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Surname	Other names
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**Pearson Edexcel**  
**International**  
**Advanced Level**

Centre Number	Candidate Number																
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# Mechanics M1

## Advanced/Advanced Subsidiary

Wednesday 25 October 2017 – Morning <b>Time: 1 hour 30 minutes</b>	Paper Reference <b>WME01/01</b>
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<b>You must have:</b> Mathematical Formulae and Statistical Tables (Blue)	Total Marks
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**Candidates may use any calculator allowed by the regulations of the Joint Council for Qualifications. 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). Coloured pencils and highlighter pens must not be used.
- **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 two significant figures or three significant figures.
- When a calculator is used, the answer should be given to an appropriate degree of accuracy.

### Information

- 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.

Turn over ►

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2.

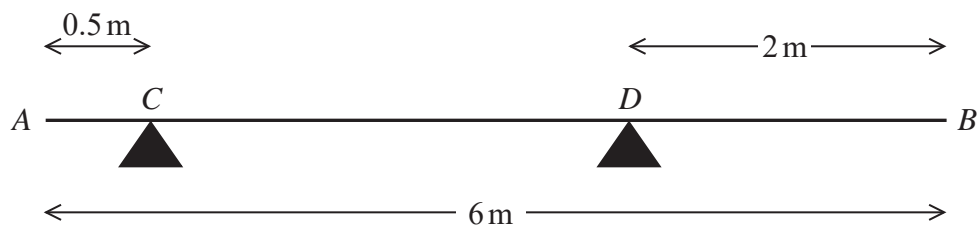


Figure 1

A metal girder  $AB$ , of weight  $1080\text{ N}$  and length  $6\text{ m}$ , rests in equilibrium in a horizontal position on two supports, one at  $C$  and one at  $D$ , where  $AC = 0.5\text{ m}$  and  $BD = 2\text{ m}$ , as shown in Figure 1. A boy of weight  $400\text{ N}$  stands on the girder at  $B$  and the girder remains horizontal and in equilibrium. The boy is modelled as a particle and the girder is modelled as a uniform rod.

(a) Find

(i) the magnitude of the reaction on the girder at  $C$ ,(ii) the magnitude of the reaction on the girder at  $D$ .

(6)

The boy now stands at a point  $E$  on the girder, where  $AE = x$  metres, and the girder remains horizontal and in equilibrium. Given that the magnitude of the reaction on the girder at  $D$  is now  $520\text{ N}$  greater than the magnitude of the reaction on the girder at  $C$ ,

(b) find the value of  $x$ .

(5)

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**Question 5 continued**

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**(Total 11 marks)**

**Q5**

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7.

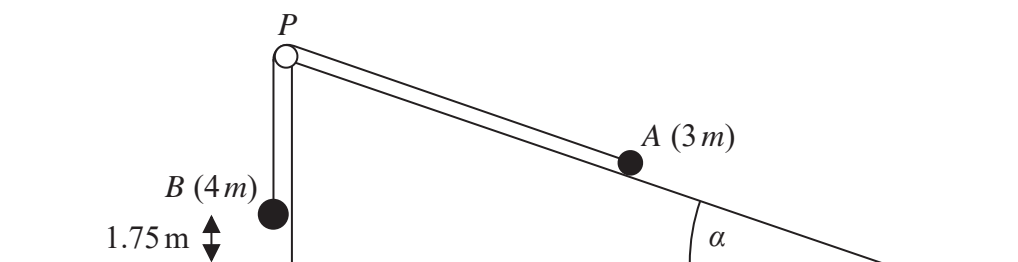


Figure 2

Figure 2 shows two particles  $A$  and  $B$ , of masses  $3m$  and  $4m$  respectively, attached to the ends of a light inextensible string. Initially  $A$  is held at rest on the surface of a fixed rough inclined plane. The plane is inclined to the horizontal at an angle  $\alpha$  where  $\tan \alpha = \frac{3}{4}$ . The coefficient of friction between  $A$  and the plane is  $\frac{1}{4}$ . The string passes over a small smooth light pulley  $P$  which is fixed at the top of the plane. The part of the string from  $A$  to  $P$  is parallel to a line of greatest slope of the plane. The particle  $B$  hangs freely and is vertically below  $P$ . The system is released from rest with the string taut and with  $B$  at a height of  $1.75\text{ m}$  above the ground. In the subsequent motion,  $A$  does not hit the pulley.

For the period before  $B$  hits the ground,

(a) write down an equation of motion for each particle. (4)

(b) Hence show that the acceleration of  $B$  is  $\frac{8}{35}g$ . (5)

(c) Explain how you have used the fact that the string is inextensible in your calculation. (1)

When  $B$  hits the ground,  $B$  does not rebound and comes immediately to rest.

(d) Find the distance travelled by  $A$  from the instant when the system is released to the instant when  $A$  first comes to rest. (7)

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