Mathematics M1

Past Paper

This resource was created and owned by Pearson Edexcel

WMF01

Surname	Other I	names
Pearson Edexcel nternational Advanced Level	Centre Number	Candidate Number
Mechanic	c M1	
Advanced/Advance		
	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 question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

P 4 3 0 6 8 A 0 1 2 8

Turn over ▶



Mathematics M1

www.mystudybro.comThis resource was created and owned by Pearson Edexcel

WME01

Leave
hlank

1.	Two small smooth balls A and B have mass 0.6 kg and 0.9 kg respectively. They are moving in a straight line towards each other in opposite directions on a smooth horizontal floor and collide directly. Immediately before the collision the speed of A is v m s ⁻¹ and the speed of B is 2 m s ⁻¹ . The speed of A is 2 m s ⁻¹ immediately after the collision and B is brought to rest by the collision.	l 1
	Find	
	(a) the value of v , (3)	,
	(b) the magnitude of the impulse exerted on A by B in the collision. (2))

Sur	~ ~	^	20	4 4	
Sur	nm	er	ZU	14	

'aper	This resource was created and owned by Pearson Edexcel	
Question 1 continu	ued	

www.mystudybro.com

Mathematics M1

This resource was created and owned by Pearson Edexcel

WME01

Leave blank

2. A ball is thrown vertically upwards with speed 20 m s⁻¹ from a point A, which is h metres above the ground. The ball moves freely under gravity until it hits the ground 5 s later.

(a) Find the value of h.

(3)

A second ball is thrown vertically downwards with speed w m s⁻¹ from A and moves freely under gravity until it hits the ground.

The first ball hits the ground with speed $V \, \mathrm{m \, s^{-1}}$ and the second ball hits the ground with speed $\frac{3}{4} \, V \, \mathrm{m \, s^{-1}}$.

(b) Find the value of w.

(5)

Sum		204	4
Sum	mer	Z U1	4

Paper	This resource was created and owned by Pearson Edexcel	,
Question 2 continu	ued	

This resource was created and owned by Pearson Edexcel

WME01

Leave blank

- 3. A particle P of mass 1.5 kg is placed at a point A on a rough plane which is inclined at 30° to the horizontal. The coefficient of friction between P and the plane is 0.6
 - (a) Show that P rests in equilibrium at A.

(5)

A horizontal force of magnitude X newtons is now applied to P, as shown in Figure 1. The force acts in a vertical plane containing a line of greatest slope of the inclined plane.

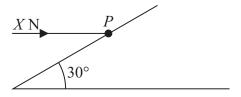


Figure 1

The particle is on the point of moving up the plane.

- (b) Find
 - (i) the magnitude of the normal reaction of the plane on P,
 - (ii) the value of X.

(7)

Summer 2014	www.mystudybro.com	Mathematics M i
Past Paper	This resource was created and owned by Pearson Edexcel	WME01

	blank
Overtion 2 continued	Diank
Question 3 continued	

Summer 2014	www.mystudybro.com	Mathematics M1
Past Paper	This resource was created and owned by Pearson Edexcel	WME0
		Leave

Question 3 continued	blank

Sι	ım	m	۸r	20	14	1
Эι.	ım	m	er	Ζl	ľ	4

d	
	— -
	(Total 12 m

This resource was created and owned by Pearson Edexcel

WME01 Leave

blank

4.

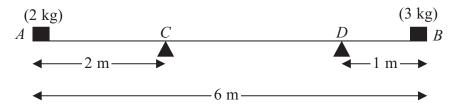


Figure 2

A plank AB, of length 6 m and mass 4 kg, rests in equilibrium horizontally on two supports at C and D, where AC = 2 m and DB = 1 m. A brick of mass 2 kg rests on the plank at A and a brick of mass 3 kg rests on the plank at B, as shown in Figure 2. The plank is modelled as a uniform rod and all bricks are modelled as particles.

- (a) Find the magnitude of the reaction exerted on the plank
 - (i) by the support at C,
 - (ii) by the support at D.

(6)

The 3 kg brick is now removed and replaced with a brick of mass x kg at B. The plank remains horizontal and in equilibrium but the reactions on the plank at C and at D now have equal magnitude.

(b) Find the value of 3	κ.
-------------------------	----

(4)

Sum	mar	201	1
Juli	IIIEI	Z U I	4

Julillier Zul a	www.mystudybro.com	Matriciliatics Wil
Past Paper	This resource was created and owned by Pearson Edexcel	WME01

	Leave blank
Question 4 continued	

Summer	2014
Julillei	ZUI

ummer 2014 ast Paper	www.mystudybro.com This resource was created and owned by Pearson Edexcel	Mathematics M1
adr. upo.		Leave
Question 4 conti	nuod	blank
Question 4 conti	mueu	

Sum	m	٥r	20	1 /
Sum	m	er	ZU	14

Past Paper	This resource was created and owned by Pearson Edexcel	WME01
	·	Leave
		blank
Question 4 continued		
		04
		Q4
	/TD / 140	
	(Total 10 marks)	

Mathematics M1

Past Paper

This resource was created and owned by Pearson Edexcel

WME01

Leave

5. [In this question **i** and **j** are horizontal unit vectors due east and due north respectively. Position vectors are given relative to a fixed origin O.]

A boy B is running in a field with constant velocity $(3\mathbf{i} - 2\mathbf{j})$ m s⁻¹. At time t = 0, B is at the point with position vector $10\mathbf{j}$ m.

Find

(a) the speed of B,

(2)

(b) the direction in which B is running, giving your answer as a bearing.

(3)

At time t = 0, a girl G is at the point with position vector $(4\mathbf{i} - 2\mathbf{j})$ m. The girl is running with constant velocity $\left(\frac{5}{3}\mathbf{i} + 2\mathbf{j}\right)$ m s⁻¹ and meets B at the point P.

- (c) Find
 - (i) the value of t when they meet,
 - (ii) the position vector of *P*.

(6)

Sum	mor	201	A
Sum	mer	Z U1	4

Summer 2014	www.mystudybro.com	Mathematics M1
Past Paper	This resource was created and owned by Pearson Edexcel	WME01
		Leave

Question 5 continued	blank

_						
Sı	ım	m	er	20	11	Δ

Mathematics	M

ummer 2014	www.mystudybro.com	Mathematics M
st Paper	www.mystudybro.com This resource was created and owned by Pearson Edexcel	WME
	·	Leave
		blank
Question 5 conti	nuad	Otalis
Question 5 contin	nucu	

Sum		204	4
Sum	mer	Z U1	4

st Paper	This resource was created and owned by Pearson Edexcel	WME
		Leav
Question 5 continue	ed	blan
Question e continu		
		Q
	(Total 11 m	arks)

Mathematics M1

■ Past Paper

www.mystudybro.comThis resource was created and owned by Pearson Edexcel

WME01 Leave

6.	A car starts from rest at a point A and moves along a straight horizontal road. The moves with constant acceleration 1.5 m s ⁻² for the first 8 s. The car then moves constant acceleration 0.8 m s ⁻² for the next 20 s. It then moves with constant speed T seconds before slowing down with constant deceleration 2.8 m s ⁻² until it stops point B .			
	(a) Find the speed of the car 28 s after leaving A.	(3)		
	(b) Sketch, in the space provided, a speed–time graph to illustrate the motion of the as it travels from <i>A</i> to <i>B</i> .			
		(2)		
	(c) Find the distance travelled by the car during the first 28 s of its journey from A .	(4)		
	The distance from A to B is 2 km.			
	(d) Find the value of <i>T</i> .	(4)		
		(4)		
		_		

_			_
Sum	mer	201	4

www.mystudybro.comThis resource was created and owned by Pearson Edexcel

Mathematics M1
WME01

Question 6 continued	Leave blank

_			
Sum	mer	201	4

ast Paper	This resource was created and owned by Pearson Edexcel	WME0 ²
		Leave blank
Question 6 contin	nued	Dialik

Sι	ım	m	۸r	20	14	1
Эι.	ım	m	er	Ζl	ľ	4

www.mystudybro.comThis resource was created and owned by Pearson Edexcel

Mathematics M1

WMF01

st Paper	This resource was created and owned by Pearson Edexcel	WME0
		Leave
Overtion 6 continued		blank
Question 6 continued		
		Q6
	(Total 13 m	arks)

7.

This resource was created and owned by Pearson Edexcel

WME01

Leave blank

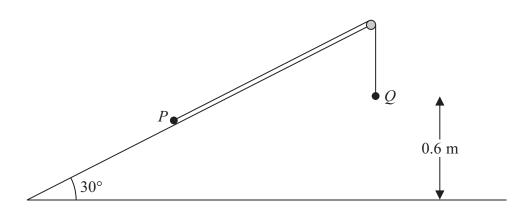


Figure 3

Two particles P and Q, of mass 2 kg and 3 kg respectively, are connected by a light inextensible string. Initially P is held at rest on a fixed smooth plane inclined at 30° to the horizontal. The string passes over a small smooth fixed pulley at the top of the plane. The particle Q hangs freely below the pulley and 0.6 m above the ground, as shown in Figure 3. The part of the string from P to the pulley is parallel to a line of greatest slope of the plane. The system is released from rest with the string taut.

For the motion before Q hits the ground,

- (a) (i) show that the acceleration of Q is $\frac{2g}{5}$,
 - (ii) find the tension in the string.

(8)

On hitting the ground Q is immediately brought to rest by the impact.

(b) Find the speed of P at the instant when Q hits the ground.

(2)

In its subsequent motion *P* does not reach the pulley.

(c) Find the total distance moved up the plane by P before it comes to instantaneous rest.

(4)

(d) Find the length of time between *Q* hitting the ground and *P* first coming to instantaneous rest.

(2)

_					
Su	ım	m	er	201	14

nmer 2014	www.mystudybro.com	Mathematics
Paper	www.mystudybro.com This resource was created and owned by Pearson Edexcel	WM
		Le
		bl
Question 7 continued		

Sum	mar	2014
Juli	IIIEI	ZUI 4

ummer 2014	www.mystudybro.com This resource was created and owned by Pearson Edexcel	Mathematics M1
ast Paper	This resource was created and owned by Pearson Edexcel	WME0
		Leave blank
Question 7 contin	nued	Olalik
Question / 0011011		

0		004	4
Sum	mer	Z U1	4

ouiiiiiei 2014	www.mystudybro.com	Walliellialics W
Past Paper	This resource was created and owned by Pearson Edexcel	WME0

Question 7 continued	blanl

Sum	mar	2014
Juli	IIIEI	ZUI 4

tummer 2014 ast Paper	www.mystudybro.com This resource was created and owned by Pearson Edexcel	Mathematics M1 WME0
азі Рареі	This resource was created and owned by Fearson Edexcer	Leave
Overtion 7 contin	nuad	blank
Question 7 contin	nued	

_					
Su	m	m	er	201	14

www.mystudybro.comThis resource was created and owned by Pearson Edexcel

_	 _	_		-	-
	۱ ۸	/8	4	\sim	a

estion 7 continued	

Summer	2014
Julillei	ZUI

www.mystudybro.com was created and owned by Pearson Edexcel

apei	This resource was created and owned by Fearson Edexcer	VVIVII
		Lea
		bla
Question 7 continued		
	(Total 16 marks)	
	(Total 16 marks)	
	(Total 16 marks) TOTAL FOR PAPER: 75 MARKS END	