



UCL

Support for UCL Mathematics offer holders with the Sixth Term Examination Paper

The Sixth Term Examination Paper (STEP) examination tests advanced mathematical thinking and problem solving. The examination encourages you to:

- › explore different possible strategies to analyse and answer questions
- › use the techniques you know in unusual and interesting ways
- › develop confidence, stamina and fluency in working through unstructured problems

Preparing for the STEP examination will reward you with stronger problem solving skills. These are essential in many disciplines, and invaluable for studying mathematics at university.



$a^2b \sin^2 a^2 + c$
 $\log_4 x = +$

› University College London provides Mathematics offer holders with a comprehensive package to help with preparation for the STEP examination.

During 2020/21, all offer holders have free access to:

- **Online Resources** – extensive notes, questions and solutions to support independent study
- **Live Online Lectures** – a series of seventeen live online lectures giving detailed advice on how to tackle STEP questions; to attend these all you need is a computer or tablet connected to the internet
- **Study Days** – two study days at University College London giving you a chance to work face-to-face with expert tutors and other students on STEP questions.



Here is a selection of feedback on similar support provided to previous applicants:

Thank you so much for the online lectures, I found them invaluable and they were no doubt a vital part of my preparation for STEP.

I found the whole package incredibly useful.

I found the resources such as notes and solutions really helpful.

The study day that I attended was brilliant. I took away a lot from the day.

➤ As a UCL offer holder you get access to a set of online resources to support your independent study for STEP and to complement the live online lectures and study days.

These are provided by MEI, a charity that supports mathematics teaching and learning. MEI also provides highly-acclaimed online resources to support A level Mathematics and Further Mathematics.

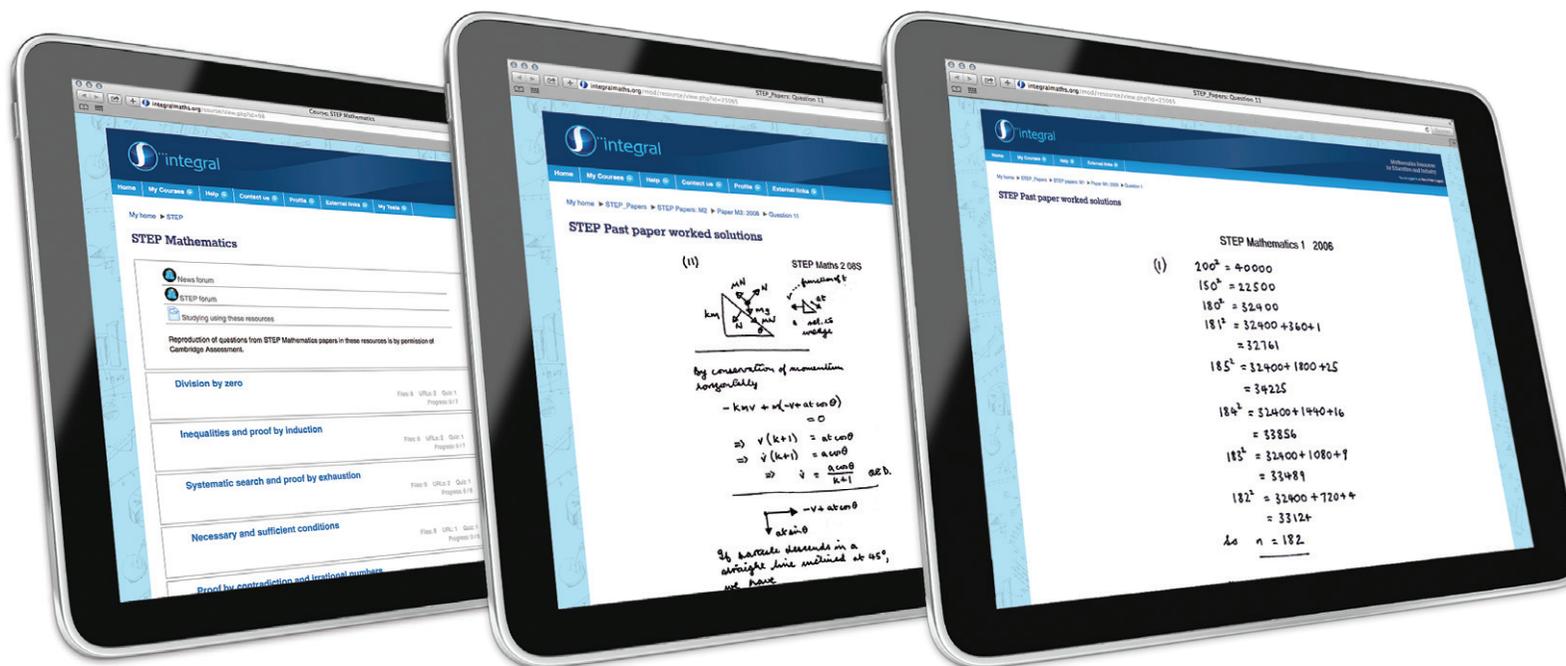
Arranged by mathematical theme these include:

- full worked solutions to all STEP papers since 2005
- additional notes
- additional questions and solutions (not from STEP past papers)
- video worked solutions.

The Mathematics Department at UCL will send your username and password for the resources to you by email.

You log in to the resources at www.integralmaths.org

Offer holders who make UCL their firm or insurance choice on UCAS will continue to have access to this material until the end of the examination period.



› Topic-by-topic, this series of live online lectures provides comprehensive coverage of the pure mathematics ideas, skills and techniques useful in STEP.

Throughout the series there is an emphasis on:

- providing insight into the type of thinking needed to solve problems successfully
- building a knowledge-base of useful techniques, facts and 'tricks'
- producing high-quality written explanations of solutions.

STEP past paper questions will be considered in every session.



The Mathematics Department at UCL will send your personal hyperlink to attend the online lectures to you by e-mail. Similar online sessions have been provided to UCL mathematics applicants since 2014. Feedback comments included:

Essential

I really enjoyed the online lectures. It was helpful to see how to make connections between different areas of maths and how to produce elegant solutions.

Everything was perfectly clear and very informative, thank you.

Great sessions and really helpful!

Session title		2021 dates (all lectures are on Thursday and start at 1800 UK time)
1	What is STEP?	14 January
2	Integer properties	21 January
3	Cubics/quadratics/polys	28 January
4	Differentiation	04 February
5	Coordinate geometry	11 February
6	Trigonometry and solving trig equations	25 February
7	Sequences	04 March
8	Curve sketching	11 March
9	Integration	18 March
10	Logs and their uses	25 March
11	Integration with trig	22 April
12	Inequalities, series, proof	29 April
13	Parametric equations	06 May
14	Vectors	13 May
15	The unexpected (eg floor functions, modulo arithmetic, differential equations)	20 May
16	Geometry	27 May
17	Exam technique	10 June



Here is a flavour of the content of the first three sessions.

Live online lecture 1

What is STEP?

Problem solving is key to mathematics and tackling STEP questions should be viewed as a means of developing problem solving to less familiar questions and scenarios. STEP questions incorporate techniques from different branches of maths which should be used with rigour and detail in the solution.

With the help of examples this session will look at

- The effective use of diagrams and graphs
- Algebraic techniques not used regularly at A level
- How to approach longer questions than A level and maintain order and logical thought through the solution

Live online lecture 2

Use of integer properties to solve problems

This session looks at integer properties, the use of integers, properties of numbers in general together with their uses in proof. It looks at the behaviour of odd and even numbers, divisibility, the use of prime factorisation and significance of specific digits in integers.

> Example problem

Is $n^5 - n$ divisible by 30 for all positive integers n ?

Can all integers be written as a difference of two squares?

Live online lecture 3

Polynomials including the special properties of quadratics and cubics

The expectation of fluency of algebraic manipulation is higher at STEP level so the following will be covered:

- Special cases of factorisation of polynomials
- Uses of the remainder theorem (and factor theorem)
- For quadratics, further uses of completing the square and the discriminant
- For cubics and polynomials of higher order - factorisation, use of the shapes of graphs and turning points to aid solving problems

Two STEP study days will take place at UCL in 2021. They provide a great opportunity to come to UCL to learn and practice mathematics. The emphasis will be on gaining experience in answering past paper questions but there will also be teaching sessions on some selected topics.

Study Day 1 Friday 16 April 2021

all UCL offer holders are welcome to attend

The focus of the day will be curve sketching and trigonometry. We will cover the curve sketching techniques needed in the STEP paper but not necessarily covered in A-level Maths and Further Maths, general solutions of trigonometric equations, and inverse trigonometric functions.

Study Day 2 Friday 4 June 2021

for offer holders who make UCL their firm choice on UCAS

The focus of the day will be calculus. After an extensive revision of integration techniques, we will examine different types of exam questions on integration. We will also look at differentiation and differential equations.

To book a place at a study day email:

admissions@math.ucl.ac.uk



I really enjoyed the trigonometry and the graph questions and once again found that my confidence had improved.

I enjoyed meeting people and working through the questions at the study day and I thought that the tutor was very good.