

Please check the examination details below before entering your candidate information

Candidate surname					Other names								
Pearson Edexcel International Advanced Level					Centre Number					Candidate Number			
					<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>					<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>			
Thursday 14 May 2020													
Afternoon (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 (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.

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 ►

P65760A

©2020 Pearson Education Ltd.

1/1/1/



Pearson

Leave
blank

4.

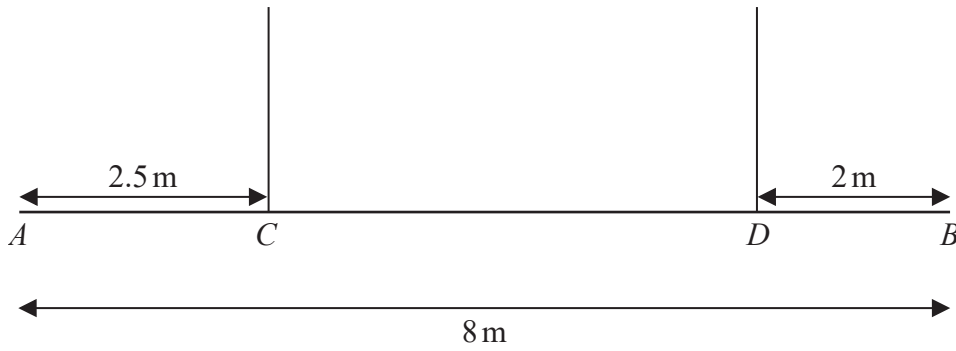


Figure 2

A non-uniform beam AB has length 8 m and mass M kg.

The centre of mass of the beam is d metres from A .

The beam is supported in equilibrium in a horizontal position by two vertical light ropes. One rope is attached to the beam at C , where $AC = 2.5$ m and the other rope is attached to the beam at D , where $DB = 2$ m, as shown in Figure 2.

A gymnast, of mass 64 kg, stands on the beam at the point X , where $AX = 1.875$ m, and the beam remains in equilibrium in a horizontal position but is now on the point of tilting about C .

The gymnast then dismounts from the beam.

A second gymnast, of mass 48 kg, now stands on the beam at the point Y , where $YB = 0.5$ m, and the beam remains in equilibrium in a horizontal position but is now on the point of tilting about D .

The beam is modelled as a non-uniform rod and the gymnasts are modelled as particles.

Find the value of M .

(8)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



Leave
blank

5. A particle P is moving in a plane with constant acceleration.
The velocity, $\mathbf{v} \text{ m s}^{-1}$, of P at time t seconds is given by

$$\mathbf{v} = (7 - 5t)\mathbf{i} + (12t - 20)\mathbf{j}$$

- (a) Find the speed of P when $t = 2$ (3)
- (b) Find, to the nearest degree, the size of the angle between the direction of motion of P and the vector \mathbf{j} , when $t = 2$ (3)

The constant acceleration of P is $\mathbf{a} \text{ m s}^{-2}$

- (c) Find \mathbf{a} in terms of \mathbf{i} and \mathbf{j} (3)
- (d) Find the value of t when P is moving in the direction of the vector $(-5\mathbf{i} + 8\mathbf{j})$ (4)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



Leave
blank

6.

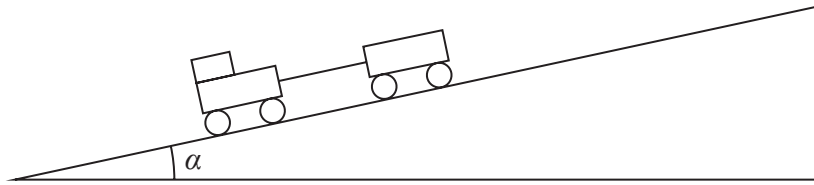


Figure 3

A railway engine of mass 1500 kg is attached to a railway truck of mass 500 kg by a straight rigid coupling. The engine pushes the truck up a straight track, which is inclined to the horizontal at an angle α , where $\sin \alpha = \frac{7}{25}$. The coupling is parallel to the track and parallel to the direction of motion, as shown in Figure 3.

The engine produces a constant driving force of magnitude D newtons. The engine and the truck experience constant resistances to motion, from non-gravitational forces, of magnitude 1200 N and 500 N respectively.

The thrust in the coupling is 2000 N.

The coupling is modelled as a light rod.

(a) Find the acceleration of the engine and the truck. (4)

(b) Find the value of D . (4)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



Leave
blank

8.

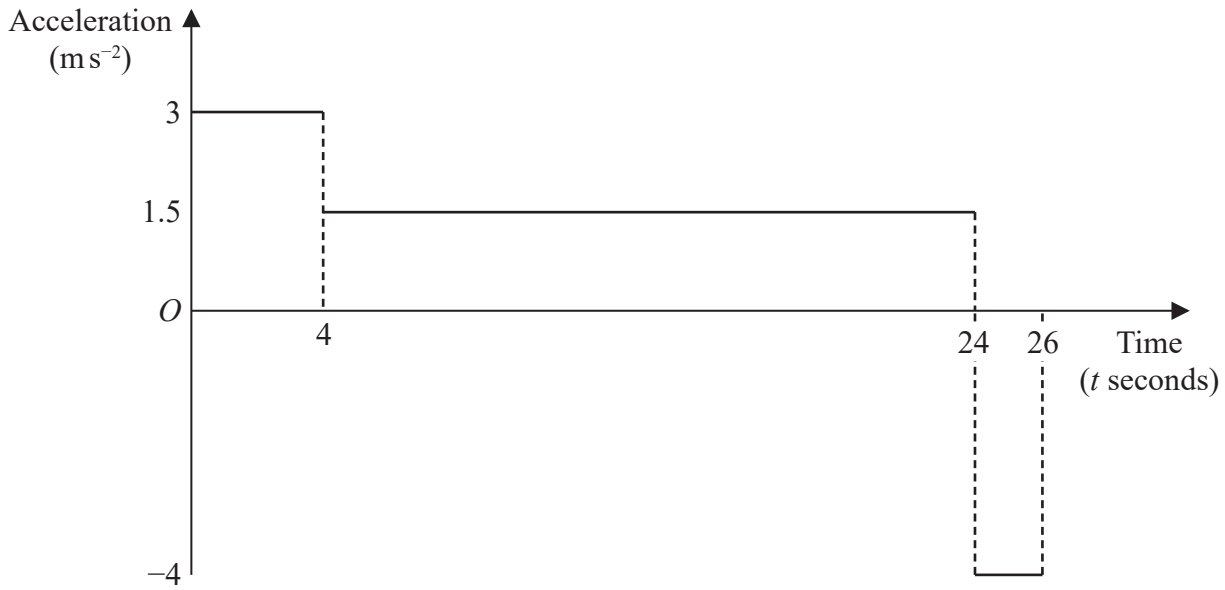


Figure 5

The acceleration-time graph shown in Figure 5 represents part of a journey made by a car along a straight horizontal road. The car accelerated from rest at time $t = 0$

- (a) Find the distance travelled by the car during the first 4 s of its journey. (2)
- (b) Find the total distance travelled by the car during the first 26 s of its journey. (6)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



