OCR
Oxford Cambridge and RSA

A LEVEL

Examiners' report

FURTHER MATHEMATICS B (MEI)

H645
For first teaching in 2017

Y420/01 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.

(i)	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 Y420 series overview

Y420 is the Core Pure component of the Further Mathematics B qualification. The examination is worth 50% of the total A Level and is a 2 hour 40 minute paper consisting of 144 marks. Candidates are expected to attempt all questions and have the use of a scientific or graphical calculator. The paper is split into 2 sections; section A (36 marks) comprises of more straightforward questions and section B (108 marks) which is more comprehensive.

To do well on this paper, candidates need to have a good understanding of each of the topics and be able to communicate their understanding clearly through their solutions.

Candidates who did well on this paper generally did the following:	Candidates who did less well on this paper generally did the following:
• Structured their solutions clearly, ensuring that they were easy to follow. • Were very familiar with the specification and able to apply key concepts. • Had strong calculus skills.	• Couldn't recall key formulae. • Were unable to show clear steps on '**detailed reasoning**' questions.

It is important that candidates are aware of the demand required for question that include the statement '**In this question you must show detailed reasoning**' and make sure that they give clear calculations for each step so that they are able to gain all the marks. Equally on 'show that' questions candidates need to make sure that they show all their calculations and not miss steps because when an answer is given they need to demonstrate their understanding of each step. Although lots of candidates did this well, examiners felt that there were occasions when candidates lost marks for not being explicit enough with their workings.

When completing 'explain' questions, candidates would benefit from looking at the marks available so they know how many key points to write and to re-read their answer to make sure that they are not rewriting the details given in the question. When it is possible to include references to mathematical formula and values, candidates should include this in their explanation.
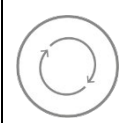
	OCR support	Full guidance and exemplar of the defined command words used in Further Mathematics B (MEI) – H645 can be found in the specification. A summary poster can be downloaded from the qualification website: A Level Maths command words poster A2 size A Level Maths command words poster A4 size

Section A overview

Overall candidates demonstrated some good mathematical skills in this part of the paper.

Question 1

In Question 1 most candidates achieved at least 3 marks. Lower ability candidates were unable to factorise their answer fully.

	AfL	Candidates would benefit from explicit teaching and practicing taking out common factors and fractions from multiple term expressions.

Question 2

Most candidates were able to multiply together two matrices and find missing variables. A lot of candidates did not know that only square matrices have an inverse resulting in no marks being gained on Question 2b.
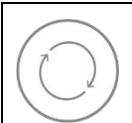
	Misconception	If two matrices N and M multiply together to make I then they are inverses of each other. A large number of candidates didn't know that both matrices must be square matrices.

Question 3

Question 3 was the first '**detailed reasoning**' question in the paper. If candidates did lose marks on this question it was because they were unable to change the integral into a suitable form to use the formula from the formulae booklet.

Question 4

Some candidates were unable to correctly recall the formulae for roots of polynomials so were unable to apply these to Question 4. Some candidates also got the various methods that are used in this module confused meaning that they were given no marks.

	AfL	Candidates would benefit from regular low-stakes quizzes to give them the opportunity to recall key formulae.

Question 5

When explaining why the curve in Question 5 is symmetrical about the initial line there was a lot of candidates who reworded the question rather than answering it. Candidates need to consider the mathematical concepts when answering this type of question. Also, in this question there were a lot of candidates who used incorrect limits resulting in them loosing accuracy marks. It is important for candidates to look at any conditions given in the initial text for the question.

Question 6

If candidates lost marks in Question 6 it was because they didn't equate the real and imaginary parts of the equation. This was a minority of candidates.

Section B overview

Section B was more challenging and allowed candidates more problem solving opportunities. There were lots of good quality answers; here are some examples where candidates can make small adjustments to improve:

Question 7

When proving by mathematical induction candidates need to work on their communication of the inductive step. Some candidates didn't show their expression in the form ((k+1)+1)! - 1 or give a target of (k+2)! -1 so this meant examiners could not give the accuracy mark, and then the candidate could not receive the final 2 marks as they were dependent.

Question 10

A number of candidates couldn't access this question as they were unable to recall the formula for rotating a curve about the *y*-axis. Some candidates rotated the curve about the *x*- axis).

Question 13

In part (b) it was important to take account of the word 'hence'. To achieve both marks candidates must use the result found in part (a). In part (c) some candidates lost marks for not being thorough in their explanation. The most common mistake to say that the odd powers are all functions of sinh(*x*) instead of sinh(2*x*).

Question 15

For 'show that' questions, part (a), part (b) and part (e)(i),it is important for candidates to show every step of their solution. In part (e)(i) candidates lost marks for not showing their calculation of the scalar product.

Question 16

In Question 16 the most common mistake for the candidates who were able to access the question was not using limits and constants correctly. In part (a)(ii), when verifying the long-term condition, candidates had to show that $e^{-kt} \to 0$ as $t \to \infty$ and not that $e^{-\infty} = 0$. Also in part (c)(i) and part (d) they needed to consider the long-term condition to know that the constant involved is A and not change their constant to this without explanation.

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