o.com

Mathematics M1

Examiner's use only

Team Leader's use only

Question

1

2

3

4

5

6

7

Past Paper

This resource was created and owned by Pearson Edexcel

Centre No.

Candidate No.

Paper Reference(s)

6677/01

Edexcel GCE

Mechanics M1

Advanced/Advanced Subsidiary

Friday 15 January 2010 – Afternoon

Time: 1 hour 30 minutes

Materials required for examination
Mathematical Formulae (Pink or
Green)Items included with question papers
Nil

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 to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature. Check that you have the correct question paper.

Answer ALL the questions.

You must write your answer to each question in the space following the question.

If you need more space to complete your answer to any question, use additional answer sheets.

Whenever a numerical value of g is required, take $g = 9.8 \text{ m s}^{-2}$.

When a calculator is used, the answer should be given to an appropriate degree of accuracy.

Information for Candidates

A booklet 'Mathematical Formulae and Statistical Tables' is provided.

Full marks may be obtained for answers to ALL questions.

The marks for individual questions and the parts of questions are shown in round brackets: e.g. (2).

There are 7 questions in this question paper. The total mark for this paper is 75.

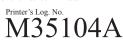
There are 24 pages in this question paper. Any blank pages are indicated.

Advice to Candidates

You must ensure that your answers to parts of questions are clearly labelled. You should show sufficient working to make your methods clear to the Examiner. Answers without working may not gain full credit.

This publication may be reproduced only in accordance with Edexcel Limited copyright policy.

©2010 Edexcel Limited.





Turn over

Total



Mathematics M1

■ Past Paper

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

6677

A particle A of mass 2 kg is moving along a straight hori Another particle B of mass m kg is moving along the san direction to A , with speed 8 m s^{-1} . The particles collide. is unchanged by the collision. Immediately after the coll 3 m s^{-1} and B is moving with speed 4 m s^{-1} . Find	me straight line, in the opposite The direction of motion of A lision, A is moving with speed
(a) the magnitude of the impulse exerted by <i>B</i> on <i>A</i> in the	e collision, (2)
(b) the value of <i>m</i> .	(4)

Winter	2010

ter 2010	www.mystudybro.com This resource was created and owned by Pearson Edexcel	Mathematics
Paper	This resource was created and owned by Pearson Edexcel	
		L
Question 1 continued		
		-
		1



Mathematics M1

■ Past Paper

This resource was created and owned by Pearson Edexcel

6677 Leave blank

- 2. An athlete runs along a straight road. She starts from rest and moves with constant acceleration for 5 seconds, reaching a speed of $8 \,\mathrm{m\,s^{-1}}$. This speed is then maintained for T seconds. She then decelerates at a constant rate until she stops. She has run a total of $500 \,\mathrm{m}$ in $75 \,\mathrm{s}$.
 - (a) In the space below, sketch a speed-time graph to illustrate the motion of the athlete.

(3)

(b) Calculate the value of *T*.

(5)

W.	ntor	2010	

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

st Paper	This resource was created and owned by Pearson Edexcel	667
		Leave blank
Question 2 continue	d	biank
		Q2
	(Total 8 ma	arks)



Past Paper

This resource was created and owned by Pearson Edexcel

6677 Leave blank

3.

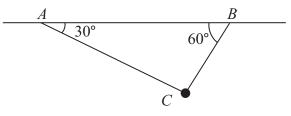


Figure 1

A particle of mass m kg is attached at C to two light inextensible strings AC and BC. The other ends of the strings are attached to fixed points A and B on a horizontal ceiling. The particle hangs in equilibrium with AC and BC inclined to the horizontal at 30° and 60° respectively, as shown in Figure 1.

Given that the tension in AC is 20 N, find

(a) the tension in BC,

(4)

(b) the value of m.

(4)

Winter	2010
Past Pape	er

Paper	This resource was created and owned by Pearson Edexcel	watnematics
		L
Question 3 continued		
		Q

Past Paper

This resource was created and owned by Pearson Edexcel

Leave blank

4.

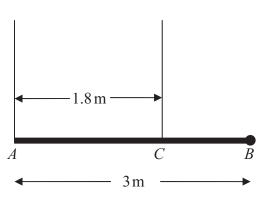


Figure 2

A pole AB has length 3 m and weight W newtons. The pole is held in a horizontal position in equilibrium by two vertical ropes attached to the pole at the points A and C where AC = 1.8 m, as shown in Figure 2. A load of weight 20 N is attached to the rod at B. The pole is modelled as a uniform rod, the ropes as light inextensible strings and the load as a particle.

- (a) Show that the tension in the rope attached to the pole at C is $\left(\frac{5}{6}W + \frac{100}{3}\right)N$.
- (b) Find, in terms of W, the tension in the rope attached to the pole at A. (3)

Given that the tension in the rope attached to the pole at C is eight times the tension in the rope attached to the pole at A,

				(3)



(c) find the value of W.

Winter	2010
vviiner	<i>Z</i> W1W

William ZUIU	www.iiiystuuybio.coiii	IVIALITEITIALICS IVIT
Past Paper	This resource was created and owned by Pearson Edexcel	6677

	Leave
	blank
Question 4 continued	
Question 4 continued	

Mathematics M1

VIIIICI ZUIU	www.mystaaybro.com	Matriciliati
ast Paper	This resource was created and owned by Pearson Edexcel	

Question 4 continued		b

Winter	2040
WINTER	7010

st Paper	This resource was created and owned by Pearson Edexcel	6677
		Leave blank
Question 4 con	ntinued	biank
		Q4
	(Total 10 m	arks)

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

Past Paper

6677

Leave blank

- 5. A particle of mass 0.8 kg is held at rest on a rough plane. The plane is inclined at 30° to the horizontal. The particle is released from rest and slides down a line of greatest slope of the plane. The particle moves 2.7 m during the first 3 seconds of its motion. Find
 - (a) the acceleration of the particle,

(c) Find the value of X.

(3)

(b) the coefficient of friction between the particle and the plane.

(5)

The particle is now held on the same rough plane by a horizontal force of magnitude X newtons, acting in a plane containing a line of greatest slope of the plane, as shown in Figure 3. The particle is in equilibrium and on the point of moving up the plane.

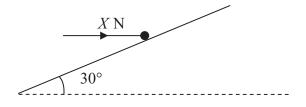


Figure 3

(1)

۱۸/:	ntor	2010
vvi	ME	/11/11/

William ZUIU	www.iiiystuuybio.com	Mathernatics in i
Past Paper	This resource was created and owned by Pearson Edexcel	6677

	Leave
	blank
Question 5 continued	
	1

Mathematics M1

Tiller Zolo	www.mystudybro.com	wathernaties is
ast Paper	This resource was created and owned by Pearson Edexcel	66

Question 5 continued	blank

W.	ntor	2010	

st Paper	This resource was created and owned by Pearson Edexcel	667
		Leave
Question 5 cont	inued	blank
Question 5 cont.	mucu	
		Q5
	(Total 15 ma	arks)

Past Paper

This resource was created and owned by Pearson Edexcel

Leave

blank

6.

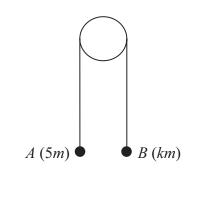


Figure 4

Two particles A and B have masses 5m and km respectively, where k < 5. The particles are connected by a light inextensible string which passes over a smooth light fixed pulley. The system is held at rest with the string taut, the hanging parts of the string vertical and with A and B at the same height above a horizontal plane, as shown in Figure 4. The system is released from rest. After release, A descends with acceleration $\frac{1}{4}g$.

(a) Show that the tension in the string as A descends is $\frac{15}{4}mg$.

(b) Find the value of k.

(3)

(c) State how you have used the information that the pulley is smooth.

(1)

After descending for 1.2s, the particle A reaches the plane. It is immediately brought to rest by the impact with the plane. The initial distance between B and the pulley is such that, in the subsequent motion, B does not reach the pulley.

(d) Find the greatest height reached by *B* above the plane.

(7)



winter 2010	www.mystudybro.com	watnemati	CS IVIT
Past Paper	This resource was created and owned by Pearson Edexcel		6677
			Leave

Question 6 continued	blank

Mathematics M1

William ZOTO	www.mystadybro.com	Matrici
Past Paper	This resource was created and owned by Pearson Edexcel	

Question 6 continued	blank

۱۸/:	ntor	2010
vvi	ME	/11/11/

Mathematics	М1
maniciliancs	

st Paper	This resource was created and owned by Pearson Edexcel	66
		Lea
0 4 6 4	1	blar
Question 6 contin	uea	
		Q
		[Y
	(Total 14 ma	arks)



7.	[In this question, \mathbf{i} and \mathbf{j} are horizontal unit vectors due east and due north respectively and position vectors are given with respect to a fixed origin.]	blan
	A ship S is moving along a straight line with constant velocity. At time t hours the position vector of S is \mathbf{s} km. When $t = 0$, $\mathbf{s} = 9\mathbf{i} - 6\mathbf{j}$. When $t = 4$, $\mathbf{s} = 21\mathbf{i} + 10\mathbf{j}$. Find	
	(a) the speed of S , (4)	
	(b) the direction in which S is moving, giving your answer as a bearing. (2)	
	(c) Show that $\mathbf{s} = (3t+9)\mathbf{i} + (4t-6)\mathbf{j}$. (2)	
	A lighthouse L is located at the point with position vector $(18\mathbf{i} + 6\mathbf{j})$ km. When $t = T$, the ship S is 10 km from L .	
	(d) Find the possible values of <i>T</i> . (6)	

۱۸/:	ntor	2010
vvi	ME	/11/11/

Willie Zulu	www.mystudybro.com	Mathernatics in i
Past Paper	This resource was created and owned by Pearson Edexcel	6677

	Leave blank
Question 7 continued	Ulalik
	1

Mathematics M1

VIIIICI ZOIO	WWW.iiiyotaaybi o.ooiii	
Past Paner	This resource was created and owned by Pearson Edexcel	

Wint		104	^
Wint	Δr 2	201	n

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

Mathematics	М1
-------------	----

rapei	This resource was created and owned by Fearson Edexcer	
		Le
		bl
Question 7 continued		
	(Total 14 marks)	
	TOTAL FOR PAPER: 75 MARKS	
	IOIAL FOR IAI ER. 73 MARKS	
	END	

