

Please check the examination details below before entering your candidate information

Candidate surname

Other names

Pearson Edexcel
International
Advanced Level

Centre Number

--	--	--	--	--

Candidate Number

--	--	--	--	--

Thursday 20 June 2019

Morning (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 (Blue), 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.
- Inexact answers should be given to three significant figures unless otherwise stated.

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 ►

P55876A

©2019 Pearson Education Ltd.

1/1/1/1/1/



Pearson

1. A truck of mass 800 kg is moving on a straight road that is inclined at an angle α to the horizontal, where $\sin \alpha = \frac{1}{10}$. When the truck is moving up the road at a constant speed of 12 m s^{-1} , the engine of the truck is working at a constant rate of 15 kW . The resistance to the motion of the truck from non-gravitational forces is modelled as a constant force of magnitude R newtons.

(4)

(b) Find the acceleration of the truck at the instant when it is moving at 12 m s^{-1} .

(3)

DO NOT WRITE IN THIS AREA



Question 1 continued

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Leave
blank

Question 1 continued

Lined area for writing the answer to Question 1.

(Total 7 marks)

Q1



Question 2 continued

Handwriting practice area with 30 horizontal lines.

(Total 10 marks)

Q2	
----	--



3. A particle P of mass 0.4 kg is moving with velocity $u\mathbf{i} \text{ m s}^{-1}$, where u is a positive constant. The particle receives an impulse $(3\mathbf{i} + 6\mathbf{j}) \text{ N s}$.

Immediately after receiving the impulse, the speed of P is $2u \text{ m s}^{-1}$.

Find the value of u .

(5)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



DO NOT WRITE IN THIS AREA

Leave
blank

Question 3 continued

Lined area for writing the answer to Question 3 continued.

(Total 5 marks)

Q3



4.

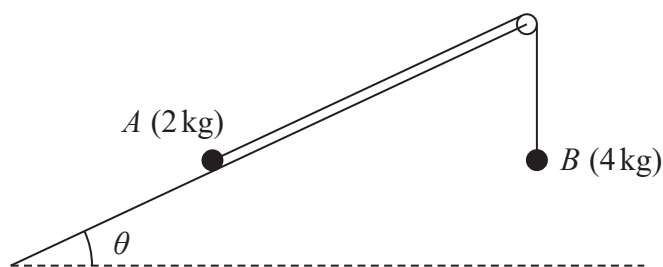


Figure 1

A particle A of mass 2 kg is attached to one end of a light inextensible string. A particle B of mass 4 kg is attached to the other end of the string. The string passes over a small smooth pulley. The pulley is fixed at the top of a fixed rough plane, which is inclined to the horizontal at an angle θ , where $\tan \theta = \frac{3}{4}$. Initially the particles are held at rest with A on the plane, B hanging freely below the pulley and the string taut, as shown in Figure 1. The part of the string from A to the pulley lies along a line of greatest slope of the plane. The coefficient of friction between A and the plane is $\frac{1}{5}$.

At time $t = 0$, the particles are released from rest, with A more than 1.5 m from the pulley and B more than 1.5 m above the ground.

At time $t = T$ seconds, the speed of B is $v \text{ ms}^{-1}$ and B is 1.5 m below its initial position.

- (a) Find the total potential energy lost by the system in the interval $0 \leq t \leq T$. (3)
- (b) Find the work done against friction in the interval $0 \leq t \leq T$. (3)
- (c) Use the work-energy principle to find the value of v . (3)



Question 4 continued

Handwriting practice area with 30 horizontal lines.

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



Leave
blank

Question 4 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

Leave
blank

Question 4 continued

Lined area for writing the answer to Question 4.

(Total 9 marks)

Q4



Question 5 continued

Handwriting practice area with 30 horizontal lines.

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

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

(Total 11 marks)

Q5



- (6)

(5)

Question 6 continued

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



Leave
blank

Question 6 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

Leave
blank

Question 6 continued

Handwriting practice area with 30 horizontal lines.

(Total 11 marks)

Q6



Question 7 continued

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



Question 7 continued

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Leave
blank

Question 7 continued

Blank lined area for writing the answer to Question 7.

(Total 11 marks)

Q7



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

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

--	--

TOTAL FOR PAPER: 75 MARKS

28

