



General Certificate of Education

Mathematics 6360

MM1B Mechanics 1B

Report on the Examination

2008 examination - June series

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General

Most candidates found the paper accessible and were able to make good attempts at a number of the questions. The weaker candidates were able to produce reasonable amounts of work on a fair number of questions, and there were relatively few very weak scripts. Some of the questions offered more challenge to the stronger candidates.

Question 1

This question was done very well by the vast majority of the candidates. Almost all gained full marks on part (a), but a few did make arithmetic errors. Again, in part (b), almost all the candidates found the acceleration correctly, although a few did give the answer $\frac{4}{3}$. Part (c) did cause a little more difficulty, although there were many correct responses. The two most common errors were either to assume that the tension was equal to the weight or to make a sign error and obtain an equation such as $400g - T = 400a$.

Question 2

This question was also done well by many candidates. In part (a), there were some confused responses and occasional problems with minus signs. Part (b) was also generally done well. In part (c), a few candidates had problems. The most common of these was to omit an arrow from the diagram to show the force; the other was to use the lengths incorrectly when calculating the angle, for example $\tan^{-1}\left(\frac{8}{2}\right)$ and $\sin^{-1}\left(\frac{8}{8.25}\right)$.

Question 3

This question caused the candidates more difficulty. A relatively small number were able to produce completely correct solutions. The majority found part (a) difficult to deal with, but were often able to pick up marks with correct solutions for the more familiar part (b). Many of the candidates did not make coherent attempts at part (a) and produced confused working.

Question 4

This question tended to be either done very well or very badly. The candidates who drew a correct velocity triangle were able to apply the sine and cosine rules correctly for both parts. However a large number of candidates were not able to do this and based their solutions on a right-angled triangle. A few candidates gained a small number of marks, for example for drawing a correct diagram, but applied the cosine rule incorrectly.

Question 5

Generally the candidates made quite good attempts at this question, but some parts caused the candidates more difficulty. A few candidates made poor use of vector notation. Part (a) was answered correctly by the vast majority of the candidates. The most common error was dealing incorrectly with the initial velocity. A few went on to simplify their answers incorrectly. Part (b) was a little more demanding, as some candidates confused the components. Part (c) did cause a little more difficulty for some candidates, with a few candidates not giving any answer at all. However, there were again many correct solutions.

In part (d)(i), although there were many correct solutions, some candidates showed that the helicopter was south or north of the origin, rather than specifically north. Interestingly, some candidates who could not answer part (c) were able to write down the position vector at the specified time. A few candidates found the correct position vector but did not conclude that the helicopter was due north.

When answering part (d)(ii), many of the candidates found the correct velocity, but some did not find the speed as requested.

Question 6

The force diagram in part (a) was often drawn well, but the usual errors of extra forces and missing labels or arrows were seen. Part (b) was done very well, with the printed answer helping almost all of the candidates to gain full marks. The responses to part (c) were very varied, with some solutions excellent and some very poor. One fairly common error was to form an equation with a sign error, like $F - 5g \sin 40^\circ = 5 \times 0.8$. Other more serious errors included using the normal reaction force instead of the weight component parallel to the slope, and simply assuming that the friction was equal to 4. Part (d) of the question was found to be very difficult, with very few candidates giving acceptable answers. The majority of candidates stated that the coefficient of friction would increase.

Question 7

Parts (a) and (b) were generally done well. There were a few candidates who obtained the printed answer in part (a) from incorrect working. A popular approach was to find the time to the maximum height and to double this to find the time of flight. Part (b) was done very well, with some candidates who had not done part (a) using the printed answer to enable them to proceed.

Part (c) was more challenging and there were fewer correct completions. The main area of difficulty for this part of the question was the setting up of a quadratic equation. Many candidates included a 1 to allow for the change in height, but gave it the wrong sign. A number of candidates solved incorrect quadratic equations. A further issue concerned the solution of the quadratic. Some candidates showed both solutions and indicated that the solution required was the positive one; other candidates simply ignored the second solution without giving any justification for doing so.

In part (c), some candidates found the time by summing two times. For some of these students this approach worked well, but for others, especially when they involved the time to the highest point, there were quite a number of errors in their working.

Question 8

Part (a) was done well by many candidates, although some assumed that the particles had coalesced. Some candidates produced equations with the correct terms, but the incorrect signs. For example, an equation such as $2m - 6 = 0.5m - 1.5$ was quite a common error.

Some candidates did part (b) very well and gained full marks. However, solutions where only one possible value for m was obtained correctly were seen quite frequently.

Mark Ranges and Award of Grades

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