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General Certificate of Education

Mathematics 6360

MM1A Mechanics 1A

Report on the Examination

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General

The paper seemed to have been accessible to the vast majority of candidates, who appeared to be able to complete the paper in the time allocated. There were two general issues that emerged in the marking of the paper. The first concerns the "show that" type of question. There were a few of these on this paper and for all of these there were candidates who lost marks because they did not show sufficient working to support their answer. It is essential that candidates do show all of the steps that they take, so that the examiners can be convinced that the candidates do know how to obtain the result.

The second, but less common, issue concerns cases where the candidates give two solutions. The regulations state that in this case both solutions should be marked and the mean awarded, rounding down if necessary. Thus from a correct solution worth five marks and an incorrect solution worth zero marks, a candidate gains only two marks. Candidates should be encouraged to delete solutions that they have replaced and advised against the policy of leaving two or more solutions in the scripts.

Question 1

This question was generally done very well, particularly parts (a) and (b). In part (c), some candidates simply assumed that the tension would be equal to the weight. Some of these candidates gave the same answer for part (d) and gained the mark there. A few candidates performed the calculation $4410 - 45$ and obtained an incorrect value.

Question 2

There were many good solutions to this question. The main issues that emerged were that some candidates found the momentum after the collision, but did not use the mass to find the velocity after the collision. There were also some candidates who did not know how to find the speed, sometimes giving their answer to part (b) as a vector. The negative signs in the velocities caused some candidates to make arithmetic errors.

Question 3

This question, particularly part (a), proved to be more demanding and was not answered well by the weaker candidates. In part (a), some candidates ignored the instruction to resolve horizontally. The main issue was that the vast majority of candidates assumed that the tensions were equal and did not assign variables such as T_1 and T_2 to the tensions. In parts (b) and (c), some candidates did not take account of the fact that there were two tensions to consider. In addition, some candidates made resolving errors using $\sin 30°$ instead of $\cos 30°$. In part (c), some candidates felt that there was no need to resolve the forces, although they had done so in part (b). Also a small number of candidates found the weight rather than the mass.

Question 4

Parts (a) and (b) of this question were done well by many candidates, but part (c) was more demanding. In part (a) most candidates formed two equations as requested, but a few only worked with one equation for the whole system. Those who had done part (a) correctly had few problems with part (b), while those with incorrect equations in part (a) obtained incorrect answers as a result. The main problem in part (c) was that many candidates assumed that the particles had moved $1\ \text{m}$ each, instead of the $0.5\ \text{m}$ that was needed for them to be $1\ \text{m}$ apart. A few candidates took the acceleration to be $9.8\ \text{m s}^{-2}$ in this part of the question.

Question 5

This question was done very well by the vast majority of candidates. Some candidates who could not do part (a) used the printed answer to find the correct answer for part (b).

Question 6

This question caused problems for a number of candidates. The most common error, which created difficulties throughout the question, was to treat the ball as if it had an initial vertical component of velocity, often equal to 20 m s^{-1}. This would lead to equations of the form $2.45 = 4.9t^2 \pm 20t$. A few candidates who were unable to do part (a) were able to use the printed answer from part (a) to complete part (b) correctly, but some did include an initial vertical component of velocity again.

Part (c) of this question was more demanding. There were two main errors. The first was to work with the position of the ball when it hit the ground. These candidates would calculate an angle based on the two distances that they knew. A typical answer for these candidates was $\theta = \tan^{-1}\left(\frac{2.45}{14.14}\right)$. The other error was to only find one component of the ball's velocity.

Question 7

Parts (a), (b) and (c) of this question were often done very well. In part (a), candidates occasionally gave the answer "5" or "5**j**", but the vast majority of the answers were correct. In part (b), many candidates correctly stated the velocity, but some candidates then performed incorrect simplifications. Part (c) was done well by those candidates who had obtained the velocity vector.

Part (d) proved to be more challenging. Some candidates realised that they needed to find the position vector and hence the bearing. These candidates usually made good progress, although some stopped when they had the position vector and others gave the answer as $52.3°$. Some candidates tried to work with velocities.

Coursework Component

There was still a tendency to make transcription and addition errors when totalling the scripts. The final marks should be carefully checked prior to submission to AQA and for moderation. A number of scripts had either no marking on them or were marked in pencil. Scripts should be marked in red pen and calculations should be checked for accuracy (and indicated as such on the scripts). All Candidate Record Forms must be signed by the candidate and the teacher responsible for the assessment of the script.

In interpretation, candidates should interpret their results clearly and try to relate these to the 'real-life' situations being modelled; e.g. in the basketball task, is the ball on a downwards path to ensure a basket is scored?

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the **Results statistics** page of the AQA Website.