Examiners' Report/
Principal Examiner Feedback

January 2011

GCE

GCE Mechanics M1 (6677) Paper 1

Edexcel Limited. Registered in England and Wales No. 4496750
Registered Office: One90 High Holborn, London WC1V 7BH

A PEARSON COMPANY

Edexcel is one of the leading examining and awarding bodies in the UK and throughout the world. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers.

Through a network of UK and overseas offices, Edexcel's centres receive the support they need to help them deliver their education and training programmes to learners.

For further information, please call our GCE line on 0844 576 0025, our GCSE team on 0844 576 0027, or visit our website at www.edexcel.com.

If you have any subject specific questions about the content of this Examiners' Report that require the help of a subject specialist, you may find our Ask The Expert email service helpful.

Ask The Expert can be accessed online at the following link:

http://www.edexcel.com/Aboutus/contact-us/

January 2011

Publications Code UA026576

All the material in this publication is copyright
© Edexcel Ltd 2011

Mechanics Unit M1
Specification 6677

General

The paper seemed to be of a suitable length for the vast majority with very few candidates unable to attempt all the questions. The final part of the last question was very discriminating and so it wasn't always clear whether the weaker candidates had run out of time or run out of ideas. Overall the paper seemed to be very accessible and there were several very straightforward questions. The first question proved to be a very easy starter for most and question 5 also provided an opportunity for many to score highly. Other good sources of marks were questions 4(a) and 6(a). The questions which caused difficulties were 4(c), 6(c) and 7(c).
Overall, candidates who used large and clearly labelled diagrams and who employed clear and concise methods were the most successful. It should also be emphasised that candidates should "show sufficient working to make your methods clear to the Examiner" as stated on the front page and usually correct answers only, with no working, will gain no marks. In calculations the numerical value of g which should be used is 9.8, as advised on the front of the question paper. Final answers should then be given to 2 (or 3) significant figures – more accurate answers will be penalised. If a candidate runs out of space in which to give his/her answer than he/she is advised to use a supplementary sheet – if a centre is reluctant to supply extra paper then it is crucial for the candidate to say whereabouts in the script the extra working is going to be done.

Report on individual questions

Question 1

This provided a very straightforward start for most candidates. In part (a), nearly all used an appropriate conservation of linear momentum equation and sign errors due to incorrect interpretation of directions were comparatively rare. Occasionally attempts to equate impulses were seen; these were acceptable provided it was recognised that they were in opposite directions. The majority used impulse = change in momentum in part (b), generally with appropriate signs, although 3(3 – 2) was sometimes seen. The marks could be achieved by considering either particle, but one of them depended on a correct value of m from part (a). Most remembered to give the magnitude as (+)15 for the final mark.

Question 2

In part (a) relatively few were able to show that $u = 0.9$ exactly. It must be stressed that when an answer is given, the method used must be clear and fully correct. Many candidates fudged the signs in their methods, failing to appreciate that u was a speed and therefore positive, or else used an inexact method. The second part elicited many correct responses for finding the height reached above the point of projection. However, the answer was not always given to the required 2 or 3 SF, consistent with the use of g = 9.8 and 1 SF and 4 SF answers were penalised. There were many possible approaches for finding the required height in part (c); sign errors were fairly common and some found the total height reached by the ball. Others found the correct value but added or subtracted another distance to produce their final answer showing a lack of real understanding of the situation. Nevertheless, there were some entirely correct systematic solutions seen.

Question 3

The first part was done well with the most common error being to give *Rc* as 117.6 N which was penalised for being over-accurate. The question required two equations and those who used a vertical resolution were almost always successful whereas those who used two moments equations often made errors. The same was true in part (b), but candidates often made errors when expressing the distances used in terms of *AD*. The omission of g was penalised in the first part but not in part (b), provided it was consistent, where it was not needed to obtain a fully correct solution. A few used the same values for the reactions in part (b) as those found in the first part and received little credit.

Question 4

In part (a) almost all candidates found the magnitude of the velocity to give the speed correctly. Most derived the acceleration, in the second part, by subtracting the velocities and dividing by the time appropriately (often by setting up a $\mathbf{v}=\mathbf{u}+\mathbf{a}t$ equation first); however, a significant minority continue to lack confidence in dealing with vectors and vector notation. Most realised they then had to multiply by the mass to find the force, but sometimes the answer given was the same as the acceleration. The final part proved to be a good discriminator. Some failed to set up an equation in terms of *t* for the velocity, using their acceleration and the initial velocity; various combinations of terms were often seen. Many realised the **j**-component had to be zero, but some equated the **i**-component to zero whilst others equated the two components. Nevertheless, there were a significant number of candidates who correctly deduced the answer, often with very little working.

Question 5

The vast majority of candidates achieved full marks for the speed-time graph in part (a) and for equating the area under the graph to the given distance in order to find *v*, in part (c). Occasionally '*v*' was left off the axis, or '40,50' labelled instead of '60,70' which also led to errors in part (c). The acceleration-time graph in the second part provided a greater challenge and some non-horizontal lines were seen. Those who had a graph with the correct basic shape were penalised if they included vertical lines on their sketch, although dotted lines were acceptable.

Question 6

Most candidates were able to resolve perpendicular to the plane, in part (a), to obtain a correct expression for the reaction. The given answer was exact so evidence of rounding, such as using a rounded value for the angle, was penalised. In the second part, some did not realise that they needed to find the new reaction and so lost a number of marks. Many did complete the resolutions correctly although occasionally the friction was acting up the slope instead of down. Attempts at part (c) tended to be less successful, with the weight component often omitted or else limiting friction was used. Those who found a correct numerical value for the magnitude of the frictional force (by resolving parallel to the plane) did not always deduce the correct direction.

Question 7

Despite the lack of structure in part (a) most candidates knew the methods required. Many gained the marks for resolving perpendicular to the slope and for using $F = \frac{2}{3}R$. The equation of motion for the 7kg mass was also often correct, but a common error was to replace T by 7g when resolving parallel to the plane. Sometimes a term, either friction or the weight component, was omitted from this equation. Although some candidates failed to complete successfully all the substitution and rearranging required to find the acceleration, there were a number of entirely correct solutions. An appropriate constant acceleration formula was generally used for the velocity in part (b), although an incorrect answer from part (a) led to loss of the accuracy mark. In the final part, many did not manage to find the new acceleration by a valid method; some used the value from part (a) or quoted '9.8' without any justification, whilst others realised that a new value was required but omitted a term from the equation of motion. Amongst those who resolved the two forces, a number had friction acting in the wrong direction. There were a small number of entirely correct solutions seen.

Grade Boundaries

Grade boundaries for this, and all other papers, can be found on the website on this link:
http://www.edexcel.com/iwantto/Pages/grade-boundaries.aspx

Further copies of this publication are available from
Edexcel Publications, Adamsway, Mansfield, Notts, NG18 4FN

Telephone 01623 467467
Fax 01623 450481

Email publications@linneydirect.com

Order Code UA026576 January 2011

For more information on Edexcel qualifications, please visit www.edexcel.com/quals

Edexcel Limited. Registered in England and Wales no.4496750
Registered Office: One90 High Holborn, London, WC1V 7BH