A-LEVEL
FURTHER MATHEMATICS

7367/3M Mechanics
Report on the Examination

7367/3M
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General Comments

There was a wide variety of work produced by students. The earlier questions were generally done well and the later questions provided more challenge. In response to the questions that required an explanation students often did not provide enough explanation to enable them to gain all of the marks.

Question 1

This question was done very well, with the vast majority of students selecting the correct response.

Question 2

There were a lot of good responses to this question, but not as many for the other multiple choice questions. The most common incorrect answers were 8 N m and 10 N m.

Question 3

This question was done very well, with the vast majority of students selecting the correct response.

Question 4

This question was done very well by the vast majority of students who obtained the correct force. A small number of students found the acceleration correctly, but not the force.

Question 5

The majority of students gained a number of marks on part (a) of this question. Many obtained the required value, but often there was no mention of the density of the solid, which was required for the final mark. A few students formed the wrong integrals often considering a lamina rather than a solid.

A lot of students worked through all the stages of the integration in full, which was fine, but simply stating the integrals and evaluating them using a calculator function was the approach that was anticipated and would have gained full marks. These students did a lot of unnecessary work.

Part (b) was not done as well as part (a), with students often using inappropriate distances. Some students gave the answer 9° rather than the correct 81°.

Question 6

There were many correct responses to part (a). Those who had difficulties often did not use the correct change in height for their GPE calculation. A small number of students tried incorrectly to use constant acceleration equations.

The vast majority of students gained the mark on part (b).
Students found part (c) much more challenging. One of the main issues was not considering conservation of energy and just trying to work with an equation derived from resolving radially. These students then ended up with an equation for the tension which was in terms of v and θ.

Some students did consider energy, but used an incorrect change in height for their GPE term. The explanation required at the end of this part often started from the assumption that the sphere was directly below rather than obtaining this as a consequence of considering their expression for the tension.

In part (d) most students tried to relate their explanation back to their expression for the tension, but many simply stated something along the lines of “my value is very close to the student’s value” rather than explaining why it was reasonable for the student’s value to be less than their predicted value.

Question 7

While there were some very good responses to part (a) of this question, a lot of the students found this question to be quite challenging. lMany were able to identify the components of the initial velocities, but did not apply the principle of conservation of momentum correctly. Of those who did find the correct velocity after the collision, some got into difficulties finding the impulse. Many did quote the formula for the impulse correctly, although they found it difficult to apply.

A good number of students stated the correct magnitude in part (b), but often did not explain why this was the case. Some students incorrectly gave a negative value for the magnitude of the impulse.

In part (c), students who had a correct impulse vector could find the angle, but some obtained 7° rather than 83°. Some students used the values from their velocity vector rather than their impulse vector to calculate an angle.

There were relatively few correct explanations in part (d). many students said things like “the velocity of B is bigger than A” or “B has more momentum” rather than considering the motion of B after the collision. There were a few very good explanations.

Question 8

There were some good responses to part (a) of this question, but a lot of partially correct solutions. Common errors were to consider energy rather than force or to use an incorrect normal reaction.

There were a lot of good responses to part (b) of this question.

Part (c) was found to be quite challenging by most students. The most common error was to omit one of the energy terms, most often the work done by the 100 N force. Other energies were also left out of the calculations. A few students used incorrect distances, a typical example being taking the distance moved and the extension of the string as being the same.

Part (d) was more challenging, with very few students gaining full marks. Solutions with missing energy terms were common. Successful students either found the distance that the block moved or compared the energy available with the energy needed for the block to reach the wall. Very few students considered the size of the block which was required for the final mark.

Mark Ranges and Award of Grades

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