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Surname

Other names

Pearson Edexcel
International
Advanced Level

Centre Number

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Candidate Number

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Mechanics M1

Advanced/Advanced Subsidiary

Monday 22 January 2018 – Afternoon
Time: 1 hour 30 minutes

Paper Reference

WME01/01**You must have:**

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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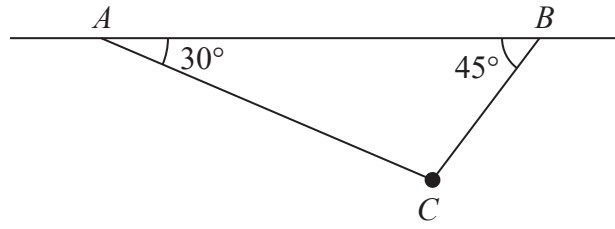


Figure 1

A particle of weight W is attached at C to two light inextensible strings AC and BC . The other ends of the strings are attached to fixed points A and B on a horizontal ceiling. The particle hangs in equilibrium with the strings in a vertical plane and with AC and BC inclined to the horizontal at 30° and 45° respectively, as shown in Figure 1.

Find, in terms of W ,

- (i) the tension in AC ,
- (ii) the tension in BC .

(7)

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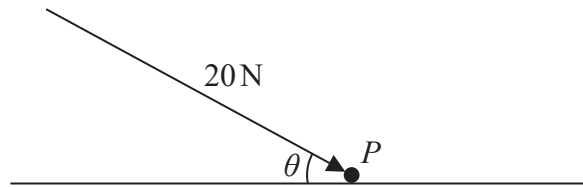


Figure 2

A particle P of weight 40 N lies at rest in equilibrium on a fixed rough horizontal surface. A force of magnitude 20 N is applied to P . The force acts at angle θ to the horizontal, as shown in Figure 2. The coefficient of friction between P and the surface is μ .

Given that the particle remains at rest, show that

$$\mu \geq \frac{\cos \theta}{2 + \sin \theta}$$

(6)

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6. [In this question \mathbf{i} and \mathbf{j} are perpendicular horizontal unit vectors.]

A particle P of mass 2 kg moves under the action of two forces, $(2\mathbf{i} + 3\mathbf{j})$ N and $(4\mathbf{i} - 5\mathbf{j})$ N.

(a) Find the magnitude of the acceleration of P .

(4)

At time $t = 0$, P has velocity $(-u\mathbf{i} + u\mathbf{j})$ m s⁻¹, where u is a positive constant.

At time $t = T$ seconds, P has velocity $(10\mathbf{i} + 2\mathbf{j})$ m s⁻¹.

(b) Find

(i) the value of T ,

(ii) the value of u .

(5)

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