

Write your name here

Surname

Other names

**Pearson Edexcel**  
**International**  
**Advanced Level**

Centre Number

--	--	--	--	--

Candidate Number

--	--	--	--	--

# Mechanics M2

## Advanced/Advanced Subsidiary

Wednesday 21 January 2015 – Afternoon  
**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 ►

P45062A

©2015 Pearson Education Ltd.

5/5/1/1/



P 4 5 0 6 2 A 0 1 2 8

**PEARSON**

(a) the magnitude of  $\mathbf{I}$ ,

(4)

(b) the kinetic energy lost by  $P$  as a result of receiving the impulse.

(3)

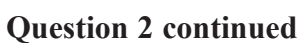


**(Total 7 marks)**









**(Total 9 marks)**

Q2







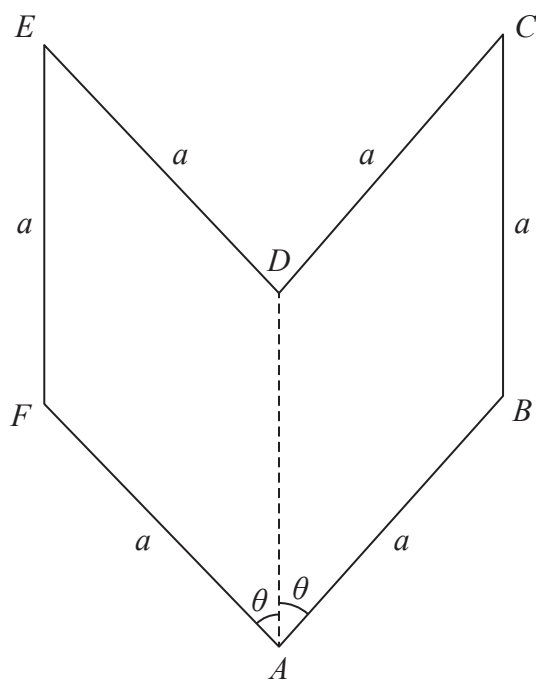


[illegible]

**(Total 12 marks)**

**Q3**





### Figure 1

(a) Show that  $\cos \theta = 0.8$

(5)

(b) Find the value of  $k$ .

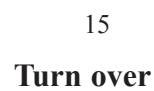
(4)

[illegible]

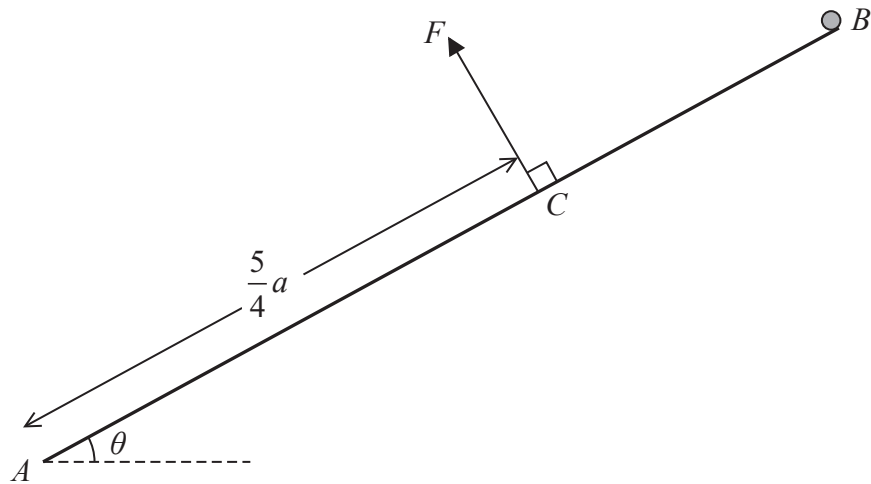
[illegible]

[illegible]

**(Total 9 marks)**



5.



**Figure 2**

A uniform rod  $AB$ , of mass  $m$  and length  $2a$ , is freely hinged to a fixed point  $A$ . A particle of mass  $km$  is fixed to the rod at  $B$ . The rod is held in equilibrium, at an angle  $\theta$  to the horizontal, by a force of magnitude  $F$  acting at the point  $C$  on the rod, where  $AC = \frac{5}{4}a$ , as shown in Figure 2. The line of action of the force at  $C$  is at right angles to  $AB$  and in the vertical plane containing  $AB$ .

Given that  $\tan \theta = \frac{3}{4}$

(a) show that  $F = \frac{16}{25}mg(1 + 2k)$ , (4)

(b) find, in terms of  $m$ ,  $g$  and  $k$ ,

- (i) the horizontal component of the force exerted by the hinge on the rod at  $A$ ,
- (ii) the vertical component of the force exerted by the hinge on the rod at  $A$ . (5)

Given also that the force acting on the rod at  $A$  acts at  $45^\circ$  above the horizontal,

(c) find the value of  $k$ . (3)

---

---

---

---

---

---

---





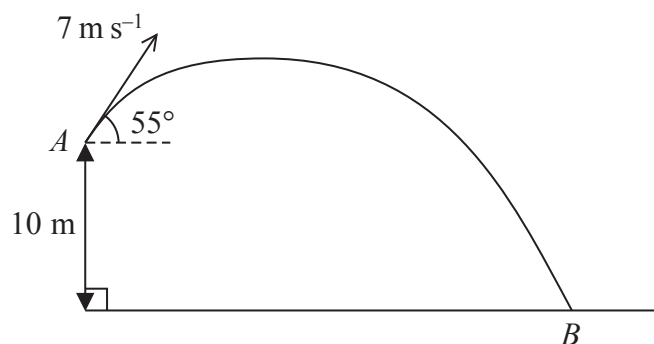


This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

**(Total 12 marks)**

**Q5**

**6.**



### Figure 3

A small ball  $P$  is projected with speed  $7 \text{ m s}^{-1}$  from a point  $A$   $10 \text{ m}$  above horizontal ground. The angle of projection is  $55^\circ$  above the horizontal. The ball moves freely under gravity and hits the ground at the point  $B$ , as shown in Figure 3.

Find

- (a) the speed of  $P$  as it hits the ground at  $B$ , (4)
- (b) the direction of motion of  $P$  as it hits the ground at  $B$ , (3)
- (c) the time taken for  $P$  to move from  $A$  to  $B$ . (5)



This image shows a full page of blank, lined paper. It features approximately 28 horizontal gray lines spaced evenly across the page, typical of standard notebook paper. The lines are thin and light gray, set against a plain white background. There are no margins, text, or other markings on the page.

This image shows a full page of blank, lined paper. It features approximately 28 horizontal gray lines spaced evenly apart, typical of standard notebook paper. The lines extend across the entire width of the page, leaving small margins at the top and bottom. There are no vertical lines, text, or other markings present.

**Q6**





[illegible]

[illegible]



Leave  
blank

**Question 7 continued**

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

**Q7**

**(Total 14 marks)**

**TOTAL FOR PAPER: 75 MARKS**

**END**

