



General Certificate of Education

Mathematics 6360

MM1B Mechanics 1B

Report on the Examination

2008 examination - January series

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General

This paper seemed accessible to the great majority of candidates. This paper contained some questions where the answers were given and the candidates were expected to obtain these results. For all of these questions there were a number of candidates who did not show enough working to justify their answers. It is important that candidates show all of the steps that are required, to convince the examiners that they have obtained the printed result.

Question 1

While there were many good responses to this question, candidates did make some errors and some did not show enough working in part (a). In part (b), there were a number of incorrect approaches. These included:

- Simply calculating the weight.
- Calculating the magnitude of the resultant force using $F = ma$.
- Making a sign error by producing an equation such as $70g - T = 70 \times 0.64$.

Part (c) was usually done well, although a few candidates did not appear to know how to calculate the average speed.

Question 2

There were very many good responses to this question and many candidates gained full marks, particularly for part (a). The most common error seen was to give an answer of 53° . This was often accompanied by a diagram that showed an incorrect representation of the velocities.

Question 3

This question caused more difficulties. There were a large number of poor force diagrams. The most common errors were to include a reaction force and to show the two tensions as equal, by using the same letter to indicate the magnitude of each tension.

In part (b), there were candidates who did not show enough working to obtain full marks. Reasons for this included not showing a trigonometric term such as $\sin 30^\circ$ or $\cos 60^\circ$ and not showing how the value of 78.4 was obtained from the candidate's initial equation. A few candidates tried to resolve the weight instead of the tension.

The candidates did find part (c) easier, with some candidates only obtaining marks on this part of the question, using the printed result in part (b).

Question 4

There were many good responses to this question. Parts (a)(i) and (a)(ii) were often done well by candidates. A small number of candidates did not include the mass when forming their equations. In part (b), some candidates gave the velocity of the particle as the answer instead of the speed.

Question 5

Generally part (a) was done well, whilst part (b) caused more difficulties. The fact that the acceleration was given did seem to help many candidates, but some did not justify the minus sign. Applying the constant acceleration equation to find the distance was also done well, although a few candidates took $u = 0$ and $v = 4$. There were a number of candidates who used

two constant acceleration equations, finding the time taken to stop as an intermediate step. A few of these candidates did not go on to find the distance.

In part (b), many of the candidates were able to find the magnitude of the friction force. In a few cases the candidates did not show how the reaction force was obtained. Full marks were not awarded if the candidates simply stated $R = 1.84$ without any justification. When calculating the acceleration there were many sign errors in candidates' equations and some candidates also included a^2 which appeared as if it was a force. While many candidates realised that the puck would remain at rest, only a relatively small number of them were able to give a convincing explanation. Many of the explanations contained vague statements and lacked precision and clarity.

Question 6

Part (a) was done very well and some candidates had clearly been helped by the presence of the printed answer. There were several examples of candidates who obtained the printed answer in part (b) showing enough supporting working. A value of 4000 was often introduced without any working to show that it had been obtained from an application of Newton's Second Law.

Several candidates found the tension in the rope first and then found the value of P . Some candidates were confused about when to include the tension in the rope. The responses to part (c) were variable, but those who had taken a systematic approach to part (b) usually did well. The answers for part (d) were very varied, with some very good explanations and other responses which lacked coherence.

Question 7

Many candidates did well on this question, scoring a good number of marks. Part (a) was often answered well, but some candidates did include a number of spurious reasons. In part (b), there were many good responses. Some candidates did not show clearly how they obtained the equation which they went on to solve to find the time.

A large number of candidates found the time to the maximum height and doubled this value. Some of these candidates did not explain why this doubling had taken place and a 2 seemed to appear in their equations with no justification. Part (c) was generally done well. Some candidates gained full marks on part (c) without doing part (b). A few candidates had difficulty solving the inequalities to find the values of V .

Question 8

In this question the use of vector notation by some candidates was quite poor. Part (a) was done well by a good number of candidates, but some did not show enough working to gain full marks. Typical issues were not showing that their equation was derived from $\mathbf{v} = \mathbf{u} + \mathbf{a}t$ and not showing the division by 40 clearly. Some candidates did well with part (b), but there were quite a lot of arithmetic errors.

Some candidates used an incorrect initial velocity, for example $4\mathbf{i}$ instead of $5\mathbf{j}$. Part (c) proved to be too demanding for the majority of the candidates, although some were able to gain a few marks. One of the most common errors was to work with position vectors rather than with velocities. For those who did work with velocities, creating an equation to find the time when the Jet Ski was travelling south east was found to be difficult. Quite a number of the candidates who got this far had equations that lacked a minus sign.

Mark Ranges and Award of Grades

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