

Please check the examination details below before entering your candidate information

Candidate surname		Other names	
Centre Number		Candidate Number	

Pearson Edexcel International Advanced Level

Time 1 hour 30 minutes **Paper reference** **WME01/01**

Mathematics

International Advanced Subsidiary/Advanced Level

Mechanics M1

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 ►

P66649A

©2021 Pearson Education Ltd.

E:1/1/1/



DO NOT WRITE IN THIS AREA

Question 1 continued

Lined area for writing the answer to Question 1.

<https://britishstudentroom-b430a.web.app/>

Leave blank



DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Question 1 continued

Lined area for writing the answer to Question 1.



DO NOT WRITE IN THIS AREA

Question 1 continued

Lined area for writing the answer to Question 1.

<https://britishstudentroom-b430a.web.app/>

Leave blank

Q1

(Total 6 marks)



DO NOT WRITE IN THIS AREA

- (a) Find, in terms of u , the speed of P immediately after the collision.

(3)

- (b) State clearly the direction of motion of P immediately after the collision.

(1)

The coefficient of friction between Q and the plane is μ .

- (c) Find the value of μ .

(6)

DO NOT WRITE IN THIS AREA

Question 2 continued

Lined area for writing the answer to Question 2.

<https://britishstudentroom-b430a.web.app/>

Leave blank



DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Question 2 continued

Lined area for writing the answer to Question 2.



DO NOT WRITE IN THIS AREA

Question 2 continued

<https://britishstudentroom-b430a.web.app/>

Leave blank

Lined area for writing the answer to Question 2.

(Total 10 marks)

Q2

Marking boxes for Q2.



DO NOT WRITE IN THIS AREA

- (4)

DO NOT WRITE IN THIS AREA

Question 3 continued

<https://britishstudentroom-b430a.web.app/>

Leave blank



DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Question 3 continued

Lined area for writing the answer to Question 3.



DO NOT WRITE IN THIS AREA

Question 3 continued

<https://britishstudentroom-b430a.web.app/>

Leave blank

Lined area for writing the answer to Question 3.

(Total 10 marks)

Q3

Grading box with two empty cells.



4. The position vector, $\mathbf{r}$ metres, of a particle P at time t seconds, relative to a fixed origin O , is given by

$$\mathbf{r} = (t - 3)\mathbf{i} + (1 - 2t)\mathbf{j}$$

- (a) Find, to the nearest degree, the size of the angle between $\mathbf{r}$ and the vector $\mathbf{j}$, when $t = 2$
- (3)**

- (b) Find the values of t for which the distance of P from O is 2.5 m. (5)

DO NOT WRITE IN THIS AREA

Question 4 continued

<https://britishstudentroom-b430a.web.app/>

Leave blank



Question 4 continued

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



Question 4 continued

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Q4

(Total 8 marks)



P 6 6 6 4 9 A 0 1 7 3 2

A small bead of mass 0.2 kg is attached to the end P of a light rod PQ . The bead is threaded onto a fixed vertical rough wire.

The bead is held in equilibrium with the rod PQ inclined to the wire at an angle α , where $\tan \alpha = \frac{4}{3}$, as shown in Figure 2.

The bead is modelled as a particle.

- (a) Find the magnitude and direction of the friction force acting on the bead when $T = 2.5$

(3)

The coefficient of friction between the bead and the wire is μ .

Given that the greatest possible value of T is 6.125

- (b) find the value of μ .

(7)

DO NOT WRITE IN THIS AREA

Question 5 continued

<https://britishstudentroom-b430a.web.app/>

Leave blank



Leave
blank

Leave blank

<https://britishstudentroom-b430a.web.app/>

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Question 5 continued



DO NOT WRITE IN THIS AREA

Question 5 continued

<https://britishstudentroom-b430a.web.app/>

Leave blank

Lined area for writing the answer to Question 5.

(Total 10 marks)

Q5

Two small boxes for marking the question.



A velocity-time graph for a particle moving in a straight line. The vertical axis is labeled $v \text{ m s}^{-1}$ and the horizontal axis is labeled $t \text{ seconds}$. The origin is marked O . The graph is a straight line that starts at a positive velocity on the v -axis, crosses the t -axis at 2.5 , and continues into negative velocities. A point is marked on the t -axis at 7 .

A small ball is thrown vertically upwards at time $t = 0$ from a point A which is above horizontal ground. The ball hits the ground 7 s later.

The velocity-time graph shown in Figure 3 represents the motion of the ball for $0 \leq t \leq 7$

- (a) Find the speed with which the ball is thrown. (2)
- (b) Find the height of A above the ground. (3)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Question 6 continued

<https://britishstudentroom-b430a.web.app/>

Leave blank

Q6

(Total 5 marks)



7.

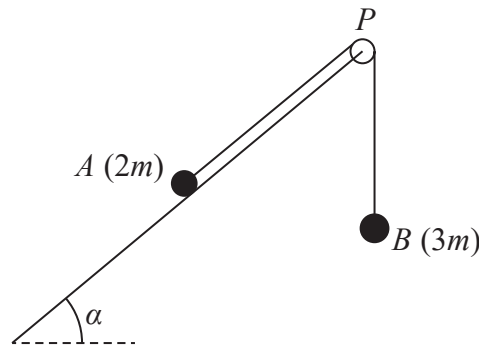


Figure 4

One end of a light inextensible string is attached to a particle A of mass $2m$. The other end of the string is attached to a particle B of mass $3m$. The string passes over a small, smooth, light pulley P which is fixed at the top of a rough inclined plane. The plane is inclined to the horizontal at an angle α , where $\tan \alpha = \frac{3}{4}$

Particle A is held at rest on the plane with the string taut and B hanging freely below P , as shown in Figure 4. The section of the string AP is parallel to a line of greatest slope of the plane.

The coefficient of friction between A and the plane is $\frac{1}{2}$

Particle A is released and begins to move up the plane.

For the motion before A reaches the pulley,

- (a) (i) write down an equation of motion for A ,
- (ii) write down an equation of motion for B ,
- (4)
- (b) find, in terms of g , the acceleration of A ,
- (5)
- (c) find the magnitude of the force exerted on the pulley by the string.
- (4)
- (d) State how you have used the information that P is a smooth pulley.
- (1)

DO NOT WRITE IN THIS AREA

Question 7 continued

Lined area for writing the answer to Question 7.

<https://britishstudentroom-b430a.web.app/>

Leave blank



DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Question 7 continued

Lined area for writing the answer to Question 7.



Question 7 continued

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Lined area for writing the answer to Question 7.

Q7

(Total 14 marks)



DO NOT WRITE IN THIS AREA

- (d) Find the position vector of the ship when it is due south of the lighthouse. (4)

DO NOT WRITE IN THIS AREA

Question 8 continued

Lined area for writing the answer to Question 8.

<https://britishstudentroom-b430a.web.app/>

Leave blank



Question 8 continued

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



DO NOT WRITE IN THIS AREA

Question 8 continued

Lined area for writing the answer to Question 8.

<https://britishstudentroom-b430a.web.app/>

Leave blank



Q8

DO NOT WRITE IN THIS AREA

11

END