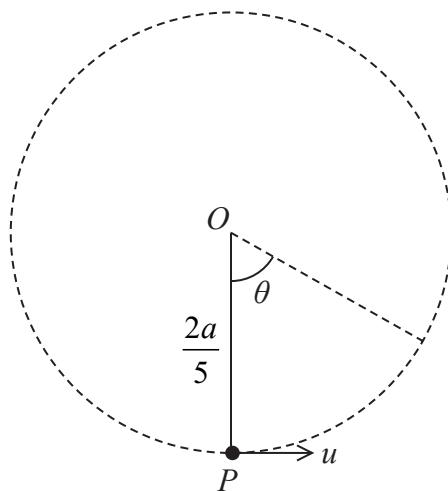


Figure 5

A package P of mass m is attached to one end of a string of length $\frac{2a}{5}$. The other end of the string is attached to a fixed point O . The package hangs at rest vertically below O with the string taut and is then projected horizontally with speed u , as shown in Figure 5.

When OP has turned through an angle θ and the string is still taut, the tension in the string is T

The package is modelled as a particle and the string as being light and inextensible.

(a) Show that $T = 3mg \cos \theta - 2mg + \frac{5mu^2}{2a}$ (6)

Given that P moves in a complete vertical circle with centre O

(b) find, in terms of a and g , the minimum possible value of u (2)

Given that $u = 2\sqrt{ag}$

(c) find, in terms of g , the magnitude of the acceleration of P at the instant when OP is horizontal. (3)

(d) Apart from including air resistance, suggest one way in which the model could be refined to make it more realistic. (1)



