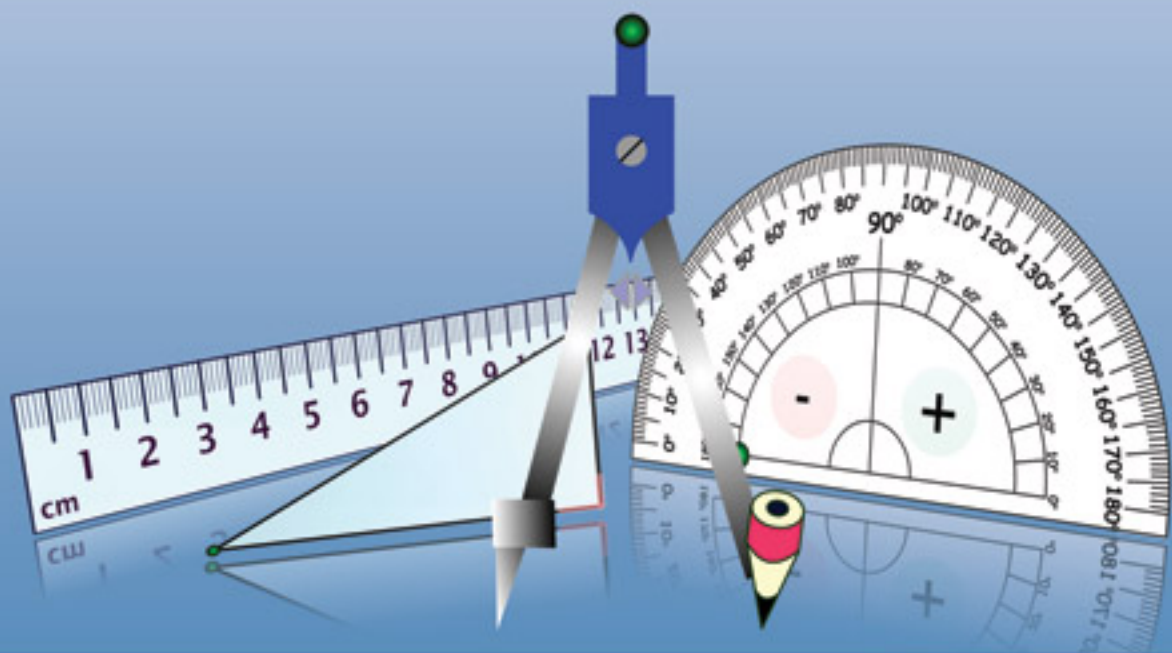




Maths Matters™

Lessons Suite · Interactive Toolkit
Interactive Worksheets for VLE
Integrated Lesson Plans



The application of technology to teaching

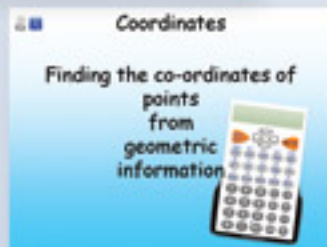
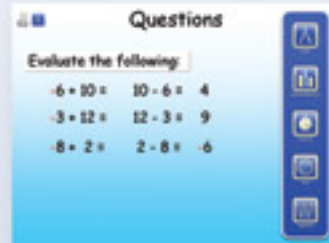
The most comprehensive resource for whole-class
teaching of mathematics to IGCSE level.

Maths Matters

Maths Matters is a complete application that provides the resources for whole-class teaching of any topic within Key Stages 3 and 4, right through to IGCSE Additional Maths - at exactly the right level.

Maths Matters contains:-

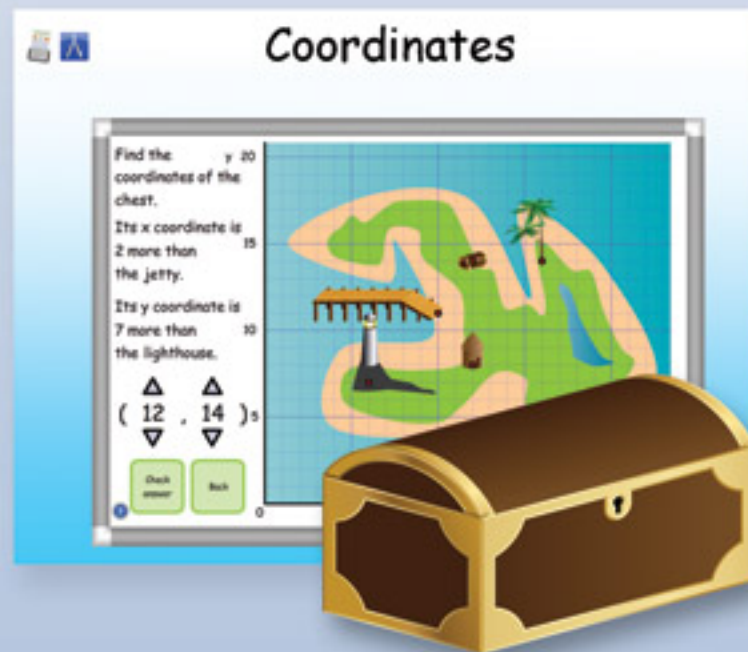
- A lessons suite for teachers to use, dedicated to whole-class teaching, that is installed on individual PCs or on a network
- SCORM-compliant worksheets for pupils to access directly, to make the most of your investment in a VLE
- Revision material, tutorials etc. for your pupils to access over the web.



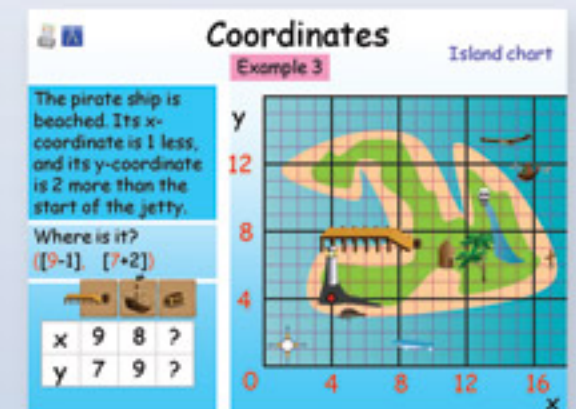
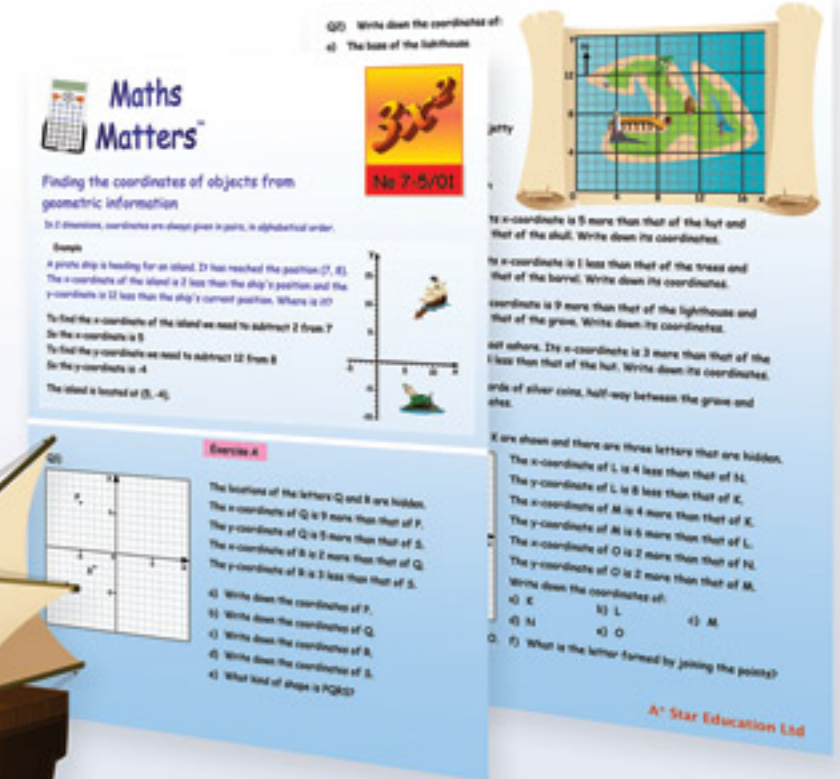
The lessons suite is a massive resource of pre-populated lessons, complete with:-

- Starter questions
- Exposition of the teaching points with diagrams and worked examples
- Summaries/plenary activities
- Worksheets and homework sheets
- Lesson plans
- Interactive toolkit

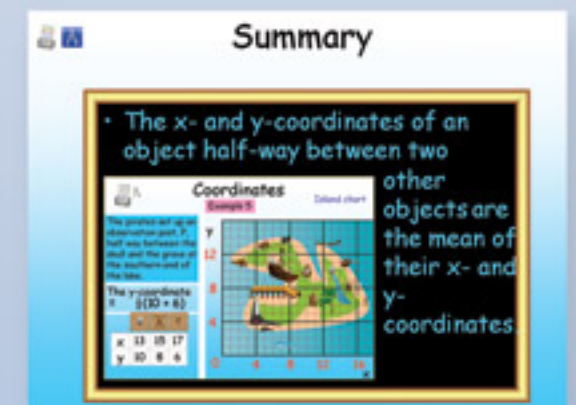
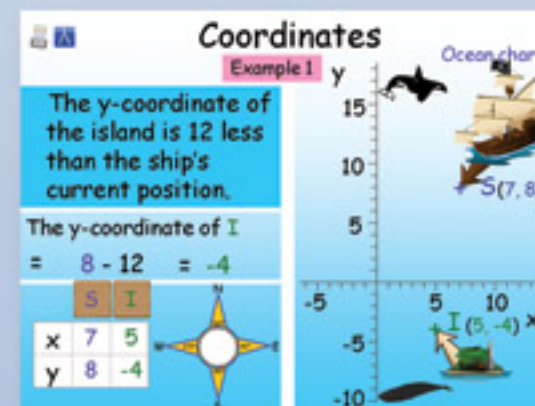
The slides contain sophisticated programming to give lessons true, real-time interaction of astonishing capability, whilst still allowing you to change the content and add your own material. Step-by-step working adjusts to use your data.



The worksheets act like an interactive textbook, providing complete worked examples and a tutorial on prerequisite topics, if required.



The lessons suite is underpinned by a database that allows you to search for content (by topic, by year group, by level) and the superb Interactive Toolkit contains facilities for accurate construction, graph plotting and data handling as well allowing access to the main tasks in the interactive Flash library, externally to the lessons.



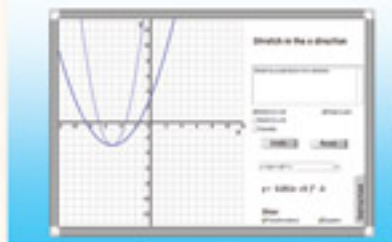
The Lessons Suite

Maths Matters saves time and reduces teachers' workload; lessons are complete, self-contained and can be used without modification, or changed completely and quickly using the Lesson Designer to suit your teaching style or particular requirement.

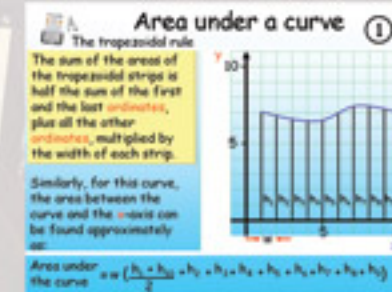
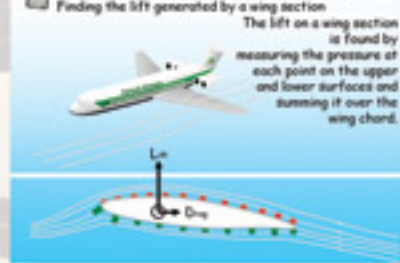
Graphs of quadratic equations



Transforming Quadratics

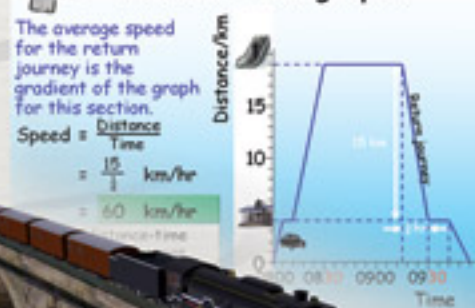


Area under a curve

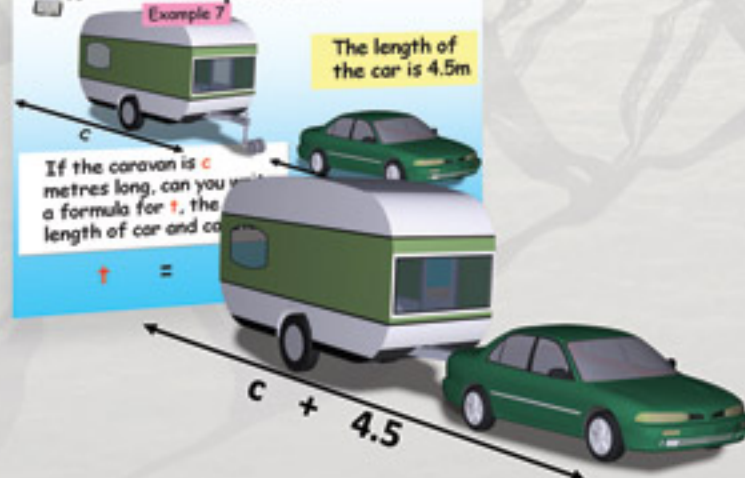


Teaching points are indicated to help pupils take notes.

Distance-time graphs



Simple formulae



Questions

Trigonometry

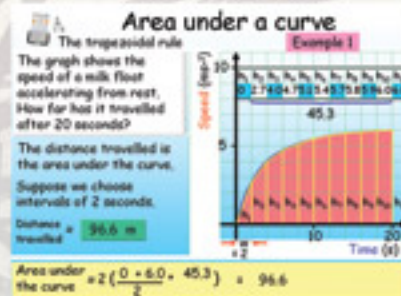
What is the radius, r , of the base of the cone?

$\sin 25^\circ = \frac{\text{opposite}}{\text{hypotenuse}} = \frac{r}{8}$

$$r = 8 \times \sin 25^\circ = 3.38 \text{ cm}$$

Starter questions are integrated into the lessons.

Maths Matters makes full use of the facilities of interactive whiteboards although it can simply be projected onto a standard whiteboard or screen.



Compound measures

PL.U.T.O. (pipeline under the ocean)

Less than four weeks after D-Day, the allies had landed 900 000 men and 150 000 vehicles in Normandy. Their demands for petrol were huge.

Compound measures

PL.U.T.O. (pipeline under the ocean)

If each of the steel pipes delivered 812 gallons per hour, what was the flow rate, u , through the pipes in metres per second?

1 gallon = 4.5 litres
1 inch = 0.0254 m
1 m³ = 1000 litres

Compound measures

PL.U.T.O. (pipeline under the ocean)

If each of the steel pipes delivered 812 gallons per hour, what was the flow rate, u , through the pipes in metres per second?

1 gallon = 4.5 litres
1 inch = 0.0254 m
1 m³ = 1000 litres

Area = $\pi(1.5 \times 0.0254)^2 \text{ m}^2$

Volume pumped per second = Area \times Flow rate

$$0.000015 = \pi(1.5 \times 0.0254)^2 \times u$$

$$u = \frac{0.000015}{\pi(1.5 \times 0.0254)^2} = 0.2226 \text{ m/s}$$

Diagrams, tables, graphs, explanatory text and illustrations provide great clarity and accuracy. Pre-populated interactive examples, which can be dynamically changed to simulate any SATs or GCSE problem with each stage of explanation and working appearing when requested, eliminate the need to draw on the board.

Effects of enlargement

Example 5

The Forth rail bridge contains 50 000 tons of steelwork.

Effects of enlargement

Example 5

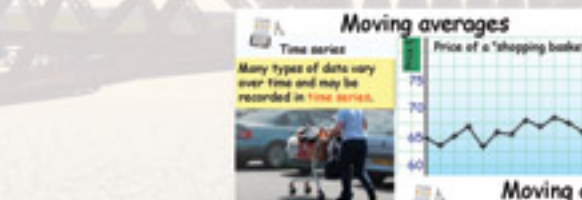
If an exact 1/100 scale model is made of the bridge, what would be the mass of steel in the model?

Mass \propto volume
Volume \propto (scale factor)³

Mass of steel = $50000 \times \left(\frac{1}{100}\right)^3 = 0.05 \text{ tons or } 50 \text{ kg}$

Mass \propto volume \times density
1 ton = 1000 kg
1 cm³ = 10⁻⁶ m³

All working is shown in detail.



Proportion

Example 8

A 2-litre tin of paint covers an area of 12 square metres. The small tin contains 0.75 litres. How many square metres will that cover?

Find how much 1 litre covers

$$1 \text{ litre covers } \frac{12}{2} = 6 \text{ m}^2$$

Therefore,

$$0.75 \text{ l covers } 6 \times 0.75 = 4.5 \text{ m}^2$$

The more complex calculations are illustrated on a model calculator.

Summary

The side of a right-angled triangle opposite a known angle can be found from the sine of the angle and the length of the hypotenuse.

Example 5 Trigonometry

Finding the opposite side

$\sin 70^\circ = \frac{\text{opposite}}{\text{hypotenuse}}$

$$\sin 70^\circ = \frac{y}{35}$$

$$y = 35 \sin 70^\circ$$

Example 5 Trigonometry

The sine ratio

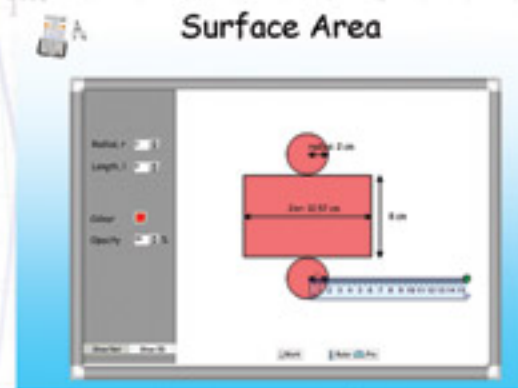
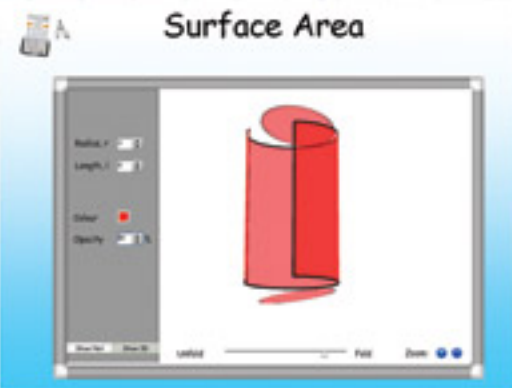
$\sin \theta = \frac{\text{opposite}}{\text{hypotenuse}}$

$$\sin 70^\circ = \frac{y}{35}$$

$$y = 35 \sin 70^\circ$$

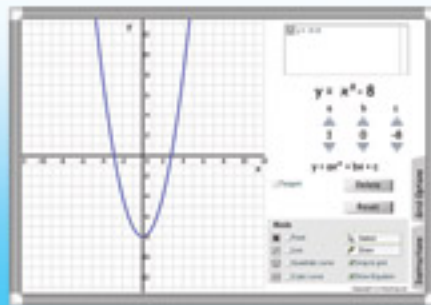
The Interactive Library

The interactive library contains slides with embedded Flash programming. Although you can treat them simply as PowerPoint slides for the purpose of planning and inserting them into your lesson exactly where you would like them, each one is a powerful application that allows easy illustration even of very hard-to-teach topics.



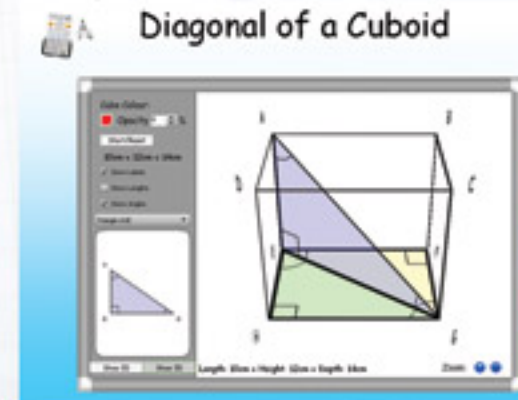
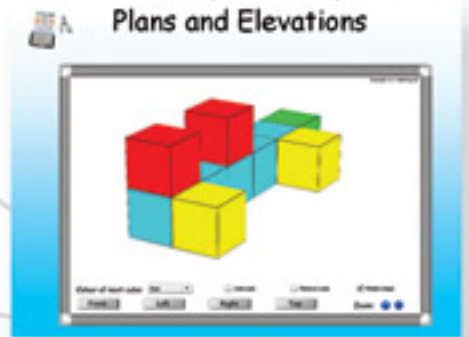
You can choose the length and radius and show the curved surfaces unfolding into the net – from any angle. Then uncover the working to calculate the surface area.

Transforming Graphs



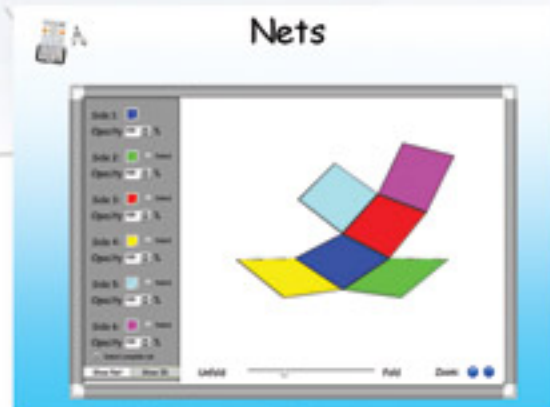
Drawing graphs at the whiteboard could not be easier – a quadratic or cubic can be produced by dragging your finger across the board and translating or stretching the curve to suit. Of course, you can alter any of the coefficients as well – and use the hide/show features to test the class. The effects of transformations on the equations rapidly become apparent.

A single slide within the interactive library allows any cube model to be built and rotated to illustrate all aspects clearly.

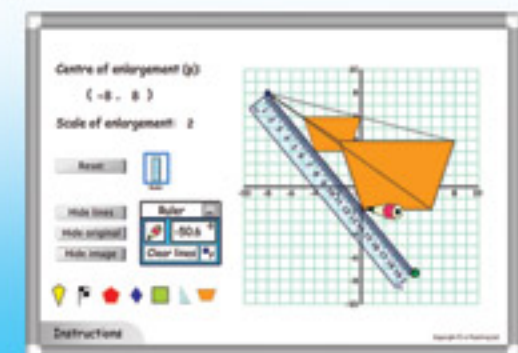


This is the way to illustrate how to find the length of the diagonal of a cuboid. Hard to visualise? Not any more. Select the dimensions of the cuboid to simulate any problem and orientate the model exactly as you like. This is full 3-D rotation in real time, with the ability to show 2-D views of your choosing and the 3-D model simultaneously. Annotate and write notes on the 2-D views and see them appear on the 3-D model. Uncover the working or write your own.

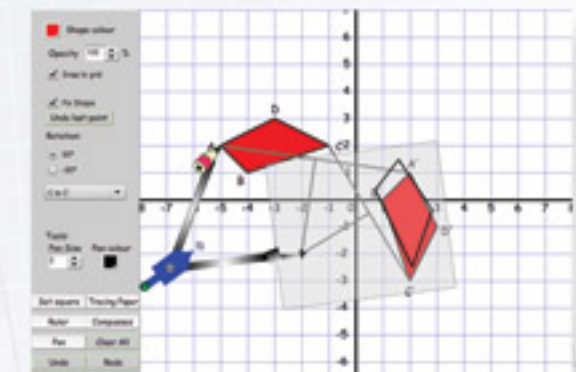
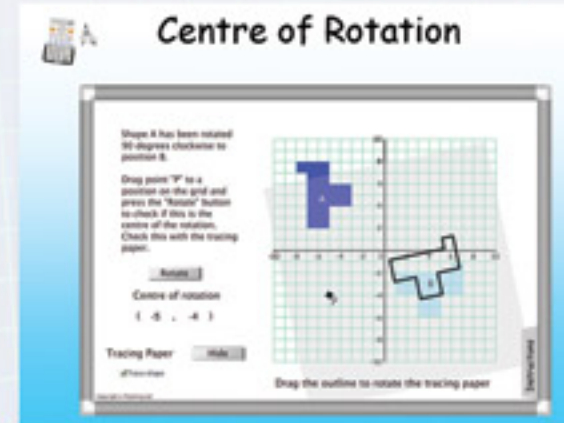
Manipulation of mathematical models allows any view to be shown and is not constrained to preset animations.



Enlargement



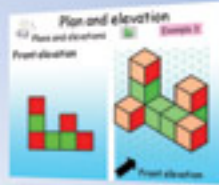
The technique for enlarging shapes using positive, negative or fractional scale factors, for rotating or finding the centre of rotation of 2-D objects can be taught using the virtual ruler, compasses and tracing paper – and the pupils' efforts compared with the correct results.



Libraries and customising lessons

The lessons in Maths Matters are designed to be changed and customised to suit your own teaching style. Change is simple and rapid. Additional material, from any PowerPoint presentation, can be inserted into Maths Matters using the Add Lesson function. This process automatically adds them into the Maths Matters database.

Custom Lessons



Space diagrams

There are 36 possible scores.

There are 10 ways to score more than 6.

The probability of scoring more than 6 is $\frac{10}{36} = \frac{5}{18}$

Two dice are rolled and the scores added together

2	3	4	5	6	7
3	4	5	6	7	8
4	5	6	7	8	9
5	6	7	8	9	10
6	7	8	9	10	11
7	8	9	10	11	12

Angles in a Polygon

Completing the square

Solve $x^2 - 7x + 5 = 0$ by completing the square.

This can be rearranged as $x^2 - 7x = -5$

x^2	$-7x$	
		$+4.5x$
		$-4.5x$
		$+20.25$

$x^2 - 7x$ represents the large square minus the blue one.

Scatter graphs

x	y
4.30	5.44
6.45	5.88
6.65	7.55
6.33	6.20
3.44	3.76
3.52	2.37
1.76	1.77

The mean of x is 4.87222 and the mean of y is 4.90475

Inequalities

$7 \geq x > -5$

Inequalities

Libraries

- Starters
- Interactive Flash tasks
- Videos
- Puzzles

Looking in the libraries is the quickest way to find additional or alternative material.

Simultaneous equations

Solve:

$$y = x^2 + 3x - 6$$

$$y = x^2 - 2x + 4$$

$$5x = 10$$

This occurs when $x = -2$ and $x = 2$

Plot the line $y = -5x + 10$

Distance-time graphs

Office

Airport

Distance 60 km

Time 3 hrs

Speed 20 km/h

Lessons can easily be customised using the Lesson Designer

Lesson Designer



Any slides, anywhere within Maths Matters, can be mixed in any order using the Lesson Designer function and saved to form a totally customised lesson.

Of course, you will want to select the type of starter questions. You may want to include a video and you will definitely want to choose the most appropriate interactive tasks to ensure understanding.

Worksheets

Maths Matters interactive worksheets are a truly remarkable resource for your VLE.

Worksheets are designed to support the specific objectives of each individual lesson, showing fully-worked examples with clear explanations and progression throughout.

The worksheets are intended to be completed online, although they can be printed.

Maths Matters
No 11-14/10

Using trigonometry to solve problems in 3-D

Exercise A

Q1) Find:
a) the length of the diagonal of the cuboid shown.
b) the angle θ , that it makes with the base.

Q2) The ship illustrated has a cross-section that is an isosceles trapezium. Find the length BC .

Exercise B

Q1) Find:
a) the height, h , of the turret.
b) the angle θ .

Maths Matters
No 9-6/05

Finding outward and return bearings

Exercise C

Q1) A yacht sets off from harbour H, and sails for 10 km on a bearing of 200° . It then turns onto a bearing of 320° and sails for 15 km before heading back towards the harbour. By plotting the course of the yacht on a scale diagram (use the scale 1 cm to 2 km), find:
a) the bearing for the yacht to return to the harbour.
b) the bearing of the harbour from the yacht.

Exercise A

Q1) From the map, find the bearing of the following:
a) La Hogue Saints from Hougoumont.
b) Hougoumont from La Hogue Saints.
c) Mount St Jean from Plancenoit.
d) Plancenoit from Mount St Jean.
e) Papelotte from Remusart.
f) Remusart from Papelotte.

Pupils can play tutorials to review essential techniques.

Maths Matters
No 13-14/08

Solving problems using the cosine rule

To find the adjacent side we can rearrange to give:
 $b = \sqrt{a^2 + c^2 - 2ac \cos B}$

Similarly, we can find the hypotenuse from:
 $c = \sqrt{a^2 + b^2 - 2ab \cos C}$

Exercise A

Q1) Use the cosine rule to find each of the angles marked with letters (to 1 d.p.).

Maths Matters
No 9-7/03

Solving problems involving algebra by following the generalising recipe

1 st term	2 nd term	3 rd term	4 th term	5 th term	6 th term
1	3	6	10	15	21
1 st difference	+2	+3	+4	+5	+6
2 nd difference	+1	+1	+1	+1	+1

The rule is: add 1 to the 1st difference.

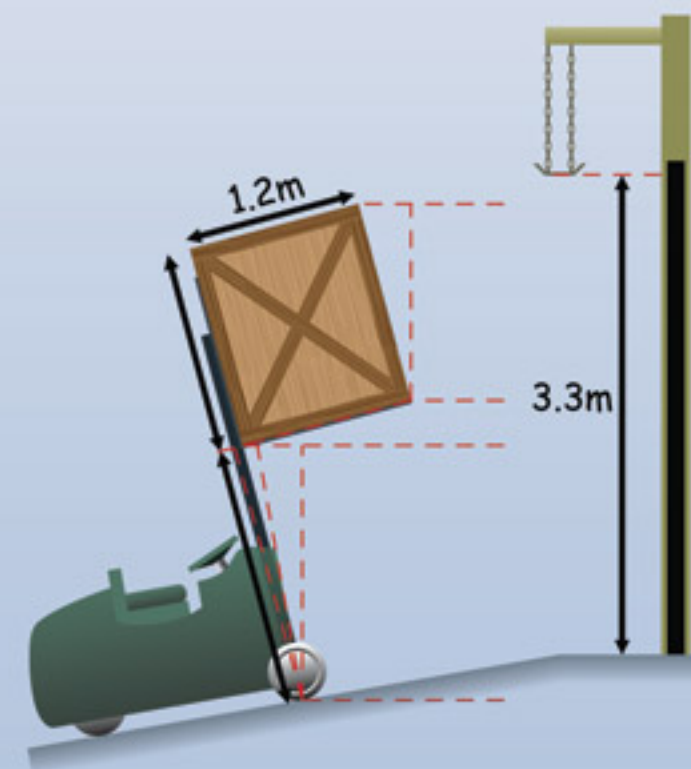
Exercise A

Q1) Find the next two terms in the sequence and give your reasons.

SCORM-compliant versions of the worksheets are supplied ready for use on your VLE.

Pupils use your school's existing VLE login details, so you retain full control of sensitive data.

Worksheets can be called up on your interactive whiteboard, allowing you to demonstrate model solutions, save the working, and make it available to your pupils on your VLE.



Maths Matters
No 11-14/10

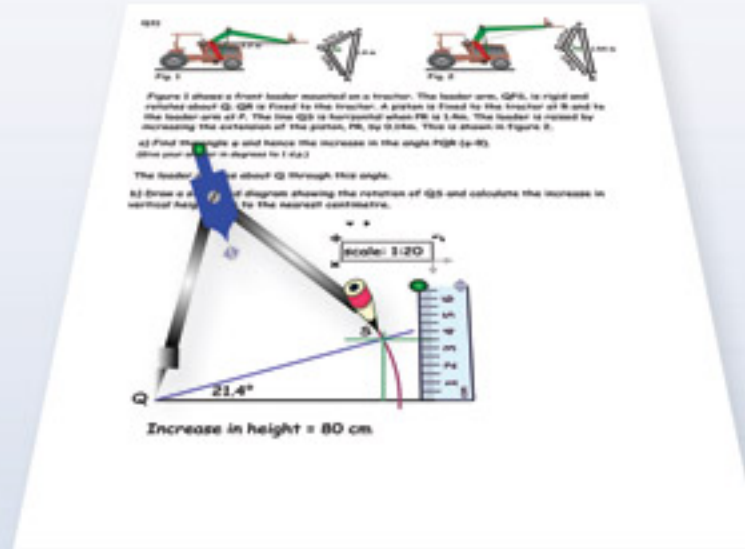
Q1) The diagram shows the plan view of a crane lifting a crate. Find:
a) the length, l , of each girder.
b) the distance, d , between opposite ends of the two girders.

Q2) An automatic barrier at a car park with a 1.2 m long, 2.5 m high post is 1.2 m above the ground. It is fully raised and the end of the barrier is 1.25 m above the ground. Find:
a) the angle θ .
b) the minimum angle that the plank makes with the ground.

Q3) A 4-wheeled truck driver collects a crate from a loading bay. He lifts the crate so that one edge of the crate is directly over the wheels on level ground and returns up a ramp to the warehouse. A loading bay hangs over the entrance 2.2 m from the floor. The height to the top of the crate on level ground is 3.2 m. Find:
a) the total height, h .

Worksheets

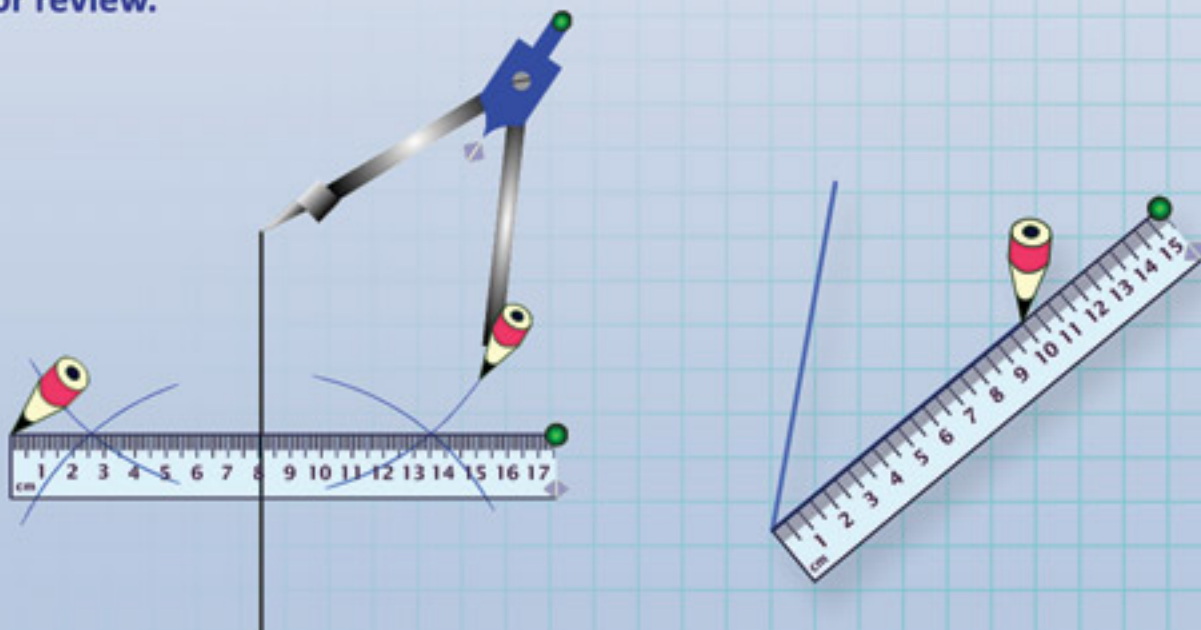
Pupils can complete the worksheets online by logging onto your school's network in the normal way. All of the virtual tools in the Toolkit are available to answer the questions.



Each question, with any diagrams, automatically appears at the top of the answer page.

When answers are submitted, not only can numerical solutions be marked automatically, and the marks passed to your VLE mark book, but *all of the working is captured as well.*

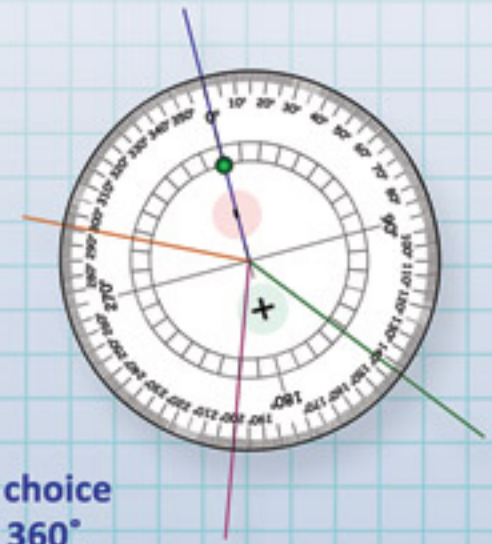
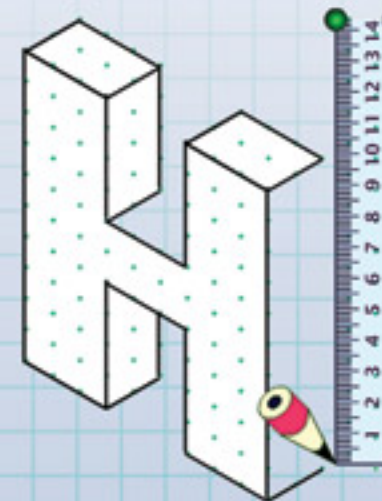
For accurate construction questions, the measurements for lengths of lines, size of angles etc. can be marked and all of the construction lines are stored for review.



The Interactive Toolkits

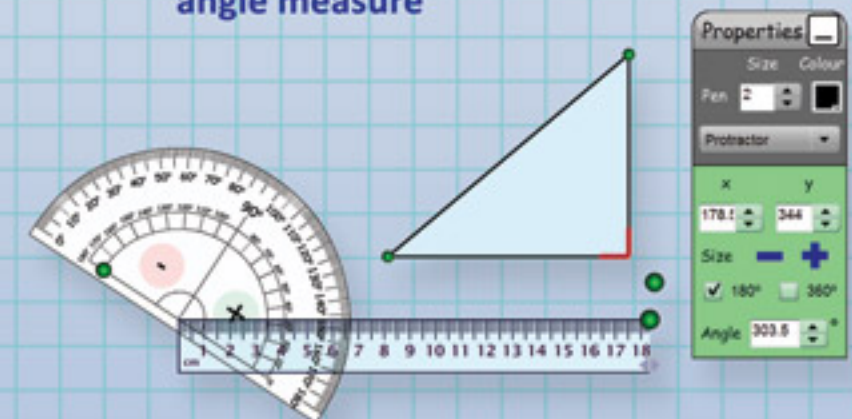
A superb interactive toolkit is embedded in every lesson, allowing you to access tools to demonstrate the features of accurate construction, isometric drawing and graph plotting. But it is much more. It includes the ability to read in any set of data from disk – or enter it in real time – and produce frequency diagrams, cumulative frequency graphs, bar charts, histograms, pie charts, moving averages and scatter diagrams.

Each element of the virtual toolset operates in a realistic way – the compasses extend along the ruler just as pupils would expect.



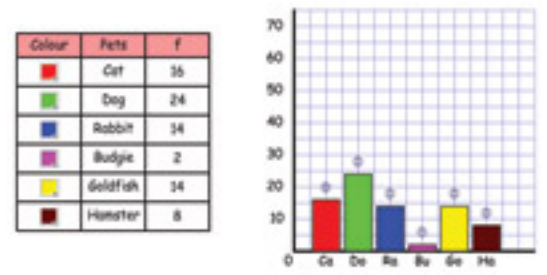
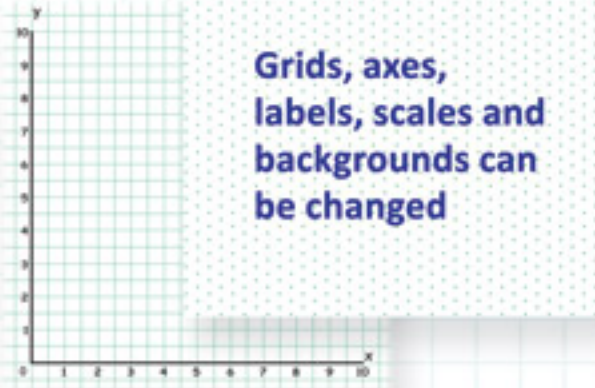
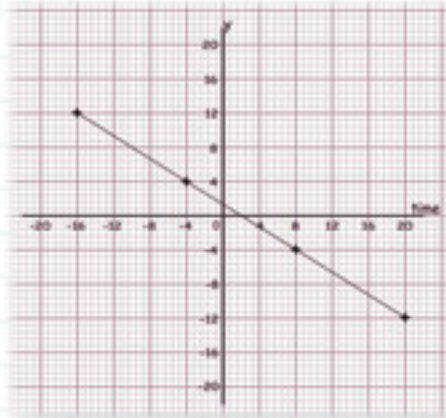
There is a choice of 180° or 360° angle measure

Drop-down menus for each tool allow you to select appropriate options and set accurate positioning and rotation.

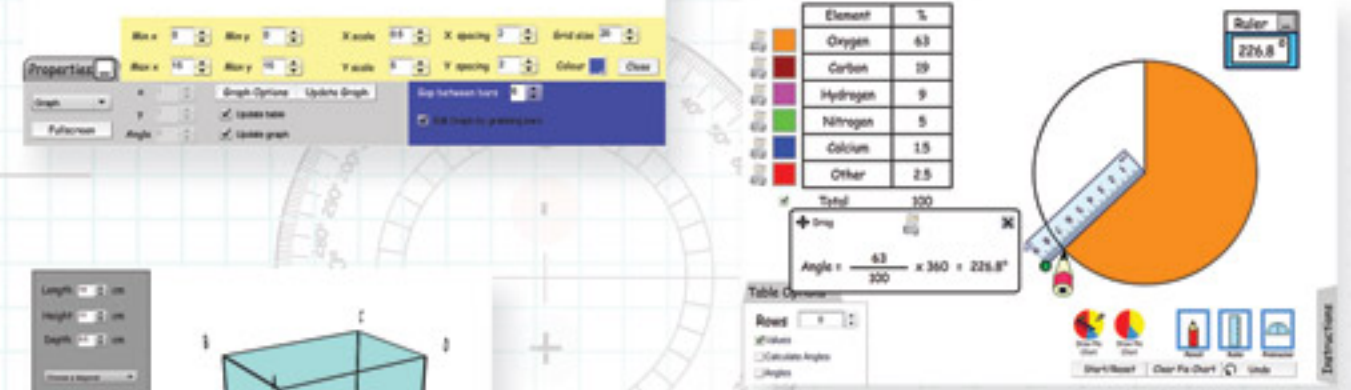


The Interactive Toolkit

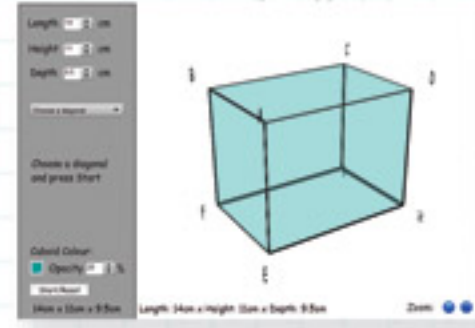
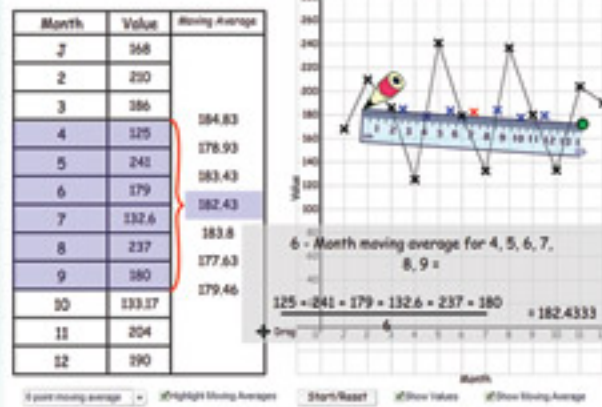
The interactive Maths Matters tools allow for quick and easy demonstrations of accurate constructions, data handling and 3-D problem solving.



Pie charts are drawn as you would normally do – using the virtual compasses, protractor and ruler.

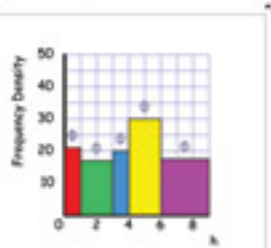


Data can be altered interactively – by changing the values in the table or by moving points on the graphs.

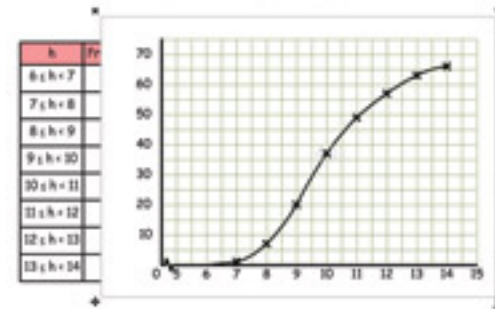


Calculations for 3-D problems are demonstrated with ease.

Colour	h	Frequency	Class width	Frequency density
Red	$0 < h \leq 1$	21	1	21
Green	$1 < h \leq 2$	34	2	17
Blue	$2 < h \leq 3$	20	1	20
Yellow	$4 < h \leq 6$	60	2	30
Purple	$6 < h \leq 9$	54	3	18



h	Frequency	LCF	Cum Freq
$0 < h \leq 1$	0	1	0
$1 < h \leq 2$	7	2	7
$2 < h \leq 3$	13	3	20
$3 < h \leq 4$	17	4	37
$4 < h \leq 5$	12	5	49
$5 < h \leq 6$	8	6	57
$6 < h \leq 7$	6	7	63
$7 < h \leq 8$	3	8	66



Graphs and tables can be resized and moved about the working area – into the foreground or background, as required.

Lessons

- Integrated starter questions
- 3 or 4-part lessons
- Cross-curricular references
- Original artwork and illustrations

Distance-time graphs

The freighter makes the return journey of 70 nautical miles to Porton at a steady speed of 30 knots (nautical miles per hour).

Draw the distance-time graph for the voyage. At what time did the freighter arrive at Porton?



Volumes

Volume of a fraction of a cone
A cone of height 10 cm has the top 4 cm to be sliced off. What is the volume of the remaining part of the cone?
The volume of the small cone is $\frac{1}{8} \times 4^2 \times 4 = 8$ cm³.
The volume of the large cone is $\frac{1}{8} \times 10^2 \times 10 = 125$ cm³.
Volume of fraction = 125 - 8 = 117 cm³.

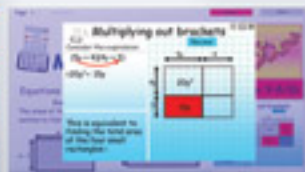
Volumes

Volume of a sphere



The volume of a sphere of radius 7 is $\frac{4}{3} \times 7^3 = 343 \times \frac{4}{3} = 458 \frac{2}{3}$ cm³.

A sphere, radius 7, is dropped into a cylinder containing a volume of liquid. The cylinder has a radius of 7 cm and the height of liquid rises from 5 cm to 8 cm. What is the radius of the sphere?



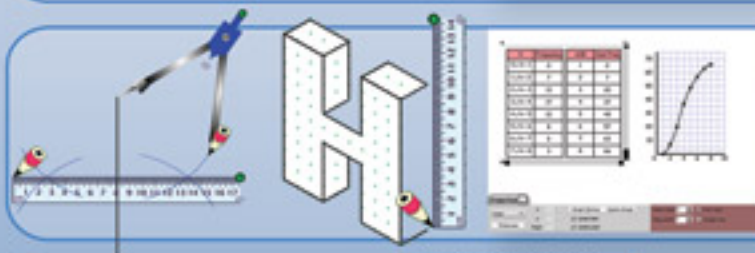
Worksheets

- Detailed explanations
- Fully-worked examples
- Can be completed online and all working captured

Lesson Plans

- Accompany every lesson
- Are fully-editable
- Update to reflect any changes made with the Lesson Designer

Lesson Designer



Interactive Toolkit

- Tools operate realistically
- Great for isometric drawing, accurate construction and producing graphs and charts

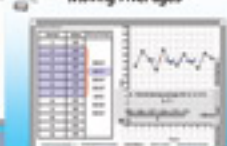
Libraries

- Alternative starter questions
- Interactive Flash tasks
- Video clips for introductions
- Can be used to create custom lessons

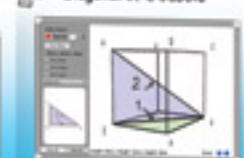
Plans and Elevations



Moving Averages



Diagonal of a Cuboid



Technical Requirements

Maths Matters can be installed on stand-alone PCs or on a network. It makes use of password-protect and encrypted PowerPoint slides which has implications for the use of mandatory profiles.

Maths Matters Installation has the following minimum requirements:

- Windows XP (Service Pack 2 or higher), Windows Vista
- CD-ROM or DVD-ROM drive
- 512MB of RAM
- 2GB of available hard-disk space per full installation
- MS PowerPoint 2003 (or higher)

The following are also required but are either available free of charge from Microsoft and Adobe websites and/or are provided on the Maths Matters release disks:

- MS SQL Server Express 2005
- .Net Framework (Version 2 for XP/Office 2003 and Version 3.5 for Vista/Office 2007)
- Adobe Flash Player (latest version)
- MS Internet Explorer 6 (or higher) or Mozilla Firefox 2 (or higher) (Maths Matters does not require an Internet connection to run)

www.maths-matters.co.uk

A*Star Education
sales@astar-education.co.uk
Tel: +44 (0)1480 459 480