Past Paper

This resource was created and owned by Pearson Edexcel

WMF01

Please check the examination detai	ls below	before enterir	ng your candidate information
Candidate surname		(	Other names
Pearson Edexcel International Advanced Level	Centre	Number	Candidate Number
Wednesday 2	<b>4</b> C	ctok	per 2018
Morning (Time: 1 hour 30 minutes	s)	Paper Ref	erence <b>WME01/01</b>
Mechanics M1 Advanced/Advanced Su	ubsid	liary	
You must have: Mathematical Formulae and Stati	istical T	ables (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 ▶







■ Past Paper

**Mathematics M1** 

**www.mystudybro.com**This resource was created and owned by Pearson Edexcel

WME01

Leave blank

hoizontal opposite collide di	the $P$ of mass 0.8 kg is moving along a straight horizontal line on a smooth surface with speed $4\mathrm{ms^{-1}}$ . A second particle $Q$ of mass 2 kg is moving, in the direction to $P$ , along the same straight line with speed $2\mathrm{ms^{-1}}$ . The particles rectly. Immediately after the collision the direction of motion of each particle is and the speed of $P$ is $2.5\mathrm{ms^{-1}}$ .
(a) Find	the speed of $Q$ immediately after the collision. (3)
	the magnitude of the impulse exerted by $Q$ on $P$ in the collision, stating the units ur answer.
j	(3)

<b>umn 2018</b> Paper	www.mystudybro.com This resource was created and owned by Pearson Edexcel	Mathema
<b>Question 1 contin</b>	ued	



(Total 6 marks)

blank

2.

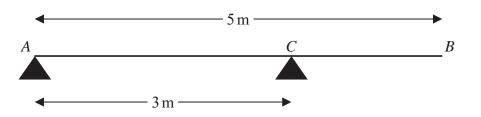


Figure 1

A non-uniform plank AB has weight 60 N and length 5 m. The plank rests horizontally in equilibrium on two smooth supports at A and C, where  $AC = 3 \,\mathrm{m}$ , as shown in Figure 1. A parcel of weight 12 N is placed on the plank at B and the plank remains horizontal and in equilibrium. The magnitude of the reaction of the support at A on the plank is half the magnitude of the reaction of the support at *C* on the plank.

By modelling the plank as a non-uniform rod and the parcel as a particle,

(a) find the distance of the centre of mass of the plank from A.

**(6)** 

- (b) State briefly how you have used the modelling assumption
  - that the parcel is a particle,
  - (ii) that the plank is a rod.

**(2)** 

1	
1.14	
- 70	· `*c
1.1	
· /	
· . X ·	
1.7	O.
100	
	120
REA	K.
100	
·	( .
-	134
Ø	
- 64	1
	w
7.7	
. Un	133
/- 4	0.
1	1
100	
. in	
-	( )
1 B. / .	. \
	r)
	US.
=	C.
100	/
VIEW I	100
-144	Κ.
- EX.	
V	
	1
122	
VRITE IN THIS	
100	
. 5	Κ.
-	18
Annual Contract of the Person	
- 201	
OTW	10
. N. C.	
$\sim$	Ů3
AL J	ķ.
-	.\.

Autumn 2018

<b>utumn 2018</b> ast Paper	www.mystudybro.com This resource was created and owned by Pearson Edexcel	Mathematics M1 WME01
от оро		Leave
Question 2 conti	nued	blank
Question 2 conti	nucu	



# www.mystudybro.com

Mathematics M1

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Autuiiii 2010	www.mystudybro.com	Matriernatics in i
Past Paper	This resource was created and owned by Pearson Edexcel	WME01

	Leave
	blank
Question 2 continued	
Question 2 continued	
	1
	1
	1
	1
	1
	1
	1
	1
	1
	1
	1

<b>itumn 2018</b> st Paper	www.mystudybro.com This resource was created and owned by Pearson Edexcel	Mathematics WM
		Le
		bl
Question 2 contin	nued	
		Q2



(Total 8 marks)

**Mathematics M1** 

**www.mystudybro.com**This resource was created and owned by Pearson Edexcel ■ Past Paper

WME01

Leave blank

3.	At time $t = 0$ , a stone is thrown vertically upwards with speed $19.6 \mathrm{ms^{-1}}$ from a point which is $h$ metres above horizontal ground. At time $t = 3 \mathrm{s}$ , another stone is released from rest from a point $B$ which is also $h$ metres above the same horizontal ground. Both stone hit the ground at time $t = T$ seconds. The motion of each stone is modelled as that of particle moving freely under gravity.	n es
	Find	
	(i) the value of $T$ ,	
	(ii) the value of $h$ .	
		7)
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_

DO NOT WRITE IN THIS AREA

			K				
	ď				×		
	۲				۲		
٩							
	٦		•		٦		
						3	
1	ŀ						
	ì	ø	问	ţ	,		
	9	٠	ч	Ь	ċ	٩	
	ç		1	7	Ē.		
	ı	Ь		4			
ĸ	e.	Ξ	7	₹	3		
	ч	Р	ч	ρ	ĸ,		
	в	à		í	ı		
			Ξ	S	ď		
	'n		9	r	٦		
	8	7	ч	6	'n	3	
١	ď		ï		3		
	à	K	à	•	c		
	٩	L	/			3	
	c	3	1	٩	5		
	8	9	7	-	•		
Ų.	н			ę	ú		
	S						
	E	•	₹	-	۹		
٩	ı	Ľ	_	s	_		
		۲	•	7	и,		
1	я	Ė	×	è	ı		
	2	ú	ø	7			
	я	ņ	8	۳	п	٦	
	ė	ê	-	à	×		
	'n		è	vi	ú		
		L		2			
	Ξ	7	₹	7	7		
		ŀ	÷	b			
	1						
	Ē	Ħ			ı	3	
	d	à	'n	à	ø		
		Š		7			
	c	7	7	7	•	٩	
,	ē	۹	۹	è	ú		
	н			7	7		
		2	3		p		
	٩	7	~		۹		
	×						
١		ø	×	h	ij		
	1	U	-	ż			
	ĺ	6	7	3	k	3	
1	ą	٤		١			
		ę	٠	۳			
Ų.	=	ķ			ø		
	vi		ď	_	s		

Autumn 2018

autumn 2018 ast Paper	www.mystudybro.com This resource was created and owned by Pearson Edexcel	Mathematics M <sup>2</sup> WME0
<u> </u>	,	Leave blank
Question 3 continu	ned	biank



tumn 2018 Paper	www.mystudybro.com This resource was created and owned by Pearson Edexcel	ME0
		eave lank
Question 3 contin	ued	Tank

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

<b>umn 2018</b> Paper	www.mystudybro.com This resource was created and owned by Pearson Edexcel	Mathema
apoi	The recourse was breated and owned by I carson Edekter	
<b>Question 3 contin</b>	nued	



(Total 7 marks)

DO NOT WRITE IN THIS AREA

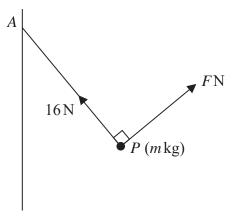


Figure 2

A particle P of mass  $m \log A$  is attached to one end of a light inextensible string of length 2.5 m. The other end of the string is attached to a fixed point A on a vertical wall. The tension in the string is 16 N. The particle is held in equilibrium by a force of magnitude F newtons, acting in the vertical plane which is perpendicular to the wall and contains the string. This force acts in a direction perpendicular to the string, as shown in Figure 2.

Given that the horizontal distance of P from the wall is 1.5 m, find

- (i) the value of F,
- (ii) the value of m.

(I)

	1				
Ç					
(					
ĺ					
	ù				
	ø		ā		

Autumn 2018

Autumn 2018 ast Paper	www.mystudybro.com This resource was created and owned by Pearson Edexcel	Mathematics M <sup>2</sup> WME0
ши. т черо.	100001100 Trad ordated and office by 1 outdon Edukoul	Leave
Question 4 conti	nued	blank



O. // / / -	
777	
DO N	
X	
<b>A</b>	
O	
J- 30 N	
V-Z-V	
× 27 /	
<u> 20</u> ()	
X Deliver	
X - X - X	
X : X : X	
XZX	
77	
X	
S	
17.16.	
D	
V 25 V	
1.7.	
1.7.57	
/.'./.'./ ·	
1.1.1	
1.1.1.1	
1:1:1	
3/3/3	
1:1:4	
. / . /	
1.1.1.	
\$XXX	
$\times \times \times$	
DO NOT WRITE IN	
DO NOT WRITE IN	

		ì			
			þ		
			$\leq$		
	5				
			Ś		
				₹	
					ā
					2
		Ş	Z	Z	2
		Ş	Z		
	3	Ş	Z		
	3	Ş	Z	3	
		Ş	Z		
	3	3	2		
	3	3	2		
	3	3	2	<	
	3	Ş	2		
	3	3	2		
	3	3	2		
	3	3	2		
	3	3	2		
	3	3	2		
	3	3	2		
	3	3	2		
	3	3	2		
	3	3	2		
	3	3	2		
	3	3	2		
	3	3	2		
	3	3	2		
	3	3	2		
	3	3	2		
	3	3	2		
	3	3	2		
	3	3	2		
	3	3	2		
	3	3	2		
	3	3	2		
	3	3	2		
	3	3	2		
	3	3	2		
	3	3	2		
	3	3	2		
	3	3	2		
	3	3	2		
	3	3	2		
	3	3	2		


14

<b>umn 2018</b> Paper	www.mystudybro.com This resource was created and owned by Pearson Edexcel	Mathema
- 1	2 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	
<b>Question 4 continu</b>	ed	
<b>C</b>		



(Total 7 marks)

DO NOT WRITE IN THIS AREA

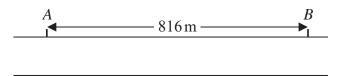


Figure 3

Two posts, A and B, are fixed at the side of a straight horizontal road and are 816 m apart, as shown in Figure 3. A car and a van are at rest side by side on the road and level with A. The car and the van start to move at the same time in the direction AB. The car accelerates from rest with constant acceleration until it reaches a speed of  $24 \,\mathrm{m\,s^{-1}}$ . The car then moves at a constant speed of  $24 \,\mathrm{m\,s^{-1}}$ . The van accelerates from rest with constant acceleration for  $12 \,\mathrm{s}$  until it reaches a speed of  $V \,\mathrm{m\,s^{-1}}$ . The van then moves at a constant speed of  $V \,\mathrm{m\,s^{-1}}$ . When the car has been moving at  $24 \,\mathrm{m\,s^{-1}}$  for  $30 \,\mathrm{s}$ , the van draws level with the car at B, and each vehicle has then travelled a distance of  $816 \,\mathrm{m}$ .

(a) Sketch, on the same diagram, a speed-time graph for the motion of each vehicle from *A* to *B*.

(3)

(b) Find the time for which the car is accelerating.

**(3)** 

(c) Find the value of V.

**(3)** 

		////					
		Ĺ					
		6					
				×	ı		
	ŧ		Ų	ŧ			4
ĺ	į	Ŀ	ļ				4
`	į	ŀ					,
`	į	ŀ					,
	į	ŀ	· ·				, , ,
`	į	ŀ	_				, , ,
`	į		- V				, , ,
` ' '			V			1	, , , ,
			- X				, , , ,
1.1.1			- X				7 . 7 . 7 .
` '	1						7 . 7 . 7 .
` '	1						7 . 7 . 7 . 7
` '	1						7 . 7 . 7 . 7
` '	1						7 . 7 . 7 . 7 .
` '	1						7 . 7 . 7 . 7 .
` '	1						7 . 7 . 7 . 7 . 7
` '	1						7 . 7 . 7 . 7 . 7
` '	1						7 . 7 . 7 . 7 . 7 .
` '	1						
` '	1						7 . 7 . 7 . 7 . 7
` '	1						
` '	1						
/ · / · / · / · / ·	7 1 7 1						
/ · / · / · / · / ·	7 1 7 1						
/ · / · / · / · / ·	7 1 7 1						
/ · / · / · / · / ·	7 1 7 1						
/ · / · / · / · / ·	7 1 7 1						
/ · / · / · / · / ·	7 1 7 1						
/ · / · / · / · / ·	7 1 7 1						
/ · / · / · / · / ·	7 1 7 1						
/ · / · / · / · / ·	7 1 7 1						
/ · / · / · / · / ·	7 1 7 1						

DO NOT WRITE IN THIS ARE

utumn 2018 ast Paper	www.mystudybro.com This resource was created and owned by Pearson Edexcel	Mathematics M1 WME0
or r upor	The resource was created and emissibly rearest Edoxest	Leave
Question 5 conti	inued	blank

■ Past Paper

Question 5 continued	Leave blank

<b>tumn 2018</b> t Paper	www.mystudybro.com This resource was created and owned by Pearson Edexcel	Mathematics WM
	•	L
		b
Question 5 continu	ied	
		Q.



(Total 9 marks)

# www.mystudybro.com

**Mathematics M1** 

This resource was created and owned by Pearson Edexcel

WME01

Leave blank

DO NOT WRITE IN THIS AREA

Past Paper [In this question the unit vectors  $\mathbf{i}$  and  $\mathbf{j}$  are horizontal vectors due east and due north respectively and position vectors are given relative to a fixed origin.] The point A on a horizontal playground has position vector  $(3\mathbf{i} - 2\mathbf{j})$  m. At time t = 0, a girl kicks a ball from A. The ball moves horizontally along the playground with constant velocity (4i + 5j) m s<sup>-1</sup>. Modelling the ball as a particle, find (a) the speed of the ball, **(2)** (b) the position vector of the ball at time t seconds. **(2)** The point B on the playground has position vector  $(\mathbf{i} + 6\mathbf{j})$  m. At time t = T seconds, the ball is due east of B. (c) Find the value of T. **(2)** A boy is running due east with constant speed  $v \, \text{m s}^{-1}$ . At the instant when the girl kicks the ball from A, the boy is at B. Given that the boy intercepts the ball, (d) find the value of v. **(5)** 

HTE IN THIS AREA	I
ZVXV.	
$\times \times \times$	
·X·X·;	
XXX	
\$7.77.	
1.01.0	
× / / / -	
1/1/15	
O MINOR	
000	
ARE	
( <b>4</b> )	
1/2/11	
E S	
X	
$\rightarrow \leftarrow \sim$	
VIII.	
XXX	
000	
WRITE	
NOTWRITE	
2	
( C)	
Z	
KZX	
1:1:1	
::/::/.:	
1.00	
1.7.7.	
///.	
:XX:	
1010	
1:1:1	
1.7.7.	
1.	
$\times \times \times$	
$\times \times \times$	
$\times \times \times$	
XXX	
3XXX	
XXXX	
AREA DO N	

DO NOT WRITE IN THIS AREA

Autumn 2018	www.mystudybro.com	<b>Mathematics M1</b>
ast Paper	This resource was created and owned by Pearson Edexcel	WME01

	Leave
	blank
Question 6 continued	

■ Past Paper

WME01

stion 6 continued	

<b>Itumn 2018</b> st Paper	www.mystudybro.com This resource was created and owned by Pearson Edexcel	Mathematics WM
		Le bla
Question 6 contin	nued	Ola
& mossion o consi		



# www.mystudybro.com

**Mathematics M1** 

Past Paper

This resource was created and owned by Pearson Edexcel

WME01

Leave blank

DO NOT WRITE IN THIS AREA

7. A truck of mass 1600 kg is towing a car of mass 960 kg along a straight horizontal road. The truck and the car are joined by a light rigid tow bar. The tow bar is horizontal and is parallel to the direction of motion. The truck and the car experience constant resistances to motion of magnitude 640 N and R newtons respectively. The truck's engine produces a constant driving force of magnitude 2100 N. The magnitude of the acceleration of the truck and the car is 0.4 m s<sup>-2</sup>.

(a) Show that R = 436

(3)

(b) Find the tension in the tow bar.

**(3)** 

The two vehicles come to a hill inclined at an angle  $\alpha$  to the horizontal where  $\sin \alpha = \frac{1}{15}$ .

The truck and the car move down a line of greatest slope of the hill with the tow bar parallel to the direction of motion. The truck's engine produces a constant driving force of magnitude 2100 N. The magnitudes of the resistances to motion on the truck and the car are 640 N and 436 N respectively.

(c) Find the magnitude of the acceleration of the truck and the car as they move down the hill.

**(4)** 




			1
		iri Ni	
			74
			1

u <b>tumn 2018</b> st Paper	www.mystudybro.com This resource was created and owned by Pearson Edexcel	Mathematics M <sup>2</sup> WME0
<u> apo.</u>		Leave
Question 7 cont	inued	blank



· X :: X = X .
050
X TOX
0.70
<b>**</b>
C 100
X. Z. X
/
<u> </u>
Z 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
্ত
XVVX
4.Z.X.
X
1 X - 1 X
() <del>20</del> (()
(C) (C)
7.7.7.
1:1:1:
NAM
6.1.1.
SASASA.
(XXX)
CX:X:1
7.7.7.
9/3/3/
/ / /
47.73
1.7.7.
11/11/11
1.1.1.
X:X:X
$\langle \mathcal{N} \mathcal{N} \mathcal{N} \rangle$
$G \times G \times X$
-X:-X:-X:-
ZNZXZX
\/.\/X/
7\/X/X
$\times\times\times$
<u></u>
Ö
Ü
0
0
0
0
0
ONO
0
ONO
ONO
V.LON O
M.LON O
W.LON O
O NOT WA
O NOT WA
O NOT WA
O NOT WRIT
O NOT WRIT
O NOT WRITE
O NOT WRITE!
O NOT WRITE!
O NOT WRITE IN
O NOT WRITE!
O NOT WRITE IN
O NOT WRITE IN
O NOT WRITE IN T
O NOT WRITE IN TH
O NOT WRITE IN T
O NOT WRITE IN TH
O NOT WRITE IN TH
O NOT WRITE IN TH
O NOT WRITE IN THIS AR
O NOT WRITE IN TH
O NOT WRITE IN THIS AR

DO NOT WRITE IN THIS AREA

	L b
Question 7 continued	

<b>tumn 2018</b> t Paper	www.mystudybro.com This resource was created and owned by Pearson Edexcel	Mathematics WM
		Le
Question 7 contin	nued	OI:
		0
		l 10 marks)



WME01

Leave blank

8.

Past Paper

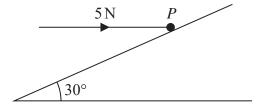


Figure 4

A rough plane is inclined at  $30^{\circ}$  to the horizontal. A particle P of mass  $0.5 \,\mathrm{kg}$  is held at rest on the plane by a horizontal force of magnitude  $5 \,\mathrm{N}$ , as shown in Figure 4. The force acts in a vertical plane containing a line of greatest slope of the inclined plane. The particle is on the point of moving up the plane.

(a) Find the magnitude of the normal reaction of the plane on P.

**(4)** 

(b) Find the coefficient of friction between P and the plane.

**(5)** 

The force of magnitude 5 N is now removed and P accelerates from rest down the plane.

(c) Find the speed of P after it has travelled 3 m down the plane.

**(8)** 

			ï			
	٦,		٠			
	2		ù		ø	
	4		2	L		
		Ε	-	9	я	
	'n		Ė			
	a	a		ì		
	G	Ξ		2	=	
		۲		ŗ	۳,	
	ŧ	à		ė	н	
			7	S	ā	
	'n		Я	ľ	۳,	
	5	٩	ы	L		
					7	
	١		٠.		×	
	а	٩		н	h	
٩	۹		r	٩		
	١	i	÷		à	
	E	3		Ξ	3	
4	н	۰		۹	=	
	٤					
	E	•	₹	•	٠	ч.
٩	н	Ŀ		×		
		۰	•	۰	щ,	
	÷	ä	-	š		
	7	5		ĕ	P.	
	ø		5	ì		
	9	۰	-	ņ	8	
	н		н			
		h		ė		
	Ξ	7				
		ŀ	÷	b		
	1					
	а	à	-	ė	н	
		ŭ	ı.	s	a	
		Т		7	۰,	
	8	Ė		Ė	п	
	b	ä	_			
	S	Ξ			b	
	П			5	2	
	×	ĕ	ã		ø	
	5	7	*		×	
	×					
	1	ü	×	h	Ħ	
	넴		c		×	

Autumn 2018

st Paper	This resource was created and owned by Pearson Edexcel	WME0
		Leave
Quarties 9 conti	nuod	blank
Question 8 contin	nueu	

www.mystudybro.com



■ Past Paper

# www.mystudybro.com

www.iiiystuaybio.com	Matricinatics i
This resource was created and owned by Pearson Edexcel	WME

Question & continued	blank
Question 8 continued	

					۲,
	d	ò	ú	à	
		Г		_	
	Ħ				
	c	s	5		
3	e	9		•	
	a	ы		ø	
	н	9	ч	-	
	×	ä	ø		
	٠	-	٠,		
	н	Ŀ	7	_	

Autumn 2018

autumn 2018 ast Paper	www.mystudybro.com This resource was created and owned by Pearson Edexcel	Mathematics M1 WME01
•		Leave
Question 8 contin	nued	blank

st Paper	This resource was created and owned by Pearson Edexcel	WME01
		Leave
		blank
Question 8 contin	nued	
		Q8
	(Total 17 marks)	
	TOTAL FOR PAPER: 75 MARKS	
	END	