

## Instructions for the Examinations Officer

Pearson Edexcel International A level Mathematics Mechanics Paper 1 WME01  
Date: 10 January 2025

There is an error on page 2 of this question paper. A Clarification Notice is enclosed below.

At the start of the examination the Clarification Notice must be read aloud to the candidates taking the examination.

All other questions on the paper have been printed correctly.

# Clarification Notice

There is an error on page 2, Question 1b.

Please amend your question paper as follows:

The question currently reads:

- The resultant of the four forces acts in **the direction of** the vector  $(7i + 2j)$ .

It should read:

- The resultant of the four forces acts in **a direction that is parallel to** the vector  $(7i + 2j)$ .

Please check the examination details below before entering your candidate information

Candidate surname					Other names				
Centre Number					Candidate Number				

**Pearson Edexcel International Advanced Level**

**Friday 10 January 2025**

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 (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 7 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. A particle of mass 2.5 kg moves on a smooth horizontal plane under the action of three horizontal forces,  $\mathbf{F}_1$ ,  $\mathbf{F}_2$  and  $\mathbf{F}_3$ , where

$$\mathbf{F}_1 = (6\mathbf{i} + 8\mathbf{j})\text{N}$$

$$\mathbf{F}_2 = (-16\mathbf{i} + 2\mathbf{j})\text{N}$$

$$\mathbf{F}_3 = (-2\mathbf{i} + 8\mathbf{j})\text{N}$$

- (a) Find the magnitude of the acceleration of the particle.

(4)

A fourth force,  $\mathbf{F}_4 = (p\mathbf{i} + p\mathbf{j})\text{N}$ , where  $p$  is a constant, is added.

The resultant of the four forces acts in the direction of the vector  $(7\mathbf{i} + 2\mathbf{j})$ .

- (b) Find the value of  $p$ .

(4)

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4.

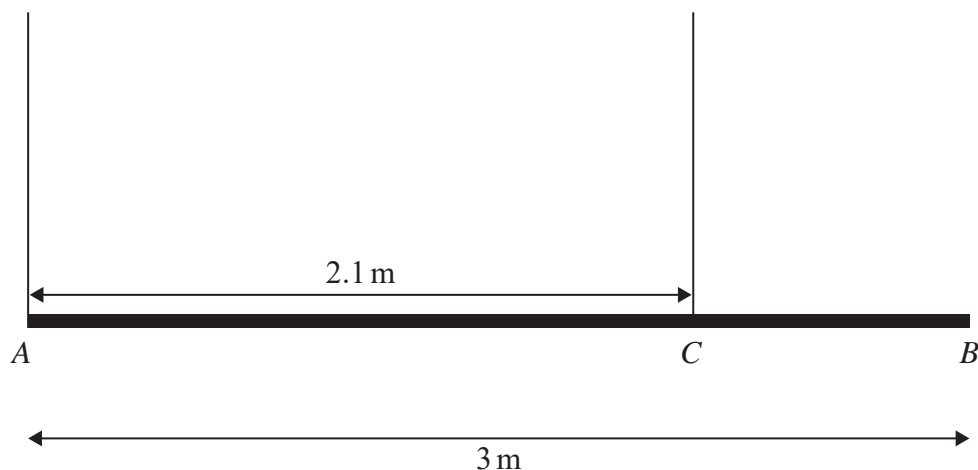


Figure 2

A uniform rod  $AB$  has length 3 m and weight  $W$  newtons.

The rod is suspended by two light vertical ropes.

One rope is attached to the rod at  $A$  and the other rope is attached to the rod at  $C$ , where  $AC = 2.1$  m.

The rod is in equilibrium in a horizontal position, as shown in Figure 2.

The tension in the rope at  $C$  is 350 N.

- (a) Show that  $W = 490$  (3)

A particle  $P$  of weight 210 N is attached to the rod at a distance  $d$  metres from  $A$ .

The tension in the rope at  $C$  is now 600 N.

The rod remains in equilibrium in a horizontal position.

- (b) Find the value of  $d$ . (3)

Particle  $P$  is removed from the rod.

A particle  $Q$  of weight  $X$  newtons is now attached at  $B$ .

The rod remains in equilibrium in a horizontal position and is now on the point of tilting.

- (c) Find the value of  $X$ . (4)

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5. [In this question  $\mathbf{i}$  and  $\mathbf{j}$  are horizontal perpendicular unit vectors and position vectors are given relative to a fixed origin.]

In a game, a ball  $B$  is rolled across a horizontal surface towards a fixed target. The ball is modelled as a particle moving with constant velocity.

At time  $t = 1$  s, the position vector of  $B$  is  $(-2\mathbf{i} + 5\mathbf{j})$  m.

At time  $t = 9$  s, the position vector of  $B$  is  $(10\mathbf{i} - 3\mathbf{j})$  m.

- (a) Find the velocity of the ball. (3)

The position vector of the target is  $(13\mathbf{i} - 5\mathbf{j})$  m.

- (b) Use the model to find the distance of  $B$  from the target at time  $t = 7$  s. (4)

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7.

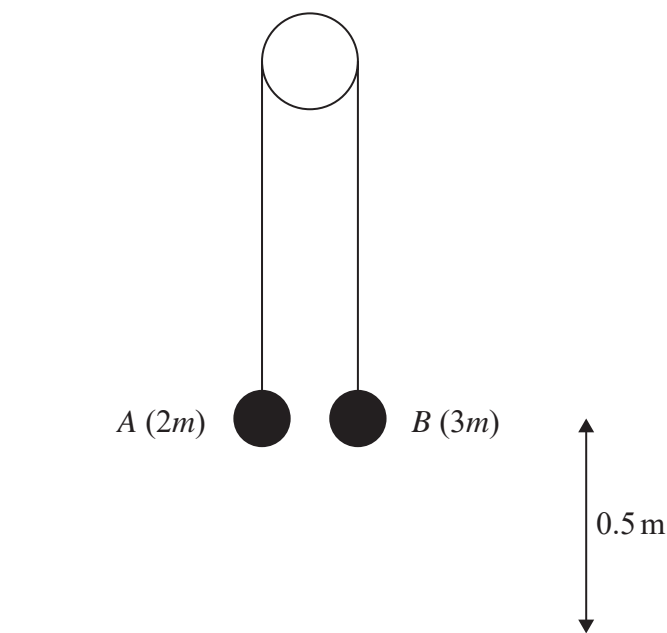


Figure 4

One end of a light inextensible string is attached to a particle  $A$  of mass  $2m$ .  
 The other end is attached to a particle  $B$  of mass  $3m$ .  
 The string passes over a small smooth fixed pulley.  
 The string is taut and both straight parts of the string are vertical.  
 Both particles are held at a distance  $0.5\text{ m}$  above a horizontal surface, as shown in Figure 4.

The system is released from rest and  $B$  moves downwards.

(a) Find the tension in the string in terms of  $m$  and  $g$ . (5)

(b) Find the speed of  $B$  at the instant it strikes the surface. (4)

In the subsequent motion,  $A$  does not reach the pulley and  $B$  does not rebound after it strikes the surface.

(c) Find the time from the instant when the system is released from rest to the instant when  $A$  first reaches a height of  $1.06\text{ m}$  above the surface. (6)

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