RECOGNISING ACHIEVEMENT

ADVANCED GCE

MATHEMATICS (MEI)

4762

Mechanics 2

QUESTION PAPER

Candidates answer on the printed answer book.

OCR supplied materials:
- Printed answer book 4762
- MEI Examination Formulae and Tables (MF2)

Other materials required:
- Scientific or graphical calculator

Thursday 16 June 2011
Afternoon

Duration: 1 hour 30 minutes

INSTRUCTIONS TO CANDIDATES

These instructions are the same on the printed answer book and the question paper.

- The question paper will be found in the centre of the printed answer book.
- Write your name, centre number and candidate number in the spaces provided on the printed answer book. Please write clearly and in capital letters.
- **Write your answer to each question in the space provided in the printed answer book.** Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- You are permitted to use a scientific or graphical calculator in this paper.
- Final answers should be given to a degree of accuracy appropriate to the context.
- The acceleration due to gravity is denoted by g m s^{-2}. Unless otherwise instructed, when a numerical value is needed, use $g = 9.8$.

INFORMATION FOR CANDIDATES

This information is the same on the printed answer book and the question paper.

- The number of marks is given in brackets **[ ]** at the end of each question or part question on the question paper.
- You are advised that an answer may receive **no marks** unless you show sufficient detail of the working to indicate that a correct method is being used.
- The total number of marks for this paper is **72**.
- The printed answer book consists of **12** pages. The question paper consists of **8** pages. Any blank pages are indicated.

INSTRUCTION TO EXAMS OFFICER / INVIGILATOR

- Do not send this question paper for marking; it should be retained in the centre or destroyed.

2R–1C22

1 **(a)** Sphere P, of mass 10 kg, and sphere Q, of mass 15 kg, move with their centres on a horizontal straight line and have no resistances to their motion. P, Q and the positive direction are shown in Fig. 1.1.

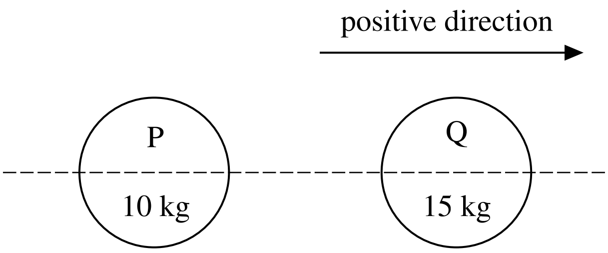

Fig. 1.1

Initially, P has a velocity of $-1.75\,\text{m}\,\text{s}^{-1}$ and is acted on by a force of magnitude 13 N acting in the direction PQ.

After T seconds, P has a velocity of $4.75\,\text{m}\,\text{s}^{-1}$ and has not reached Q.

(i) Calculate T. **[3]**

The force of magnitude 13 N is removed. P is still travelling at $4.75\,\text{m}\,\text{s}^{-1}$ when it collides directly with Q, which has a velocity of $-0.5\,\text{m}\,\text{s}^{-1}$.

Suppose that P and Q coalesce in the collision to form a single object.

(ii) Calculate their common velocity after the collision. **[2]**

Suppose instead that P and Q separate after the collision and that P has a velocity of $1\,\text{m}\,\text{s}^{-1}$ afterwards.

(iii) Calculate the velocity of Q after the collision and also the coefficient of restitution in the collision. **[6]**

(b) Fig. 1.2 shows a small ball projected at a speed of $14\,\text{m}\,\text{s}^{-1}$ at an angle of 30° below the horizontal over smooth horizontal ground.

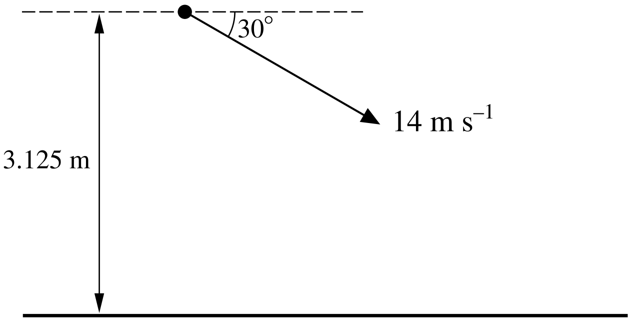

Fig. 1.2

The ball is initially 3.125 m above the ground. The coefficient of restitution between the ball and the ground is 0.6.

Calculate the angle with the horizontal of the ball's trajectory immediately after the **second** bounce on the ground. **[8]**

2 Any non-exact answers to this question should be given correct to four significant figures.

A thin, straight beam AB is 2 m long. It has a weight of 600 N and its centre of mass G is 0.8 m from end A. The beam is freely pivoted about a horizontal axis through A.

The beam is held horizontally in equilibrium.

Initially this is done by means of a support at B, as shown in Fig. 2.1.

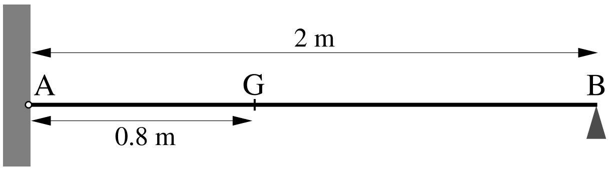

Fig. 2.1

(i) Calculate the force on the beam due to the support at B. **[3]**

The support at B is now removed and replaced by a wire attached to the beam 0.3 m from A and inclined at 50° to the beam, as shown in Fig. 2.2. The beam is still horizontal and in equilibrium.

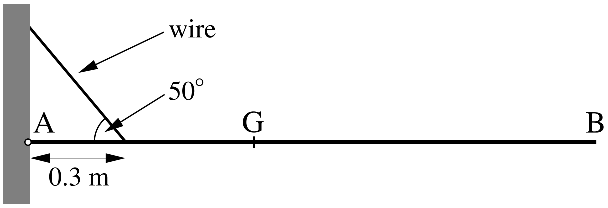

Fig. 2.2

(ii) Calculate the tension in the wire. **[5]**

The forces acting on the beam at A due to the hinge are a horizontal force X N in the direction AB, and a downward vertical force Y N, which have a resultant of magnitude R at α to the horizontal.

(iii) Calculate X, Y, R and α. **[7]**

The dotted lines in Fig. 2.3 are the lines of action of the tension in the wire and the weight of the beam. These lines of action intersect at P.

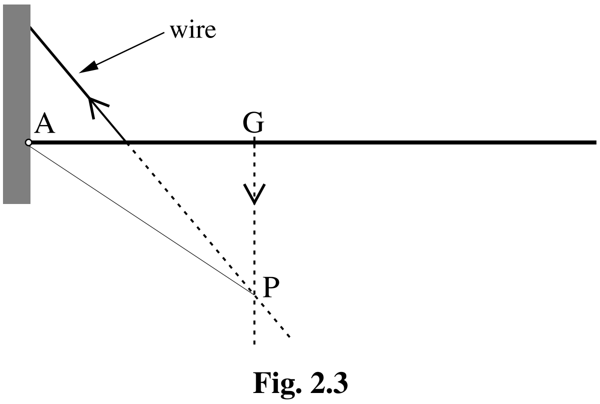

Fig. 2.3

(iv) State with a reason the size of the angle GAP. **[2]**

3 A bracket is being made from a sheet of uniform thin metal. Firstly, a plate is cut from a square of the sheet metal in the shape OABCDEFHJK, shown shaded in Fig. 3.1. The dimensions shown in the figure are in centimetres; axes Ox and Oy are also shown.

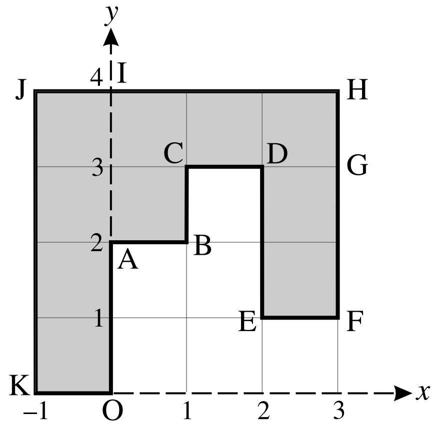

Fig. 3.1

(i) Show that, referred to the axes given in Fig. 3.1, the centre of mass of the plate OABCDEFHJK has coordinates (0.8, 2.5). **[4]**

The plate is hung using light vertical strings attached to J and H. The edge JH is horizontal and the plate is in equilibrium. The weight of the plate is 3.2 N.

(ii) Calculate the tensions in each of the strings. **[5]**

The plate is now bent to form the bracket. This is shown in Fig. 3.2: the rectangle IJKO is folded along the line IA so that it is perpendicular to the plane ABCGHI; the rectangle DEFG is folded along the line DG so it is also perpendicular to the plane ABCGHI but on the other side of it. Fig. 3.2 also shows the axes Ox, Oy and Oz.

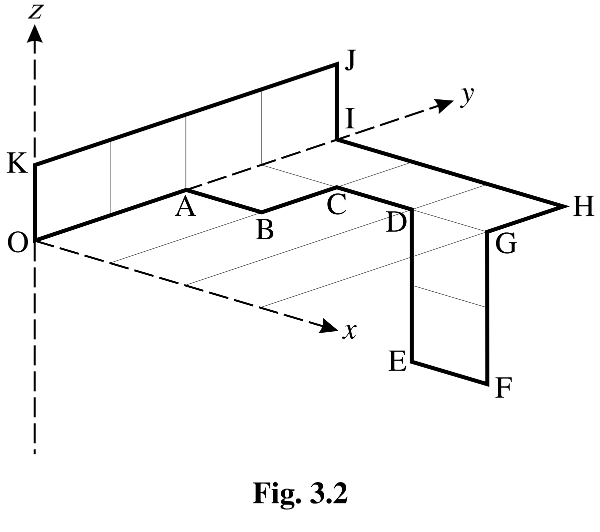

Fig. 3.2

(iii) Show that, referred to the axes given in Fig. 3.2, the centre of mass of the bracket has coordinates (1, 2.7, 0). **[5]**

The bracket is now hung freely in equilibrium from a string attached to O.

(iv) Calculate the angle between the edge OI and the vertical. **[4]**

4 **(a)** A parachutist and her equipment have a combined mass of 80 kg. During a descent where the parachutist loses 1600 m in height, her speed reduces from $V\,\mathrm{m\,s^{-1}}$ to $6\,\mathrm{m\,s^{-1}}$ and she does 1.3×10^6 J of work against resistances.

Use an energy method to calculate the value of V. **[5]**

(b) A vehicle of mass 800 kg is climbing a hill inclined at θ to the horizontal, where $\sin\theta = 0.1$. At one time the vehicle has a speed of $8\,\mathrm{m\,s^{-1}}$ and is accelerating up the hill at $0.25\,\mathrm{m\,s^{-2}}$ against a resistance of 1150 N.

(i) Show that the driving force on the vehicle is 2134 N and calculate its power at this time. **[7]**

The vehicle is pulling a sledge, of mass 300 kg, which is sliding up the hill. The sledge is attached to the vehicle by a light, rigid coupling parallel to the slope. The force in the coupling is 900 N.

(ii) Assuming that the only resistance to the motion of the sledge is due to friction, calculate the coefficient of friction between the sledge and the ground. **[6]**

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OCR
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ADVANCED GCE

MATHEMATICS (MEI) 4762

Mechanics 2

PRINTED ANSWER BOOK

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Candidate forename		Candidate surname	

Centre number						Candidate number				

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1(a)(i)

1(a)(ii)

1 (a) (iii)	

Turn over

1 (b)

2 (i)	
2 (ii)	

2 (iii)	

2 (iv)	
3 (i)	

3 (ii)

3 (iii)

3 (iii) **(continued)**

3 (iv)

4 (a)

4(b)(i)

4(b)(ii)	

GCE

Mathematics (MEI)

Advanced GCE

Unit **4762:** Mechanics 2

Mark Scheme for June 2011

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by Examiners. It does not indicate the details of the discussions which took place at an Examiners' meeting before marking commenced.

All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the Report on the Examination.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

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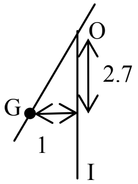
Q 1		mark	notes
(a) (i)	$13T = 10(4.75 - (-1.75))$ so $T = 5$. So 5 s. OR: $13 = 10a$ $T = \frac{4.75-(-1.75)}{1.3} = 5$	M1 A1 A1 B1 M1 A1 3	Use of $I = Ft$. Allow sign errors Signs correct on RHS cao N2L Use of *suvat* cao
(ii)	PCLM: $10\times 4.75 - 15\times 0.5 = 25v_{\text{P+Q}}$ $v_{\text{P+Q}} = 1.6$ so 1.6 m s^{-1} in +ve direction	M1 A1 2	PCLM with combined mass. Allow sign errors No need for reference to direction
(iii)	PCLM: $10\times 4.75 - 15\times 0.5 = 10\times 1 + 15v_{\text{Q}}$ Hence $v_{\text{Q}} = 2$ and Q has velocity 2 m s^{-1} NEL: $\frac{v_{\text{Q}} - 1}{-0.5 - 4.75} = -e$ so $e = 0.19047\ldots$ so 0.190 (3 s. f.)	M1 A1 A1 M1 A1 A1 6	PCLM with all correct terms. Allow sign errors Any form Accept no direct reference to direction NEL. Accept **their** v_{Q} and any sign errors. Fraction must be correct way up Any form. FT **their** v_{Q}. cao accept 0.19 , 4/21 accept 0.2 only if 0.19 seen earlier

(b)	Initial vert cpt is 14sin30 = 7 1st hits ground at v given by $v^2 = 7^2 + 2\times 9.8\times 3.125$ $v = 10.5$ Vert cpt after 2nd bounce 10.5×0.6^2 Horiz cpt is unchanged throughout $(14\cos 30)$ Angle is $\arctan\left(\dfrac{10.5\times 0.6^2}{14\cos 30}\right) = 17.31586...$ so 17.3° (3 s. f.)	B1 M1 A1 M1 B1 B1 M1 A1 8	 Appropriate *suvat*. Allow ±9.8 etc Condone $u = 14$ **their** 10.5×0.6^n for n = 1, 2 or 3 Condone use of their initial vertical component. Do not award if horiz component is also multiplied by 0.6 use of × 0.6² or attempt at two bounces with 0.6 used each time Award even if value wrong or not given FT their horiz and vert components. oe. Fraction must be for correct angle. cao SC answer of 11.7 will usually earn 5/8
		19	

Q 2		mark	notes
			Penalise answers to fewer than 4sf only once
(i)	cw moments about A Let force be S		
	$600\times 0.8 - S\times 2 = 0$	M1	Moments. All forces. No extras
		A1	
	$S = 240$ so 240 N vertically upwards	A1	Need statement of direction or diagram
		3	
(ii)	cw moments about A Let tension be T	M1	Moments. All forces. No extras. Attempt at moment of T (need not be resolved) Note that mmts about B needs forces at hinge.
	$600\times 0.8 - T\sin 50\times 0.3 = 0$		
		M1	Correct method for moment of T. Allow length errors and $s \leftrightarrow c$
		A1	Moment of T correct (allow sign error)
		A1	All correct
	$T = 2088.65\ldots$ $\left(\frac{1600}{\sin 50}\right)$		
	so 2089 N (4 s. f.)	A1	cao
		5	
(iii)	Resolve → $X - T\cos 50 = 0$	M1	Resolving horiz. Allow sign error. T must be resolved, allow $s \leftrightarrow c$
	so $X = 1342.55\ldots.$		
	= 1343 (4 s. f.)	F1	FT **their** T only. Allow 1600cot50
	Resolve ↓ $Y - T\sin 50 + 600 = 0$	M1	NB other methods possible
	so $Y = 1000$	F1	FT **their** T only
	Method for either R or α	M1	M dependent on attempts at X and Y using moments/resolution
	$R = \sqrt{1600^2\cot^2 50 + 1000^2} = 1674.05..$		
	so 1674 (4 s. f.)	F1	FT **their** X and Y Numerical value only
	$\alpha = \arctan\dfrac{1000}{1600\cot 50}$		
	$\alpha = 36.6804\ldots$ so 36.68° (4 s. f.)	F1	FT **their** X and Y Numerical value only Accept 36.67
		7	
(iv)	Angle GAP is α above so 36.68° (4 s. f.)	B1	
	Weight, T and R are the only forces acting on the beam which is in equilibrium. Hence they are concurrent. Or geometrical calculation	E1	Must be clear
		2	
		17	

Q 3		**mark**	notes
(i)	$10\begin{pmatrix}\bar{x}\\ \bar{y}\end{pmatrix} = 4\begin{pmatrix}-\frac{1}{2}\\ 2\end{pmatrix}+2\begin{pmatrix}\frac{1}{2}\\ 3\end{pmatrix}+\begin{pmatrix}1\frac{1}{2}\\ 3\frac{1}{2}\end{pmatrix}+3\begin{pmatrix}2\frac{1}{2}\\ 2\frac{1}{2}\end{pmatrix}$	M1	Correct method clearly indicated for *x* or *y* component.
		B1	If 2D method, at least 1 mass + cm correct for a region. If separate cpts, at least 2 mass + cm correct for one of the cpts
	$= \begin{pmatrix}-2+1+1\frac{1}{2}+7\frac{1}{2}\\ 8+6+3\frac{1}{2}+7\frac{1}{2}\end{pmatrix} = \begin{pmatrix}8\\ 25\end{pmatrix}$	E1	Working shown. Either expression shown oe
	so $\begin{pmatrix}\bar{x}\\ \bar{y}\end{pmatrix} = \begin{pmatrix}0.8\\ 2.5\end{pmatrix}$ and c.m. is (0.8, 2.5)	E1	Both
		4	
(ii)	c.w. moments about J $3.2\times 1.8 - T_{\text{H}}\times 4 = 0$	B1	Use of 1.8 oe
		M1	A moments equation with all relevant forces. Allow use of 10 instead of 3.2
	so $T_{\text{H}} = 1.44$ and the force at H is 1.44 N	A1	
	Resolving ↑	M1	Or moments again
	force at J is 3.2 – 1.44 = 1.76 N	F1	Only FT if positive final answer
		5	
(iii)	below		

(iii)	$10\begin{pmatrix}\bar{x}\\\bar{y}\\\bar{z}\end{pmatrix}=4\begin{pmatrix}0\\2\\\frac{1}{2}\end{pmatrix}+2\begin{pmatrix}\frac{1}{2}\\3\\0\end{pmatrix}+2\begin{pmatrix}2\\3\frac{1}{2}\\0\end{pmatrix}+2\begin{pmatrix}2\frac{1}{2}\\3\\-1\end{pmatrix}$ $=\begin{pmatrix}0+1+4+5\\8+6+7+6\\2+0+0-2\end{pmatrix}=\begin{pmatrix}10\\27\\0\end{pmatrix}$ so $\begin{pmatrix}\bar{x}\\\bar{y}\\\bar{z}\end{pmatrix}=\begin{pmatrix}1\\2.7\\0\end{pmatrix}$ and c.m. is (1, 2.7, 0)	M1 B1 B1 E1 E1 5	Dealing with 3D Dealing correctly with one folded part Dealing with the other folded part Working shown. Either expression shown oe All three components
(iv)	 Let angle IOG be θ $\tan\theta=\frac{1}{2.7}$ so angle is 20.323... so 20.3° (3 s. f.)	B1 B1 M1 A1 4	Recognising that cm is vertically below O (may be implied) Correctly identifying the angle Accept $\tan\theta=\frac{2.7}{1}$ oe Do NOT isw
		18	

Q 4		mark	notes
(a)			
	$\frac{1}{2}\times 80\times\left(6^2 - V^2\right)$	M1	WE equation. Allow GPE OR init KE term omitted or wrong. Allow sign errors. There must be 3 terms one of which is the WD term
	$= 80 \times 9.8 \times 1600 - 1300000$		
		B1	KE terms correct (accept $40 \times (V^2 - 6^2)$)
		B1	GPE term. Allow sign error
		A1	All terms present. Accept only sign errors, but not the 1300000 and 80x9.8x1600 terms with same sign
	so $V =$ 34.29285… so 34.3 m s^{-1}, (3 s. f.)	A1	Cao accept $14\sqrt{6}$
		5	
(b)			
(i)	N2L up the slope. Driving force is S N		
	$S - 1150 - 800 \times 9.8 \times 0.1 = 800 \times 0.25$	M1	N2L. Allow either resistance or weight cpt omitted. Allow weight not resolved and sign errors.
		B1	RHS correct
		M1	Attempt at weight cpt (800*g*sinθ is sufficient) Allow missing ***g***
		A1	Weight cpt correct (numerical) May be implied
	$S = 2134$	E1	
	Power is 2134 × 8	M1	Use of $P = Fv$
	= 17072 so 17.1 kW (3 s. f.)	A1	
		7	
(ii)	Let resistance on sledge be F N		
	N2L up slope for sledge		
	$900 - F - 300 \times 9.8 \times 0.1 = 300 \times 0.25$	M1	Need non-zero accn, correct mass and 900. Allow weight missing or unresolved and allow sign errors. Do not award if 2134 included
	so $F = 531$	A1	
	normal reaction is $300g\cos\theta$	B1	
	Use $\cos\theta = \sqrt{0.99}$ or cos5.7	B1	In context
	$\mu = \dfrac{531}{300\times 9.8\times\sqrt{0.99}}$	M1	Use of $F = \mu R$ for any F and R but not F=900
	= 0.181522… so 0.182 (3 s. f.)	A1	cao
		6	
		18	

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4762: Mechanics 2

General Comments

This paper proved to be very accessible to candidates. It gave opportunity for them to demonstrate their knowledge and understanding of Mechanics and many did so, to very good effect. The presentation of answers was generally of a high standard. As usual, some marks were lost unnecessarily through arithmetical slips and rounding errors from calculator work. It is worth noting that candidates must remain diligent about giving sufficient evidence when they are working towards a given answer. The examiner needs to be convinced that the candidate is able to work through to the answer, without error.

Comments on Individual Questions

1

(a)(i) Most candidates scored full marks, the only loss of marks being due to either a sign error in calculating the change in momentum or an arithmetical slip.

(a)(ii) This was almost always correctly answered.

(a)(iii) The principle of conservation of linear momentum was clearly known and it was applied successfully by the vast majority of candidates. Again, there were some sign errors. Newton's experimental law was understood and there were pleasingly few errors in applying it.

(b) There were a pleasing number of clearly-presented and accurate answers to this question, displaying a sound understanding of the mechanics of the situation under consideration. A common error, however, was to assume that the ball travelled in a straight line and hit the ground at the given angle of projection, rather than considering first its motion under gravity. Most candidates knew that only the vertical component of the impact velocity of the ball is changed at the collision. It was a pity that a minority of candidates noted that the horizontal velocity was unchanged, but then proceeded to multiply it by the coefficient of restitution. It is worth pointing out that those candidates who drew clear diagrams, indicating velocity components before and after each bounce, were usually more successful than those who appeared to work in an unordered way. A significant minority of candidates either made little attempt beyond writing down the initial vertical component of the velocity of the ball, or seemed to write down every equation that they knew, involving time, distance, velocity in the hope that something would emerge.

2

(i) Candidates rarely had any problem in taking moments to find the correct magnitude of the force at B, but more than half did not indicate its direction, either in words or clearly on a diagram.

(ii) The vast majority of candidates showed again their good understanding of the principle of moments. A few took moments about B rather than A but did not take into account the forces at the hinge.

(iii) Again, there were many clear and concise answers, with candidates who chose to resolve horizontally and vertically almost always successful. The minority who opted for taking moments were more liable to make errors, usually by using an incorrect length or, occasionally, omitting a distance in one of the terms.

(iv) About 20% of the candidates were able to give the correct angle with either an appropriate explanation noting that the lines of actions of the three forces must meet at the point P, or by using the trigonometry of the situation. Many candidates falsely gave the answer as 40° supported by a variety of geometrical properties such as equality of alternate angles.

3

(i) The majority of candidates scored full marks here, with clear and sufficient working shown. As the answer was given in the question, a few lost one or two marks by not giving sufficient evidence of how they had achieved it.

(ii) Again, there were many well-presented solutions, showing a sound understanding of how to apply the principle of moments.

(iii) As in part (i), answers were usually clearly-presented and sound, with the bending of the shape causing no problem to most.

(iv) The majority of candidates were able to calculate the correct angle and earn full marks, though the diagrams drawn were not of the same good standard. A significant minority were not able to identify the required angle; others had incorrect lengths for their triangle.

4

(a) Almost all candidates realised that they needed to use the work energy equation and many did so very well. Some made sign errors, particularly by assigning the same sign to the Work Done and Gravitational Potential Energy terms. Others omitted either the initial kinetic energy term or the Gravitational Potential Energy term.

(b)(i) There were many solutions presented with the clarity required when an answer is given in the question. The minority who did not overtly indicate their use of Newton's second law often made sign errors along the way, though the correct result was still miraculously obtained.

(b)(ii) The majority of candidates did not appreciate the fact that the sledge had the same acceleration as the vehicle, detailed in the stem of the question. It was common to see an assumption of zero acceleration. The normal reaction was usually found successfully and credit was given for the use of $F = \mu R$ for most calculated values of a frictional force.

GCE Mathematics (MEI)

			Max Mark	a	b	c	d	e	u
4751/01	(C1) MEI Introduction to Advanced Mathematics	Raw	72	55	49	43	37	32	0
		UMS	100	80	70	60	50	40	0
4752/01	(C2) MEI Concepts for Advanced Mathematics	Raw	72	53	46	39	33	27	0
		UMS	100	80	70	60	50	40	0
4753/01	(C3) MEI Methods for Advanced Mathematics with Coursework: Written Paper	Raw	72	54	48	42	36	29	0
4753/02	(C3) MEI Methods for Advanced Mathematics with Coursework: Coursework	Raw	18	15	13	11	9	8	0
4753/82	(C3) MEI Methods for Advanced Mathematics with Coursework: Carried Forward Coursework Mark	Raw	18	15	13	11	9	8	0
4753	(C3) MEI Methods for Advanced Mathematics with Coursework	UMS	100	80	70	60	50	40	0
4754/01	(C4) MEI Applications of Advanced Mathematics	Raw	90	63	56	50	44	38	0
		UMS	100	80	70	60	50	40	0
4755/01	(FP1) MEI Further Concepts for Advanced Mathematics	Raw	72	59	52	45	39	33	0
		UMS	100	80	70	60	50	40	0
4756/01	(FP2) MEI Further Methods for Advanced Mathematics	Raw	72	55	48	41	34	27	0
		UMS	100	80	70	60	50	40	0
4757/01	(FP3) MEI Further Applications of Advanced Mathematics	Raw	72	55	48	42	36	30	0
		UMS	100	80	70	60	50	40	0
4758/01	(DE) MEI Differential Equations with Coursework: Written Paper	Raw	72	63	57	51	45	39	0
4758/02	(DE) MEI Differential Equations with Coursework: Coursework	Raw	18	15	13	11	9	8	0
4758/82	(DE) MEI Differential Equations with Coursework: Carried Forward Coursework Mark	Raw	18	15	13	11	9	8	0
4758	(DE) MEI Differential Equations with Coursework	UMS	100	80	70	60	50	40	0
4761/01	(M1) MEI Mechanics 1	Raw	72	60	52	44	36	28	0
		UMS	100	80	70	60	50	40	0
4762/01	(M2) MEI Mechanics 2	Raw	72	64	57	51	45	39	0
		UMS	100	80	70	60	50	40	0
4763/01	(M3) MEI Mechanics 3	Raw	72	59	51	43	35	27	0
		UMS	100	80	70	60	50	40	0
4764/01	(M4) MEI Mechanics 4	Raw	72	54	47	40	33	26	0
		UMS	100	80	70	60	50	40	0
4766/01	(S1) MEI Statistics 1	Raw	72	53	45	38	31	24	0
		UMS	100	80	70	60	50	40	0
4767/01	(S2) MEI Statistics 2	Raw	72	60	53	46	39	33	0
		UMS	100	80	70	60	50	40	0
4768/01	(S3) MEI Statistics 3	Raw	72	56	49	42	35	28	0
		UMS	100	80	70	60	50	40	0
4769/01	(S4) MEI Statistics 4	Raw	72	56	49	42	35	28	0
		UMS	100	80	70	60	50	40	0
4771/01	(D1) MEI Decision Mathematics 1	Raw	72	51	45	39	33	27	0
		UMS	100	80	70	60	50	40	0
4772/01	(D2) MEI Decision Mathematics 2	Raw	72	58	53	48	43	39	0
		UMS	100	80	70	60	50	40	0
4773/01	(DC) MEI Decision Mathematics Computation	Raw	72	46	40	34	29	24	0
		UMS	100	80	70	60	50	40	0
4776/01	(NM) MEI Numerical Methods with Coursework: Written Paper	Raw	72	62	55	49	43	36	0
4776/02	(NM) MEI Numerical Methods with Coursework: Coursework	Raw	18	14	12	10	8	7	0
4776/82	(NM) MEI Numerical Methods with Coursework: Carried Forward Coursework Mark	Raw	18	14	12	10	8	7	0
4776	(NM) MEI Numerical Methods with Coursework	UMS	100	80	70	60	50	40	0
4777/01	(NC) MEI Numerical Computation	Raw	72	55	47	39	32	25	0
		UMS	100	80	70	60	50	40	0