

A LEVEL

Examiners' report

MATHEMATICS B
(MEI)

H640

For first teaching in 2017

H640/01 Autumn 2020 series

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 Autumn 2020 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 answers.

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

H640/01 covers pure mathematics and mechanics. Many responses were very good as candidates sought the top grades. It appeared that candidates had sufficient time to complete the paper. The answer spaces were usually sufficient although some candidates did use the additional page at the end of the Printed Answer Booklet.


<i>Candidates who did well on this paper generally did the following:</i>	<i>Candidates who did less well on this paper generally did the following:</i>
<ul style="list-style-type: none">• Expressed complete arguments, explaining their thinking.• Had well annotated diagrams and graphs.• Understood the process of building a model and evaluating its usefulness.• Realised that a question required multiple steps for a complete solution.	<ul style="list-style-type: none">• Worked in fragments with little or no linking text to explain their thinking.• Struggled with negative powers.• Were careless with notation.• Had diagrams and graphs with insufficient labelling.

Themes in candidate responses

Instructions that specify how the answer should be given were not always heeded. For example answers to Question 2 where $\sqrt{2}$ appeared twice did not get full marks, and Question 4 and Question 10c required the answers in factorised form.

Diagrams and graphs need to be carefully labelled to get full credit. Sketch graphs with just the basic shape and no indication of scales or coordinate of key points were sometimes seen, even where the question indicated the labelling needed for the marks – for example Question 6 requires distances and Question 12b the points at which the gradient is zero.


Questions requiring several steps of working can be identified from the number of marks allocated. The problem solving in Question 13c was not handled well as candidates did not realise that the maximum height information was given so that theta could be evaluated and then used to determine whether the projectile hits the wall.


	AfL	Rarely does an exam question ask for the same sort of working more than once. For example in Question 4, the chain rule is needed to find the first derivative. Some candidates did not notice that this result needed the product rule to differentiate again.
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Common misconceptions

Some candidates are unsure when the *suvat* equations are appropriate which led them to substitute the function $0.8t + 0.5$ when finding the velocity in Question 9. Others integrated acceleration to find velocity but did not include the arbitrary constant – and so proved the particle was stationary when $t = 0$ even though the information in the question stated that the initial velocity was 3 m s^{-1} .

Many candidates found the use of vectors in the mechanics context of Question 15 quite difficult particularly where the unit vectors are not horizontal and vertical. Some wrote $\mathbf{i} = \dots$ and $\mathbf{j} = \dots$ instead of writing \mathbf{W} in terms of \mathbf{i} and \mathbf{j} .

	Misconception	The vector equilibrium equation is most easily expressed as total force = zero vector. It was very common to see the weight equal to the sum of the other forces. (Question 15b)
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	OCR support	The use of Free-body force diagrams may help students clearly resolve a force into components. A short blog on Ideas to help students who find mechanics hard can be found on the OCR website.
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Key teaching and learning points – comments on improving performance

Some candidates need to express their arguments more clearly, particularly when the question included the statement '**In this question you must show detailed reasoning**' or to establish a given answer where the command word 'Show that' is used.

In Question 7a it was not enough to show that $f(-2) = 0$ but a statement indicating that this implied that $(x + 2)$ is a factor was also needed. Question 7b was only given full marks when a quadratic factor and a product of linear factors were seen – some candidates had the factors and not the roots of the equation.

In Question 3, using -4^2 instead of $(-4)^2$ cost a mark.

In Question 12a the differentiation from first principles must clearly express the key concept of the limit as h tends to zero to get full credit.

	OCR support	An Exam hints for students document can be downloaded from the OCR website with further exemplification of the meanings of the defined command words used in H640 examination papers.
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Guidance on using this paper as a mock

This paper would be suitable for a mock exam paper. It could be made simpler for teachers to mark if Question 9 were changed to $a = 0.8t - 0.5$ in order to remove the need for the alternative methods.

Supporting you

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