General Certificate of Education

Mathematics 6360

MM1B Mechanics 1B

Report on the Examination

2010 examination – June series

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General

The first five questions provided a range of very accessible questions, while the last three questions provided more demand, and some parts challenged the candidates who had found the earlier questions easy. The candidates seemed to cope well with the new style examination papers, although some did have to use extra pages.

There were fewer answers given on the question paper. This reduced the opportunities for candidates to find the 'correct' answer from incorrect working.

Question 1

This question was done well by the vast majority of candidates, with many scoring full marks. Although not made often, the most common error was failing to multiply by 0.5, or divide by 2, when finding the distances in parts (b) and (c). Most candidates used a correct approach to find the average speed in part (d). Another error, seen in part (e), was to find 2400 but not subtract the answer to part (c).

Question 2

This question was also done well by many candidates. There were relatively few errors on the force diagrams. In part (b)(ii), some candidates made errors, the most common being to multiply the 30 by 0.5 or subtract the 30 from 49. Part (c) caused difficulties for some candidates. The most common errors here were to attempt to include the weight or to omit the friction force.

Question 3

While there were many good solutions to this question, some candidates made little progress. Some candidates made errors when trying to write down a vector equation based on conservation of momentum. The most common of these errors was to use a mixture of scalars and vectors in the equation. Some candidates were able to form a correct vector equation, but had difficulty extracting the correct equations for each component.

Question 4

There were many good responses to this question, with a good number of candidates gaining full marks. The most common two errors were to use incorrect trigonometric terms when resolving and, in part (b), to find the weight rather than the mass, by omitting g from their equations.

Question 5

This question, particularly part (a), was found to be very straightforward by many candidates. Many gained full marks in part (a), but in part (b) quite a number made errors when giving the bearing. For example, it was quite common to see candidates find an angle of $17°$ but then subtract this from $90°$ to give a final answer of $73°$.

Question 6

The candidates generally did well with parts (a) and (b), which were fairly standard, but had more difficulties with the later parts. The main reasons that candidates lost marks in part (a) were because they made errors with the signs in the equations or because they did not form an equation for each particle. Those with sign errors in part (a) often did not obtain the correct tension in part (b).

In part (c), many errors were due to the candidates using the wrong values in the wrong places. For example, in part (c)(i), some used an acceleration of 9.8 instead of 1.96, while in parts (c)(ii) and (c)(iii), some used an acceleration of 1.96 instead of 9.8. Similar confusion concerned the

use of the distance of 4 metres in part (c)(i) instead of the later parts, while the time of 2 seconds was sometimes used in the later parts instead of in part (c)(i).

In part (c)(iii), the most common approaches involved the use of constant acceleration equations. While some candidates used the correct numerical values in their equations, many made errors with the signs. Another common approach was to find two times and add them together. With this method also, sign errors were often made by the candidates.

Question 7

While some candidates did well with this question, others made some fundamental errors. In part (a), some candidates found the magnitude of the acceleration and then tried to use this scalar quantity in the later parts of the question, ending up with a mix of scalar and vector quantities.

In part (b)(i), many candidates found the position vector, but did not go on to find the distance as requested. There were quite a number of correct responses to part (b)(ii), but quite often this was not followed by a correct approach to the final part of the question.

Question 8

Very many candidates were able to prove the result in part (a). Most considered the vertical component of the velocity and found the result easily. Some tried to find the time of flight first. In some cases these candidates halved their answer, but some did not do this or did not make it clear. A very small number of candidates used equations that they had learned for the time of flight or similar, but did not justify these results and so did not gain the marks. Candidates should not use learned formulae for the range etc in questions like this.

There were many different approaches to part (b)(i). Quite often candidates could produce a correct equation as a starting point, but failed to simplify it correctly. Often the candidates ended up with a mixture of $\sin\alpha$ and $\sin^2\alpha$ terms. There were many minor arithmetic or algebraic errors. In part (b)(ii), many candidates used the incorrect time: their approach was based on a time of $\frac{3\sin\alpha}{2}$ instead of $3\sin\alpha$.

Part (c) was often done well, but quite a few candidates incorrectly talked about the projectile having no mass.

Mark Ranges and Award of Grades

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