Pearson Edexcel

Examiners' Report

Principal Examiner Feedback

Summer 2019

Pearson Edexcel GCE AS Mathematics (8FM0)

In Mechanics 2 Paper 26

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General

A significant number of the candidates were very poorly prepared and were unable to make much progress on any of the questions. On Q01, 42% of the candidates scored 0/9. On Q03, 39% scored 0 or 1 out of 9 and on Q04, 43% scored 0 or 1 out of 10 and on all three of these questions, the modal mark was zero. Q02 proved to be much more successful, with 35% of the entry scoring 10, 11 or 12 out of 12. Some candidates did not fully answer the last question, but it was not clear whether they had run out of time or had run out of ideas.

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.

If there is a printed answer to show then candidates need to ensure that they show sufficient detail in their working to warrant being awarded all of the marks available.

In all cases, as stated on the front of the question paper, candidates 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 their answer than they are 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

In Q01(a), very few scored the B1 mark. The uniformity of the rods was the criterion which was the most often missed. There were also several zero scores for the second part. Some took the weight of the entire lamina as W, some wrote down dimensionally incorrect equations and some displayed a general lack of understanding of moments, with candidates working out the distance from the point at which the weight acted to the point A or B rather than the perpendicular distance from the line of action. The majority of those who did manage to produce a correct answer used the tensions and $5W$ rather than considering every rod. In Q01(c), very few realised that T_A was the larger tension. A number took moments about both A and B and then selected the correct k. Some chose the wrong one on the basis that $9.5 > 0.9$ and they thought they were looking for the largest k overall. Some chose the right one but ended up with an inequality rather than the maximum value.

Question 2

Although 18.5% of the candidates scored full marks for this question, some candidates, in Q02(a), had no idea how to separate variables and ended up with $(2 + v)$ in the denominator and consequently with $\ln(2 + v)$ after integrating. Once variables had been separated correctly, the second method on the scheme was the favoured option, with very few forgetting the constant of integration. Rearranging the solution to the given form proved to be a challenge for some, with candidates not appreciating that they had to complete the square. A few used the quadratic formula successfully. The second part proved to be more difficult with one common mistake being the omission of 8 in the denominator of the integral. A number of candidates square rooted the $8t$ and 16 and integrated term by term. Many did not realise that they had to use $v = 4$ to find t and instead used $t = 4$ as their upper limit losing marks. A few just wrote down the answer, not showing any algebraic integration. Some who used definite integration with the correct limits assumed that when $t = 0$ the value of the expression was zero.

Question 3

In Q03(a) there were many attempts with the same tension in both strings, others with no right angle at *B*, others with the same tension and no right angle and a small number with tension only in the string attached to *A* and no mention of tension in the other part of the string. Those who set up the problem correctly generally scored the first 4 marks although a minority used a wrong radius. A few applied the inequalities to T_A rather than T_B and some did not realise that they had to use $T_B > 0$. Candidates were more successful in finding the second inequality. In the second part, some just found ω or thought that v and ω were the same and others used $\frac{27ag}{4}$ as v rather than v^2. Nevertheless, there were some correct solutions.

Question 4

Very few scored the mark in Q04(a). The mass distribution was rarely referred to. Q04(b) proved to be very challenging, both for the candidates and for the examiners. The problem with this part of the question was that candidates were reluctant to say what they were doing. There were random areas and distances and they should have known from the original triangle that they were looking for a total mass proportional to 27. There was little thought as to which areas were doubled or overlapped. A small number worked out the centre of mass of the trapezium and used this and the large triangle which was a viable dissection. In order to succeed in this type of question, they should have a clear table specifying which part of the object they are considering and also specifying the axis from which they are measuring their distances. $\bar{x} = 2a$ was rarely seen despite many having said in Q04(a) that the horizontal distance of the centre of mass from *DC* would not change. Because the value of $\bar{y}$ was not a required answer, a distance from various axes was acceptable, with $\frac{11a}{9}$ and $\frac{16a}{9}$ being the most common. Some candidates lost the *a* in their working and answers but this did not prevent them from finding the angle as $\frac{16a}{9}$ was not a required answer. Correct answers for the angle were rarely seen and some who did do the working correctly then forgot to round to the nearest degree and lost the final mark. A few just divided $\bar{y}$ by $\bar{x}$, to try to produce the tan of an angle, presumably because they had done that before.

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