

Centre No.						Paper Reference							Surname	Initial(s)
Candidate No.						6	6	7	7	/	0	1	Signature	

Paper Reference(s)

6677/01

Edexcel GCE

Mechanics M1

Advanced/Advanced Subsidiary

Friday 6 June 2014 – Afternoon

Time: 1 hour 30 minutes

Examiner's use only

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Team Leader's use only

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Materials required for examination

Mathematical Formulae (Pink)

Items included with question papers

Nil

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 or symbolic differentiation/integration, or have retrievable mathematical formulae stored in them.

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature. Check that you have the correct question paper.

Answer ALL the questions.

You must write your answer to each question in the space following the question.

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 for Candidates

A booklet 'Mathematical Formulae and Statistical Tables' is provided.

Full marks may be obtained for answers to ALL questions.

The marks for individual questions and the parts of questions are shown in round brackets: e.g. (2).

There are 7 questions in this question paper. The total mark for this paper is 75.

There are 28 pages in this question paper. Any blank pages are indicated.

Advice to Candidates

You must ensure that your answers to parts of questions are clearly labelled.

You should show sufficient working to make your methods clear to the Examiner.

Answers without working may not gain full credit.

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Figure 1

Given that the tension in BC is 6 N, find

- (a) the tension in AC , (3)
- (b) the value of W . (3)



Q1

(Total 6 marks)



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Diagram of a beam AB of length 3 m inclined at 40° to the horizontal. A horizontal force of 10 kN is applied at point A , perpendicular to the beam. A vertical force of 15 kN is applied at point B , perpendicular to the beam.

Figure 2

A rough plane is inclined at 40° to the horizontal. Two points A and B are 3 metres apart and lie on a line of greatest slope of the inclined plane, with A above B , as shown in Figure 2. A particle P of mass m kg is held at rest on the plane at A . The coefficient of friction between P and the plane is $\frac{1}{2}$. The particle is released.

- (a) Find the acceleration of P down the plane. (5)
- (b) Find the speed of P at B . (2)





Q2

(Total 7 marks)



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3. A ball of mass 0.3 kg is released from rest at a point which is 2 m above horizontal ground. The ball moves freely under gravity. After striking the ground, the ball rebounds vertically and rises to a maximum height of 1.5 m above the ground, before falling to the ground again. The ball is modelled as a particle.
- (a) Find the speed of the ball at the instant before it strikes the ground for the first time. (2)
- (b) Find the speed of the ball at the instant after it rebounds from the ground for the first time. (2)
- (c) Find the magnitude of the impulse on the ball in the first impact with the ground. (2)
- (d) Sketch, in the space provided, a velocity-time graph for the motion of the ball from the instant when it is released until the instant when it strikes the ground for the second time. (3)
- (e) Find the time between the instant when the ball is released and the instant when it strikes the ground for the second time. (4)

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Question 3 continued



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The diagram shows a rectangle with vertices labeled A (bottom-left), B (bottom-right), C (top-right), and D (top-left). The horizontal side AB is labeled with a dimension line below it as $d \text{ m}$. The vertical side BC is labeled with a dimension line to its right as 4 m .

Figure 3

(a) Find the value of d .

(6)

(b) Find the value of k .

(6)





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(Total 12 marks)

Q4







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(Total 12 marks)

Q5



6.

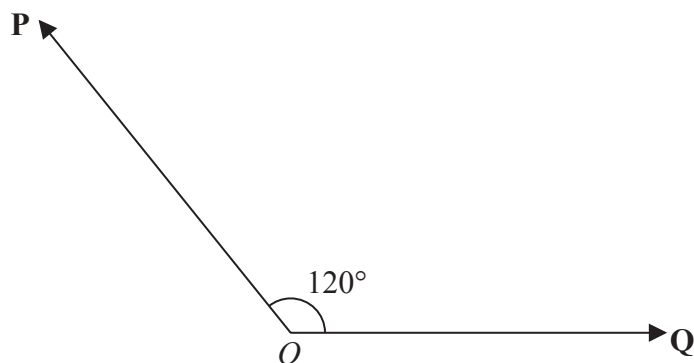


Figure 4

Given that the magnitude of \mathbf{R} is $3X$ newtons, find, giving your answers to 3 significant figures

- (a) the value of X ,
- (5)

- (b) the magnitude of $(\mathbf{P} - \mathbf{Q})$.

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(Total 9 marks)

Q6



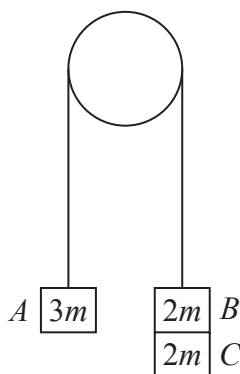


Figure 5

(a) (i) Show that the acceleration of A is $\frac{g}{7}$

(ii) Find the tension in the string as A ascends.

(7)

(b) Find the speed of A at the instant when it is 0.7 m above its original position.

(2)

(c) Find the acceleration of A at the instant after C separates from B .

(4)

(d) Find the greatest height reached by A above its original position.

(3)







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(Total 16 marks)

Q7

TOTAL FOR PAPER: 75 MARKS

END

