Pearson Edexcel

Examiners' Report
Principal Examiner Feedback

Summer 2025

Pearson Edexcel GCE
Further Mathematics (8FM0)
Paper 25 Further Mechanics 1

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General

Overall the quality of the scripts was very good although the quality of the presentation was sometimes very poor, making it difficult for examiners to follow. The paper proved to be very accessible and there was no obvious evidence of time being a limiting factor, although there were a few incomplete answers to question 4 but this was often due to students running out of ideas rather than time. Learners were usually very well prepared and demonstrated a sound knowledge of the specification.

All four questions allowed learners to show what they knew and the degree of difficulty increased through the paper – the percentages of learners achieving full marks on each question were: 32, 27.3, 20.3 and 12.2.

In calculations the numerical value of g which should be used is 9.8, unless otherwise stated. Final answers should then be given to 2 (or 3) significant figures – more accurate answers will be penalised, including fractions but exact multiples of g are usually accepted.

N.B. If a question specifies a particular method to be employed, as in parts (a) and (c) of question 3, then in order to receive any credit, learners must use that method in at least a part of their solution.

In all cases, as stated on the front of the question paper, learners should show sufficient working to make their methods clear to the examiner and correct answers without working may not score all, or indeed, any of the marks available.

If a candidate runs out of space in which to give his/her answer than he/she is advised to use a supplementary sheet – if a centre is reluctant to supply extra paper then it is crucial for the candidate to say whereabouts in the script the extra working is going to be done.

Question 1

There were many fully correct responses and in part (a), almost all equated 20000/U to the resistance and found the value of U. A few missed the reference to constant speed and had an a in their equation of motion and were unable to make any progress.

In part (b), again there were few errors, the most common being omission of the weight component from the equation of motion or including it but with a wrong sign.

There were many correct answers to the final part with most picking up on the fact that the resistance was unlikely to be constant. A few did not appreciate that the *total* resistance to motion had been modelled and felt the need to add others.

Question 2

There were many fully correct responses in part (a), particularly from those who took onboard from the start the fact that the direction of motion of P was reversed by the collision. Those who didn't just made life difficult for themselves, not only in part (a) but also in the later parts. Most, however, were able to write down a CLM and an NEL equation, do the necessary elimination and obtain the given answer, sometimes with some adjusting of the signs.

Part (b) was not answered well and proved to be a good discriminator, with a whole range of incorrect answers being given: $0 \leqslant e \leqslant \frac{1}{3}$, $e > \frac{1}{3}$, $\frac{1}{3} < e < 1$,...

Part (c) was often correctly done. The most common error was finding the velocity of Q but using m rather than $3m$ when calculating the magnitude of the impulse, closely followed by using P but making a sign error when dealing with the rebound velocity.

Question 3

Part (a) was well answered but many otherwise correct solutions were not rounded to 2 or 3 sf and 3.125 was a very common wrong answer, with a few giving 25/8. Most were able to write down an energy equation and solve it but a few ignored the question and used *suvat* formulae and scored nothing. A common error was to use $h = d/\sin\alpha$ in the PE term.

The second part was accessible to all but the least abled and often learners who scored poorly in (a) and (c), achieved full marks here.

There were many correct solutions for part (c) and oddly, some learners who didn't use conservation of energy for (a), were quite happy using the work-energy principle here. Again there were those who used *suvat* instead and scored nothing although these were relatively few in number. Common errors here included using F rather than Fd for the WD against friction, giving it the wrong sign in the equation or omitting the WD against friction altogether. A few over complicated their solutions by using two vertical heights rather than the change in vertical height when dealing with the PE, often resulting in mistakes being made.

Question 4

Part (a) caused some problems, although there many correct answers. The most common error occurred when dealing with the change in direction and there were sign errors in the impulse-momentum equation often leading to an answer of 4/13 instead of 4/5.

The second part proved to be challenging for all but the very best students and there were very few completely correct solutions. The first 4 marks were very straightforward but a surprisingly large number omitted the 2 in one or other of the CLM and KE equations. This often then led to pages of incorrect algebra. Learners would be well advised to check their equations carefully before using them. Another common error was to treat mu^2 as the KE loss rather than the final KE which again resulted in lots of unnecessary algebra. This often wasn't helped by some very basic fundamental mistakes being made – a common one being $\sqrt{u^2+v^2} = u+v$. A few chose to include NEL, despite not being given the coefficient of restitution between the particles and made life a lot more difficult for themselves. However, some of these did struggle through, found the correct values for *e*, and went on to produce fully correct solutions. Some learners, who were close to producing a fully correct answer, fell at the final hurdle by cancelling the variable from their quadratic (forgetting that it could be zero). This left only one solution which unfortunately was the wrong one.

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