Vrite your name here Surname	Other na	mes
Pearson Edexcel nternational Advanced Level	Centre Number	Candidate Number
Mechanics	- 111	
Advanced/Advanced		
	d Subsidiary	Paper Reference WME01/01

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 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 guestion 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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(5)	t=2 s.
(5)	

Question 1 continued	

2.	Particle P has mass $m \log A$ and particle Q has mass $3m \log A$. The particles are more in opposite directions along a smooth horizontal plane when they collide direction direction before the collision P has speed $4u \log A$ and Q has speed $ku \log A$ whis a constant. As a result of the collision the direction of motion of each particle is revealed the speed of each particle is halved.	oving ectly.
	(a) Find the value of k .	(4)
	(b) Find, in terms of m and u , the magnitude of the impulse exerted on P by Q .	(3)

Question 2 continued	1
	Q
	(Total 7 marks)

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3.

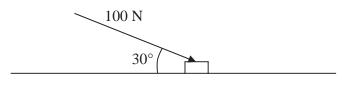


Figure 1

A small box is pushed along a floor. The floor is modelled as a rough horizontal plane and the box is modelled as a particle. The coefficient of friction between the box and the floor is $\frac{1}{2}$. The box is pushed by a force of magnitude 100 N which acts at an angle of 30° with the floor, as shown in Figure 1.

Given that the box moves with constant speed, find the mass of the box.	(7)

Question 3 continued	I	Leave blank
	Q	13
(Total 7 marks)		

4.	A beam AB has length 6 m and weight 200 N. The beam rests in a horizontal position on two supports at the points C and D , where $AC = 1$ m and $DB = 1$ m. Two children, Sophie and Tom, each of weight 500 N, stand on the beam with Sophie standing twice as far from the end B as Tom. The beam remains horizontal and in equilibrium and the magnitude of the reaction at D is three times the magnitude of the reaction at C . By modelling the beam as a uniform rod and the two children as particles, find how far Tom is standing from the end B .	Leave

Question 4 continued	Leav blan

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Question 4 continued	

Question 4 continued	
	(Total 7 marks)

Two cars P and Q are moving in the same direction along the same stranda. Car P is moving with constant speed 25 m s ⁻¹ . At time $t = 0$, P overt	aight horizontal
moving with constant speed 20 m s ⁻¹ . From $t = T$ seconds, P decelerates unto rest at a point X which is 800 m from the point where P overtook Q. Q decelerates uniformly, coming to rest at the same point X at the same in	iformly, coming From $t = 25 \text{ s}$,
(a) Sketch, on the same axes, the speed-time graphs of the two cars for $t = 0$ to the time when they both come to rest at the point X .	
	(4)
(b) Find the value of <i>T</i> .	(8)

Question 5 continued	Leav blan
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Question 5 continued	
	1

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49	ball is projected vertically upwards with a speed of 14.7 m s ⁻¹ from a point which makes a particle moving freely unvity, find	ch is nder
(a)	the greatest height, above the ground, reached by the ball,	(4)
(b)	the speed with which the ball first strikes the ground,	(3)
(c)	the total time from when the ball is projected to when it first strikes the ground.	(3)

Question 6 continued	Leav blan

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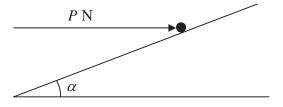


Figure 2

A particle of mass 0.4 kg is held at rest on a fixed rough plane by a horizontal force of magnitude P newtons. The force acts in the vertical plane containing the line of greatest slope of the inclined plane which passes through the particle. The plane is inclined to the horizontal at an angle α , where $\tan \alpha = \frac{3}{4}$, as shown in Figure 2.

The coefficient of friction between the particle and the plane is $\frac{1}{3}$.

Given that the particle is on the point of sliding up the plane, find

(a) the magnitude of the normal reaction between the particle and the plane,

(b) the value of *P*.

Question 7 continued	Leav blan

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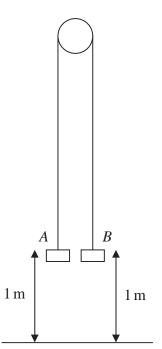


Figure 3

Two particles A and B have mass 0.4 kg and 0.3 kg respectively. The particles are attached to the ends of a light inextensible string. The string passes over a small smooth pulley which is fixed above a horizontal floor. Both particles are held, with the string taut, at a height of 1 m above the floor, as shown in Figure 3. The particles are released from rest and in the subsequent motion B does not reach the pulley.

(a) Find the tension in the string immediately after the particles are released.

(6)

(b) Find the acceleration of A immediately after the particles are released.

(2)

When the particles have been moving for 0.5 s, the string breaks.

(c) Find the further time that elapses until *B* hits the floor.

(9)

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TOTAL FOR PAPER: 75 MARKS	s
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