Pearson Edexcel

Examiners' Report
Principal Examiner Feedback

October 2020

Pearson Edexcel Advanced Subsidiary
In Further Mathematics (8FM0/25)
Paper 25: Further Mechanics 1

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The quality of the work from this small group of candidates was very variable. Some candidates were well prepared and demonstrated a good understanding of the topics in this specification. Several candidates showed some understanding of the basic concepts, but only limited confidence in applying them. It is not enough to understand the mechanical principles – many marks were lost through errors in basic algebra and arithmetic.
The best work was presented in a clear and logical manner, and was easy to follow. There was no evidence that the space allocated for responses was too small, so there was no need for work for marking to be mixed in with work that had been deleted: some solutions were presented in a very piecemeal fashion.
All candidates need to remember to read the questions very carefully and to make sure that their response matches the demand. If the question asks for the answer to be given in a particular format, then the candidate should not stop short of reaching that point. If a particular method is specified in the question, then marks will not be scored for solutions using alternative methods.

Question 1
(a) Several candidates did not distinguish between the initial impulse given to the particle *P* and the impulse in the collision between *P* and *Q*. Some diagrams showed evidence of correct thinking, but this was not always translated into dimensionally correct statements. In some solutions it appeared that the candidate thought that the initial impulse had been applied to *Q*.
(b) Those candidates who had found the speed of *P* immediately before the collision with *Q* usually gave a correct justification of $e = \frac{1}{4}$. Many candidates quoted the formula $e = \frac{\text{speed of separation}}{\text{speed of approach}}$ and showed the correct substitution of values. Some misquoted a formula in *u*s and *v*s, making a sign error and obtained the negative of the required answer. Rather than trace their error they simply stated that $-\frac{1}{4} = \frac{1}{4}$.
(c) The majority of candidates understood how to find the change in kinetic energy, although some made errors in simplifying to obtain the answer. The most common errors were in processing $(4w)^2$ or not using the correct masses for the particles.

Question 2
(a) The majority of candidates completed this task correctly, but a significant minority showed little understanding of the relationship between the different units.
(b) There were several fully correct solutions, with the majority of candidates being familiar with the relationship between the power, the speed and the driving force. The majority of errors were due to incorrect signs or slips in the arithmetic.
(c) The most common answers were $V = 43$ and $V = 43\ \text{m s}^{-1}$. Many candidates had not noticed that the maximum speed was given as $V\ \text{km h}^{-1}$.

Question 3
(a) The majority of candidates were familiar with the conservation of linear momentum and with the impact law and most applied these correctly to score the first four marks. Only a few candidates correctly identified the condition for no further collision. Some candidates thought that it depended on the velocity of *C* and did not attempt to find an

expression for the velocity of *B*. The most common condition used was $v_C > v_B$ although some candidates came much closer with $v_B > 0$, not appreciating that if *B* were at rest there would be no further collisions. Fully correct solutions were unusual.
The candidates were free to select their own names for the velocities of *B* and *C* after their collision, so it was a little surprising to find candidates calling them v_A and v_B - such a choice has the potential to cause confusion.
Some candidates considered only the case when *B* was at rest after the collision. Although they demonstrated understanding of the conservation of momentum and of the impact law, there was nothing in their responses to justify considering only the limiting value, or to justify their decision about the final inequality.
(b) Those candidates who wrote down an equation for the impulse on *B* were more likely to make a sign error than those candidates who considered the impulse on *C*. Here again candidates who started with a correct equation often made arithmetical and algebraic errors in reaching their final answers.

Question 4
(a) This part of the question asked candidates to use the work-energy principle, so solutions that did not take that approach did not score any marks. Several candidates did score the first two marks for correct statements of the work done against the resistance and for the change in kinetic energy. The most common errors in the energy equation were to omit the work done against the resistance, to include both the work done against the weight of the ball and the gain in gravitational potential energy, and sign errors.
(b) Most candidates made a correct start by using the coefficient of restitution correctly. Several candidates used the work-energy principle again. If they had made an error in the work-energy equation in part (a) they usually repeated the same error here.
No particular method was required in this part of the question, so correct solutions using *suvat* equations gained full credit. Some correct solutions were seen, but many used incorrect values for the acceleration, usually g or $\frac{3g}{2}$.
(c) The key factor that the candidates were expected to note was the loss in kinetic energy in the collision with the ceiling. Although the question states that the revised model assumes no air resistance, many responses referred to air resistance.

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