






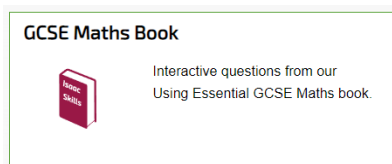
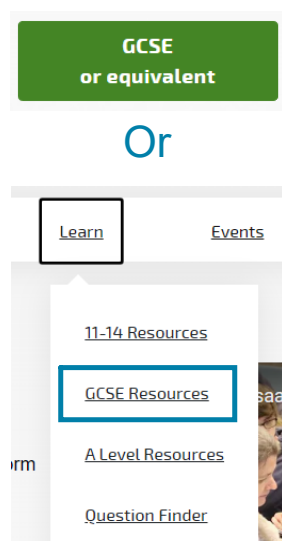


Isaac Maths Resources

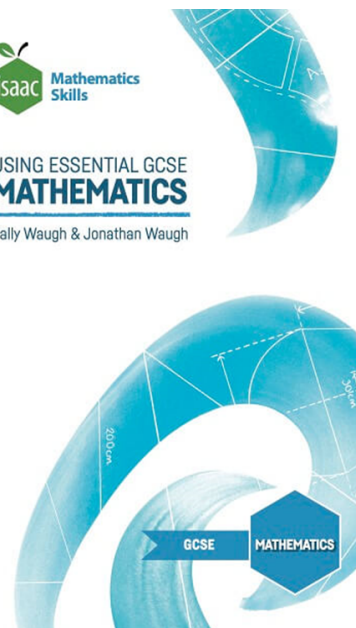
GCSE Book	 https://isaacphysics.org/books/maths_book_gcse
A-level Book	 https://isaacphysics.org/books/pre_uni_maths
Practise Maths	 https://isaacphysics.org/pages/maths_practice
Master Maths	 https://isaacphysics.org/pages/master_maths
Question finder	 https://isaacphysics.org/gameboards
Concept Pages	 https://isaacphysics.org/concepts
Questions to try	 https://isaacphysics.org/gameboards#tcpd_newtoisaac_maths3

GCSE Book

https://isaacphysics.org/books/maths_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

Q

Essential GCSE Maths 36.3

Maths > Functions > Graph Sketching

GCSE

A Level

Q

Essential GCSE Maths 36.4

Maths > Functions > Graph Sketching

GCSE

A Level

Q

Essential GCSE Maths 36.5

Maths > Functions > Graph Sketching

GCSE

A Level

Q

Essential GCSE Maths 36.6

Maths > Functions > Graph Sketching

GCSE

A Level

Q

Essential GCSE Maths 36.8

Maths > Functions > Graph Sketching

GCSE

A Level

Q

Essential GCSE Maths 36.9

Maths > Functions > Graph Sketching

GCSE

A Level

Q

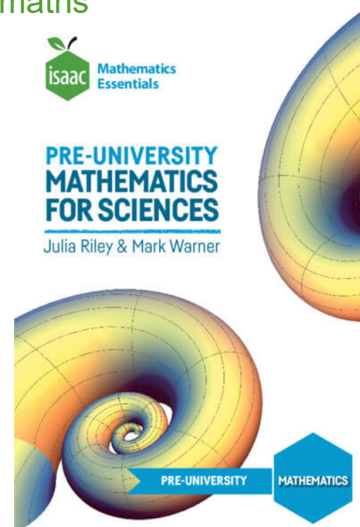
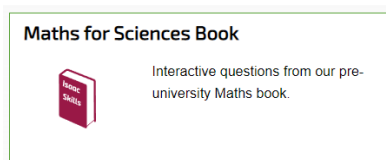
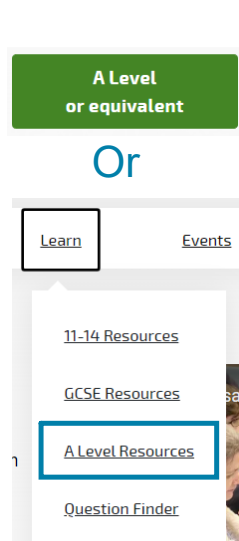
Essential GCSE Maths 36.10

GCSE

A Level

A-level Book

https://isaacphysics.org/books/pre_uni_maths



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

Buy the book

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

Buy Isaac Books

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

Level 1

2

Level 2

3

Level 3

4

Level 4

5

Level 5

6

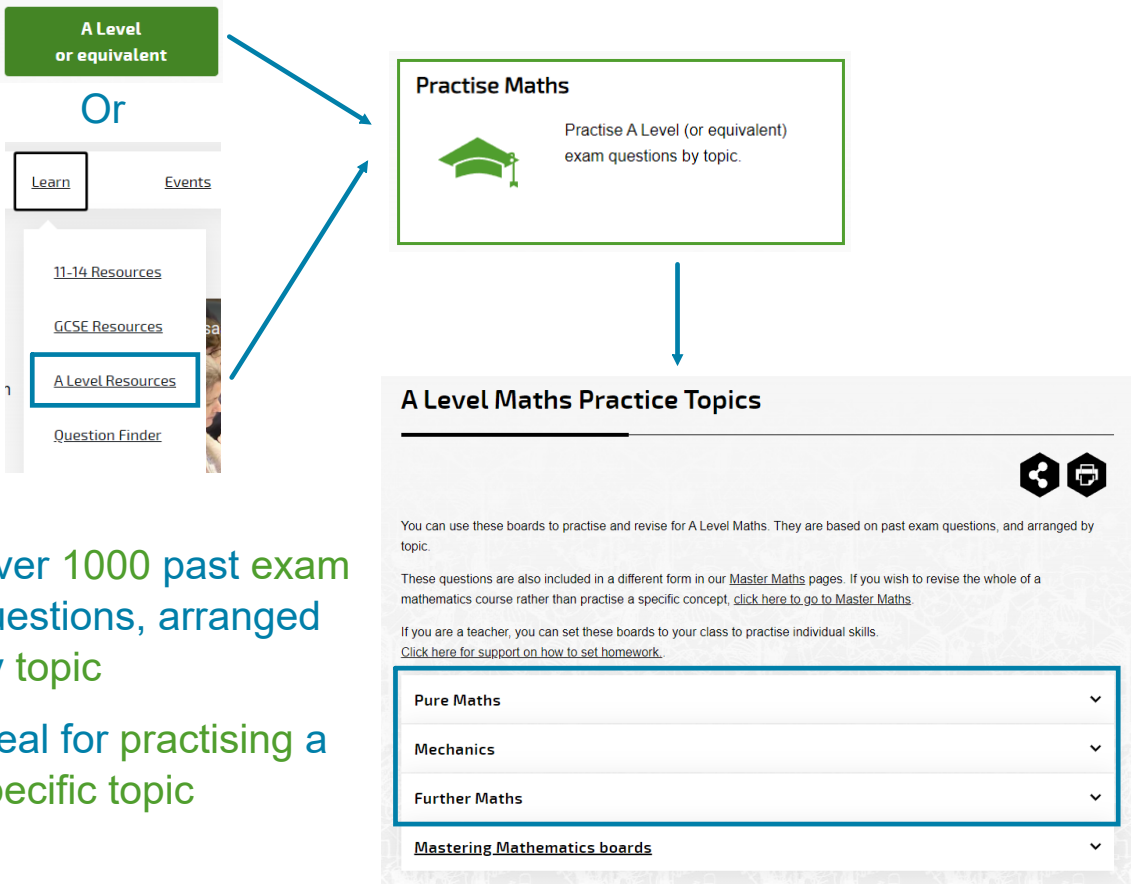
Level 6

7

Level 7

Practise Maths

https://isaacphysics.org/pages/maths_practice



Over 1000 past exam questions, arranged by topic

Ideal for practising a specific topic

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

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

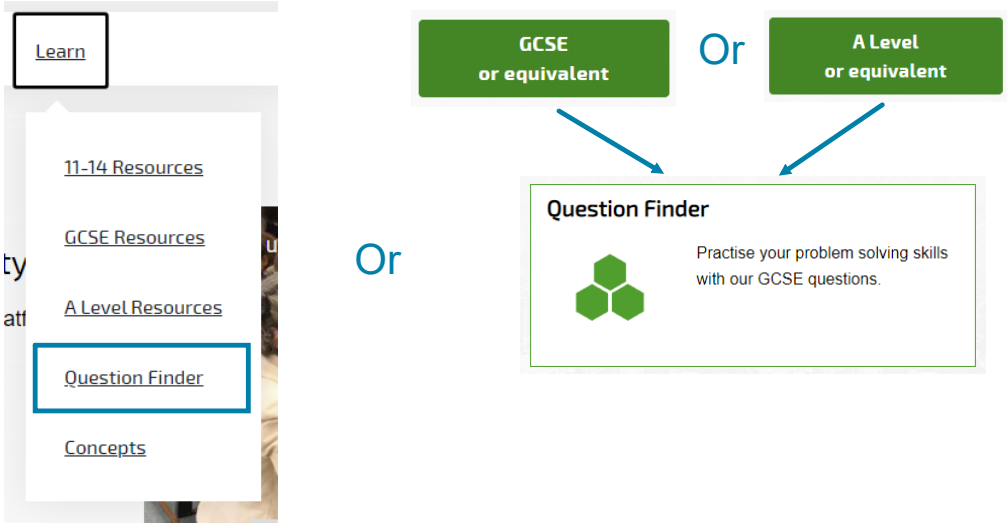
Part A Solving $2 \sin^2 x = 1 + \cos x$

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.

Select stage

Select difficulty

Select topic

The screenshot shows the 'Choose your Questions' interface. At the top, it says 'Choose your Questions' with a 'Help' link. Below this, there are 'Topics' (Maths, Geometry, Trigonometry) and a 'Scroll to questions...' link. A section titled 'Click these buttons to choose your question gameboard' contains two main areas. The first area, 'I am interested in stage...', has a dropdown menu set to 'A Level'. The second area, 'I would like questions for...', has 'Practice' (P1, P2, P3) and 'Challenge' (C1, C2, C3) options. A 'Shuffle Questions' button is at the bottom right. A 'Go to Questions...' button is at the bottom center. A 'Generate a new set of questions' label points to the 'Shuffle Questions' button.

The screenshot shows the 'Trigonometry' gameboard. At the top, it says 'Trigonometry' and 'Save to My Gameboards'. Below this, there is a list of questions with their difficulty levels. The questions are: 'Addition of Forces 2' (A Level), 'Circles and Arcs 2' (A Level), 'Radians to Degrees 1' (A Level), 'Oscillating Mass' (A Level), and 'Circles and Arcs 1' (A Level). A 'Save board of questions' label points to the 'Save to My Gameboards' button.

Concept Pages

https://isaacphysics.org/concepts

Learn

Events

11-14 Resources

GCSE Resources

A Level Resources

Question Finder

Concepts

Concepts

Search bar

Search concepts

Subject filter

Filter: ☒ Physics ☒ Maths ☒ Chemistry ☒ Biology

Search Results

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

All Stages

Further A

Matrix addition and subtraction

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 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. A matrix is identified by the number of rows and columns, $m \times n$.

$\begin{pmatrix} a & b \\ c & d \end{pmatrix}$

$\begin{pmatrix} 4 \\ 1 \\ -2 \end{pmatrix}$

$\begin{pmatrix} 0 & 0 & -3 \\ -2 & 2 & k^2 \end{pmatrix}$

$\begin{pmatrix} a_1 \\ a_2 \\ \vdots \\ a_m \end{pmatrix}$

2 x 2 matrix

3 x 1 matrix

2 x 3 matrix

Further A

Special types of matrix

Further A

Matrix addition and subtraction

Further A

Scalar multiplication

Quick Q1

Quick Q2

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

Hide answer







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

Feature worked examples

9

Question Types

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

Numeric	 https://isaacphysics.org/questions/gcse_maths_ch2_11_q1
Symbolic	 https://isaacphysics.org/questions/algebra_level2_ineq_5
Graph sketcher	 https://isaacphysics.org/questions/sketch_reciprocal_trig
Cloze text	 https://isaacphysics.org/questions/proof_surface_areas
Reorder	 https://isaacphysics.org/questions/combined_transformations
Board link:	 https://isaacphysics.org/gameboards#tcpd_newtoisaac_maths3

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

Choose a unit

Enter a number

Check my answer

These will check answers for appropriate use of significant figures.

Symbolic Questions

Type your answer

Or use the equation editor

Useful symbols and functions

Part A 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

click here to drag and drop your answer

Check my answer

Algebraic symbols

a θ

Numbers

1 2 3 4 5 6
7 8 9 0 \pm \times -18

Operators

$+$ $-$ \pm $\frac{a}{b}$ (x) $|x|$ \sqrt{x} $=$ $<$ $>$ \leq \geq

Functions

cos sin tan cosec sec cot

123 Δ γ $+$ $-$ \sqrt{x} sin \int

a° \bullet cos (θ)

Bin

Help ?

Re-centre $\rightarrow \leftarrow$

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

HIDE QUESTION

cos(θ)

Finish

Question text

Graph Sketcher Questions

https://isaacphysics.org/questions/cubic_modulus

Click on the grid to start:

Straight
line



Curve



Colour



Click and
hold to
sketch



Bin



Clear



Undo



Redo

Sketch the graph of $y = (x - 1)(x + 2)(x - 3)$.

HIDE QUESTION

Question text

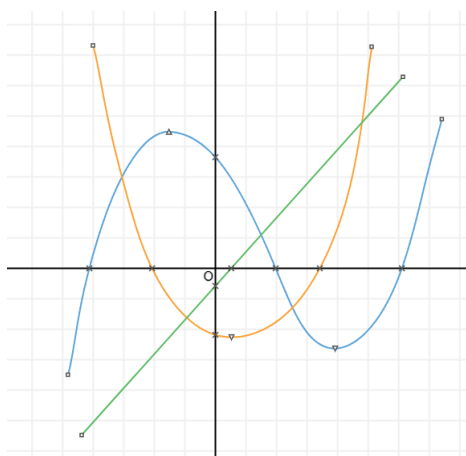


Help

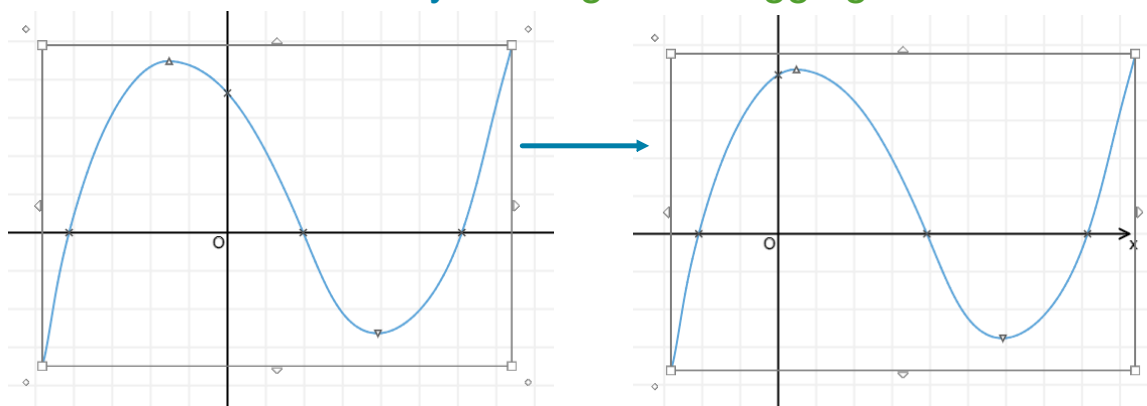


Finish

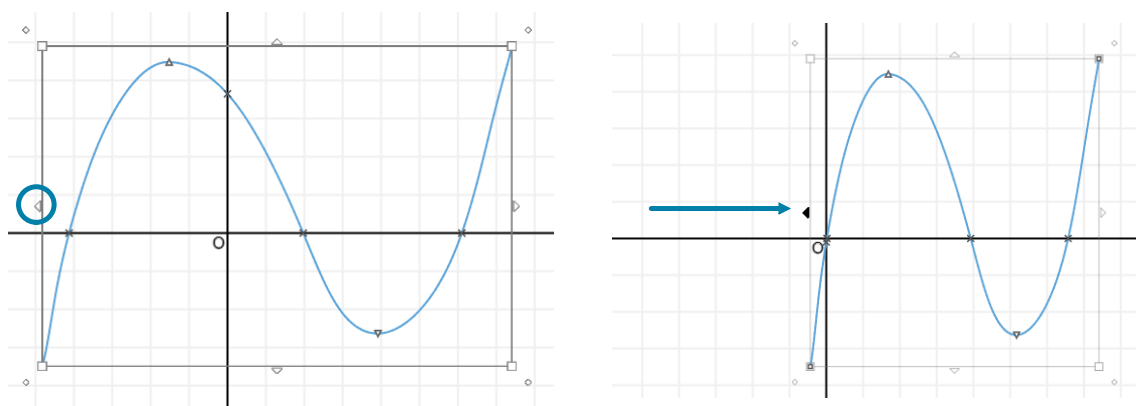
You can draw up to 3 strokes:



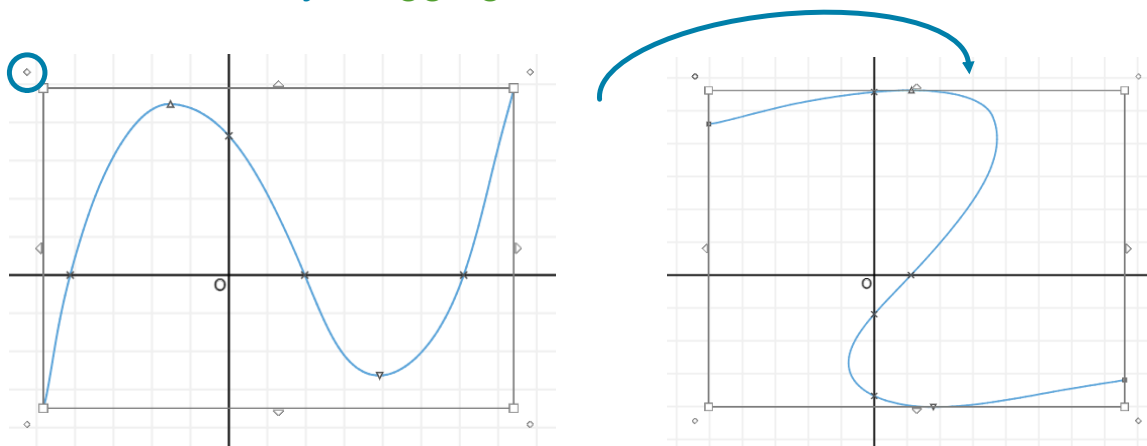
You can move a stroke by clicking and dragging.



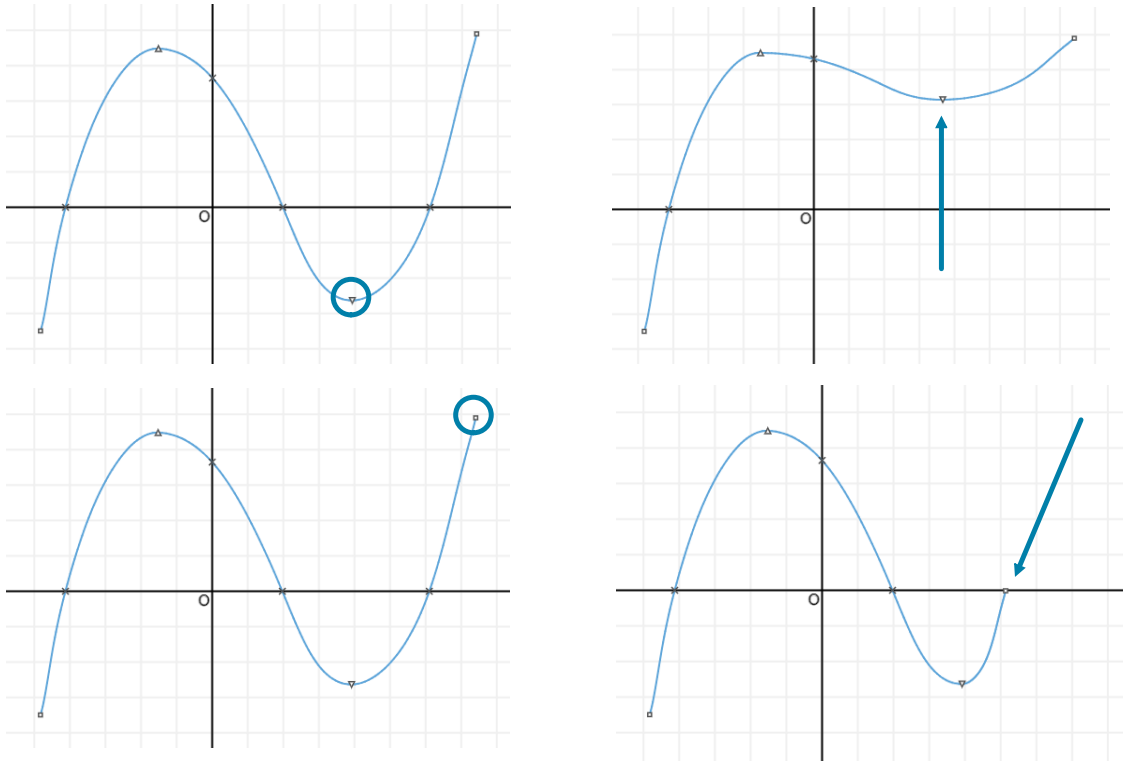
You can stretch it by dragging the edge of the selection box.



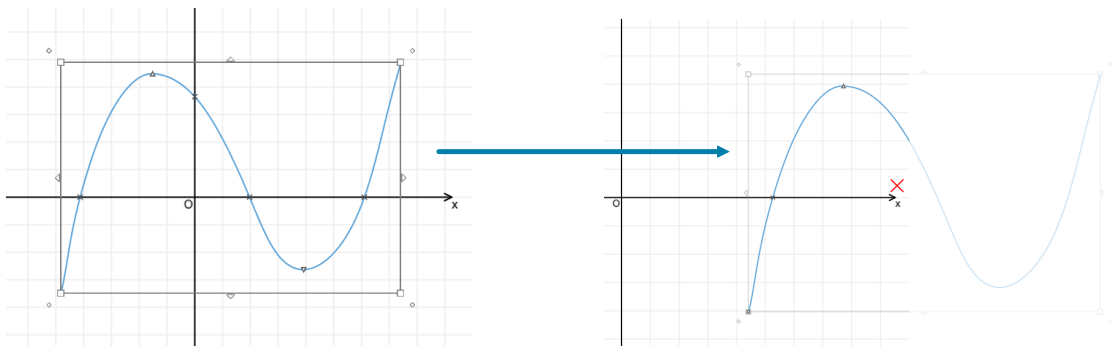
You can rotate it by dragging the outer handle near the corner.



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

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

17

Cloze Text Questions

Drag items to fill in the boxes

Receive individual feedback on each item

Part A Expected frequencies

Calculate the expected frequencies. Fill in the gaps below.

		Hair colour		
		Dark	Fair	Red
Height	Less than 165 cm			
	165 cm to 180 cm			
	More than 180 cm			

Items:

2.522.844.084.237.67.768.6411.2813.7716.1521.6229.1631.1134.238.0743.5444.6545.26

Check my answer

Part A Expected frequencies

Calculate the expected frequencies. Fill in the gaps below.

		Hair colour		
		Dark	Fair	Red
Height	Less than 165 cm	16.15 ✓	13.77 ✓	4.23 ✗
	165 cm to 180 cm	44.65 ✓	43.54 ✗	11.28 ✓
	More than 180 cm	34.2 ✓	29.16 ✓	7.76 ✗

Items:

2.522.844.087.68.6421.6231.1138.0745.26

Incorrect

Check my answer

Have a go!

GCSE Book	https://isaacphysics.org/books/maths_book_gcse
A-level 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#tcpd_newtoisaac_maths3