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A LEVEL

Examiners' report

MATHEMATICS B (MEI)

H640

For first teaching in 2017

H640/01 Autumn 2021 series

Version 1

ocr.org.uk/maths

Introduction

Our examiners' reports are produced to offer constructive feedback on candidates' performance in the examinations. They provide useful guidance for future candidates.

	Reports for the November 2021 series will provide a broad commentary about candidate performance, with the aim for them to be useful future teaching tools. As an exception for this series they will not contain any questions from the question paper nor examples of candidate responses.

The reports will include a general commentary on candidates' performance, identify technical aspects examined in the questions and highlight good performance and where performance could be improved. The reports will also explain aspects which caused difficulty and why the difficulties arose, whether through a lack of knowledge, poor examination technique, or any other identifiable and explainable reason.

A full copy of the question paper and the mark scheme can be downloaded from OCR.

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Paper 1 series overview

This paper covered Pure and Mechanics content for A Level Mathematics B (MEI).

Section A contains questions requiring less reading and interpretation of text.

Section B contains longer questions with more problem solving and explanations of mathematical models.

Mechanics questions could be found in both Section A and Section B.

Candidates who did well on this paper generally did the following:	***Candidates who did less well on this paper generally did the following:***
• Worked accurately with arithmetic and algebra • Showed a clear method in extended answers • Extracted relevant information from the question to help with problem solving • Gave relevant comments for questions requiring an explanation.	• Made errors in arithmetic and algebra, particularly with negatives, surds and multiples of p • Started with the given answer in "show that" questions • Did not use the functionality of their calculator to give exact roots of quadratic equations.

Common misconceptions

It is important to understand the difference between a statement and its converse.

?	**Misconception**	Question 1 required a counterexample and a comment for full credit. The statement to be disproved began with if $p^2 > q^2$ but it was common to see a suggested counterexample for which this was not the case. Even where the values for p and q satisfied this condition, it was common to see the figures given without drawing a proper conclusion from the counterexample.

It is important to use language in a precise way as used in the question.

?	**Misconception**	Question 4(b)(ii) needed candidates to be aware of the distinction between a sequence and a series. The definition of convergence for a sequence includes a sequence with a single repeated term converges but the corresponding series does not. The final part asked for the infinite sum, and candidates who had forgotten the formula often investigated using their calculator but lost a mark where they claimed the sum was approximately 0.5 rather than exactly 0.5.

It is important to understand the distinction between mass and weight.

?	**Misconception**	In Question 2 it was not uncommon to see Newton's second law written as $F = mga$ and using weight for mass there invalidates the whole equation. Similarly in Question 5, it was not uncommon to see mass multiplied by distance for a moment.

Key teaching and learning points – comments on improving performance

Many candidates appeared to have gaps in their knowledge. Particular problems arose in Question 3(a) where many solutions had no *y*-coordinate, Question 4(a)(i) where the term periodic from the specification was not often seen, Question 5(b) where the effect of a resultant moment was not well understood and in Question 8(d)(i) where candidates struggled to represent a graphical understanding of the Newton-Raphson method.

It is really important in examinations for the answer to follow from correct working.

?	**AfL**	Question 10(c) required the calculation of a speed. The velocity at time $t = 5$ is negative and candidates, knowing that speed is not negative, sometimes just deleted their minus sign writing $29.4 - 9.8 \times 5 = 19.6$ which is clearly incorrect, so an accuracy mark was lost.

It is better to write complete equations rather than fragments.

?	**AfL**	The method mark in Question 5(a) was only given once candidates put their moments together into an equilibrium equation. A missing term, or an incorrect distance was allowed but just a list of moments did not get the method mark.

Often a question is structured to provide help to candidates with extended questions. Few candidates realised in Question 10 that the work in parts (a) and (b) were there to help with the problem solving in parts (d) and (e).

Guidance on using this paper as a mock

Candidates marking their own work often err on the generous side as they award method marks for their intention and not for the evidence in their written answer. Teachers can use the detailed guidance in the mark scheme to understand the evidence required to credit a method and reinforce to Candidates that they must show the evidence of their thinking.

	**AfL**	Question 10(a) asked candidates to show that the particle reached its maximum height after 3s. An answer showing only $29.4 \div 9.8 = 3$ with no *suvat* formula seen got no credit. Similarly, where candidates substituted the given values into $v = u + at$ to show that the velocity after 3s is zero, a clear justification of the significance of that value is required to complete the argument.

To help with the awarding of follow through marks, teachers can create a spreadsheet for Questions 7(c), 9(c), 12 and 13(a), so that typing the candidate's incorrect answer for the previous working gives the values needed for the later accuracy marks.

Supporting you

Review of results

If any of your students' results are not as expected, you may wish to consider one of our review of results services. For full information about the options available visit the OCR website.

Supporting you through 2021-2022

Our priority is supporting you and your students this autumn and to support you as you prepare for summer 2022 exams. We'll update our website information regularly with resources, guidance and key information.

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- Students
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Supporting you

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For the Autumn 2021 series, results analysis is available for GCSE English Language, GCSE Mathematics and Cambridge Nationals (moderated units) only.

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