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General Certificate of Education

Mathematics 6360

MM1A Mechanics 1A

Report on the Examination

2009 examination - June series

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Registered address: AQA, Devas Street, Manchester M15 6EX *Dr Michael Cresswell Director General.*

Written Component

General

The candidates found this paper accessible. Almost all candidates were able to attempt the early questions, and the later questions provided more challenge for the candidates who were working at grade-A level.

Question 1

While many candidates gained full marks on this question, there were two common reasons for losing marks. The first, in part (a), was simply arithmetic errors, which seemed to be quite common in this question. The second, also in part (a), was candidates' not including the combined mass of $10\ \text{kg}$ in their working. This often led to answers such as $\begin{bmatrix} 11 \\ 22 \end{bmatrix}$. In part (b), many candidates who had made errors were able to gain the method marks.

Question 2

Parts (a) and (c) were done well, with almost all of the candidates gaining full marks on these parts. Part (b) was a little more demanding. There were a number of correct solutions, but the two most common errors were to subtract 400 from 660 to obtain $260\ \text{N}$ or to include the weight of the motorcycle and rider in some way.

Question 3

Generally this question was done well, with almost all candidates gaining some marks on it. In part (a), some candidates lost marks by not making it clear that they had divided by 10 to get the given speed.

In part (b), some candidates did not realise that the $1.6\ \text{m s}^{-1}$ should be on the hypotenuse of their velocity triangle. This also caused them problems in part (c).

In part (c), some candidates found the 'wrong' angle: for example giving $36.9°$ as their answer, not realising that this value should be taken away from $90°$. In general, the candidates who drew correct velocity triangles did not experience these difficulties.

Question 4

Part (a) of this question was done very well, but part (b) caused difficulties for some candidates. The most common errors in part (b) were to include the weight of the car and trailer or to produce equations in which the wrong combinations of forces were used.

Question 5

This question was demanding for the candidates, although part (a) caused very few difficulties for the majority, and some gained only the three marks for this part of the question.

Part (b) was the most demanding part of the question, and only very few candidates gained the marks available. Many candidates stated that the **i** component should be zero, but very few formed an equation to find the time when this would be. Most incorrect approaches were based on using a time, often 20 seconds, and then calculating the **j** component of the velocity and stating that the **i** component was 0.

There were some good answers to part (c), but quite a few candidates failed to include the initial position of the particle.

In part (d), there were some good solutions, but some candidates made errors. These included not subtracting the initial position. Some candidates used $\frac{\mathbf{u}+\mathbf{v}}{2}$. With this method there were two main errors: dividing by 20 rather than 2 and using an incorrect expression for either $\mathbf{u}$ or $\mathbf{v}$.

Question 6

Parts (a) and (b) were found to be fairly straightforward by candidates, but part (c) was much more demanding. The candidates often calculated the vertical component of the velocity in part (c), but were unable to use this correctly in further calculations. There was often confusion about how to calculate the speed and the direction of motion.

Question 7

The candidates found part (a) of this question relatively straightforward, but part (b) was found to be very demanding, and very few correct solutions were seen. Candidates lost marks in part (a) mainly due to errors in the resolving: for example using $\sin 30°$ instead of $\cos 30°$ in part (a)(ii). A few candidates lost one mark because they gave their final answer for the coefficient of friction as 0.31 rather than 0.313.

In part (b), very few candidates realised that they needed to express the normal reaction in terms of the tension. This error resulted in solutions that were flawed. Most of the candidates who did express the normal reaction in terms of the tension went on to gain full marks for this part of the question, although a few did make arithmetic or algebraic errors.

Coursework Component

It is important that all centres read their feedback forms from the moderator carefully, as there is some evidence that the advice offered is not always being taken, leading to some centres having marks adjusted session upon session. It should be clear from the comments made what such centres need to do to avoid any further issues. The comments should also indicate if a centre is close to falling out of tolerance; in such cases careful internal moderation is strongly advised. Centres should remember that the moderator has no idea of the individual qualities of the candidates submitting the work; the marks must reflect what is submitted not what the candidates have done in exams or class work.

Centres should ensure that all work is dispatched in appropriate AQA stationary and does not require a signature, and that the deadlines for submission are met. If a centre does have an issue with making a deadline, then they must contact AQA for advice.

There was a significant improvement this session in the ‘other areas of work’ strand, after the advice offered in previous reports.

Overall there was very little work submitted in this session for Mechanics 1, with ‘basketball’ being the most popular task. The advanced use of Excel by some candidates enhanced the quality of many of the scripts seen.

Mark Ranges and Award of Grades

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