Version : 1.0 0609

General Certificate of Education

Mathematics 6360

MM05 Mechanics 5

Report on the Examination

2009 examination - June series

Further copies of this Report are available to download from the AQA Website: www.aqa.org.uk

Set and published by the Assessment and Qualifications Alliance.

The Assessment and Qualifications Alliance (AQA) is a company limited by guarantee registered in England and Wales (company number 3644723) and a registered charity (registered charity number 1073334).
Registered address: AQA, Devas Street, Manchester M15 6EX *Dr Michael Cresswell Director General.*

General

The standard of work for this paper was again high, with candidates showing sound knowledge and application of the principles of mechanics. Use of mathematical techniques such as integration was also impressive, and numerical accuracy was excellent. Slight weaknesses were seen in the selection of appropriate trigonometric identities, and in the completion of solutions which required a result in terms of a particular variable.

Question 1

This was a popular question usually yielding high marks; in part (c) some chose long methods involving times, and errors were more frequent here than with other methods.

Question 2

The required proof in part (a) was well known and there were many concise solutions. In parts (b) and (c), some were unable to quote appropriate formulae, and there was some confusion between linear and angular quantities.

Question 3

In part (a), there were some excellent solutions, but others revealed a lack of understanding, for example by including an impulse in their momentum equation. Part (b) was done well, with more concise solutions from those who used limits as opposed to a constant of integration. Part (c) proved a good source of marks.

Question 4

Part (a) was answered well, with occasional errors in finding the extension of the string. Part (b) was less successful, with some only being able to attempt the solving of the auxiliary equation before stopping. There were various algebraic errors, the most frequent being the omission of 'n' at varying stages, but still a number of good solutions. The answer to part (c) was well known. Part (d) proved quite testing in choosing correct methods for solution, and again algebraic errors marred solutions.

Question 5

There were many concise solutions to part (a) but also many long winded ones, some giving answers in terms of the wrong variables. Part (b) was mostly done very well, although a minority thought the minimum value of the cosine function to be zero. In part (c)(i), those who could see the efficiency in differentiating the expression for $r^2 \frac{\mathrm{d}\theta}{\mathrm{d}t}$ were successful, but some worked with an alternative expression for the acceleration component and their solutions were lengthy and often contained errors. Those most successful in part (c)(ii) showed excellent skills in efficient substitution to obtain an expression in terms of *r*, but there were many meandering responses, and this request proved discriminating. Solutions to part (c)(iii) rarely considered all the necessary factors.

Question 6

Finding a correct expression for the extension of the spring in part (a) proved very challenging, and subsequent use of trigonometric identities was sometimes weak. Part (b) was a good source of marks for all candidates, and there was a pleasing improvement in the use of radians in solutions of trigonometric equations. Part (c) was mostly done well.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the **Results statistics** page of the AQA Website.