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Mathematics MM05

(Specification 6360)

Mechanics 5

Report on the Examination

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General

The standard of work for this paper was mostly excellent, with the majority of candidates showing thorough knowledge of the specification and of the application of the principles of mechanics. Use of mathematical techniques such as Integration and trigonometrical identities was impressive, and algebraic manipulation was excellent. The greatest improvement this year was seen in question 5, where most candidates proved highly adept in the use of polar equations of motion in a mechanical context.

Question 1

This was a popular question yielding full marks in most cases. Standards of accuracy were again very high.

Question 2

This was another popular question for many, although a few failed to appreciate the vertical nature of the motion, falling down in part (b) (i). Parts (a) and (b) (ii) and (iii) were mostly successful but a few could not provide a correct formula for the maximum speed for this motion.

Question 3

This proved to be a highly popular and successful question. The standard of differentiation and trigonometrical manipulation were very high. Part (a) was done well, with excellent and varied use of trigonometry. Parts (b) and (c) were also done well, with a very high standard of accuracy, and only a small minority not working in radians.

Question 4

This question was answered well in most cases. Part (a) was popular and mostly yielded full marks. Solutions to the auxiliary equation in part (b) (i) were often fully correct, with the most frequent error being the omission of 'i' in the solution, despite the obvious nature of the roots. Some chose a verification method for part (b) (ii) but only consideration of a general solution was sufficient for full credit. Solutions in part (c) were impressive.

Question 5

The standard of work in this question was much improved on the previous year, with most candidates clearly well prepared in this topic. Part (a) (i) was the least well answered part of the question, with few appreciating the single relevant force. Parts (a) (ii) and (b) (i) (ii) and (iii) were successfully answered by most. Part (b) (iv) proved discriminating as again an understanding of the effect of the single force affecting the motion was crucial.

Question 6

This question provided marks for the majority of candidates. Part (a) proved testing with some candidates unable to set up and then solve this relatively simple differential equation. The majority were successful in part (b). The request for candidates to verify the solution to the differential equation in part (c) was intended to make the question less onerous; in fact those who chose to solve the equation did so very efficiently. Part (c) was a good source of marks for many candidates.

Mark Ranges and Award of Grades

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