



A-Level Further Mathematics

7367/3M

Report on the examination

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General Comments

The paper contained a number of accessible questions on which most of the students did well. Some of the later questions were found to be more demanding as expected.

Question 1

The vast majority of the students selected the correct response. The most common incorrect response was 1.25 N.

Question 2

This question was answered very well by the students. The most common incorrect response was 40 J.

Question 3

This question was answered very well by the students. The most common incorrect response was $\bar{x} = \bar{y}$.

Question 4

The students produced almost all correct responses to this question with just a few occasional errors. The most common error was in part (b) where a few students formed an equation like $\frac{u}{7} = \frac{5}{8}$ and then obtained a speed of 4.38 m s^{-1} .

Question 5

Parts (a) and (b)(i) were completed successfully by the vast majority of the students.

Part (b)(ii) was a little more challenging for some students. The most common error here was to only use one of the energies from the previous two parts, most often the gravitational potential energy, rather than the difference between the two energies that they had calculated.

While there were many good answers in part (b)(iii), some lacked precision. A good example of this was when students referred to a general sort of resistance force rather than air resistance. Another common response that was not appropriate was to say that the forces were constant.

Question 6

This question was done very well. Almost all of the students used dimensional analysis with the correct notation. The use of units rather than dimension was very rare. However, some students did show a bit of confusion by using dimensional analysis notation but with M for mass! Finding the correct dimensions of density was challenging for some students. Some students set up a correct dimensional analysis equation but made errors solving the simultaneous equations that they then formed.

Question 7

This question was more challenging for some of the students. There were a good number of completely correct solutions. Some students used $\mathbf{F} \times \mathbf{r}$ instead of $\mathbf{r} \times \mathbf{F}$ and so did not gain the final reasoning mark. The most common incorrect approach was to find the scalar product of the two vectors that were given in the question. Some students did use the scalar product to find the angle between the two vectors and then found the magnitude of the moment. Most of these students were unable to give an exact final answer, but a few did complete this method and gained full marks.

Question 8

Part (a) of this question was done very well, with a high proportion of the students gaining the required value from correct working. They were probably helped by the fact that the answer was given in the question.

Part (b) was more challenging. The main errors were either not resolving the tension or resolving it incorrectly and including the weight or a component of the weight in their equations.

Question 9

Part (a) was generally done very well with many students obtaining the correct velocity. A small number of students made errors by omitting the masses of the discs from their equations.

There were also many good responses to part (b), but this part was found to be more difficult than part (a). The most common incorrect approach was to use speeds rather than velocities when trying to calculate the impulse. Some students also made sign errors and a few used $\mathbf{I} = m\mathbf{u} - m\mathbf{v}$ rather than the correct formula.

In part (c) the most common errors were to multiply by 0.1 rather than dividing by 0.1 to find the force and not changing the signs of their impulse from part (b).

Question 10

In part (a) some students simply used the formula for the centre of mass of a sector of a circle from the formula booklet instead of using integration. Those who did use integration generally made good progress with their solutions and a variety of methods were seen with the semi-circle in different orientations, for example with the straightedge along the x -axis or the y -axis. Some students used integration to find the area of the semicircle, which was quite excessive as they could simply have quoted the formula for the area of a circle.

Part (b) was done very well, with many students obtaining the correct angle. Some drew very useful diagrams to help them form a right-angled triangle containing the required angle. A few students obtained an angle of 67° .

Question 11

Almost all of the students were able to find the correct elastic potential energy in part (a).

Part (b) was much more challenging. Only a relatively small number of students realised that the maximum speed would be reached when the resultant force on the block was zero. Many of the students who did this went on to complete the question successfully, but some omitted one of the forces usually the friction. Many students tried to form an energy equation, but the most common errors were to omit one term. The most common omissions were the elastic potential energy at the equilibrium position, or the work done against friction. A large proportion of the students thought that the maximum speed would be reached when the string became slack. A few students found an acceleration and tried to use constant acceleration equations.

Part (c) was also found to be very demanding. Many students formed arguments based on the idea that the resultant force would be less, so that the acceleration would be less and so the block would travel a greater distance before reaching its maximum speed. There were some very good responses from the students who realised that the tension would be greater at the maximum speed in this case.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the [Results Statistics](#) page of the AQA Website.