

Write your name here

Surname

Other names

Pearson Edexcel
International
Advanced Level

Centre Number

--	--	--	--	--

Candidate Number

--	--	--	--

Mechanics M2

Advanced/Advanced Subsidiary

Friday 22 June 2018 – Morning

Time: 1 hour 30 minutes

Paper Reference

WME02/01

You must have:

Mathematical Formulae and Statistical Tables (Blue)

Total Marks

--

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 ►

P51416A

©2018 Pearson Education Ltd.

1/1/1




Pearson

Leave
blank

Question 3 continued

Lined writing area for Question 3 continued.

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

(Total 8 marks)

Q3



P 5 1 4 1 6 A 0 1 1 2 8

4.

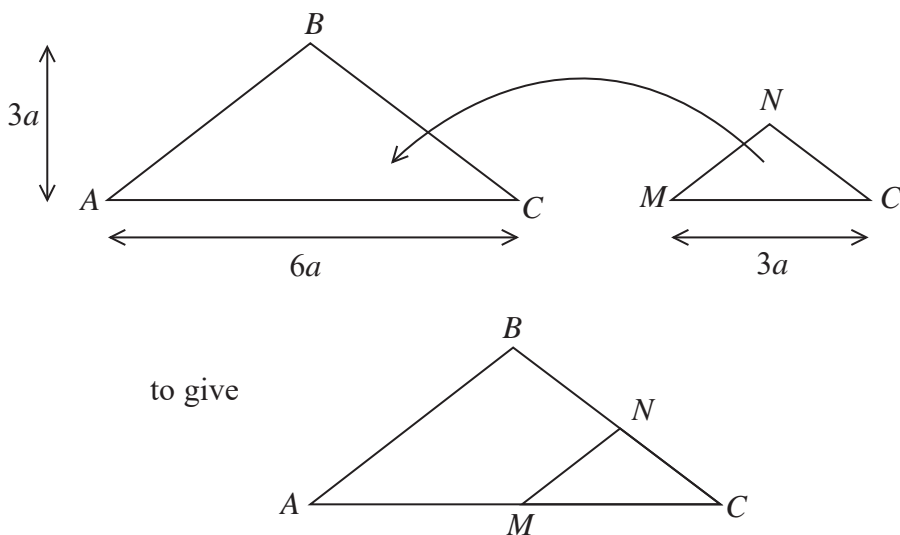


Figure 2

The uniform lamina ABC is an isosceles triangle with $AB = BC$, $AC = 6a$ and the distance from B to AC is $3a$.

The uniform lamina MNC is an isosceles triangle with $MN = NC$ and $MC = 3a$. Triangles ABC and MNC are similar and are made of the same material.

The lamina L is formed by fixing triangle MNC on top of triangle ABC , as shown in Figure 2.

(a) Show that the distance of the centre of mass of L from AC is $\frac{9}{10}a$ (5)

The lamina L is freely suspended from B and hangs in equilibrium.

(b) Find, to the nearest degree, the size of the angle between AB and the downward vertical. (7)



DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Leave blank

Question 4 continued

Ruled writing area for the response to Question 4.

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



Leave blank

Question 5 continued

Lined writing area for the answer to Question 5.

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



P 5 1 4 1 6 A 0 1 7 2 8

Leave blank

Question 5 continued

Lined writing area for the answer to Question 5.

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Q5

--	--

(Total 12 marks)



Leave blank

6. A particle P is projected from a fixed point A with speed 12 m s^{-1} at an angle α above the horizontal and moves freely under gravity. As P passes through the point B on its path, P is moving with speed 8 m s^{-1} at an angle β below the horizontal.

(a) By considering energy, find the vertical distance between A and B . (4)

Particle P takes 1.5 seconds to travel from A to B .

(b) Find the size of angle α . (3)

(c) Find the size of angle β . (3)

(d) Find the length of time for which the speed of P is less than 8 m s^{-1} . (4)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



Leave blank

Question 6 continued

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Lined writing area for the answer to Question 6 continued.



Leave
blank

Question 6 continued

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



7. Three particles A , B and C have masses $2m$, $3m$ and $4m$ respectively. The particles lie at rest in a straight line on a smooth horizontal surface, with B between A and C . Particle A is projected towards B with speed u and collides directly with B . The coefficient of restitution between A and B is e . The kinetic energy of A immediately after the collision is one ninth of the kinetic energy of A immediately before the collision.

Given that the direction of motion of A is unchanged by the collision,

- (a) find the value of e . (7)

After the collision between A and B there is a direct collision between B and C . The coefficient of restitution between B and C is f , where $f < \frac{3}{4}$. The speed of B immediately after the collision with C is V .

- (b) (i) Express V in terms of f and u .
(ii) Hence show that there will be a second collision between A and B . (7)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



Leave blank

Question 7 continued

A large rectangular area containing approximately 30 horizontal lines for writing the answer to Question 7.

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



P 5 1 4 1 6 A 0 2 7 2 8

Leave blank

Question 7 continued

Lined writing area for Question 7 continued.

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Q7

(Total 14 marks)

TOTAL FOR PAPER: 75 MARKS

END

