

Isaac Maths

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Overview of Isaac maths resources

GCSE
Maths Book

Pre-U
Maths Book

Practise Maths
&
Master Maths

Question
Finder

Concept
Pages




New maths resources and features this year



- Graph sketcher interactive graph sketching tool
 - new features
- New Inline question type
- New Coordinate question type



GCSE Book




Physics. *You work it out.*

Streak: 0

HELLO JONATHAN
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Master Physics by Solving Problems: from School to University!

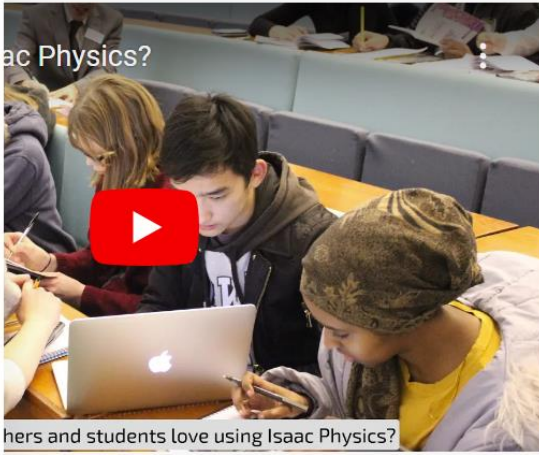
Welcome to Isaac Physics, the free platform for teachers and students.

- Use it in the **classroom**
- Use it for **homework**
- Use it for **revision**

Show me resources for...

[11-14](#) [GCSE or equivalent](#) [A Level or equivalent](#) [teachers](#)


[11-14 Resources](#)
[GCSE Resources](#)
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...ers and students love using Isaac Physics?

Head to the GCSE page...

... then use this icon:



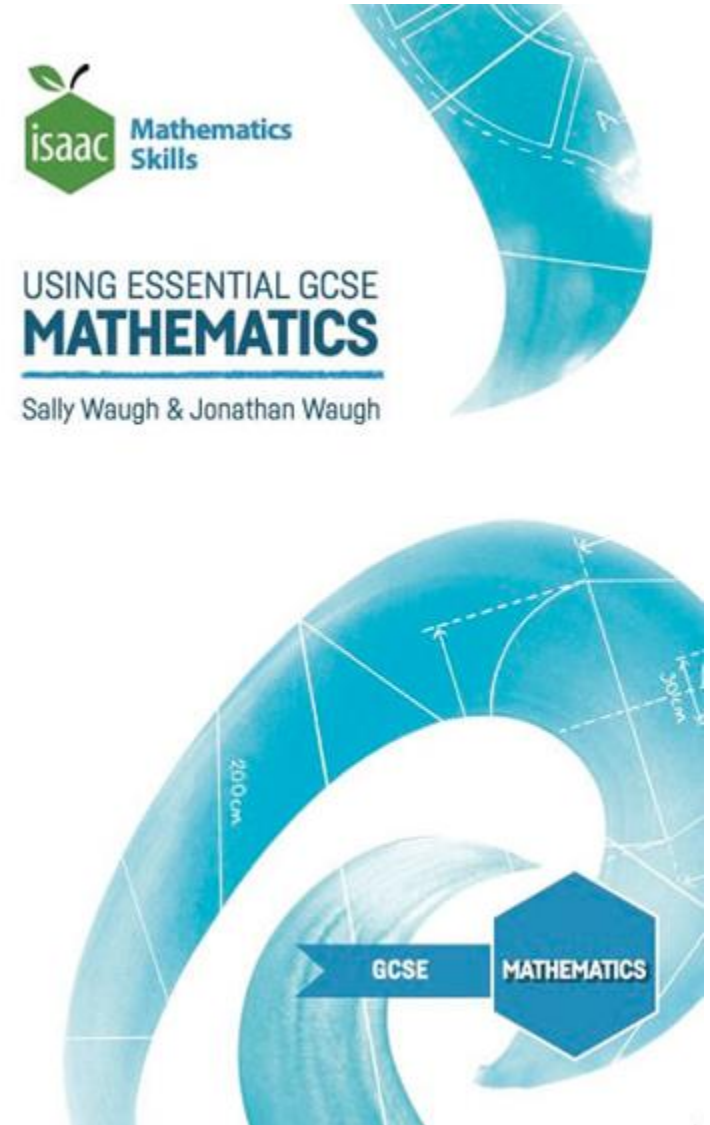
GCSE Maths Book

Interactive questions from our Using Essential GCSE Maths book.



GCSE Book

- Print book
- All material is also 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 Book

Additional online resources include:

- STEM Question Finder
- Preparation for 6th Form guide
- A Teacher's Manual

Using Essential GCSE Mathematics

Help

By S.A. Waugh & J.N. Waugh

This book is designed to provide practice for GCSE-level mathematics. It can be used by those taking GCSE mathematics courses, and also by students in other subjects who need to learn or brush up on their knowledge of particular topics. The goals of the book are to help students master the skills they learn at GCSE level, and act as a resource for students who need to use these skills in their courses at A-level.

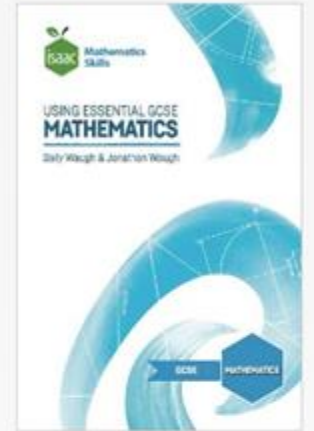
Includes worked examples and guidance.

Suitable for use with students working at the level of **all** GCSE grades. Boards of questions suitable for students working towards foundation and higher tier examinations are provided separately within each topic section (where relevant).

Buy the book

Printed copies, cost price £1 (plus p+p)

Buy Isaac Books



For Teachers

Specification Table - maps the book to your exam board.

Teacher's Manual - authors' notes for teachers.

Preparation for Sixth Form (pdf) - by the authors.

STEM Question Finder - table of problems that relate to STEM subjects.

Maths Skills for GCSE Science - table of assumed skills for GCSE science courses.


Set a section for homework

Click "Assign" below the section of the book you wish to set as an assignment.

https://isaacphysics.org/books/maths_book_gcse



Pre-U Maths Book




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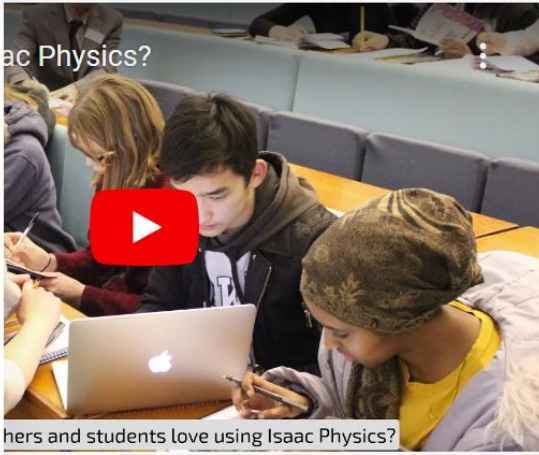
11-14

GCSE
or equivalent

**A Level
or equivalent**

teachers

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... ac Physics?
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Head to the A-level page...

... then use this icon:

Maths for Sciences Book

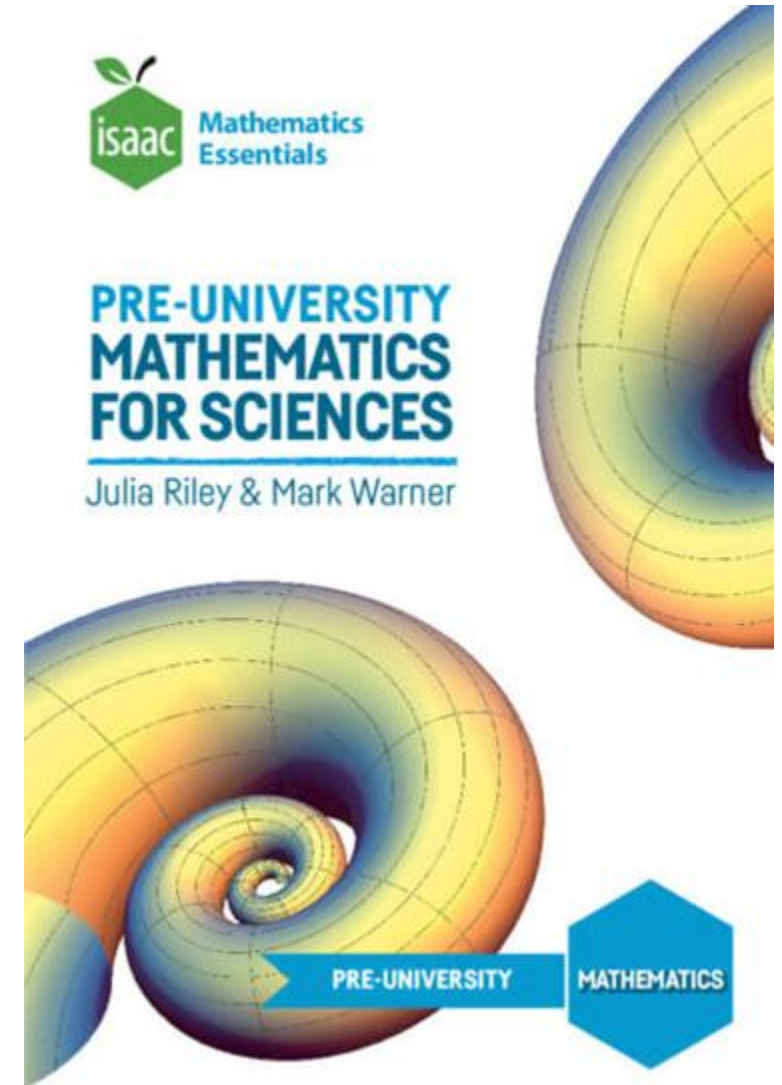


Interactive questions from our pre-university Maths book.



Pre-U Maths Book


- › Print book
- › All material is also online
- › Written with maths for science in mind
- › Maths content ranges from end-of-GCSE to first year University.
- › Useful for supporting maths in science where topics are first met at A-level, such as logarithms or calculus.



https://isaacphysics.org/books/pre_uni_maths



Practise Maths




Physics. *You work it out.*

Streak: 0

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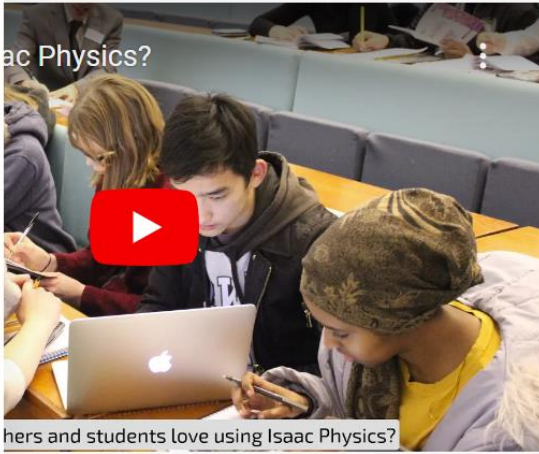
11-14

GCSE
or equivalent

**A Level
or equivalent**

teachers

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[GCSE Resources](#)
[A Level Resources](#)
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Head to the A-level page...

... then use this icon:

Practise Maths



Practise A Level (or equivalent) exam questions by topic.



Practise Maths

[Home](#) > [A Level Maths Practice Topics](#)

A Level Maths Practice Topics



You can use these boards to practise and revise for A Level Maths. They are based on past exam questions, and arranged by topic.

These questions are also included in a different form in our [Master Maths](#) pages. If you wish to revise the whole of a mathematics course rather than practise a specific concept, [click here to go to Master Maths](#).

If you are a teacher, you can set these boards to your class to practise individual skills.

[Click here for support on how to set homework.](#)

Pure Maths



Mechanics



Further Maths



Mastering Mathematics boards





Practise Maths

Stage 2 (Year 13)

Field	Topic	Board
Series	Series: Induction	Link
	Series: Summation - Standard Results	Link
	Series: Method of Differences	Link
Further vectors	Vectors: Lines and Planes	Link
	Vectors: Angles and Distances	Link
	Vectors: Geometry	Link
	Vectors: Intersecting Planes	Link
Matrices	Matrices: Intersection of Planes	Link



Either link takes you to the gameboard



Master Maths

[Home](#) > [A Level Maths Practice Topics](#)

A Level Maths Practice Topics



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[Click here for support on how to set homework.](#)

Pure Maths

Mechanics

Further Maths

Mastering Mathematics boards

Alternative
format for
the questions



Master Maths

Descending level
of difficulty

Students can find
easier questions on
a topic to practice
skills where they
are less confident.

The screenshot shows the Isaac Physics Master Maths interface. At the top, a red box highlights 'Maths Stage 1 - Revision & Practice' and a blue box highlights 'Quadratics with other functions Practice'. A purple arrow points from the text 'Descending level of difficulty' to the 'Quadratics with other functions Practice' box. Below these, a row of hexagonal icons shows progress: three checked, one with a '4', two checked, one with a '7', and three checked. Below this, three hexagonal icons are labeled '1', '2', and '3'. The main title is 'Quadratics with other functions 1i' with 'A Level' and three 'P' icons to the right. Below the title are icons for sharing, printing, and a flag. The main content area is titled 'Part A Sketch $y = 12 - x - x^2$ '. It contains the text: 'Sketch the curve $y = 12 - x - x^2$, giving the coordinates of all intercepts with the axes. Check your sketch after answering the question.' and 'Give the value of y at which the curve intercepts the y axis.' Below this is a text input field with the placeholder 'Type your formula here' and a blue button with a question mark. Below the input field is the text 'The following symbols may be useful: y ' and a button that says 'or click here to drag and drop your answer'. At the bottom are two buttons: 'Easier question?' and 'Check my answer'. A purple arrow points from the text 'Students can find easier questions on a topic to practice skills where they are less confident.' to the 'Easier question?' button.

Maths Stage 1 -
Revision & Practice

Quadratics with other
functions Practice

Quadratics with other functions 1i

A Level
P P P

Part A Sketch $y = 12 - x - x^2$

Sketch the curve $y = 12 - x - x^2$, giving the coordinates of all intercepts with the axes. Check your sketch after answering the question.

Give the value of y at which the curve intercepts the y axis.

Type your formula here ?

The following symbols may be useful: y

or click here to drag and drop your answer


Easier question?

Check my answer

https://isaacphysics.org/pages/master_maths



Question Finder




Physics. *You work it out.*

Streak: 0

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Show me resources for...

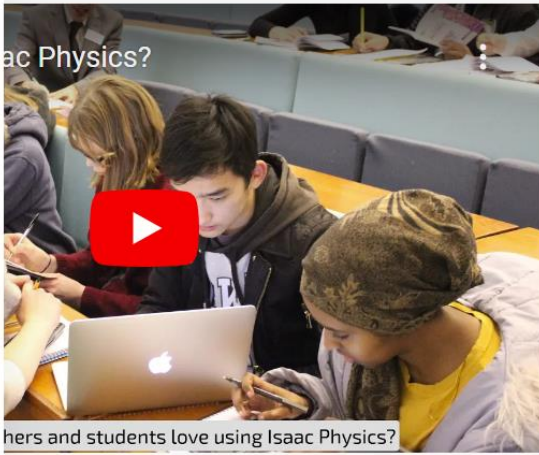
11-14

GCSE
or equivalent

A Level
or equivalent


teachers

[11-14 Resources](#)
[GCSE Resources](#)
[A Level Resources](#)
[Question Finder](#)
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This box on the A-level & GCSE pages:

Question Finder



Practise your problem solving skills.



Question Finder

Select subject & topic

Select educational stage

Select practice and/or challenge level

Include book questions (new)

Save selection

10 questions

Topics: Maths Statistics Rando...

Click these buttons to choose your question gameboard

I am interested in stage ?

Further A

I would like questions for... ?

Practice

P1 P2 P3

Challenge

C1 C2 C3

Topics:

Physics **Maths** Chemistry Biology

Number Algebra Geometry Functions Calculus **Statistics**

Data Analysis Probability **Random Variables** Hypothesis Tests

☒ Include Isaac book questions

Shuffle Questions

Go to Questions...

Random Variables

Save to My Gameboards

Continuous Random Variables 7

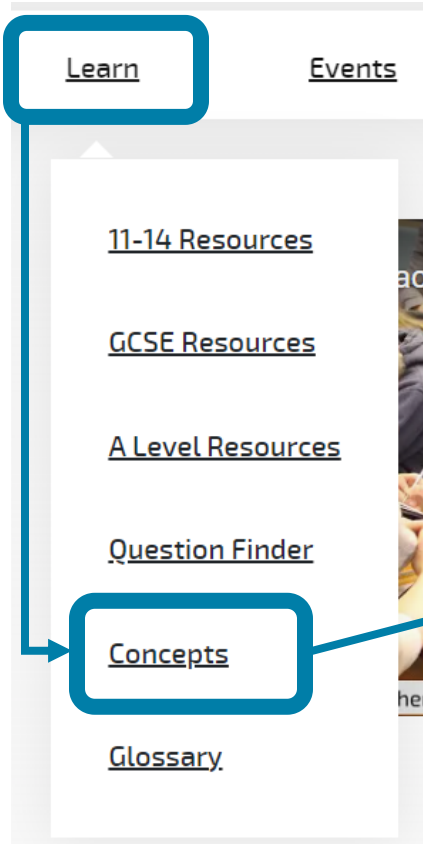
Maths > Statistics > Random Variables

Further A

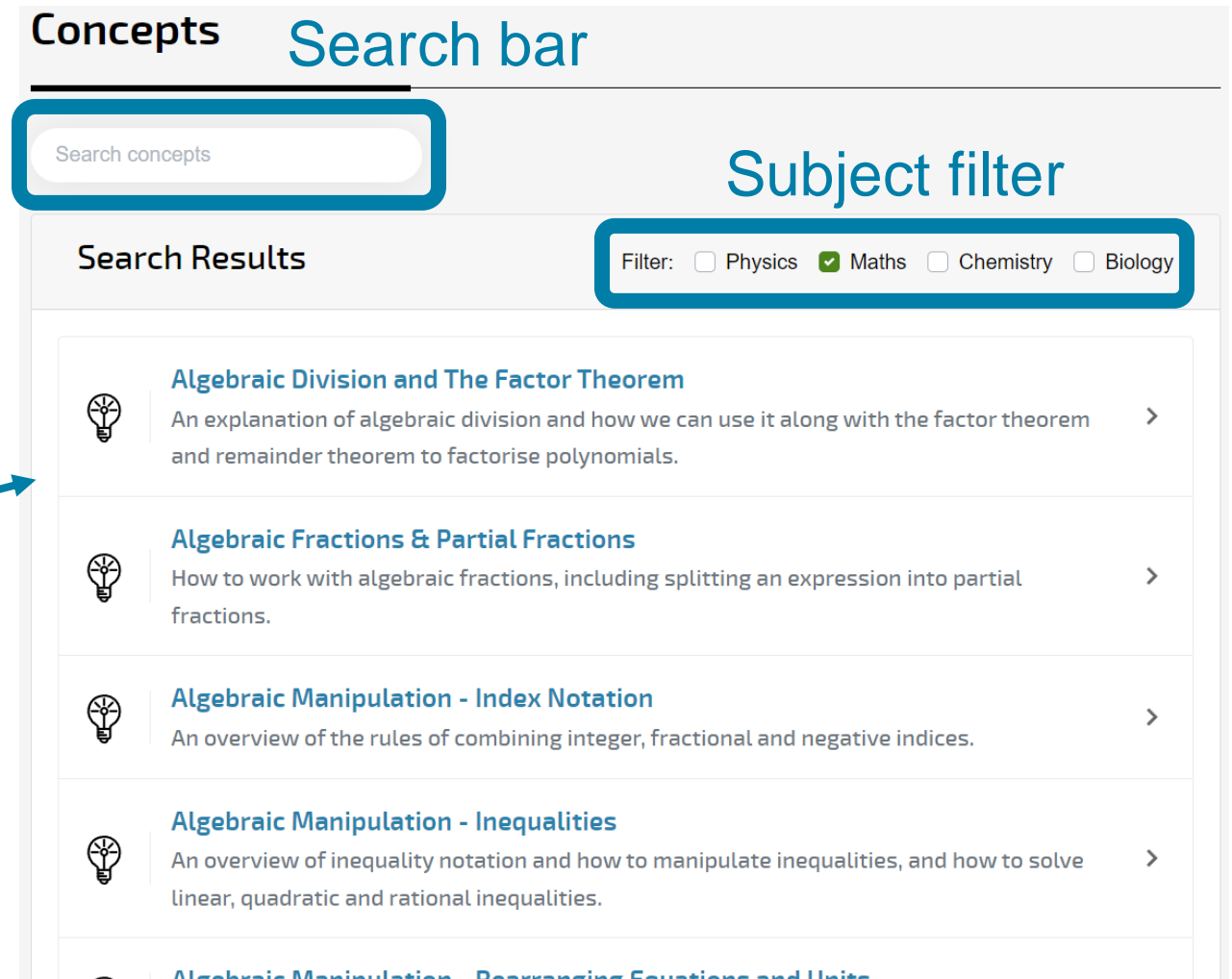
P P P



Concept Pages



<https://isaacphysics.org/concepts>





Concept Pages

Matrices - Definition

All stages ▾



Matrices have many applications in Mathematics, Physics, Chemistry and Computer Science. They can be used to systems of simultaneous equations, stress and strain in materials, geometrical transformations of objects as well as 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 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

Further A Special types of matrix

Further A Matrix addition and subtraction

Further A Scalar multiplication

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**



Question Types

We have a variety of questions of different types available.

Numeric Questions

Part A Velocity at A ^

Find the velocity of P when it passes through A . Give your answer to 1 significant figure.

Value	Units
<input type="text"/>	<input type="text"/>

Enter a **number** →

← Choose a **unit**

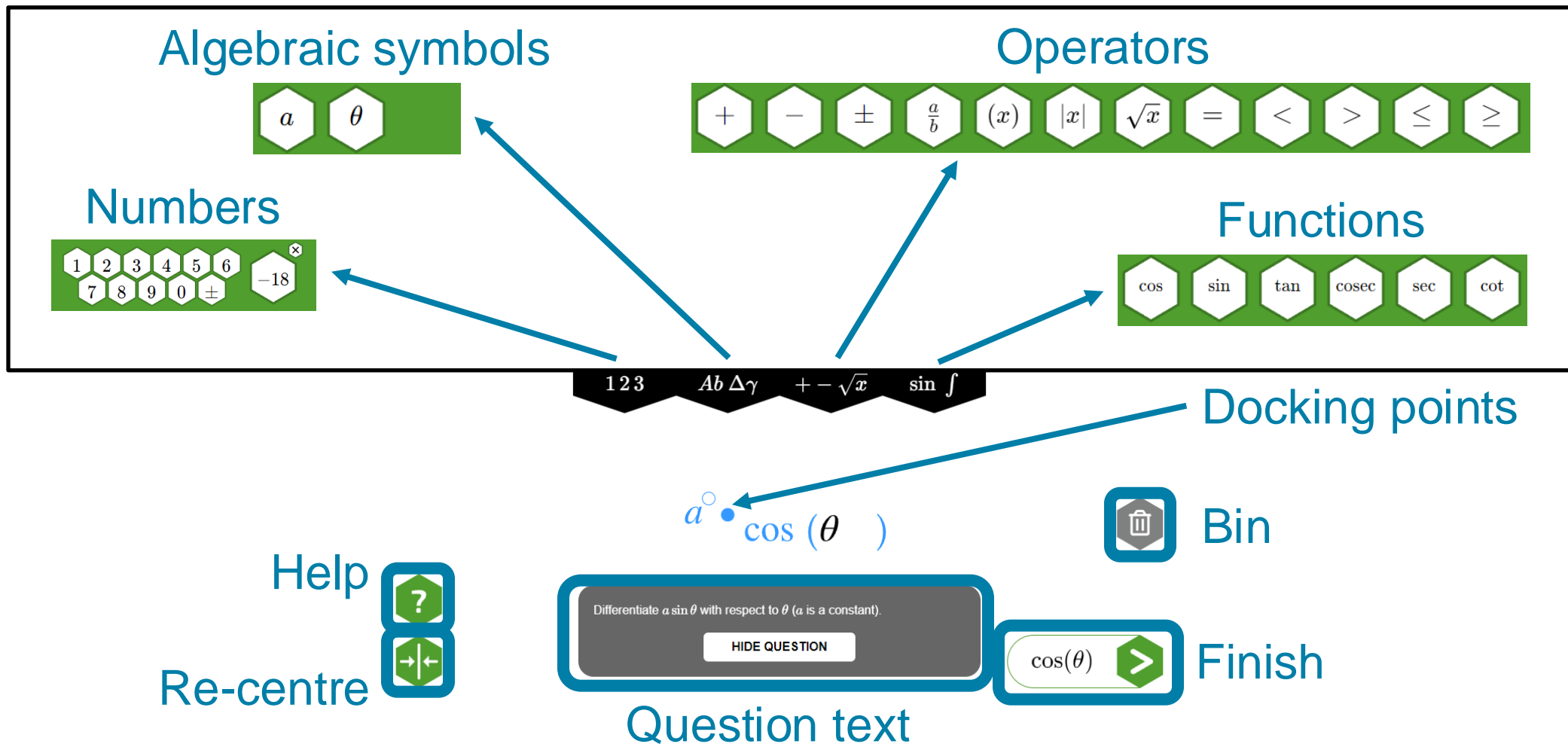
Check my answer

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



Question Types

Symbolic Questions





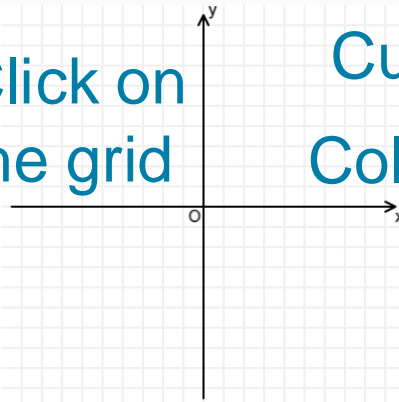
Question Types

Graph Sketcher

Part A Sketch $\arcsin \frac{\pi}{3} + \frac{\pi}{2}$

Sketch the graph of $y = \arcsin \frac{\pi}{3} + \frac{\pi}{2}$.

Click on
the grid



Check my answer

Straight line

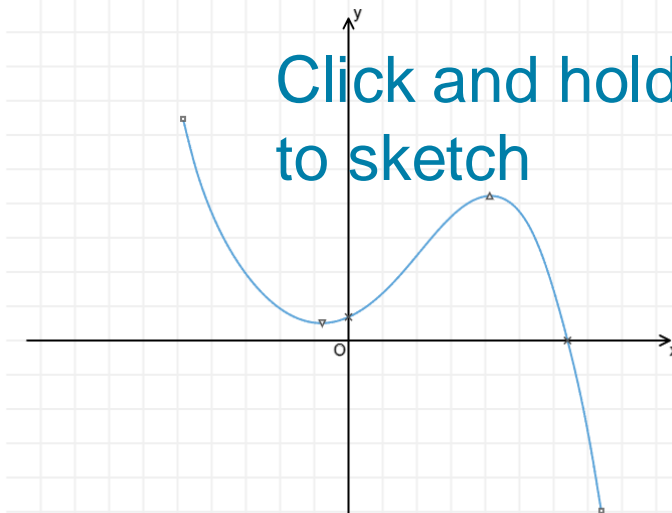
Curve

Colour



Undo Redo

Click and hold
to sketch



Question text



Bin
Clear





Help
Finish



Question Types

Graph Sketcher

You can

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

[Demo Link](#)



Question Types

Graph Sketcher

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**?



Question Types

Reorder

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 4 units in the negative y direction.

Translate the curve 7 units in the positive x direction.

Translate the curve 4 units in the negative x direction.

Stretch the curve in the x direction by a factor of m .

Translate the curve 4 units in the positive y direction.

Translate the curve 7 units in the negative y direction.

Stretch the curve in the y direction by a factor of $\frac{1}{m}$.

Your answer

Translate the curve 7 units in the negative x direction.

Stretch the curve in the x direction by a factor of $\frac{1}{m}$.

Check my answer



Question Types

Cloze Text

Drag **items** to fill in the **boxes**

Receive **individual feedback** on each **item**

Small screens use a dropdown menu



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 **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:

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 columns to do so. In this case we will combine rows or columns .

Check

[Hint](#)

- less than 10
- 1 and 3
- 2 and 3
- 1 and 2
- greater than or equal to 10
- greater than or equal to 5
- less than 5

less than or equal to 10

greater than or equal to 5

Incorrect

Check my answer



Question Types

Inline

Type **numbers** or **text** in the **boxes**

Receive **individual feedback** on each **box**

Some boxes may require **units**

Part A Expected frequencies

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

		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



Question Types

Coordinate

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.

(,)

(,)



Maths Skills for Science Teachers ✨

Over to Ally Davies ...

We plan to help develop a Maths skills course for science teachers.

Will include sets of questions for different skills

Example questions to practice rearranging equations:

https://isaacphysics.org/gameboards#ipts24_fri_3_jnw_jmr_mcr_re_eq



Have a go!

GCSE Book

https://isaacphysics.org/books/maths_book_gcse

Pre-U Book

https://isaacphysics.org/books/pre_uni_maths

Practise Maths

https://isaacphysics.org/pages/maths_practice

Master Maths

https://isaacphysics.org/pages/master_maths

Question Finder

<https://isaacphysics.org/gameboards>

Concept Pages

<https://isaacphysics.org/concepts>

Questions to try

https://isaacphysics.org/gameboards#ipts24_fri_3_jnw_jmr_mcr

Maths Skills

https://isaacphysics.org/gameboards#ipts24_fri_3_jnw_jmr_mcr_re_eq