

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 International Advanced Level

Tuesday 6 June 2023

Morning (Time: 1 hour 30 minutes)

Paper
reference

WME03/01

Mathematics

**International Advanced Subsidiary/Advanced Level
Mechanics M3**

You must have:

Mathematical Formulae and Statistical Tables (Yellow), 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.
- Whenever a numerical value of g is required, take $g = 9.8 \text{ m s}^{-2}$, and give your answer to either two significant figures or three 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.
- If you change your mind about an answer, cross it out and put your new answer and any working underneath.

Turn over ►

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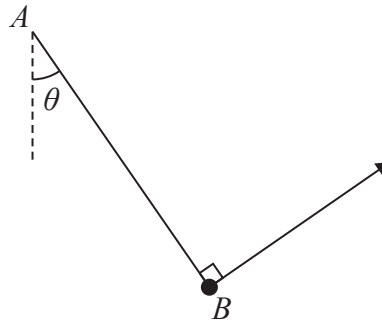


Figure 2

A light elastic string AB has modulus of elasticity $2mg$ and natural length ka , where k is a constant. The end A of the elastic string is attached to a fixed point. The other end B is attached to a particle of mass m . The particle is held in equilibrium, with the elastic string taut, by a force that acts in a direction that is perpendicular to the string. The line of action of the force and the elastic string lie in the same vertical plane. The string makes an angle θ with the downward vertical at A , as shown in Figure 2.

Given that the length $AB = \frac{21}{10}a$ and $\tan \theta = \frac{3}{4}$, find the value of k .

(6)



Question 2 continued

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(Total for Question 2 is 6 marks)



3. A uniform solid right circular cone C has base radius r , height H and vertex V . A uniform solid S , shown in Figure 3, is formed by **removing** from C a uniform solid right circular cone of height h ($h < H$) that has the same base and axis of symmetry as C .

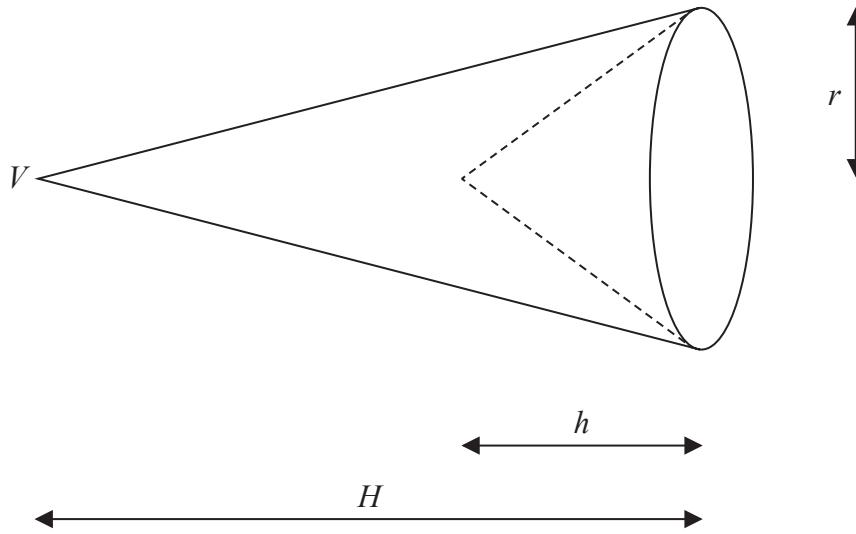


Figure 3

- (a) Show that the distance of the centre of mass of S from V is

$$\frac{1}{4}(3H - h) \tag{5}$$

The solid S is suspended by two vertical light strings. The first string is attached to S at V and the second string is attached to S at a point on the circumference of the circular base of S .

The solid S hangs freely in equilibrium with its axis of symmetry horizontal. The tension in the first string is T_1 and the tension in the second string is T_2

- (b) Find $\frac{T_1}{T_2}$, giving your answer in terms of H and h , in its simplest form. (3)



Question 3 continued

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Question 4 continued

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Question 5 continued

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Question 6 continued

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Question 6 continued

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Question 7 continued

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Question 7 continued

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(Total for Question 7 is 16 marks)

TOTAL FOR PAPER IS 75 MARKS

