

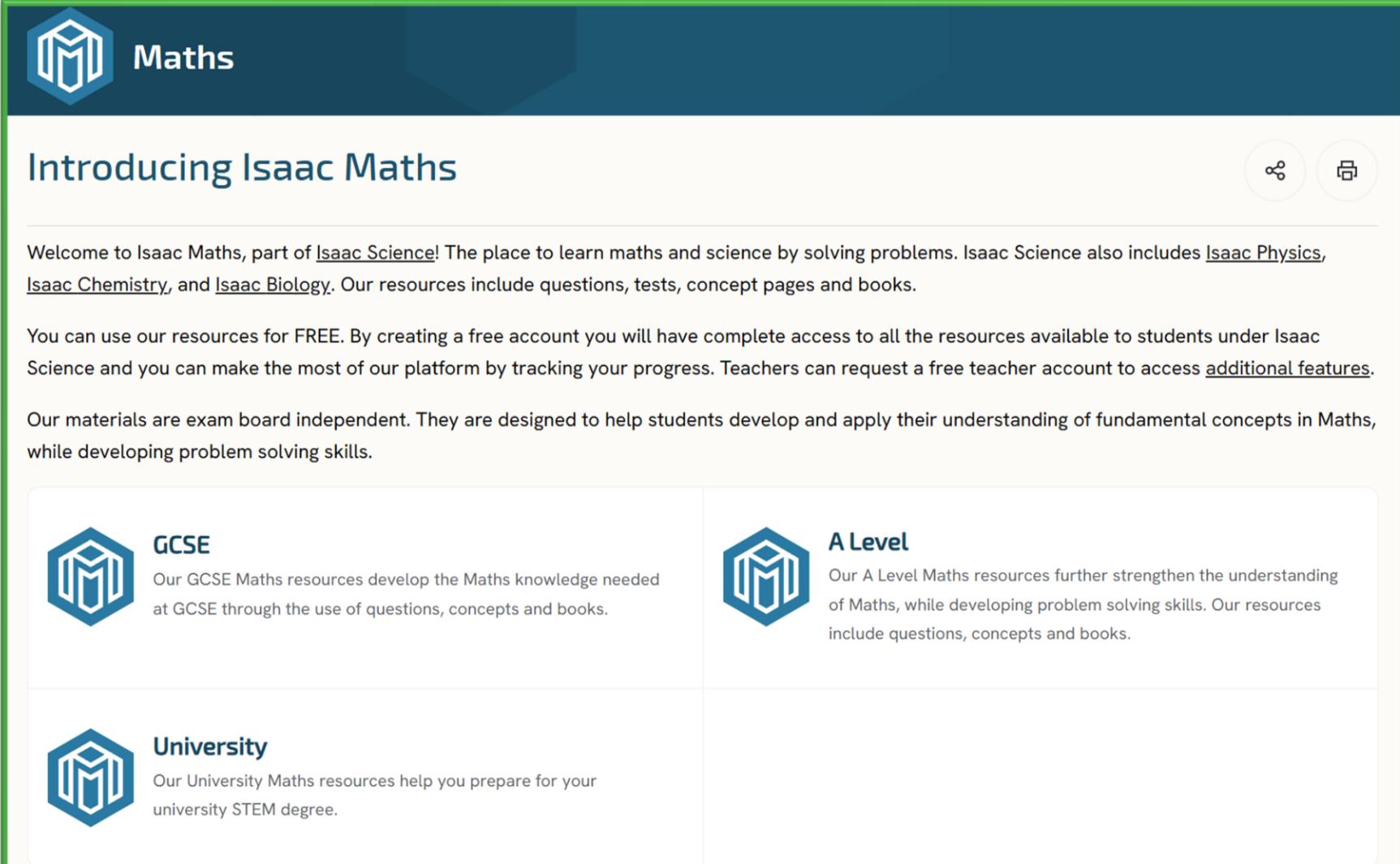


# Isaac Maths Resources

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# Maths Homepage – isaacscience.org/math



The screenshot shows the homepage of Isaac Maths. At the top left is a blue hexagonal icon with a white 'IM' monogram. To its right, the word 'Maths' is written in white. On the right side of the header are two circular icons: one with a person icon and another with a document icon. Below the header, the title 'Introducing Isaac Maths' is displayed in a large, dark blue font. Underneath the title, a paragraph of text welcomes visitors to Isaac Maths, mentioning Isaac Science, Isaac Physics, Isaac Chemistry, and Isaac Biology, and highlights the availability of free resources and teacher accounts. A section below discusses exam board independence and fundamental concepts. At the bottom, three categories are shown in separate boxes: 'GCSE' (with a GCSE logo), 'A Level' (with an A Level logo), and 'University' (with a University logo). Each category includes a brief description of the available resources.

**Maths**

## Introducing Isaac Maths

Welcome to Isaac Maths, part of [Isaac Science](#)! The place to learn maths and science by solving problems. Isaac Science also includes [Isaac Physics](#), [Isaac Chemistry](#), and [Isaac Biology](#). Our resources include questions, tests, concept pages and books.

You can use our resources for FREE. By creating a free account you will have complete access to all the resources available to students under Isaac Science and you can make the most of our platform by tracking your progress. Teachers can request a free teacher account to access [additional features](#).

Our materials are exam board independent. They are designed to help students develop and apply their understanding of fundamental concepts in Maths, while developing problem solving skills.

**GCSE**

Our GCSE Maths resources develop the Maths knowledge needed at GCSE through the use of questions, concepts and books.

**A Level**

Our A Level Maths resources further strengthen the understanding of Maths, while developing problem solving skills. Our resources include questions, concepts and books.

**University**

Our University Maths resources help you prepare for your university STEM degree.

# Example Age Group – A Level

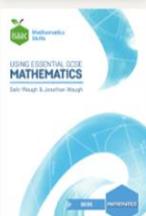


- Easy to find **resources** for an educational level.
- **Interactive online books.**

**A Level Maths books**



**Pre-University Mathematics for Sciences (2nd edition)**  
Provides questions on mathematical topics that underpin all the sciences, as well as giving practice and fluency for Maths and Further Maths A-levels themselves.



**Using Essential GCSE Mathematics**  
Develops the maths skills needed to succeed in science at GCSE level and beyond. Also useful for teaching GCSE maths.

A Level Maths

Try a random question! Get a different question C



**Probability Laws and Outcomes 10**  
Maths | Statistics | Probability

GCSE Practice 2  
A Level Practice 1



**Question finder**  
Find A Level Maths questions to try by topic and difficulty level.  
[Find questions](#)

**Question decks by topic**  
Practise specific topics by using our ready-made question decks.  
[View topic question decks](#)

**Concepts**  
Review the key concepts for A Level Maths.  
[Explore concepts](#)

**Revision**  
Revise with our tailored revision decks on core pure, further pure, and mechanics.  
[List of revision decks](#)

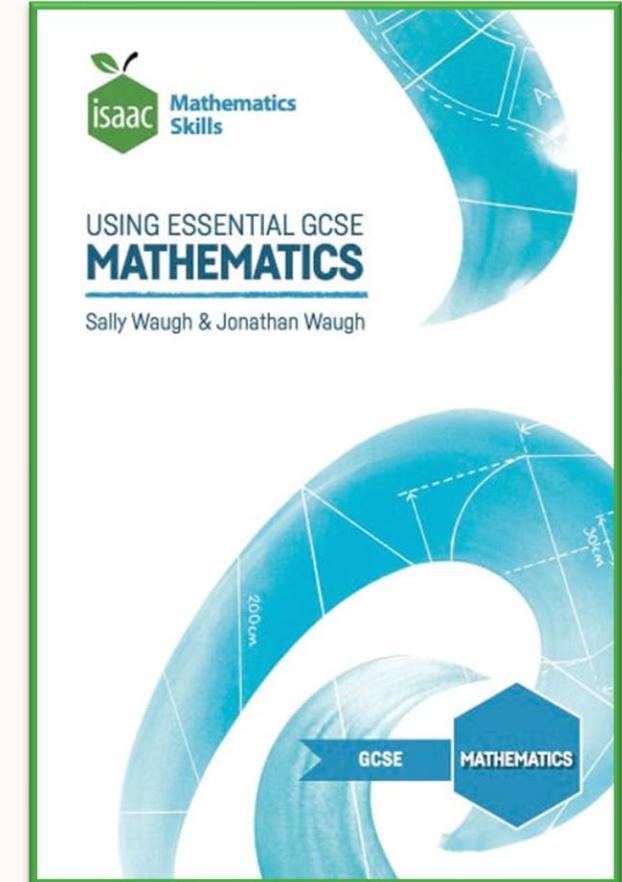
**Tests**  
Use tests to practise a range of topics. These tests are available for you to freely attempt.  
[Find a test](#)

**Core skills practice**  
Practise those core skills, such as rearranging equations, vital for A Level maths.  
[Practise core skills](#)

# GCSE Maths Book



- Print book
- All material is also available [online](#)
- Written for both [foundation](#) & higher  
(shown with § symbol)
- Useful for [supporting maths skills](#) in STEM  
subjects at [A-level](#):
  - Sixth form induction programs
  - Ongoing [support](#) where GCSE-level maths  
is needed, e.g. proportionality



# GCSE Maths Book – Teachers’ Resources



- Additional online resources for **maths** and **user-of-maths** teachers.

Teacher notes ▾

## Teacher notes

The following resources for teachers accompany this book:

**Specification Table** - This maps the content of the book to exam boards. Mapping is available for Edexcel, AQA, WJEC, OCR, IGCSE, CCEA and SQA.

**Teacher's Manual** - Notes by the author to accompany each chapter of the book, including hints for the harder questions. The manual includes suggestions for user-of-maths teachers on approaches to teaching a number of topics with which students often struggle.

**Preparation for Sixth Form (pdf)** - Suggestions on how to use the book to revisit key maths topics at the beginning of sixth form, catering for students starting a variety of different courses.

**Useful Question for STEM** - Tables listing problems within the book that may be useful for teaching STEM subjects.

**Maths Skills for GCSE Science** - Tables mapping the content of the book to mathematical skills for science requirements.

# Pre-Uni Maths Book



- Print book, all material also online
- Second edition
- Chapters 1 – 4 cover pure maths underpinning A Level sciences
- Chapter 5 covers applications of maths to sciences
- Questions categorised according to stage and difficulty

The screenshot shows a digital book interface for 'Pre-University Mathematics for Sciences' by Julia Riley & Mark Warner, 2nd Edition. The left sidebar lists chapters: Overview, Chapter 1 (Algebra & Number), Chapter 2 (Functions), Chapter 3 (Geometry), Chapter 4 (Calculus), and Chapter 5 (Applications to Sciences). The main content area displays the book's title, authors, edition, and a brief description: 'All of the content in the book is available online for free. Use the menu to find the review notes and sets of questions for practice in each topic. Each section contains one or more decks covering specific concepts.' To the right is a thumbnail image of the book cover, which features a colorful spiral design and the title 'PRE-UNIVERSITY MATHEMATICS FOR SCIENCES'.

# Question Finder



- Search for questions by **name** or **text**
- Filter by **topic**, **difficulty**, **book** or **status**
- Questions are sorted **alphabetically**, but you can **shuffle** them
- Use the **link** at the top to browse questions from **all subjects**

The screenshot shows the 'Question finder' interface. At the top, there's a search bar with the placeholder 'e.g. Crossing Paths' and a magnifying glass icon. Below it is a 'Filter questions by' section with a dropdown set to 'Learning Stage' (2) and two checked filters: 'A Level' and 'Further A'. There are also dropdowns for 'Topic' (Number, Algebra, Geometry, Functions, Calculus, Statistics), 'Difficulty', 'Book', and 'Status'. A message at the top right says, 'The questions shown on this page have been filtered to only show those that are relevant to A Level Maths. You can browse all questions [here](#)'. On the right, there are buttons for 'Help', 'A Level Challenge 3' (with a yellow square icon), 'Shuffle questions' (with a circular arrow icon), and 'A Level Practice 3' (with three green hexagons). The main area displays a list of 30 questions from 1186, each with a preview icon, title, subject, and difficulty level. For example, the first few include 'Discharging a Capacitor' (Pre-Uni Maths for Sciences 7.3.7, Maths | Calculus | Differential Equations), 'Parametric Equations 2' (Pre-Uni Maths for Sciences 35.2, Maths | Calculus | Differentiation), and 'Falling Through Air I' (Pre-Uni Maths for Sciences 7.4.3, Maths | Calculus | Differential Equations).

# Question Decks by Topic



- These decks cover a specific topic

## Question decks by topic

**Decks by stage**

A Level

**Decks by subject**

Physics

Chemistry

Maths

Biology

You can use the question decks and questions listed on this page to practise and revise individual topics in A Level Maths. Question decks are arranged by topic, and many of the decks are based on past exam questions.

The Pure Maths and Mechanics questions are also included in a different form in our [Revision](#) pages. If you wish to revise the whole of a mathematics course rather than practise a specific topic, [click here to go to Revision](#).

If you are a teacher, you can set these decks to your class to practise individual skills. [Click here for support on how to set homework.](#)

[A level - Pure maths >](#)

[A level - Mechanics >](#)

[A level - Statistics >](#)

[A level - Topic summary questions >](#)

[Further maths - Core pure >](#)

[Further maths - Statistics >](#)

# Question Decks by Topic



- These decks cover a specific topic
- Includes **pure**, **mechanics** and **statistics** topics
- Also includes **topic summaries**

Question decks by topic

A level - Statistics ▾

A level - Topic summary questions ▾

Each of the questions in the table below summarises the key points of a particular topic.

Field	Topic	Board
Algebra and functions	<a href="#">Rules of Indices</a>	<a href="#">Link</a>
	<a href="#">The Discriminant</a>	<a href="#">Link</a>
Exponentials and logarithms	<a href="#">Logarithm Basics</a>	<a href="#">Link</a>
	<a href="#">Laws of Logarithms</a>	<a href="#">Link</a>
Differentiation	<a href="#">Introducing Differentiation</a>	<a href="#">Link</a>
	<a href="#">Derivatives of Standard Functions 1</a>	<a href="#">Link</a>
	<a href="#">Derivatives of Standard Functions 2</a>	<a href="#">Link</a>
Integration	<a href="#">Integrals of Standard Functions 1</a>	<a href="#">Link</a>

# Concepts



- Cover pure maths and statistics
- Mechanics is covered in physics
- Select GCSE or A Level as appropriate

The screenshot shows the 'Concepts' page from the isaac platform. At the top, there's a search bar with placeholder text 'e.g. Triangle' and a magnifying glass icon. Below it is a 'Filter by topic' section with categories: All (73), Number (7), Algebra (17), Geometry (13), Functions (9), Calculus (14), and Statistics (13). The main content area displays a message: 'The concepts shown on this page have been filtered to only show those that are relevant to A Level Maths.' It also includes a 'Browse all concepts' button and icons for sharing and printing. Below this, a heading says 'Showing 73 results'. Five concept cards are listed:

- Algebraic Division and The Factor Theorem**: An explanation of algebraic division and how we can use it along with the factor theorem and remainder theorem to factorise polynomials.
- Algebraic Fractions & Partial Fractions**: How to work with algebraic fractions, including splitting an expression into partial fractions.
- Algebraic Manipulation - Index Notation**: An overview of the rules of combining integer, fractional and negative indices.
- Algebraic Manipulation - Inequalities**: An overview of inequality notation and how to manipulate inequalities, and how to solve linear, quadratic and rational inequalities.
- Algebraic Manipulation - Surds**

# Concepts



## Concept

### Matrices - Definition

Special types of matrix; addition, subtraction and scalar multiplication

A Level

Related concepts

- Vectors - Describing and Adding Vectors
- Vectors - Resolving Vectors
- Matrices - Matrix Multiplication

Related questions

There are no related questions for this concept.

See all questions for A Level Maths →

Further A

- Special types of matrix
- Matrix addition and subtraction
- Scalar multiplication

Matrices have many applications in Mathematics, Physics, Chemistry and Computer Science. They can be used to represent systems of simultaneous equations, stress and strain in materials, geometrical transformations of objects as well as having many uses in statistics, quantum mechanics, graph theory and artificial intelligence.

A matrix is an array of elements set out in a pair of brackets and arranged in rows and columns. We can describe the size of a matrix using the number of rows and columns,  $m \times n$ .

$$\begin{pmatrix} a & b \\ c & d \end{pmatrix} \quad \begin{pmatrix} 4 \\ 1 \\ -2 \end{pmatrix} \quad \begin{pmatrix} 0 & 0 & -3 \\ -2 & 2 & k^2 \end{pmatrix} \quad \begin{pmatrix} a_{11} & a_{12} & a_{13} & \dots & a_{1n} \\ a_{21} & a_{22} & a_{23} & \dots & a_{2n} \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ a_{m1} & a_{m2} & a_{m3} & \dots & a_{mn} \end{pmatrix}$$

2 × 2 matrix    3 × 1 matrix    2 × 3 matrix     $m \times n$  matrix

These explain a concept in detail

Further A

### Matrix addition and subtraction

We can add or subtract two matrices (of the same size) by adding or subtracting the corresponding elements, just as we would for vectors. For example,

$$\begin{pmatrix} 2 & -1 & 0 \\ -3 & 1 & k \end{pmatrix} + \begin{pmatrix} 3 & k & -3 \\ 5 & 2 & 2k \end{pmatrix} = \begin{pmatrix} 5 & k-1 & -3 \\ 2 & 3 & 3k \end{pmatrix}$$

Quick Q1 Quick Q2

Given that  $\mathbf{A} = \begin{pmatrix} 2 & -1 \\ 0 & -3 \end{pmatrix}$  and  $\mathbf{B} = \begin{pmatrix} 4 & 3 \\ -2 & -5 \end{pmatrix}$ , find  $\mathbf{A} + \mathbf{B}$ .

Hide answer

$$\begin{aligned} \mathbf{A} + \mathbf{B} &= \begin{pmatrix} 2 & -1 \\ 0 & -3 \end{pmatrix} + \begin{pmatrix} 4 & 3 \\ -2 & -5 \end{pmatrix} \\ &= \begin{pmatrix} 2+4 & -1+3 \\ 0+(-2) & -3+(-5) \end{pmatrix} \\ &= \begin{pmatrix} 6 & 2 \\ -2 & -8 \end{pmatrix} \end{aligned}$$

### Feature worked examples

# Revision Decks



- Revision decks contain past exam questions that span A Level
- Each deck spans the syllabus
- Question parts are linked to easier questions
- Hexagons update to show progress

**Question**

Maths Stage 2 - Revision & Practice

Partial Fractions Practice

Question deck: Maths Stage 2 - Revision & Practice

- Integrating Exponentials & Logs A Level Challenge 3 ■■■
- Polynomials 1 A Level Challenge 2 ■■□
- Functions and Inverse Functions A Level Challenge 2 ■■□
- Parametrics & Implicit Differentiation A Level Challenge 2 ■■□
- Integration & Exponential Equations A Level Challenge 3 ■■■
- Trigonometric Identities A Level Challenge 2 ■■□
- Polynomials 2 A Level Challenge 2 ■■□

Part A Partial Fractions >

Part B Derivative >

Part C Deduction >

The equation of a curve is  $y = f(x)$ , where  $f(x) = \frac{3x+1}{(x+2)(x-3)}$ .

Used with permission from UCLES A-level Maths papers, 2003-2017.

# Tests



- Admissions practice tests aim to help students prepare
- Aim to help students develop fluency and improve speed
- Build up to 7 questions in 10 minutes

The screenshot shows the 'Practice tests' section of the Isaac platform. At the top, there's a search bar with placeholder text 'e.g. Practice' and a magnifying glass icon. Below the search bar, a message says: 'You can see all of the tests that you have in progress or have completed in your My Isaac:'. A blue button labeled 'My tests →' with a right-pointing arrow is located below this message. To the right, there's a list of six 'Maths Admissions Practice' tests, each with a blue hexagonal icon containing three horizontal lines, the test name, and a 'View test' button. The tests are listed vertically: 1. Maths Admissions Practice 1, 2. Maths Admissions Practice 2, 3. Maths Admissions Practice 3, 4. Maths Admissions Practice 4, 5. Maths Admissions Practice 5, and 6. Maths Admissions Practice 6.

# Core Skills Practice



- Help practise a specific skill
- Aimed at personal practice
- Questions are randomly generated

The screenshot shows the 'Core skills practice' interface. At the top, there's a navigation bar with a logo and icons for search and print. Below it, a section titled 'Select stage' offers options for 'GCSE' and 'A Level', with 'A Level' currently selected. A note below states: 'Below you can see the list of apps available for practising different maths skills. Click on the buttons to access particular apps.' It also includes a disclaimer: 'These are new tools and are still under development. We encourage you to try them out, and give us your feedback! However, please note that there may be bugs, and the difficulty levels of the questions may change before the final versions are released.' The main content area is divided into two sections: 'Mental Maths' and 'Simultaneous Equations'. Under 'Mental Maths', there are three buttons: 'Get started A Level', 'Go deeper A Level', and 'Overall Mental Maths'. Under 'Simultaneous Equations', there are four buttons arranged in a grid: 'Linear, 2-variable simultaneous equations', 'Quadratic, 2-variable simultaneous equations', 'Linear, 3-variable simultaneous equations', and 'Combination of simultaneous equations'.

# Numeric Questions



Enter a  
number

Part A

**Volume of steel** ▾

Find the volume of steel required.

Value

Units  ↴

ⓘ What can I type in this box?

**Check my answer**

Choose a  
unit

These will check answers for appropriate use of **significant figures**.

# Symbolic Questions

Type your answer

Or use the equation editor

Part A  
Differentiate  $a \sin \theta$

Differentiate  $a \sin \theta$  with respect to  $\theta$  ( $a$  is a constant).

Type your formula here ?

The following symbols may be useful: a, cos(), sin(), tan(), theta

click here to drag and drop your answer

Check my answer

Useful symbols and functions

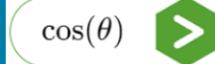
1 2 3     $Ab \Delta \gamma$      $+ - \sqrt{x}$      $\sin \int$

$a^\circ \bullet \cos(\theta)$

Differentiate  $a \sin \theta$  with respect to  $\theta$  ( $a$  is a constant). HIDE QUESTION



Bin



Finish

Help



Re-centre



Question text

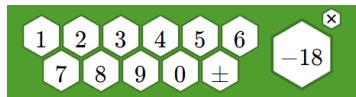
# Symbolic Questions



## Algebraic symbols



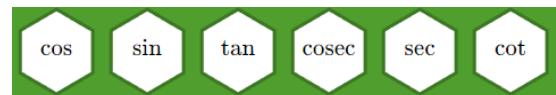
## Numbers



## Operators



## Functions



1 2 3     $A b \Delta \gamma$      $+ - \sqrt{x}$      $\sin \int$

$a^\circ \bullet \cos(\theta)$

Help



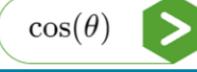
Re-centre

Differentiate  $a \sin \theta$  with respect to  $\theta$  ( $a$  is a constant).

HIDE QUESTION



Bin



Finish

Question text

# Graph Sketcher Questions



Part A  
Sketch  $y$  ▾

Find the roots of the curve  $y = x^2(3 - x)$  and sketch it.

Click on the grid

Click on the grid to start your sketch.

Check my answer

Straight line

Curve

Colour

Bin

Clear

Help

Finish

Undo

Redo

Question text

Click and hold to sketch

Find the roots of the curve  $y = x^2(3 - x)$  and sketch it.

HIDE QUESTION

The interface shows a graph of the curve  $y = x^2(3 - x)$  on a Cartesian coordinate system. The curve is a downward-opening parabola that intersects the x-axis at three points, which are the roots of the equation  $x^2(3 - x) = 0$ . The roots are at  $x = 0$ ,  $x = \sqrt{3}$ , and  $x = -\sqrt{3}$ . The curve passes through the origin (0,0) and reaches a local maximum at approximately  $(1, 2)$ .

# Graph Sketcher Questions



You can

- Draw up to 3 strokes (usually)
- Move, stretch or rotate strokes
- Move turning points or ends
- Delete by dragging it off the grid or using the buttons

[Demo Link](#)

# Graph Sketcher Questions



## How strict is it?

It uses **rough** positions:

- Which **quadrant**?
- Where does it **cross the axes**? (+/- or origin)
- Where are the **turning points**?
- What are the **start and end slopes**?
- Where do **curves intersect**?

# Reorder Questions



- Choose from **available items**
- **Drag items** into the answer
- Put items in the **correct order**

**Part A**  
Translation of the curve  $y = \sqrt{x}$  ✓

A sequence of transformations maps the curve  $y = \sqrt{x}$  to the curve  $y = f(x)$ . Give details of these transformations.

**Available items**

- Translate the curve 7 units in the negative  $y$  direction.
- Translate the curve 4 units in the negative  $y$  direction.
- Stretch the curve in the  $xz$  direction by a factor of  $m$ .
- Translate the curve 7 units in the positive  $x$  direction.
- Stretch the curve in the  $xz$  direction by a factor of  $\frac{1}{m}$ .
- Translate the curve 4 units in the positive  $y$  direction.
- Translate the curve 4 units in the negative  $x$  direction.

**Your answer**

- Translate the curve 7 units in the negative  $x$  direction.
- Stretch the curve in the  $y$  direction by a factor of  $\frac{1}{m}$ .

**Check my answer**

# Cloze Questions



- Drag items to fill in the boxes
- Receive individual feedback on each item
- Small screens use a dropdown menu

Part B  
Combining cells Incorrect

Explain why some combining of rows or columns should be carried out. Fill in the gaps below.

Since one of the expected frequencies is  less than 5, we should combine cells until they are  less than 10. We could combine rows or columns to do so. In this case we will combine rows  2 and 3.

Items:

less than or equal to 10  greater than or equal to 5

**Partly correct...**

[Check my answer](#)

Part B  
Combining cells

Explain why some combining of rows or columns should be carried out. Fill in the gaps below.

Since one of the expected frequencies is , we should combine cells until they are  We could combine rows  or  or <input type="button" value="less than 5" style="border: 1px solid

# Inline Questions



- Type numbers or text in the boxes
- Received individual feedback on each box
- Some boxes may require units

Unit...

Part A  
Expected frequencies ▾

In progress

Calculate the expected frequencies. Fill in the gaps below. Give your answers to 2 dp.

Height		Hair colour		
		Dark	Fair	Red
Height	Less than 165 cm	16.15 ✓	4.4 ✗	4.08 ✓
	165 cm to 180 cm	44.65 ✓	18.33 ✗	11.28 ✓
	More than 180 cm	15.68 ✗	!	!

**Partly correct...**

You can view feedback for a specific box by either selecting it above, or by using the control panel below.

Previous      Box 8 of 9      Next

You did not provide an answer.

[Check my answer](#)

# Coordinate Questions



- Type **numbers** in the boxes
- You can **add/delete** coordinates
- **Coordinate points** can be submitted in **any order** (but not the abscissa and ordinate)

Part B  
Intersection points ▾

Find the coordinates of the points of intersection of the line and the circle.

( ,  ) Delete

( ,  ) Delete

Add coordinate

Check my answer

# Have a go!



Maths homepage

[isaacscience.org/math](https://isaacscience.org/math)

A Level page

[isaacscience.org/math/a\\_level](https://isaacscience.org/math/a_level)

GCSE Book

[isaacscience.org/books/math\\_gcse](https://isaacscience.org/books/math_gcse)

Pre-Uni Maths Book

[isaacscience.org/books/pre\\_uni\\_maths\\_2e](https://isaacscience.org/books/pre_uni_maths_2e)

Questions to try

[isaacscience.org/question\\_decks#sample\\_maths\\_questions](https://isaacscience.org/question_decks#sample_maths_questions)