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General Certificate of Education (A-level)
June 2012

Mathematics   **MM1A**

(Specification 6360)

Mechanics 1A

Report on the Examination

General

The paper contained a number of questions that all of the candidates were able to access and also some more challenging questions which provided a greater degree of challenge, in particular question 7.

In some questions, there was evidence of candidates rounding the answers in intermediate working to 3 sf and then continuing to work with these values. This sometimes leads to inaccurate final answers. Candidates should be encouraged to work to more than 3sf when obtaining intermediate answers and only round their final answers to 3sf.

As there was a very small entry for the MM1A paper, these comments are also based on the responses to the common questions on the MM1B paper.

Question 1

This question was done very well, with many candidates gaining full marks. The candidates who did not progress on this question had difficulties setting up the equation for the conservation of momentum.

Question 2

There were many good attempts at this question. In part (a) (i), many candidates were able to obtain the correct answer although some found the time and then the acceleration. There were only a few cases of candidates confusing u and v in their equations. In part (a)(ii), there were again many good responses, but in some cases inappropriate information was used, for example using a distance of $75\mathrm{m}$ or a final speed of $10\mathrm{m\,s^{-1}}$.

In part (a)(iii) there were again many correct answers, but quite a few candidates did not find the magnitude of the force and gave negative answers. This was also the case in part (b), where candidates also sometimes added the 200 to their previous answer instead of subtracting it from it.

Question 3

This question was done very well by candidates and there were many full correct solutions. The main source of errors in part (a) was due to using incorrect combinations of $\sin$ or $\cos$ and the angle that the candidates decided to work with. In part (b) some candidates used trigonometry while other used Pythagoras' Theorem. In the final part some candidates multiplied by 9.8 rather than dividing by it.

Question 4

The candidates who understood how to approach this question did very well, but others were unable to make much progress with this question.

Question 5

Candidates who understood how to form the triangle needed to solve this problem made good progress, while the others were unable to set up the equations needed to solve the problem.

Question 6

The candidates made very little progress with this question and did not seem to be able to deal with the resolving required.

Question 7

There were some vary varied responses to this question. Part (a) was often done well and the candidates who attempted to find the position vector generally gained the marks available. However, quite a few gave the velocity instead of the position vector. Those who had a velocity vector in part (a) then generally used this in part(b) and scored no marks. Some who had a correct position vector in part (a), used the wrong component to try to answer part(b).
Part (c) was altogether more challenging and many candidates worked with position vectors rather than velocity vectors. This clearly was the wrong approach, but some expended a lot of effort solving the quadratic equations that they produced. Some candidates came up with the correct velocity, but without showing how they had obtained their answer. It is important that working is justified. Sometimes a trial and improvement method led candidates to the correct answer.

Question 8

There were many correct answers to part (a) and the candidates were clearly helped by the presence of the printed answer. In most cases the arguments given were sound, but in others this was not the case. For example some candidates simply wrote statements such as $22.4\sin\theta - 19.6$ and never included an equals sign or a zero. This was regarded as an important omission.
There were also lots of good answers to part (b), but some basic errors, such as the omission of a negative sign with g or the use of $\sin(0875)$. In part (c) there were also some good answers. Some candidates did not realise that the time of flight could be found by doubling the 2 seconds that was given, and did quite a lot of work finding the time of flight. In some cases there were errors in the calculation of the distance. For example an incorrect application of $s = \frac{1}{2}(u+v)t$ was seen with statements such as $s = \frac{1}{2}(10.8+0)\times 4$.

The approaches to part (d) were many and varied. There were quite a number of good responses, but often candidates did not really get very far with this part of the question. The most common error was for candidates to use a distance, for example $19.6 - 5 = 14.6$, with the initial speed of $22.4\sin\theta$.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the Results statistics page of the AQA Website. UMS conversion calculator www.aqa.org.uk/umsconversion