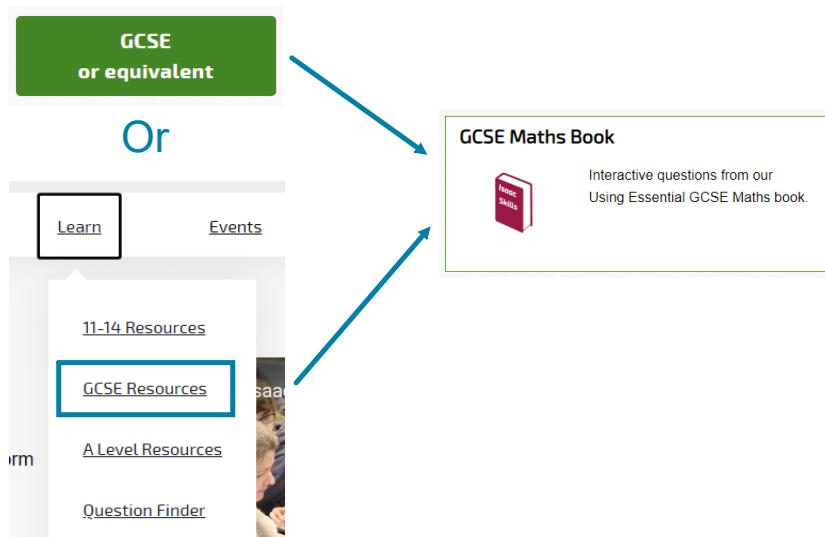


Isaac Maths Resources

GCSE Book	https://isaacphysics.org/books/mathsgcse
A-level Book	https://isaacphysics.org/books/pre_uni_maths_2e
Practise Maths	https://isaacphysics.org/pages/mathspages
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#tcpd_newtoisaac_maths4

GCSE Book

https://isaacphysics.org/books/math_s_book_gcse



USING ESSENTIAL GCSE
MATHEMATICS
Sally Waugh & Jonathan Waugh



Available for £1 in print, or online for free.

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

Buy Isaac Books

Teacher resources.

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.

Covers all of GCSE Maths, with sections for Foundation or Higher.

Chapters:

1 Solving Maths Problems
(Section 1)

2 Skills
(Sections 2-11)

3 Algebra
(Sections 12-22)

4 Linear Functions
(Sections 23-25)

5 Quadratic Functions
(Sections 26-30)

6 Inequalities
(Sections 31-32)

7 Graphs
(Sections 33-37)

8 Geometry
(Sections 38-50)

9 Probability and Statistics
(Sections 51-57)

Questions in gameboards for each chapter.

Graphs

33F Standard Function Graphs Foundation [View board](#) | [Assign](#)

33H Standard Function Graphs Higher [View board](#) | [Assign](#)

34F Proportionality Foundation [View board](#) | [Assign](#)

34H Proportionality Higher [View board](#) | [Assign](#)

35H Transformations Higher [View board](#) | [Assign](#)

36F Real-World Graphs Foundation [View board](#) | [Assign](#)

36H Real-World Graphs Higher [View board](#) | [Assign](#)

37H Numerical Methods Higher [View board](#) | [Assign](#)

36. Real-World Graphs Higher

 Notes
Real-World Graphs

 **Essential GCSE Maths 36.3**
Maths > Functions > Graph Sketching

GCSE  A Level 

 **Essential GCSE Maths 36.4**
Maths > Functions > Graph Sketching

GCSE  A Level 

 **Essential GCSE Maths 36.5**
Maths > Functions > Graph Sketching

GCSE  A Level 

 **Essential GCSE Maths 36.6**
Maths > Functions > Graph Sketching

GCSE  A Level 

 **Essential GCSE Maths 36.8**
Maths > Functions > Graph Sketching

GCSE  A Level 

 **Essential GCSE Maths 36.9**
Maths > Functions > Graph Sketching

GCSE  A Level 

 **Essential GCSE Maths 36.10**

GCSE  A Level 

A-level Book

https://isaacphysics.org/books/pre_uni_maths_2e

The diagram illustrates the Isaac Maths Resources platform. On the left, a green box labeled "teachers" has a blue arrow pointing to a "Set Assignments" section. Below this, a screenshot of the teacher dashboard shows the "Set Assignments" button highlighted. Another blue arrow points from this button to a "Add a gameboard from ... our books" section. This section contains a green button labeled "our books". A third blue arrow points from this button to a grid of 12 book covers under the heading "Isaac Skills Books". The books include titles such as "Step up to GCSE PHYSICS", "GCSE Physics", "Pre-University Physics", "Linking Concepts in Pre-University Physics", "Using Essential GCSE MATHEMATICS", "Mathematics for Sciences", "Mathematics for Sciences (2nd edition)", "Mathematics for Sciences (1st edition)", and "Pre-University Physical Chemistry".

2nd edition!

Available for £1 in print, or online for free.

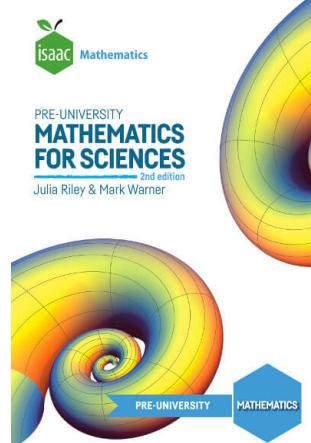
Buy the book

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

[Buy Isaac Books](#)



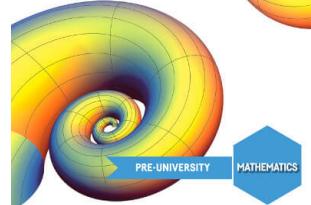
PRE-UNIVERSITY
MATHEMATICS FOR SCIENCES
2nd edition
Julia Riley & Mark Warner



Specification table for teachers

For Teachers

[Specification Table](#) - maps the book to your exam board.



Covers pure content for A-level Maths, and some of Further Maths. Focuses on mathematical methods used in the sciences.

Chapters:

1 Algebra & Number
(Sections A-D)

2 Functions
(Sections E-F)

3 Geometry
(Sections G-I)

4 Calculus
(Sections J-L)

5 Applications to Sciences
(Sections M-T)

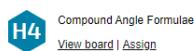
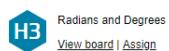
Questions in gameboards for each chapter.

Geometry

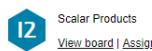
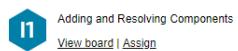
G Shapes



H Trigonometry



I Vectors



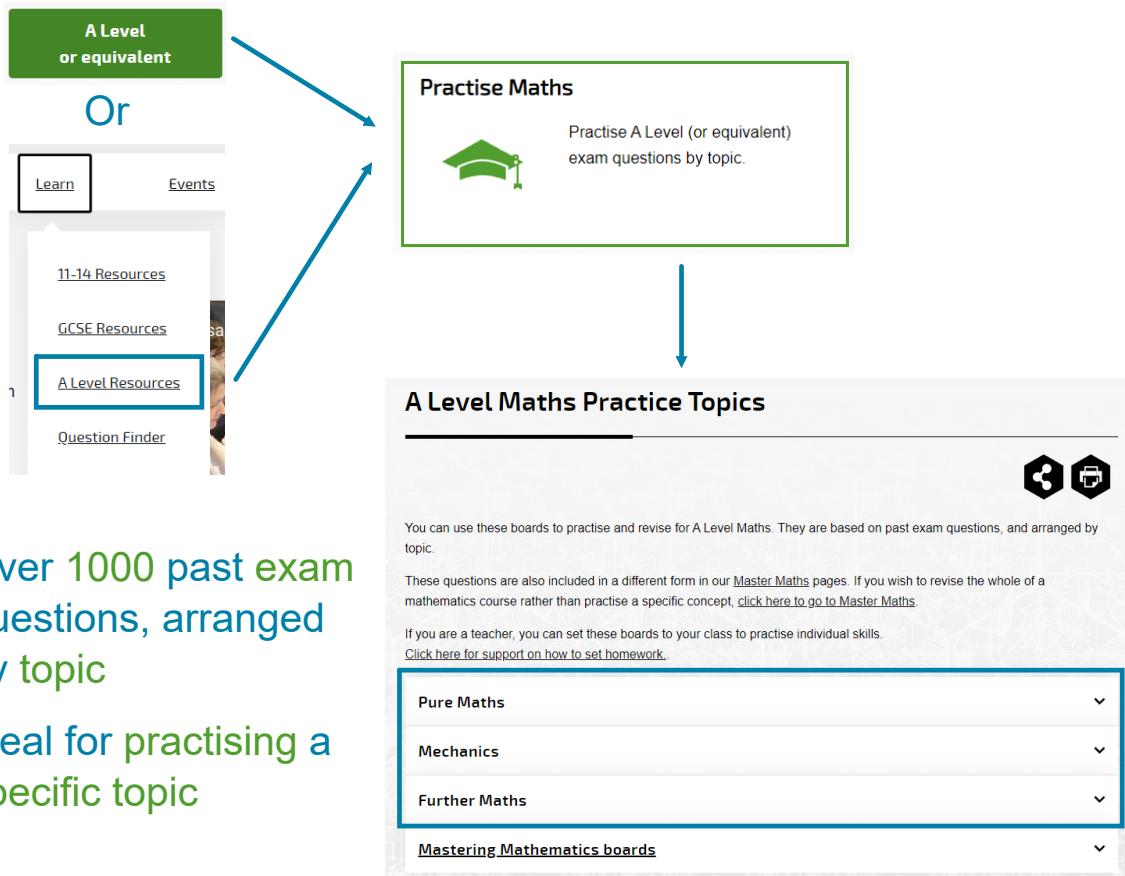
H3 Radians and Degrees

A screenshot of a gameboard titled 'H3 Radians and Degrees'. It lists several activities with icons, descriptions, and difficulty levels (A Level).

	Equation Editor: Text Entry How to enter equations into the text entry box.	>
	Simplify Trig Expressions Pre-Uni Maths for Sciences H3.1 Maths > Geometry > Trigonometry	A Level >
	Angles and Projection Pre-Uni Maths for Sciences H3.2 Maths > Geometry > Trigonometry	A Level >
	Sec, Cosec and Cot Pre-Uni Maths for Sciences H3.3 Maths > Functions > General Functions	A Level >
	Trigonometric Manipulation Pre-Uni Maths for Sciences H3.4 Maths > Functions > General Functions	A Level >
	Circles and Arcs 1 Pre-Uni Maths for Sciences H3.5 Maths > Geometry > Trigonometry	A Level >
	Circles and Arcs 2 Pre-Uni Maths for Sciences H3.6 Maths > Geometry > Trigonometry	A Level >

Practise Maths

https://isaacphysics.org/pages/maths_practice



Stage 2 (Year 13)

Field	Topic	Board
Algebra and functions	Algebraic Division	Link
	Curve Sketching and Combined Transformations	Link
	Functions and Algebra	Link
	Functions: Graphs and Inverse Functions	Link
	Modulus	Link
	Partial Fractions	Link
	Graphs and roots in context	Link
Coordinate geometry	Parametric equations	Link
Differentiation	Constructing Differential Equations	Link
	Differentiation and Gradients: Beyond Polynomials	Link
	Differentiation: Chain Rule	Link
	Differentiation: Implicit	Link
	Differentiation: Products	Link
	Differentiation: Quotients	Link
	Differentiation: Synoptic Problems	Link
Integration	Area Between Two Curves	Link
	Integration by Parts	Link
	Integration by Substitution	Link
	Integration by substitution (trig)	Link
	Integration: General	Link

Master Maths

https://isaacphysics.org/pages/master_maths

A Level or equivalent

Or

Learn Events

11-14 Resources

GCSE Resources

A Level Resources

Question Finder

Practise Maths

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

A Level Maths Practice Topics

Pure Maths

Mechanics

Further Maths

Mastering Mathematics boards

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.](#)

Past exam questions that span A-level

Linked to easier questions

Ideal for revision

Each board spans the syllabus

	Stage 1 (Year 12)	Stage 2 (Year 13)
Core Pure Maths	C	C
Mechanics	M	M
Further Pure Maths	F	

Maths Stage 1 - Revision & Practice

- Significant Figures
- Finding Roots
- Circles and Geometry
- Curves and Integration
- Quadratics and Inequalities
- Exponentials and Logs
- Calculus
- Trigonometry: Solving Equations

Each question part links to an easier question on the same topic

Easier question?

Check my answer

Maths Stage 1 - Revision & Practice

Trigonometry: Identities and Equations Practice

Trigonometry: Identities and Equations 4ii

A Level

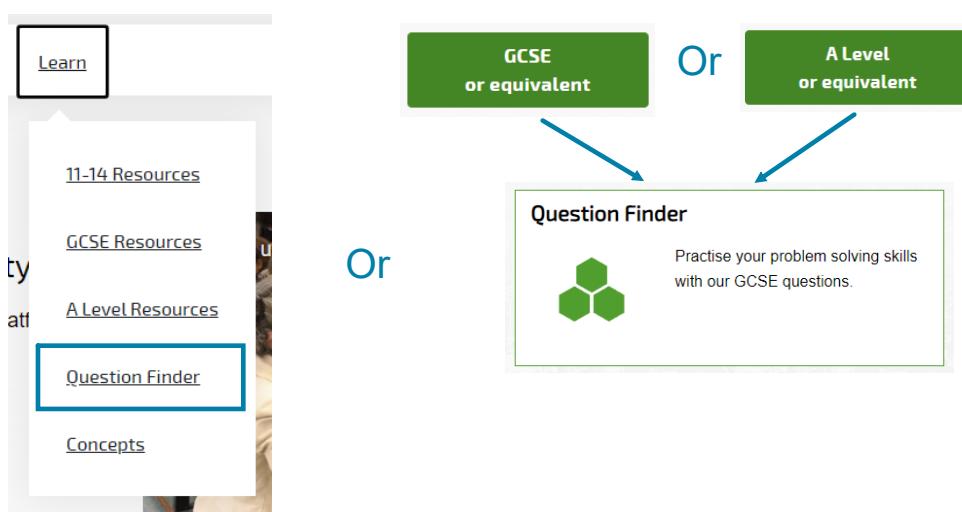
Part A Solving $2 \sin^2 x = 1 + \cos x$

Solve $2 \sin^2 x = 1 + \cos x$ in the region $-180^\circ \leq x \leq 180^\circ$. Give the largest value within this range as your answer to 3 significant figures.

Hexagons will update to show progress

Question Finder

<https://isaacphysics.org/gameboards>



Search for questions by stage, topic or difficulty.

Question Finder

Help

Use our **new** question finder to find questions to try on topics in physics, maths, chemistry and biology. Use our practice questions to become fluent in topics and then take your understanding and problem solving skills to the next level with our challenge questions.

Use the search box or filters to find questions. You can then refine your search further with the filters. **Note that you will need to click on "Apply filters" for them to take effect.**

To save your progress on each question, please [login](#) or [sign up](#) for a free account.

Once you are happy with your search, click on a question in the list to have a go; clicking on the back button will return you to your search. **Please note that the search no longer creates a gameboard.**

If you prefer to use the previous question finder, you can find it [here](#). **Please note that this previous version will be retired on 31st December 2024.**

Search for a question

🔍

Filter by

Stage	1 >
Topics	1 >
Difficulty	2 >
Book	>
Status	>

Apply filters

Search by name or text

Showing 15 of 15.

	Circles and Arcs 1 Pre-Uni Maths for Sciences 3.1.1	A Level
	Circles and Arcs 2 Pre-Uni Maths for Sciences 3.1.2	A Level
	Circles and Triangles 1 Pre-Uni Maths for Sciences 3.1.3	A Level Further A
	Circles and Triangles 2 Pre-Uni Maths for Sciences 3.1.4	A Level Further A
	Degrees to Radians 1 Pre-Uni Maths for Sciences 3.1.5	A Level
	Degrees to Radians 2 Pre-Uni Maths for Sciences 3.1.6	A Level
	Energy of Oscillating Mass	A Level Further A

Filter by stage, topic, difficulty, book or status

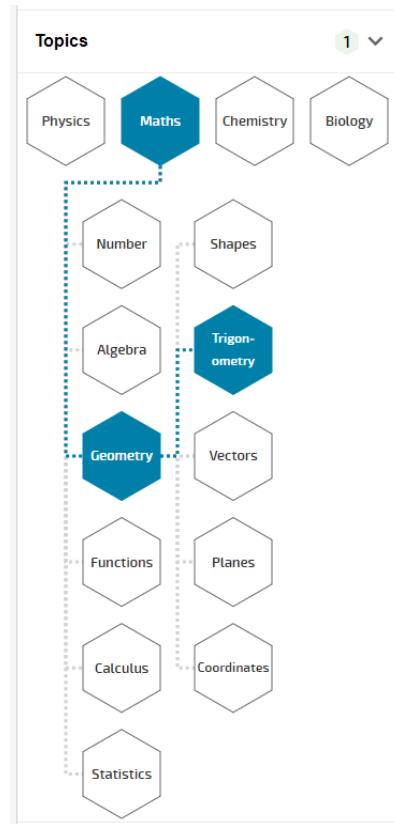
Stage

Stage	1
<input type="checkbox"/> Year 7&8	
<input type="checkbox"/> Year 9	
<input type="checkbox"/> GCSE	
<input checked="" type="checkbox"/> A Level	
<input type="checkbox"/> Further A	
<input type="checkbox"/> University	

Difficulty

Difficulty	2
Learn more about difficulty levels	
<input type="checkbox"/> Practice 1	
<input checked="" type="checkbox"/> Practice 2	
<input type="checkbox"/> Practice 3	
<input checked="" type="checkbox"/> Challenge 1	
<input type="checkbox"/> Challenge 2	
<input type="checkbox"/> Challenge 3	

Topic



Book

Book	▼
<input type="checkbox"/> Exclude skills book questions	
<input type="checkbox"/> Step Up to GCSE Physics	
<input type="checkbox"/> GCSE Physics	
<input type="checkbox"/> A Level Physics (3rd Edition)	
<input type="checkbox"/> Linking Concepts in Pre-Uni Physics	
<input type="checkbox"/> GCSE Maths	
<input type="checkbox"/> Pre-Uni Maths (2nd edition)	
<input type="checkbox"/> Pre-Uni Maths (1st edition)	
<input type="checkbox"/> A-Level Physical Chemistry	

Status

Status	▼
<input type="checkbox"/> Not started	
<input type="checkbox"/> Fully correct	
<input type="checkbox"/> In progress	

Concept Pages

<https://isaacphysics.org/concepts>

The left side shows the 'Learn' section with categories: 11-14 Resources, GCSE Resources, A Level Resources, Question Finder, and Concepts. The 'Concepts' box is highlighted with a blue border. A blue arrow points from this box to the right side, which shows a search results page titled 'Search bar'. The search bar contains 'Search concepts'. Below it is a 'Subject filter' section with checkboxes for Physics, Maths, Chemistry, and Biology, all of which are checked. The 'Search Results' section lists five concepts with icons and descriptions:

- Absolute Temperature: The Kelvin scale of absolute temperature.
- Activation Energy: The energy required to break bonds in a chemical reaction, and its link to reaction rates.
- 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.

Concepts pages explain a concept in detail.

Matrices - Definition

The top right of the page has filters: 'All Stages' (dropdown), a person icon, a printer icon, and a flag icon. The main text explains that matrices have many applications in Mathematics, Physics, Chemistry and Computer Science. It states that they can be used to represent systems of simultaneous equations, stress and strain in materials, geometrical 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, $m \times n$. The page shows examples of different matrix types:

- $\begin{pmatrix} a & b \\ c & d \end{pmatrix}$ 2 × 2 matrix
- $\begin{pmatrix} 4 \\ 1 \\ -2 \end{pmatrix}$ 3 × 1 matrix
- $\begin{pmatrix} 0 & 0 & -3 \\ -2 & 2 & k^2 \end{pmatrix}$ 2 × 3 matrix

Below these, there are three buttons for Further A topics:

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

The 'Matrix addition and subtraction' button is highlighted with a blue border. A blue arrow points from this button to the right side of the page, where a worked example for matrix addition is shown.

The worked example shows two matrices, A and B, and asks to find A + B. The matrices are given as:

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

The solution is provided in a box:

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

At the bottom right, there is a 'Feature worked examples' section.

Question Types

There are many different types of questions available on Isaac Physics. Here are some examples of different types.

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

Check my answer

En

These will check answers for appropriate use of significant figures.

Symbolic Questions

Type your answer

Part A Differentiate $a \sin \theta$

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

^

Type your formula here ?

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

Or use the equation editor

click here to drag and drop your answer

Check my answer

Useful symbols and functions

Algebraic symbols

Operators

Numbers

Functions

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

Bin

Help ?

Re-centre ⌛

Question text

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

cos(θ) > Finish

Graph Sketcher Questions

Click on the grid to start:

https://isaacphysics.org/questions/cubic_modulus



Straight
line



Curve

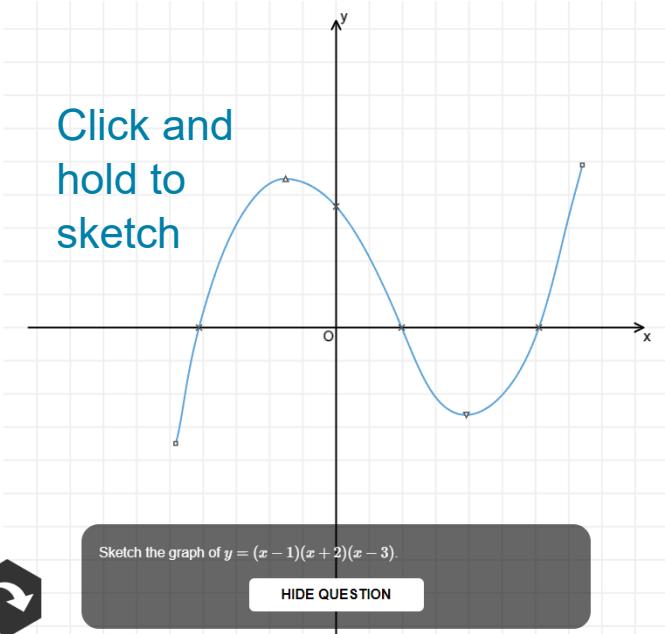


Colour



Clear

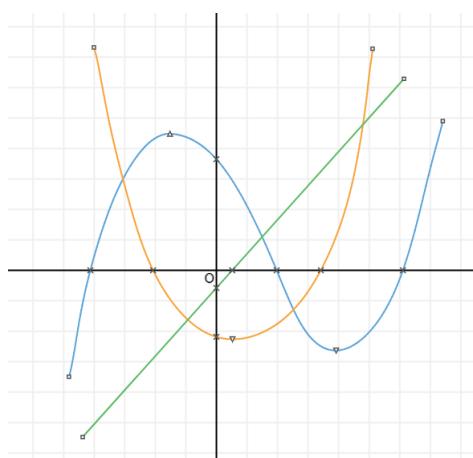
Click and
hold to
sketch



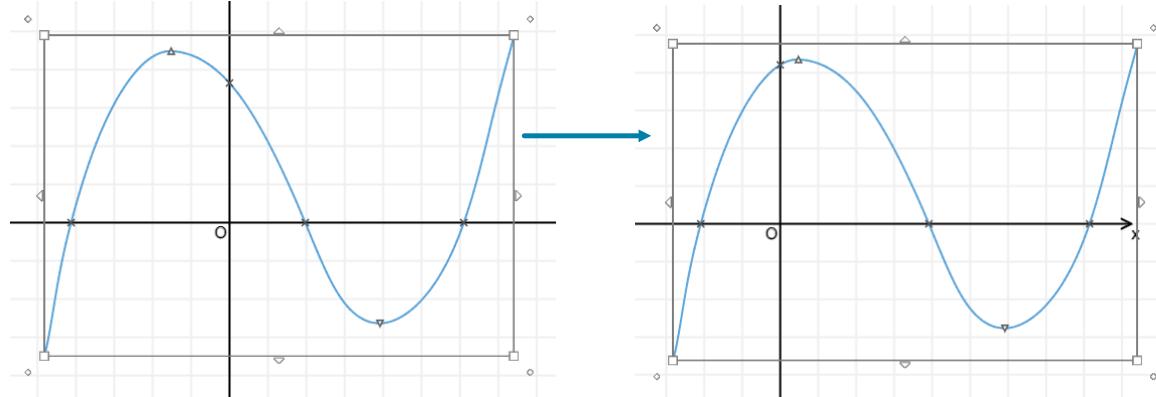
Help



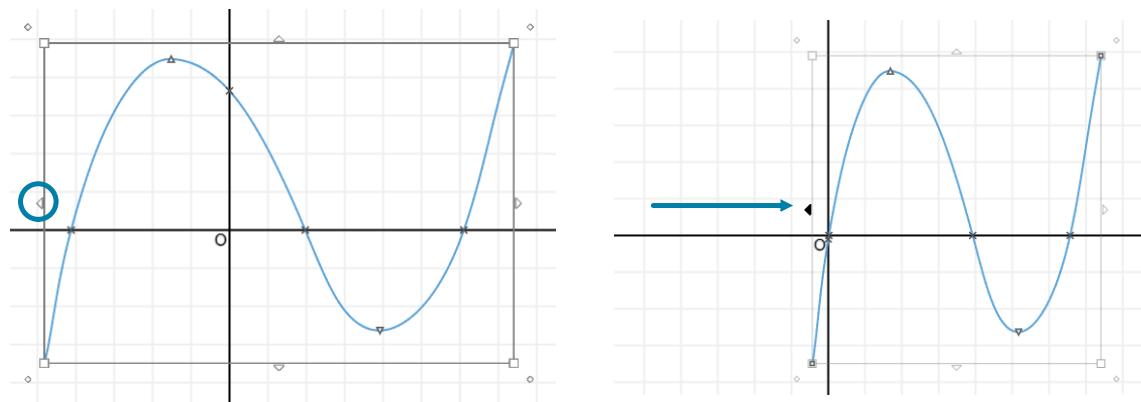
You can draw up to 3 strokes (usually):



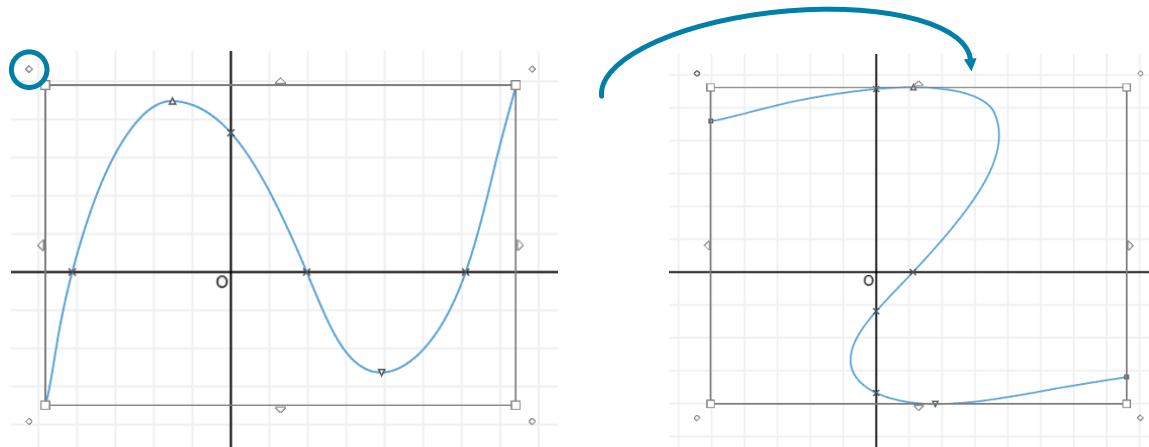
You can move a stroke by clicking and dragging.



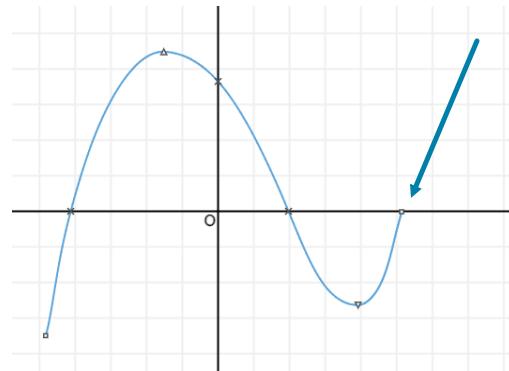
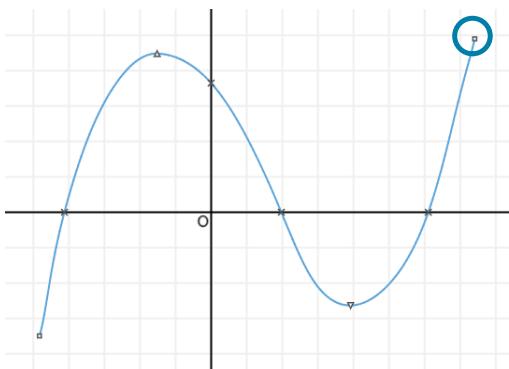
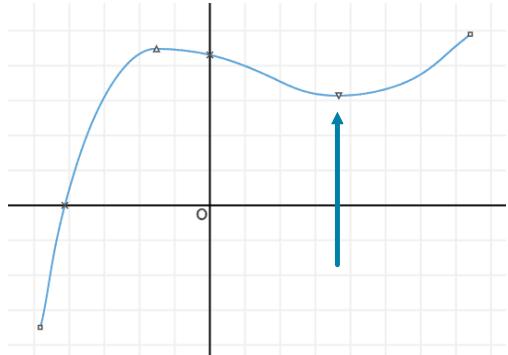
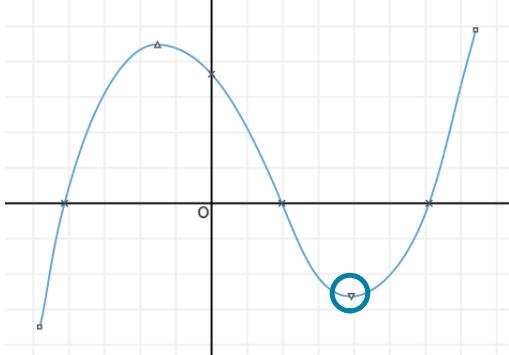
You can stretch it by dragging the edge of the selection box.



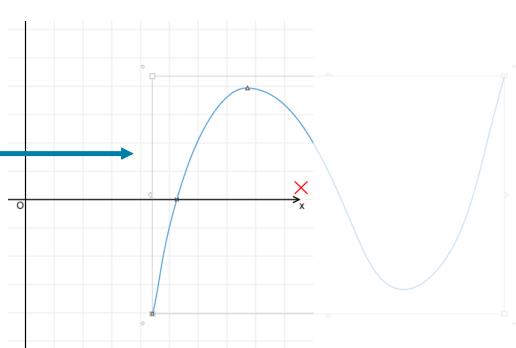
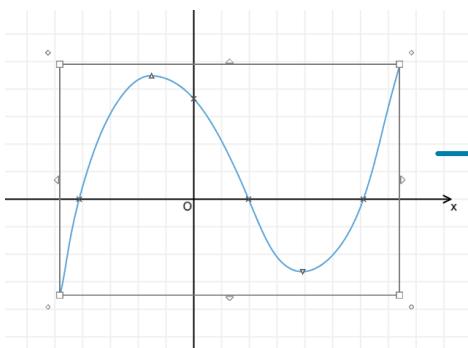
You can rotate it by dragging the outer handle near the corner.



You can move a turning point or end by dragging it.



You can delete a stroke by using the bin or dragging it off the grid.
Clear will delete everything.



How strict is it?

It uses rough positions:

- Which quadrants?
- Where does it cross the axes? (+/- or origin)
- Where are the turning points?
- What are the start and end gradients?

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	Your answer
Translate the curve 4 units in the negative x 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 $\frac{1}{m}$.	

Check my answer

^



Cloze Text Questions

Drag items to fill in the boxes

Receive individual feedback
on each item

Small screens use a
dropdown menu

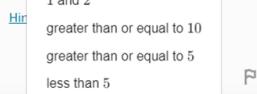
Part B Combining cells

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

Since one of the expected frequencies is ,
we should combine cells until they are
We could combine row: is
case we will combine row:

Check

- 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



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 .

Items:

- | | | | | |
|---|--------------------------------------|----------------------------------|----------------------------------|--|
| <input type="checkbox"/> less than 10 | <input type="checkbox"/> 1 and 3 | <input type="checkbox"/> 2 and 3 | <input type="checkbox"/> 1 and 2 | <input type="checkbox"/> greater than or equal to 10 |
| <input type="checkbox"/> greater than or equal to 5 | <input type="checkbox"/> less than 5 | | | |

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 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:

- | | | | |
|----------------------------------|----------------------------------|--|---|
| <input type="checkbox"/> 1 and 3 | <input type="checkbox"/> 1 and 2 | <input type="checkbox"/> greater than or equal to 10 | <input type="checkbox"/> greater than or equal to 5 |
|----------------------------------|----------------------------------|--|---|

Incorrect

Check my answer

Inline Questions

Type numbers or text in the boxes

Receive individual feedback on each box

Some boxes may require units

Unit...

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
	165 cm to 180 cm			
	More than 180 cm			

[Check my answer](#)

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 X	4.08 ✓
	165 cm to 180 cm	44.65 ✓	18.33 X	11.28 ✓
	More than 180 cm	15.68 X	!	!

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.

(,)

Add coordinate Check my answer

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!

GCSE Book	https://isaacphysics.org/books/mathsgcse 
A-level Book	https://isaacphysics.org/books/preuni2e 
Practise Maths	https://isaacphysics.org/pages/mathspages 
Master Maths	https://isaacphysics.org/pages/mastermaths 
Question finder	https://isaacphysics.org/gameboards 
Concept Pages	https://isaacphysics.org/concepts 
Questions to try	https://isaacphysics.org/gameboards#tcpd_newtoisaac_maths4 