



**Cambridge Assessment**  
Admissions Testing



# TMUA

TEST OF MATHEMATICS  
*for University Admission*

**Discover people who will thrive on  
undergraduate Mathematics and related courses**

Giving you the tools to make informed decisions

# We are a trusted partner to universities around the world

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## Case study

Durham University worked with Admissions Testing in the development of the Test of Mathematics for University Admission (TMUA) and now uses it as part of its selection processes for undergraduate Mathematics courses. We spoke to Steven Abel, Director of Education for Mathematical Sciences, to find out more about their experiences.



### Why did you start using an admissions test?

Over the years, the A Level grades an applicant needed to get a place on our course had risen, however, we were not sure that it was helping us to select the best mathematicians. At the same time, changes to the A Level marking system (the disappearance of the Uniform Mark Scale) meant that we would have to rely more heavily on references and personal statements.

We were concerned to ensure that our selection process was transparent and that applicants with access to expertise from schools and parents did not have an unfair advantage.

### Why did you choose to work with Cambridge Assessment Admissions Testing?

Their tests are tailor-made for university admissions, after several years of development. They provide some of the most accurate assessment of ability to perform at degree level.

At the same time, their tests rely only on core A Level knowledge and require minimal revision. This levels the playing field for applicants and greatly improves the fairness of our admissions process.

### Does the test help you select the right applicants?

Some of our applicants do not achieve their predicted A Level grades and these numbers have been increasing. But we have found that TMUA indicates which applicants are most likely to meet their predicted A Level grades, and go on to perform well on the course.

### What impact has the test had on selection processes?

Applicant numbers have not dropped at all and there have been significant improvements in admissions processes in many ways – speed, transparency, accuracy and robustness. The test has made the job of selectors significantly easier.

In future, student selection will be done by a central admissions team rather than academic staff, and using this test helps provide clear selection criteria to support that transition.

# Test of Mathematics for University Admission (TMUA)

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TMUA helps you identify an applicant's potential for academically demanding, mathematics-related study. It focuses on key skills needed for progression to university mathematics, but which are not tested extensively in school Mathematics qualifications.

TMUA was developed in collaboration with world-leading universities to assist in making effective admissions decisions. There is ongoing research to ensure the validity and reliability of the test.

Institutions can use TMUA either as an optional test (e.g. to support alternative offer-making) or as a compulsory part of the application process, providing a common benchmark to all applicants.

## Universities use TMUA for:

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### Predicting success

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TMUA helps you identify applicants who will thrive on your course. Validity studies show a positive relationship between test scores and on-course performance.



### Discovering students with the right skills

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TMUA focuses on the mathematical thinking that is crucial for university study, such as the application of standard knowledge to unfamiliar situations and the ability to reason, justify and prove assertions.



### Widening participation

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TMUA is designed to be accessible to all applicants. It uses mathematical knowledge already covered in school studies to minimise the amount of new learning needed. All applicants have access to comprehensive free test preparation materials.



### International reach

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Our global network of test centres lets applicants take TMUA in their own country. This means your selection procedure is accessible to all applicants, and quick and convenient for your staff.



## Test format

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The Test of Mathematics for University Admission is a 2-hour 30-minute, paper-based test.

Test sections	What it tests	Duration	Questions
1: Applications of Mathematical Knowledge	The ability to apply knowledge of mathematics in new situations.	75 minutes	20 multiple-choice questions
2: Mathematical Reasoning	The ability to deal with mathematical reasoning, and simple ideas from elementary logic.	75 minutes	20 multiple-choice questions

## Scoring and results

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Test-takers receive an overall score, given on a scale of 1.0 to 9.0. As part of the results, scores from each of the two sections are also reported.

Results are available to test-takers and universities around four weeks after the test via our secure online system. If the test is an optional part of your admissions criteria, test-takers can wait until they receive their results before deciding whether to share them with you. This gives applicants an additional 'risk-free' opportunity to show their potential and helps support widening access to university.

## Test delivery and costs

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### Available worldwide

Applicants can take the test at authorised test centres around the world. In the UK the test can normally be taken in schools. There is currently one test date per year in late October or early November.

### Affordable

We ensure test fees are affordable and do not present a barrier to students entering university. We can also make arrangements with universities for the reimbursement of test fees to students who are unable to afford the test.

### Free preparation materials

We provide everything applicants need to prepare for their test, including the test specification, past papers and answer keys. There is no need for applicants to pay for a preparation course or additional materials.

## Sample test questions

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This question is designed to test students' ability to apply the result of differentiating a polynomial, as well as their knowledge of its shape, to determine how many real roots the polynomial has.

How many real roots does the equation  $x^4 - 4x^3 + 4x^2 - 10 = 0$  have?

- A** 0
- B** 1
- C** 2
- D** 3
- E** 4

This question combines integration and differentiation/use of symmetry to test students' understanding of both topics in a new setting.

The smallest possible value of  $\int_0^1 (x - a)^2 dx$  as  $a$  varies is

- A**  $\frac{1}{12}$
- B**  $\frac{1}{3}$
- C**  $\frac{1}{2}$
- D**  $\frac{7}{12}$
- E** 2

## Sample test questions

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This question tests students' ability to deal with basic logic – the sort of basic logic they will need at university.

Let  $S$  be a set of positive integers, for example  $S$  could consist of 3, 4, and 8.

A positive integer  $n$  is called an  $S$ -number **if and only if** for every factor  $m$  of  $n$  with  $m > 1$ , the number  $m$  is a multiple of some number in  $S$ .

So in the above example, 9 is an  $S$ -number; this is because the factors of 9 greater than 1 are 3 and 9, and each of these is a multiple of 3.

Positive integer  $n$  is therefore **not** an  $S$ -number **if and only if**

- A** for **every** (positive) factor  $m$  of  $n$  with  $m > 1$ , there is a number in  $S$  which is not a factor of  $m$ .
- B** for **every** (positive) factor  $m$  of  $n$  with  $m > 1$ , there is no number in  $S$  which is a factor of  $m$ .
- C** for **every** (positive) factor  $m$  of  $n$  with  $m > 1$ , every number in  $S$  is a factor of  $m$ .
- D** for **some** (positive) factor  $m$  of  $n$  with  $m > 1$ , there is a number in  $S$  which is not a factor of  $m$ .
- E** for **some** (positive) factor  $m$  of  $n$  with  $m > 1$ , there is no number in  $S$  which is a factor of  $m$ .
- F** for **some** (positive) factor  $m$  of  $n$  with  $m > 1$ , every number in  $S$  is a factor of  $m$ .

This question tests students' ability to reason, requiring them to solve a complicated question posed using simple mathematical ideas.

A group of five numbers are such that:

- their mean is 0
- their range is 20

What is the largest possible median of the five numbers?

- A** 0
- B** 4
- C**  $4\frac{1}{2}$
- D**  $6\frac{1}{2}$
- E** 8
- F** 20

## Research

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We conduct research to ensure the validity and fairness of our admissions tests. Our research agenda and our approach to admissions testing is guided by the following key principles.

### **Positive impact for test-takers**

Our tests are designed to have a positive impact for test-takers. Any time spent preparing for our tests helps test-takers develop skills directly beneficial for their future academic studies.

### **Selection based on evidence of potential**

Our research shows that admissions test performance predicts later performance on the university course.

### **Application of existing knowledge and skills**

Many of our tests focus on knowledge and skills that should already be familiar to applicants. We aim to minimise the amount of new learning or study needed, to ensure that preparation is accessible to all test-takers.

### **Collaborative working**

The institutions that use our tests have input into our research programme and we hold regular meetings with them. We also fund research in partnership with institutions to explore the impact of our tests in their own admissions contexts.

### **Quality assurance and fairness**

We monitor the performance of all our test items to ensure they are of the highest quality. Advanced statistical analyses are used to monitor the performance of different test-taker groups (e.g. gender, school background) to guard against any potential bias.

### **A broad view of admissions**

An admissions test is one part of the admissions process and our research covers wider approaches to selection. We look at the broader context such as widening access initiatives, applicants' perceptions of admissions processes, and the relationship between admissions test scores and other parts of the admissions process.



We are Cambridge Assessment Admissions Testing, part of the University of Cambridge. Our tests provide a fair measure of skills and aptitude to help you make informed decisions.

We believe everyone should have a fair opportunity to prove they have what it takes, and you should have the right tools and information to find the people who will thrive.



## Contact us

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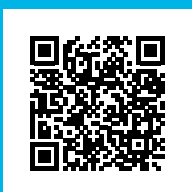
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