AQA

Questions matter

AS

Further Mathematics

7366/2M Paper 2 Mechanics

Report on the Examination

7366
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General Comments

The paper was found accessible by a good proportion of students. There were some more demanding parts in several questions that were suitably challenging for students achieving the higher grades.

Question 1
The vast majority of students selected the correct response. The most frequent incorrect response was 5 J.

Question 2
The vast majority of students selected the correct response. The most frequent incorrect response was MLT^{-2}.

Question 3
The vast majority of students selected the correct response. The most frequent incorrect response was 2.5 rad s^{-1}.

Question 4
Part (a) was done very well with the vast majority giving the correct answer.

Part (b) was also done very well. A few students did not do enough to justify the given value of 5.1 m. They needed to have stated something like $h = \frac{25}{4.9} = 5.1$ or $h = 5.102... = 5.1$ to gain full marks. Only a very small number of students used constant acceleration equations, which was not credited because the question stipulated that an energy method should be used.

Parts (c)(i) and (c)(ii) were found to be a little more demanding, but there were still very many good responses. Most of the students who did not gain marks seemed unfamiliar with the meaning of 'work done'.

In part (c)(iii) there were some good explanations that linked the magnitude of the resistance force to the speed, with some also showing that the speed and hence the resistance force were decreasing with height. The poorer explanations lacked a definite argument and often said things like "Resistance forces are not constant and so not valid."

Question 5
There were very many good responses to this question. Some students first found that the driving force was 1500 N, while others did not find the force but formed and solved the equation $75000 = k \times 50^2$. Some students did not explain that the acceleration would be zero or that the forces would be in equilibrium and lost the E1 mark for not fully justifying their answer. A small number of students did not progress after obtaining 1500 N.

Question 6
There were very many good responses to this question. There were some minor algebraic errors that produced incorrect answers, but the biggest issue for students was not referring to the dimensions of 2π. A few students said that it was a constant rather than dimensionless. The vast majority of students used correct notation and very few used units rather than dimensional analysis.

Question 7

There were very many good responses to part (a), with most students writing down the required integral and evaluating it using a calculator as expected. Some students did work through the whole process of integrating without using a calculator. A few students did not know how to approach finding the impulse or tried to use an incorrect formula.

In part (b) most students used the formula $I = mv - mu$, but some worked out the acceleration and used integration to find the required speed. This was a more demanding approach and one that was not always completed successfully. Several students benefitted from the follow through that allowed them to gain all the marks in part (b) from an incorrect answer in part (a).

Question 8

There was a very pleasing number of good responses to this question with a fair number of students gaining all the marks.

Almost all students gave the correct answer for part (a) with just a small number of other responses.

Students were helped by the given answer in part (b), with a very high proportion gaining all 4 marks. Various approaches using substitution were seen, some requiring more work than others. The neatest solution was to form the equations $v_A + 6v_B = 10u$ and $v_B - v_A = 3eu$ which very quickly led to the required result.

Students found part (c) a bit more demanding, with some not knowing how to start. Many found a correct expression for the velocity of *A* after the collision but were not sure how to use this result. There was evidence of some difficulty manipulating inequalities. Several students obtained the correct inequality $-9e < -5$ but solved this to obtain $e < \frac{5}{9}$ rather than $e > \frac{5}{9}$. Most students who obtained $e > \frac{5}{9}$ went on to give their final answer as $\frac{5}{9} < e \leq 1$.

Question 9

Part (a) of this question was the most demanding question on the paper and there were very few correct responses. There were many students who drew two horizontal forces, often labelling one friction and the other centripetal force. The phrase “centrifugal force” was also seen in some responses. A few students drew no horizontal force.

Part (b), in contrast to part (a), was done very well with many students obtaining the correct maximum angular speed. There were some problems with the units involved as conversions were needed for two values. A few students approached the problem by first finding the speed of the coin and then obtaining the angular speed from this.

In part (c), there were some good responses that talked about the air resistance on the coin and the fact that the coin should be modelled as a particle. There were many other responses that did not really focus on the context being considered.

Mark Ranges and Award of Grades

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