Qualification Accredited

OCR
Oxford Cambridge and RSA

# A LEVEL

## Examiners' report

# FURTHER MATHEMATICS A

## H245

For first teaching in 2017

## Y541/01 Autumn 2020 series

Version 1

# Introduction

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

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|---|---|
|  | 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 exam 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 exam paper and the mark scheme can be downloaded from OCR.

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# Paper Y541 series overview

This paper, along with Y540, assesses the compulsory core content of the new (from 2017) A Level Further Mathematics A – H245 qualification. Questions in each paper can assess any part of the core specification. This is the second year in which these papers have been sat. However, due to extraordinary circumstances, the paper was sat in October with an extremely small cohort. So, feedback on candidate performance is limited.

Most candidates appeared to be able to complete the paper in the time available.

| *Candidates who did well on this paper generally did the following:* | *Candidates who did less well on this paper generally did the following:* |
|---|---|
| • Were familiar with the whole breadth of the specification and secure in their knowledge of basic techniques and associated key facts.<br>• Used prior learning effectively in, for instance, questions involving calculus, partial fractions, etc.<br>• Wrote clear mathematical arguments and selected efficient methods to problem solve. | • Were unfamiliar with some topics. For example, they might be unable to select the correct form for a general solution to a differential equation.<br>• Their mathematical arguments omitted key steps. |

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|  | **OCR support** | Candidates should understand the requirements expected where a question states '**In this question you must give detailed reasoning**' or uses a command word such as 'determine' or 'show that'. In these cases, the examiner will be assessing whether the candidate is explaining each step of their process; method marks are not given unless steps are clear.<br>The command words are defined in the specification and a student summary guide can be found on the assessment tab of the H245 qualification page on the OCR website:<br>A Level Maths command words poster. |

## Comments on selected questions

### Question 1

The **detailed reasoning** command in this question means that algebraic methods must be clearly shown. It must be evident that the form $a + b\mathrm{i}$ is not merely extracted from a calculator equation solver and that modulus-argument form is not merely extracted from calculator complex number conversion.

Note that $\cos\theta - \mathrm{i}\sin\theta$ is **not** an acceptable modulus-argument form.

### Question 2

Far more candidates used a method involving specification point 4.05a (relationship between roots and coefficients) than 4.05b (substitution). Although either method is acceptable, the latter approach is probably more efficient in this case.

### Question 3

The mark scheme gives an algebraic demonstration of method of differences as the most efficient approach. Often, historically, teaching and textbooks have focused on the alternative, and equally acceptable, approach on the mark scheme – namely one which writes down several numerical and algebraic terms from the sum and shows subsequent evidence of cancellation through crossing out. Centres may wish to consider teaching the algebraic approach alongside the numerical one – certainly stronger candidates will enjoy the mathematical precision, and the completeness of the method will reduce any uncertainty as to just how many terms are required to convincingly demonstrate the alternative approach.

### Question 4

The command word 'verify', in (a), should act as a trigger to attempt to 'show it works by substitution'. Many candidates, instead, used the correct method to find an unknown intersection point. While this gained full credit, centres should make sure that candidates take advantage of the fact that verifying is usually easier than deriving.

### Question 6

Some poor notation was observed in (b) with the omission of the necessary outer brackets of the integral commonly seen.

In (c) many candidates did not realise that the ordinate $r$ did not equate to the radius of any potential circle.

## Question 9

Few candidates scored highly on this question which may well reflect the atypical cohort. It is often the case that mathematical models, at this level, are formed from the transformation of standard functions. Centres should give candidates plenty of practice in this approach so that they recognise the key features of the function in its transformed form. Here, the position of minimum value of $\cosh x$ is key.

## Question 10

In (a)(ii) the command word "determine" notifies candidates that they cannot merely use their calculator to find f'''(0). Of course, the calculator could be used here (and in questions such as Question 1) to double check responses and alert candidates as to errors they may have made.

In (b) while most candidates were able to gain the first mark by attempting integration by parts, several were unable to tackle the integral of $\frac{x}{\left(1-x^2\right)^{\frac{1}{2}}}$.

Centres may find it helpful to allow plenty of practice of selecting a suitable method of integration when facing such expressions. Candidates should then be alert to the significance, here, of '$x$' being the derivative of '$x^2$' (to within a constant term).

# Supporting you

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## Supporting you through 2020-2021

Our priority is supporting you and your students this autumn and to support you as you prepare for summer 2021 exams. We'll update our website information regularly with resources, guidance and key information.

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