Examiners' Report/
Principal Examiner Feedback

Summer 2013

GCE Mechanics M1 (6677)
Paper 01R

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Introduction

The vast majority of candidates seemed to find the paper to be of a suitable length, with no evidence of there being a lack of time. The paper proved to be very accessible and the candidates were very well prepared with many complete solutions seen for all eight of the questions. Question 4 was slightly unusual and caused some problems and parts (b) and (c) of question 7 proved to be challenging perhaps because the scenario was slightly different with the towbar at an angle to the horizontal. Generally, candidates who used large and clearly labelled diagrams and who employed clear, systematic and concise methods were the most successful.

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, including fractions.

If there is a printed answer to show then candidates need to ensure that they show sufficient detail in their working to warrant being awarded all of the marks available.
In all cases, as stated on the front of the question paper, candidates should show sufficient working to make their methods clear to the Examiner.

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 question was generally well answered. In part (a), almost all candidates quoted and used an appropriate formula for impulse in terms of difference of momenta to gain the method mark but many made a sign error in their equation and some who had a correct equation but with a negative v forgot to then state $v = 2$ and so lost the final mark as speed was required. In the second part, most also gained the method mark either for an impulse-momentum equation or conservation of momentum equation but again similar errors were made. It was not uncommon to see these marks earned first and then conservation of momentum used to find the speed of A.

Question 2

This question was usually done very well with the vast majority resolving horizontally and vertically. Some candidates lost one or both of the final A marks due to rounding errors while others made an error in solving their simultaneous equations. A very small number of candidates used the Sine Rule on a triangle of forces, a few resolved along the strings and one or two resolved perpendicular to the strings. Those that assumed that the two tensions were equal lost most of the marks.

Question 3

The vast majority had little difficulty with this question with the most common error being over specification of the final answer. Candidates should be reminded to round to an appropriate degree of accuracy when the numerical value of g (9.8) has been used to calculate an answer (see above). Most considered the two particles separately but occasionally a ‘whole system’ equation was seen and candidates are reminded that this approach is discouraged.

Question 4

There was mixed success with this question. In the first part a significant minority obtained $T = 2.8$ but from an incorrect equation and so lost marks. A common error was the 50 having the wrong sign leading to $T = -2.8$. The negative sign was often then just ignored and $T = 2.8$ was used in part (b). Those who had got part (a) completely correct usually went on to score full marks in the second part also, although some lost the final mark for 17.75 which needed to be rounded because of the use of $g = 9.8$. Some who had struggled with part (a) managed to get the method mark in the second part for substituting their T into an appropriate equation.

Question 5

The first two parts of this question were generally answered very well with the appropriate *suvat* equations usually being used correctly. It was not uncommon to see the answer for the acceleration in part (b) appearing first and then it being used to find the velocity in the first part. There were more problems with the final part where the main error was forgetting to include the component of the weight when resolving parallel to the plane.

Question 6

This was a straightforward vector question with the vast majority of candidates who attempted it scoring full marks. Those who were unsure what to do usually were able to score the first three marks for the position vectors of S and T. In part (b) a few were confused about which components to equate and lost marks if they didn’t equate both and in the final part some obtained the correct position vector for P but then forgot to calculate the appropriate distance.

Question 7

This question provided some much needed discrimination. Part (a) was usually fine but some lost the final mark for giving a negative answer. In the second and third parts candidates were at least partially successful but it was very common to see sign errors in the equations of motion. Some who found T correctly in part (b) then forgot to resolve it in part (c). Another common error was to include R in the forces acting on the car and not on the truck.

Question 8

Part (a) was a relatively straightforward question where the majority of candidates scored full marks. Resolving vertically and taking moments once, usually about C, was by far the most popular approach but a few opted to take moments twice and this inevitably made it more difficult. In the second part again many candidates scored full marks, with most resolving vertically and taking moments about B. Apart from the usual errors with distances in some of the moments equations, the other mistakes tended to be omitting the mg from the vertical resolution or using the reaction found in part (a).

Grade Boundaries

Grade boundaries for this, and all other papers, can be found on the website on this link:
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