

HA031537165

Please check the examination details below before entering your candidate information			
Candidate surname		Other names	
Pearson Edexcel International Advanced Level		Centre Number	Candidate Number
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.
- Good luck with your examination.

Turn over ►

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P 6 5 2 6 6 A 0 1 3 2

- Immediately before the collision the speed of P is ku , where k is a constant, and the speed of Q is $2u$.

The direction of motion of Q is reversed by the collision.

- (2)

- (5)

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Q1

3

Turn over ►



- The car is modelled as a particle.

In the first three seconds after passing A the car travels 20 m.

The speed of the car as it passes point B is 20 m s^{-1}

(8)

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Question 2 continued

(Total 8 marks)

Q2

- (b) Find the value of λ . (5)

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[illegible]

Question 3 continued

Lined area for writing the answer to Question 3.

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DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



Question 3 continued

(Total 9 marks)

Q3



4.

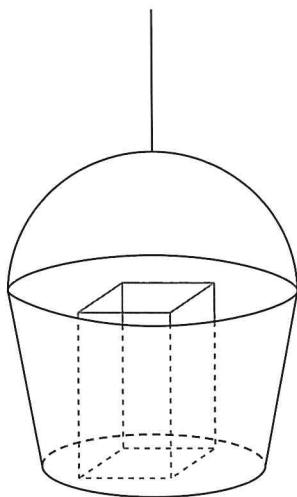


Figure 1

Figure 1 shows a large bucket used by a crane on a building site to move materials between the ground and the top of the building. The mass of the bucket is 15 kg.

The bucket is attached to a vertical cable with the bottom of the bucket horizontal. The cable is modelled as light and inextensible.

When the bucket is on the ground, a bag of cement of mass 25 kg is placed in the bucket.

The bucket with the bag of cement moves vertically upwards with constant acceleration 0.2 ms^{-2} . Air resistance is modelled as being negligible.

(a) Find the tension in the cable.

(3)

At the top of the building, the bag of cement is removed. A box of tools of mass 12 kg is now placed in the bucket.

Later on the bucket with the box of tools is moving vertically downwards with constant deceleration 0.1 ms^{-2} . Air resistance is again modelled as being negligible.

(b) Find the magnitude of the normal reaction between the bucket and the box of tools.

(3)



Question 4 continued

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[illegible]

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Question 4 continued

(Total 6 marks)

Q4

Question 5 continued

DONOT WALK IN THIS AREA



DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

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Question 5 continued

(Total 9 marks)

Q5



DO NOT WRITE IN THIS AREA

- (c) Find the distance BC . (5)

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Question 6 continued

CONCISE AND PRACTICAL

Question 6 continued

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



Question 6 continued

(Total 13 marks)

Q6



Diagram of a horizontal beam AB of length $8a$ m. Point C is at the left end A , and point D is at the right end B . The distance between C and D is $8a$ m. The distance from A to C is a m, and the distance from D to B is $2a$ m.

A non-uniform beam AB , of mass 60 kg and length $8a$ metres, rests in equilibrium in a horizontal position on two vertical supports. One support is at C , where $AC = a$ metres and the other support is at D , where $DB = 2a$ metres, as shown in Figure 2.

By modelling the beam as a non-uniform rod whose centre of mass is at a distance x metres from A ,

- (5)

The beam remains in equilibrium in a horizontal position.

The magnitude of the normal reaction between the beam and the support at C is now equal to the magnitude of the normal reaction between the beam and the support at D .

By modelling the box as a particle,

- (5)

[illegible]

Question 7 continued

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Question 7 continued

Lined area for writing the answer to Question 7.



Question 7 continued

Lined area for writing the answer to Question 7.

(Total 10 marks)

Q7

Grading box for Question 7.



- At time $t = 0$, tram A starts to move. Tram A moves with constant acceleration 2 m s^{-2} for 5 seconds and then continues to move along the track at constant speed.

At time $t = 20$ seconds, tram B starts from rest and moves in the same direction as tram A . Tram B moves with constant acceleration 3 m s^{-2} for 4 seconds and then continues to move along the track at constant speed.

The trams are modelled as particles.

- (a) Sketch, on the same axes, a speed-time graph for the motion of tram A and a speed-time graph for the motion of tram B , from $t = 0$ to the instant when tram B overtakes tram A .

(3)

At the instant when the two trams are moving with the same speed, tram A is d metres in front of tram B .

- (b) Find the value of d .

(5)

- (c) Find the distance of the trams from the depot at the instant when tram B overtakes tram A .

(5)

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Question 8 continued

Lined area for writing the answer to Question 8.



Question 8 continued

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Question 8 continued

Handwriting practice lines for Question 8.

Q8

(Total 13 marks)

TOTAL FOR PAPER: 75 MARKS

END

