

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

Time 1 hour 30 minutes

Paper
reference

WME02/01

Mathematics

International Advanced Subsidiary/Advanced Level Mechanics M2

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 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.
- 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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1.

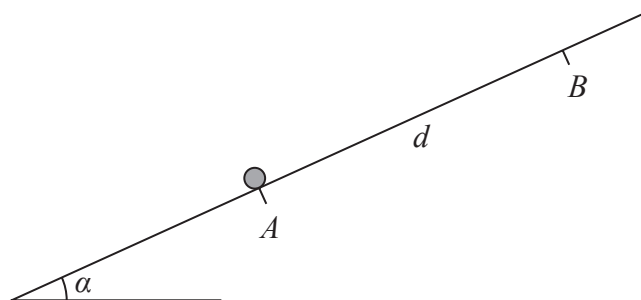


Figure 1

A particle of mass m is held at rest at a point A on a rough plane.

The plane is inclined at an angle α to the horizontal, where $\tan \alpha = \frac{5}{12}$

The coefficient of friction between the particle and the plane is $\frac{1}{5}$

The points A and B lie on a line of greatest slope of the plane, with B above A , and $AB = d$, as shown in Figure 1.

The particle is pushed up the line of greatest slope from A to B .

- (a) Show that the work done against friction as the particle moves from A to B is $\frac{12}{65}mgd$
- (3)**

The particle is then held at rest at B and released.

- (b) Use the work-energy principle to find, in terms of g and d , the speed of the particle at the instant it reaches A . (4)



Question 1 continued

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Q1

(Total 7 marks)



- (8)

Question 2 continued

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Question 2 continued

Lined area for writing the answer to Question 2.



Question 2 continued

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Q2

(Total 8 marks)



At time t seconds, $t > 0$, the x coordinate of P is given by

$$x = 2t^{\frac{7}{2}} - 14t^{\frac{5}{2}} + \frac{56}{3}t^{\frac{3}{2}}$$

(a) the non-zero values of t for which P is at instantaneous rest

(b) the total distance travelled by P in the interval $0 \leq t \leq 4$ (3)

(c) the acceleration of P when $t = 4$

Question 3 continued

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Q3

(Total 9 marks)



4. A particle P of mass 0.75 kg is moving with velocity $4\mathbf{i}\text{ ms}^{-1}$ when it receives an impulse $\mathbf{J}\text{ N}$ s. Immediately after P receives the impulse, the speed of P is 8 ms^{-1}

Given that $\mathbf{J} = c(-\mathbf{i} + 2\mathbf{j})$, where c is a constant, find the two possible values of c .

(6)

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Question 4 continued

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Q4

(Total 6 marks)



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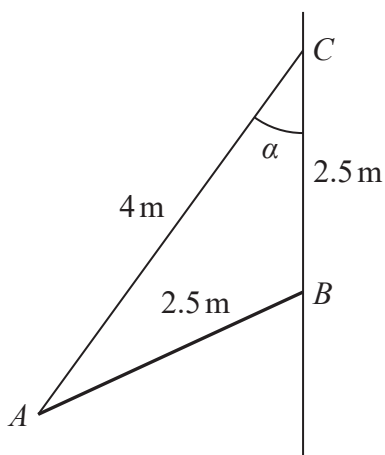


Figure 2

A pole AB has length 2.5 m and weight 70 N.

The pole rests with end B against a rough vertical wall. One end of a cable of length 4 m is attached to the pole at A . The other end of the cable is attached to the wall at the point C . The point C is vertically above B and $BC = 2.5$ m.

The angle between the cable and the wall is α , as shown in Figure 2.

The pole is in a vertical plane perpendicular to the wall.

The cable is modelled as a light inextensible string and the pole is modelled as a uniform rod.

Given that $\tan \alpha = \frac{3}{4}$

- (a) show that the tension in the cable is 56 N.

(4)

Given also that the pole is in limiting equilibrium,

- (b) find the coefficient of friction between the pole and the wall.

(6)



Question 5 continued

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Question 5 continued

Lined area for writing the answer to Question 5.



Question 5 continued

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Q5

(Total 10 marks)



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- (6)

(4)

Question 6 continued

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Question 6 continued

Lined area for writing the answer to Question 6.



Question 6 continued

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Q6

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(Total 10 marks)



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Question 7 continued

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Question 7 continued

Lined area for writing the answer to Question 7.



Question 7 continued

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Q7

(Total 11 marks)



Question 8 continued

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Question 8 continued

Lined area for writing the answer to Question 8.



Question 8 continued

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Lined area for writing the answer to Question 8.



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Question 8 continued

Handwriting practice area with 28 horizontal lines.

Q8

(Total 14 marks)

TOTAL FOR PAPER IS 75 MARKS

END

