Pearson Edexcel

Examiners' Report

Principal Examiner Feedback

October 2020

Pearson Edexcel GCE Advanced subsidiary Level in Mathematics

Paper 22: Mechanics (8MA0/22)

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General

A significant number of the candidates were poorly prepared and were unable to make much progress on any of the questions, with 35% of the candidates scoring 5 or fewer marks and 13% scoring zero.

Question 1 differentiated well and provided a good range of marks with most candidates having some understanding of what was required although full marks were relatively rare.

Given that the scenario in question 2 was very standard, it was disappointing to see 51.7% of the entry scoring 0 or 1 of the available 9 marks.

Many scored well on question 3 showing a fair understanding of the use of calculus in variable acceleration problems but again it was disappointing to see 23.7% of the candidates scoring zero.

In calculations the numerical value of g which should be used is 9.8, unless otherwise stated, as in question 1. 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 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

Part (a) was well answered with most candidates using one equation but a few found the maximum height first. There were a variety of methods seen for the second part, with the most common being use of $v = u + at$, but a significant number made a sign error in their equation and 1.4 was a very common wrong answer. In part (c), a significant minority failed to understand that $s = 1.2$ was required with many using 15.6. Those using one equation often made a sign error. Calculators were usually used to solve the resulting quadratic equation. The other method which seemed to produce fewer errors was to find the time to the top and the time down and then add. In part (d), very few correct graphs seen. Many started from the origin to produce an upside down V-shape or a trapezium. In part (e), it was very rare not to see lesser, with the vast majority not realising that for the ball to hit the ground with the given speed of 19.6 ms^{-1}, it would need to be projected with a greater speed to overcome air resistance. In the final part, correct refinements were just in the majority. A more accurate value of g was the most common correct response with weight/mass being the most common incorrect answer. It should be remembered that, when only one refinement of the

model is required, any extra answers given would all have to be correct for the mark to be awarded.

Question 2

In part (a), the equations of motion were mostly correct when attempted. A significant number of candidates obviously did not understand the model or that T was required and stopped at that point. There were a few with missing m's but this was quite rare as were sign errors. A very small number of candidates obtained the equations but then completely misunderstood the situation and replaced a by g and lost all the marks. Only a handful realised that $2T$ was required to find the force exerted on the pulley by the string. The second part was reasonably well answered but, as in question 1(f), it should be remembered that, when only one limitation of the model is required, any extra answers given would all have to be correct for the mark to be awarded.

Question 3

In part (a), a significant minority misunderstood the question and solved $v = 0$ instead of $a = 0$. The majority, however, did multiply out and differentiate correctly to find a before then equating it to zero. A few errors in multiplying out the brackets were seen and a significant number had changed the sign of v which then had consequences in part (b).The majority, for part (b), realised that the particle would change its direction of motion when $v = 0$ and solved this equation to give $t = 3.5$. They were then able to integrate v correctly and use their t value to obtain the answer. A few, however, used the t value that had been found in part(a) and lost the method mark.