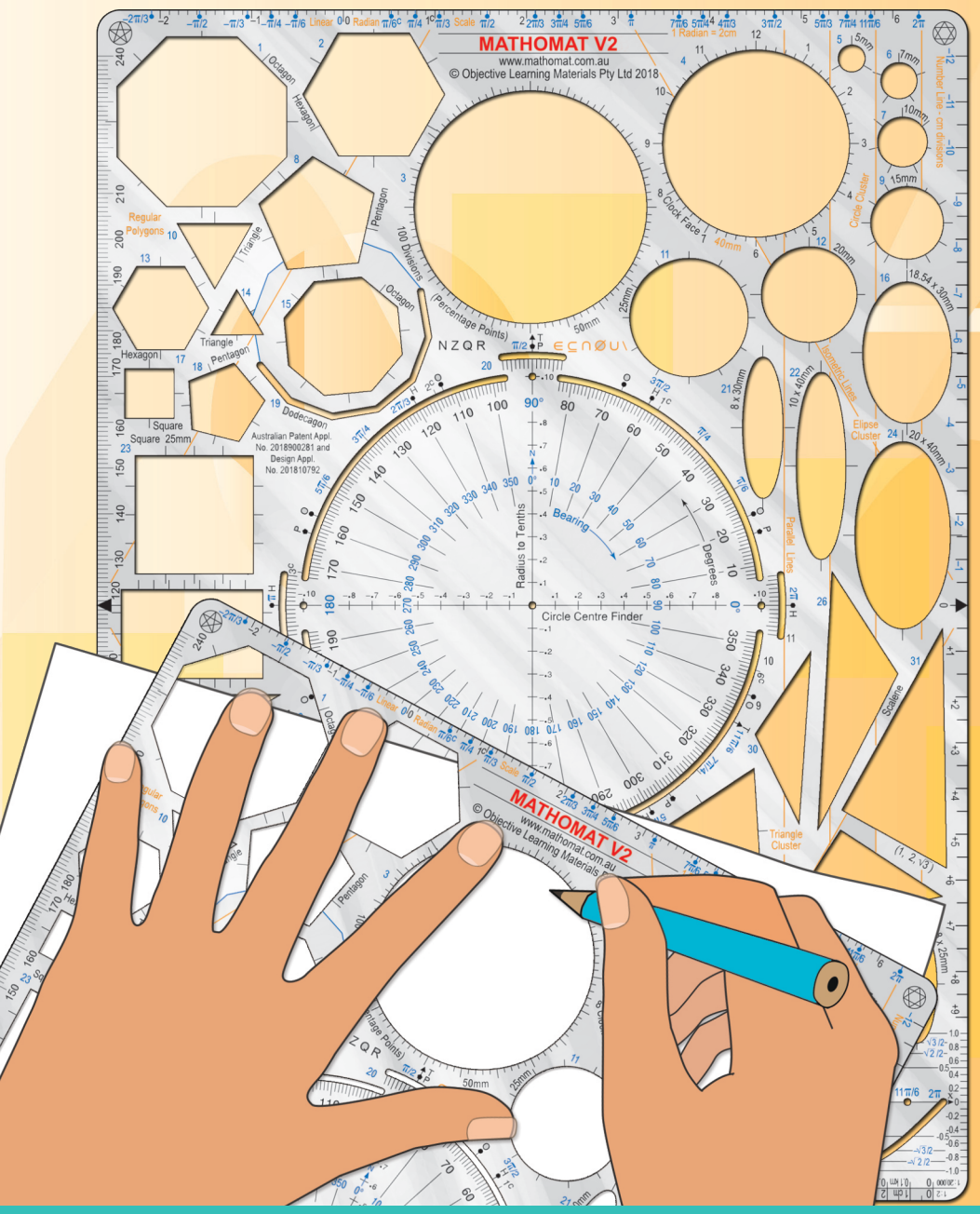
MATHOMAT™

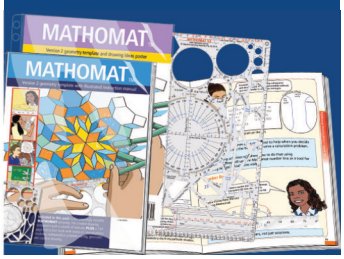
Product Catalogue

INSIDE

Announcing the new Mathomat V2 template

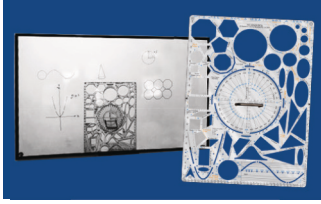


The new Mathomat V2 template in student and class packs.



The new Mathomat Primary template in student packs and class packs.

The new Mathomat for whiteboards



- **MATHOMAT** geometry templates and related publications.
- Innovative, creative, drawing tools accessible to all students.
- Mathomat empowers students through active learning

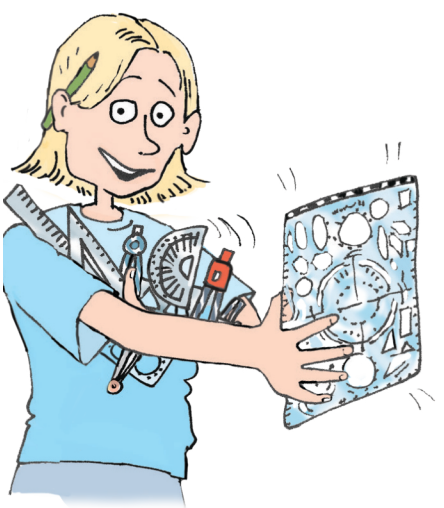
MATHOMAT: a tool for active learning

Mathematics as a school subject has become broader; in terms of the increasing number of students studying it, and in terms of the scope and nature of its topics. As predicted by Lynn Steen*, it has become a tool for mass use, one with deep and subtle influence throughout society. Objective Learning Materials are proud to introduce MATHOMAT, a mathematics tool around which much of that curriculum can evolve.

'Viewed broadly, geometric and spatial reasoning are not only important in and of themselves, but they also support number and arithmetic concepts and skills'
Arcarvi, quoted in Clements and Sarama (2011. P133)

Illustrated, finding lines of symmetry in Mathomat shapes

MATHOMAT:



- improves a student's ability to recognise and draw geometric shapes both in two and three dimensions.
- Interrelates the various branches of mathematics.
- assistswith project work and problem solving.
- stimulates creative and mental imagery.
- can make maths more relevant, interesting and practical.

* Steen, L. Numeracy.(Journal of) Literacy in America. 1990

Active learning empowers students and it forms a basis for deep and flexible understanding of mathematics. Tools are central to this process.

Mathomat templates combine many tools into a single instrument (ruler, protractor, compass replacing circles, many number lines and geometric shapes stencils, ellipse templates, graph guides and trigonometric function machine).

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Contents

For teachers, MATHOMAT can be used:

In high schools for:

- Classification and drawing of shapes and angles
- Teaching unit circle trigonometry
- Sketching sine, cosine and parabolic curves and functions
- Creating nets for polyhedra
- Tessellation and other 2D pattern investigations
- Teaching directed numbers
- Representing percentages and displaying statistical information.

In primary schools for:

- Exploring 2D patterns
- Exploring shapes
- Exploring patterns of shapes
- Exploring the symmetry of shapes
- Creating artistic designs
- Teaching students about maps, bearings and distances

At all levels for:

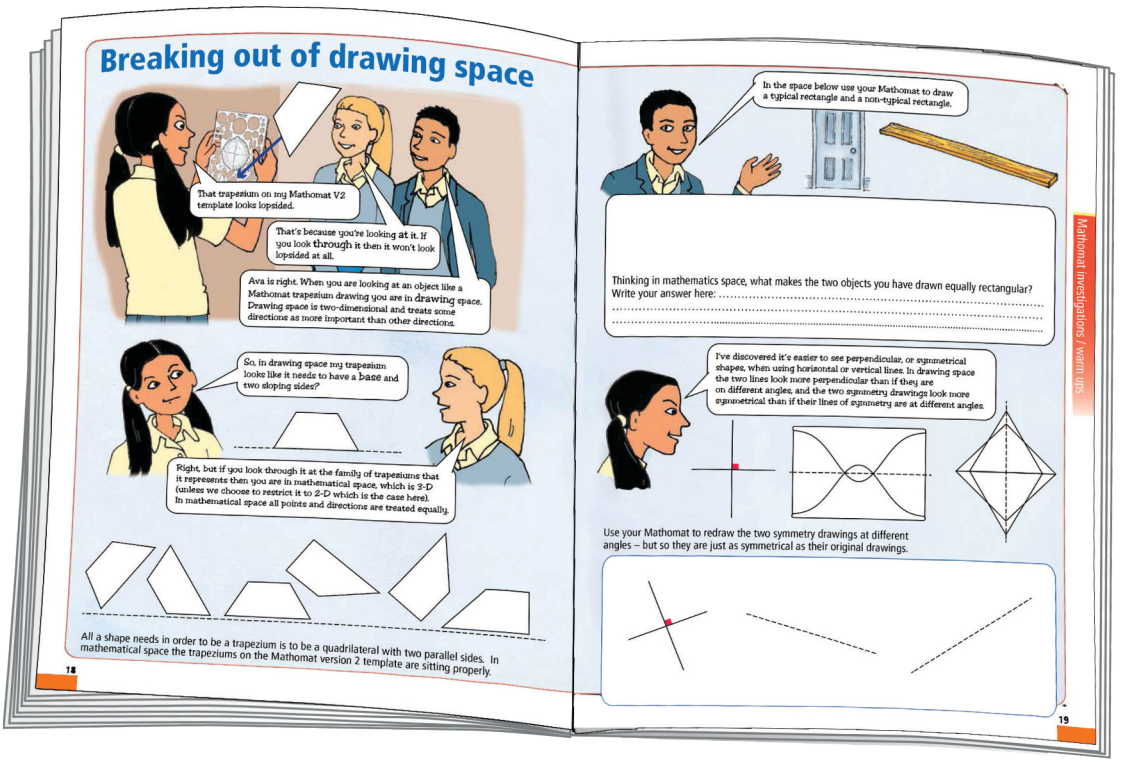
- Project and design work
- Improving the presentation of work
- Whole class presentation
- As a sketching tool

Mathomat and the journey through geometry

To be successful, geometry learners need to develop entirely new ways of thinking. This is not simply a matter of learning to apply the same strategy more effectively. For teachers this makes geometry a uniquely challenging part of mathematics*.

By year eight students are expected to have made two important transitions; from thinking about shapes visually, as wholes, to thinking about them analytically, as a collection of properties. Then to a complete re-organisation of the way in which they understand geometric shapes and their relationships, ultimately, students are challenged to think about geometry using rigorous and entirely abstract, reasoning.

A new investigation in the Mathomat V2 manual asks students to replace visual shape prototypes with analytical thinking about them.



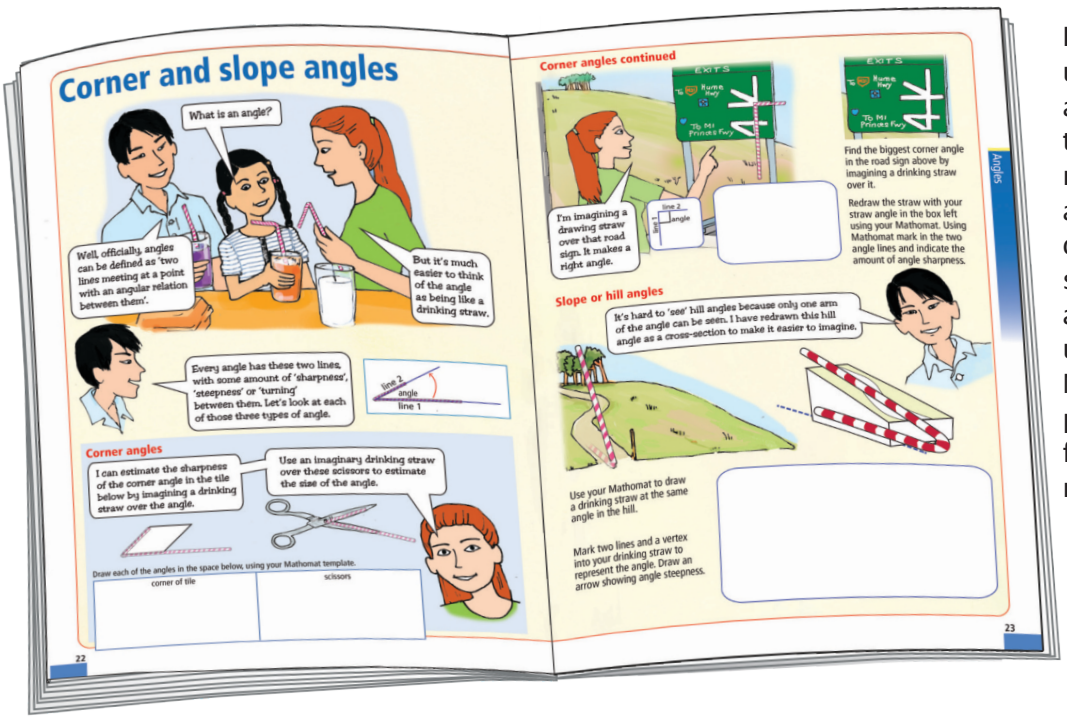
Mathomat can help on this journey as a tool that can be used intuitively, with actions that carry within them the seeds of powerful ideas. Then with teacher guidance and Mathomat learning materials, students are encouraged to develop a scientific understanding of the mathematics underlying these actions.

The way that learners engage with Mathomat will be different for each person, and will change throughout the course of their journey. As learners achieve higher levels of abstraction physical actions that were originally important for them when using Mathomat can be performed mentally (and often unconsciously). The Mathomat remains available though, as a familiar tool, that learners can fall back on for use in the original way as needed, to encourage the use of modelling, measurement and drawing in the way they work.

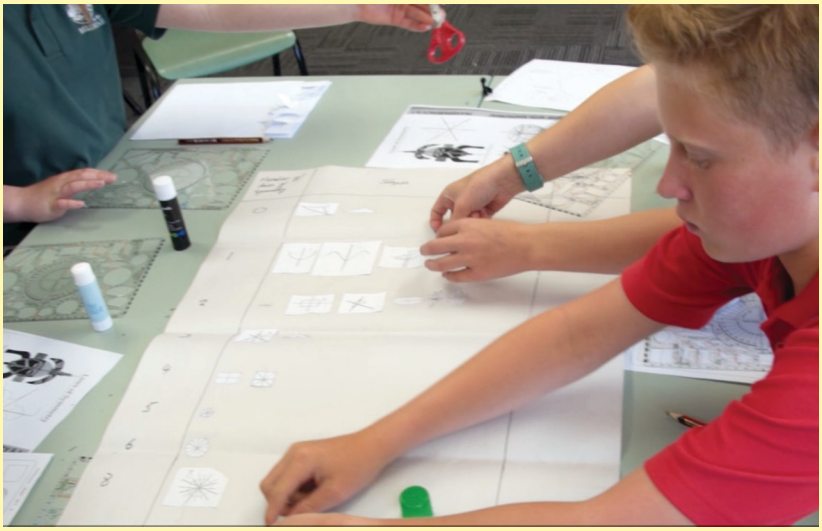
* Ekenyake, M., et al (2003). Development of a web-based learning tool to enhance formal deductive thinking in geometry. 26th international conference of the Mathematicsl Education Resarch Group. Geelong.

* Senk, L., (1989). Van Hiele levels and achievement in writing geometry proofs. Journal for research in mathematics education. 20 (3), 309–21

The illustrated investigations in Mathomat student books tell a story. These are designed to evoke mental imagery. Contexts are created that help students read relationships and operations that form the basis for geometric reasoning and algebra.



In the new understanding angles activities in the Mathomat V2 manual learners are encouraged to develop a spatial structuring of angle before using the Mathomat protractor for precision measurement.



illustrated: making a poster displaying Mathomat shapes according to their number of lines of symmetry.

Mathomat is complimentary to computer based geometry tools; both involve intuitive learning by engaging students senses at an unconscious level.

As a physical tool Mathomat exploits the usefulness of paper in classrooms, and it promotes mental imagery.

Mathematics templates

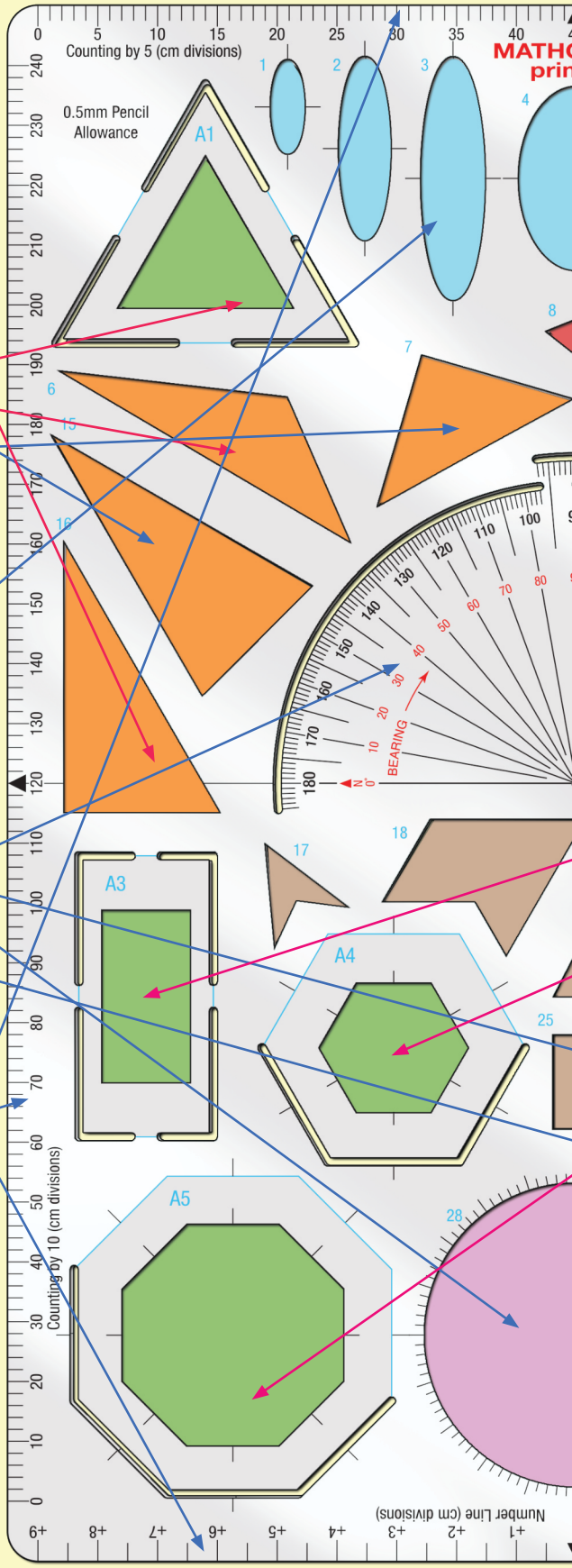
Navigating around the Mathomat Primary template

The **Mathomat Primary** template combines all of the features of a traditional drawing set (ruler, set squares, circles to replace a compass) with an important range of geometric shapes and number lines in a single tool. These include pattern block and attribute block clusters for extension drawing of patterns created from these materials; together with a rich collection of number lines to promote development of number sense. Mathomat Primary stores easily in a folder or exercise book.

Triangles
equilateral
scalene
isosceles

Ellipses

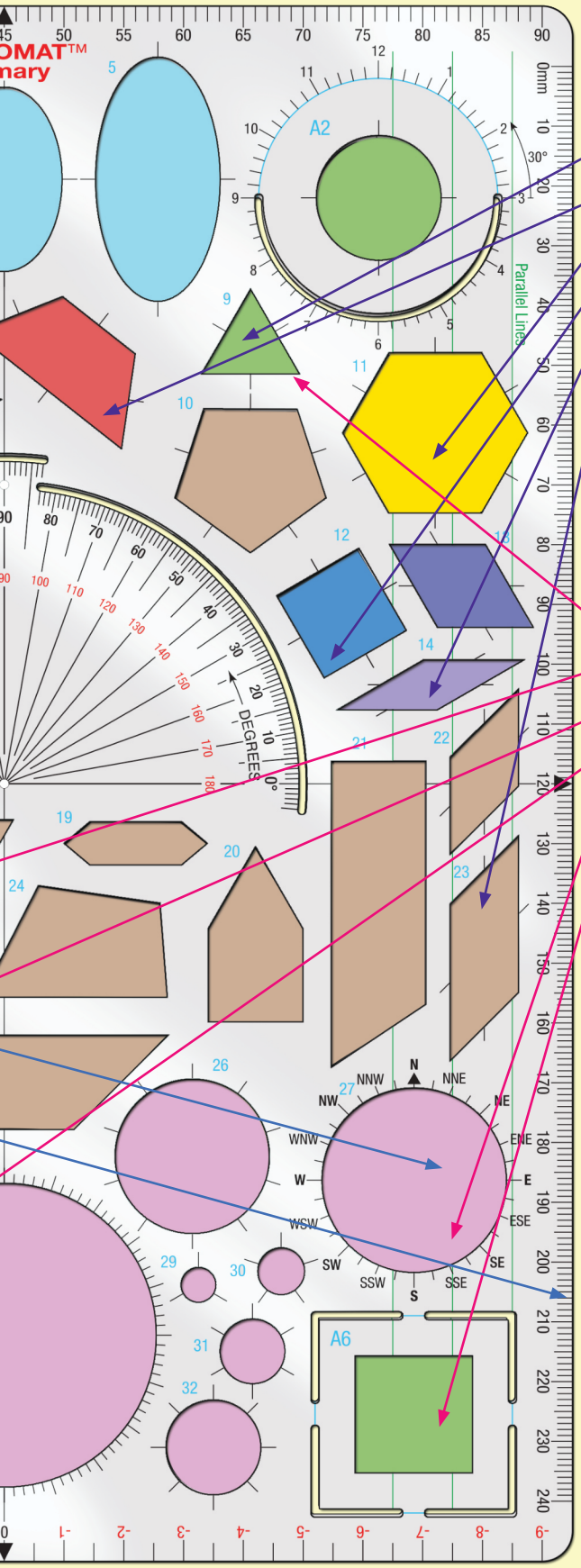
For measurement
protractor: degrees and bearings
compass rose
percentage divisions for pi charts
millimetre and centimetre rulers
number lines for:
counting by 5's
counting by 10's
positive and negative integers



Mathomat Primary is available in class folders

and in student packs

See pages 8 to 9



Pattern block cluster
- triangle
- trapezium
- hexagon
- square
- rhombus
- parallelogram

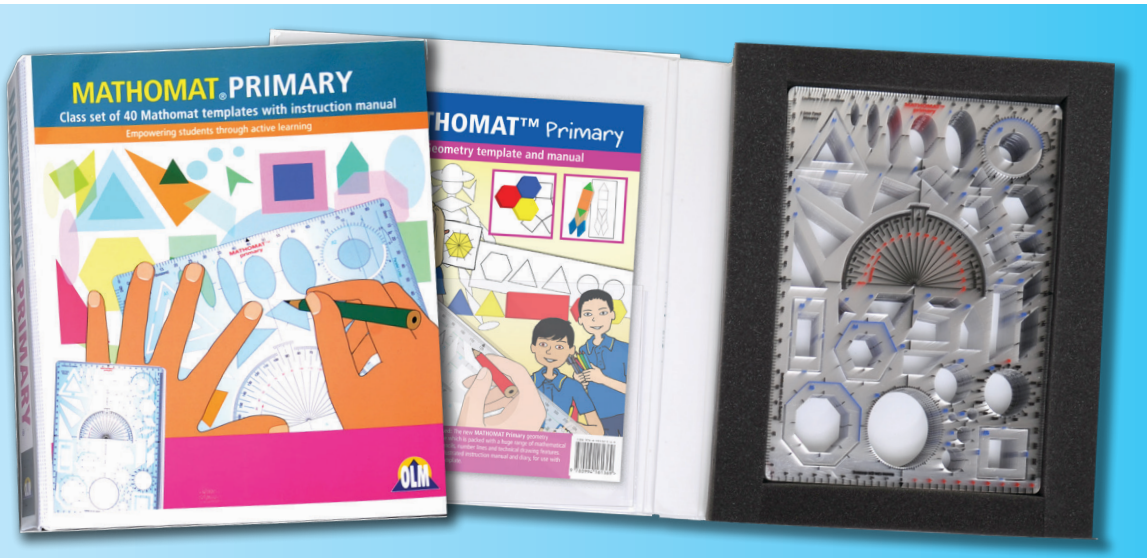
Attribute block cluster
Two sizes each of:
- triangle
- rectangle
- hexagon
- octagon*
- circle
- square

*octagons are not included in physical attribute block sets

A great range of regular and irregular polygons to explore and experiment with:

regular	irregular
• equilateral triangle • square • pentagon • hexagon • octagon *good shapes to tessellate with*	• isosceles and scalene triangles • rectangle • pentagon • hexagon • trapezium • parallelogram • concave quadrilateral

Mathomat Primary pack options



MATHOMATPrimary Class Set

H4110600008

Class set of 40 Mathomat Primary templates with a copy of the 50 page Mathomat Primary instruction manual.

Our specially designed class folder holds templates securely without scratching. Designed for compact book case storage.

MATHOMATPrimary Student Packs

H4110200050

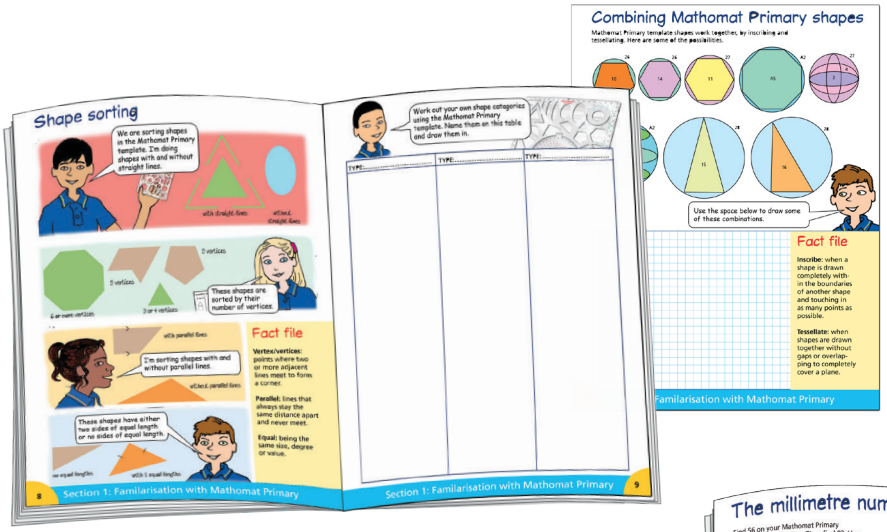
Mathomat Primary template in storage wallet with 8–pagefoldout poster insert of creative drawing ideas.

H4110200051

Mathomat Primary template in storage wallet with 50 plus page illustrated student book.

The Mathomat Primary student book

Five sections to develop deep, flexible understanding of mathematics:



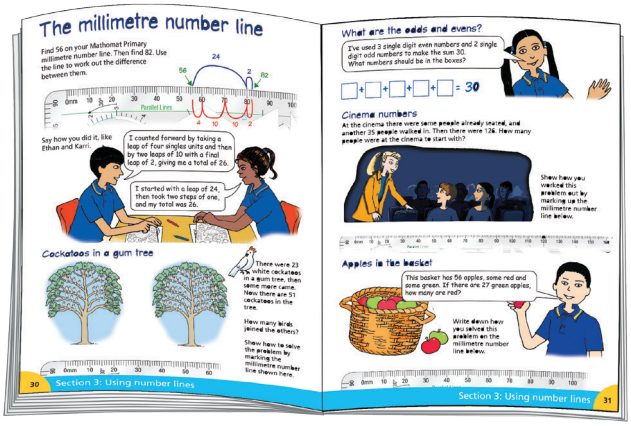
Section 1: Introduction

Drawing tips and familiarisation activities to encourage students to develop their own ways of classifying Mathomat Primary shapes and number lines.

Section 2: Understanding Mathomat Primary shapes

Students are encouraged to draw creative patterns, to begin to transition from understanding shapes as wholes to analytical reasoning about their properties.

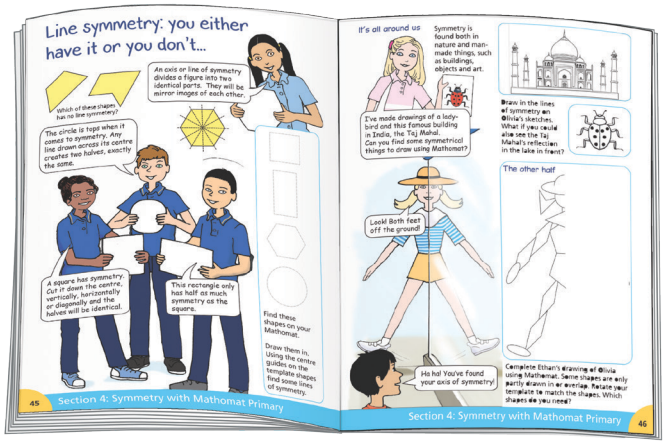
Many of these activities extend from pattern and attribute block designs, encouraging learners to reflect and to create new geometric structure as they draw.



Section 3: Mental maths activities

Using Mathomat Primary number lines to make mental computations visible.

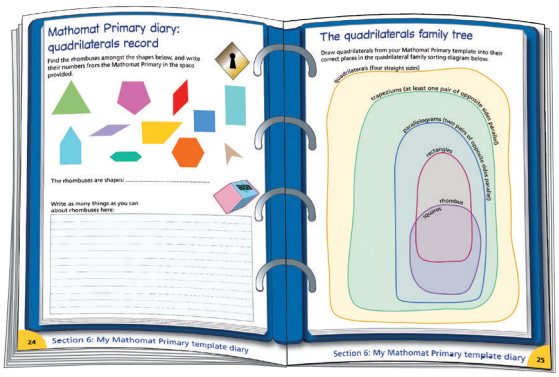
The activities in this section develop number sense with story based problems that encourage learners to think about numbers, not just their concrete representation.



Section 4: Exploring line and rotational symmetry, creative drawing activities

Section 5: Diary

A place to reflect on what has been learned.
Illustrated right: activity to challenge students to think hierarchically about Mathomat Primary shape properties.



MATHOMATPrimary

Mathomat V2 template

Navigating around the MATHOMAT V2 template

Central 360 degree protractor: creates a balanced and purposeful design. Our protractor has:

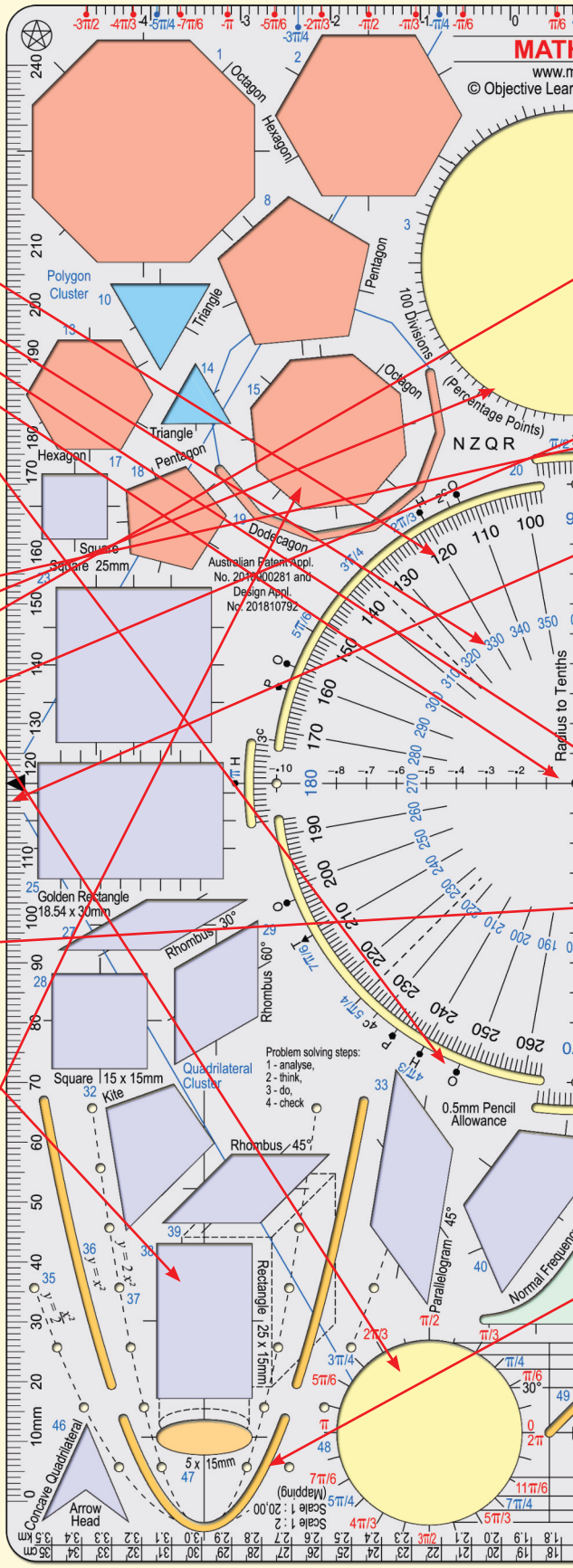
- Degrees, anti-clockwise for the positive direction of the x axis
- Bearings, clockwise from North
- Radians
- Circle centre finder
- Markers for large polygons

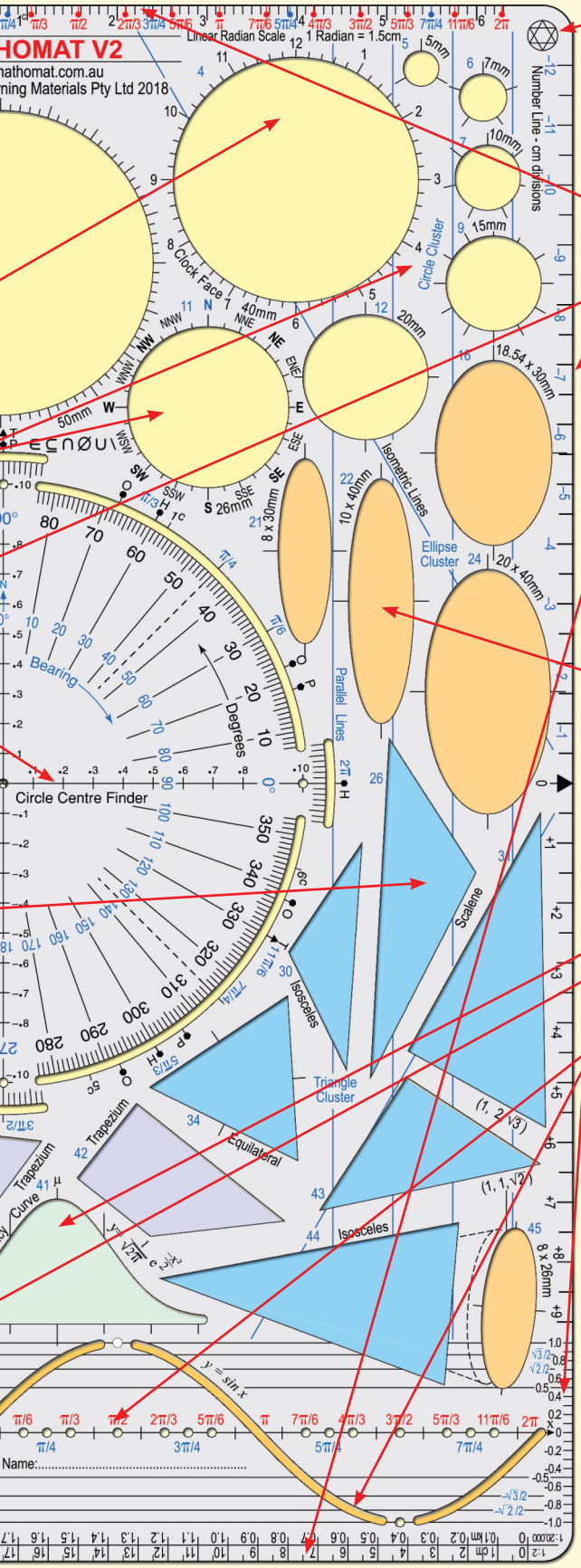
There are many ways to scale a full revolution using Mathomat other than with its protractor. The nine circles on Mathomat can be used, in conjunction with other shapes, as a replacement for a compass and include graduations for:

- The compass rose (shape 11)
- The clock face (shape 4)
- Percentage divisions for pie charts (shape 3)
- Unit circle (shape 48)
- Interesting fraction divisions : $\frac{1}{3}$ (shape 5), $\frac{1}{4}$ (shape 12), $\frac{1}{5}$ (shape 6), $\frac{1}{7}$ (shape 7), $\frac{1}{10}$ (shape 9)

Mathomat has many interesting, and challenging polygon shapes, with commonside lengths that fit together for creative drawing:

- A triangle cluster with large examples of scalene, isosceles and equilateral types, including special triangles for trigonometry.
- Many quadrilaterals. When used for drawing, these are an excellent way of deepening student understanding of a difficult area in shape property. Mathomat quadrilaterals include: isosceles and non-isosceles trapeziums, parallelogram, kite, three different rhombuses, arrow head (concave quadrilateral), rectangles and squares.
- Regular polygons with commonside lengths for drawing. 10mm sides for compact designs and 15mm sided for page filling designs. Included are: squares, pentagons, hexagons, octagons and 10mm dodecagon.





The hexagram and pentagram appear in the upper template corners to remind students of the intriguing properties of regular polygons inscribed in circles.

Mathomat has a rich collection of number lines around its four ruler edges:

- Linear radian scale (1.5cm units) for use with the unit circle and trig graph cluster
- Large millimetre scale
- Integer scale for use with directed numbers and for scaling Cartesian graph axes
- Sine scale for measuring output from the trig graph cluster as height above/below X-axis
- Scale ruler with graduations in 1:2 for engineering drawing and 1:20000 for mapping.

Parallel and isometric lines. Use with the right angled corners, central Cartesian axes and protractor on Mathomat for a huge range of technical and creative drawing tasks, such as; cross hatching, construction of angles, table preparation and drawing isometric grids.

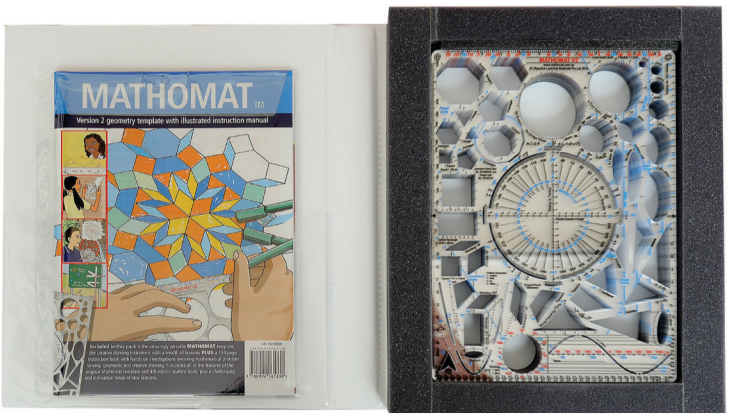
Six ellipses of various size. Use individually for drawings involving curves and in conjunction with Mathomat circles for 3-D drawing including spheres.

Graphing cluster: includes

- Normal frequency curve
- Parabola
- Sine curve
- Trig graph cluster for visualising trigonometry problems in terms of the unit circle. Integration of unit circle, sine curve and scales for x-axis input and measuring y-axis output values. Allows for measurement of angle as distance travelled around the circumference of the unit circle while locating position on the corresponding sine curve.

The Mathomat V2 template is subject to:
Australian Patent number 2018101269
Australian Design registration 201810792

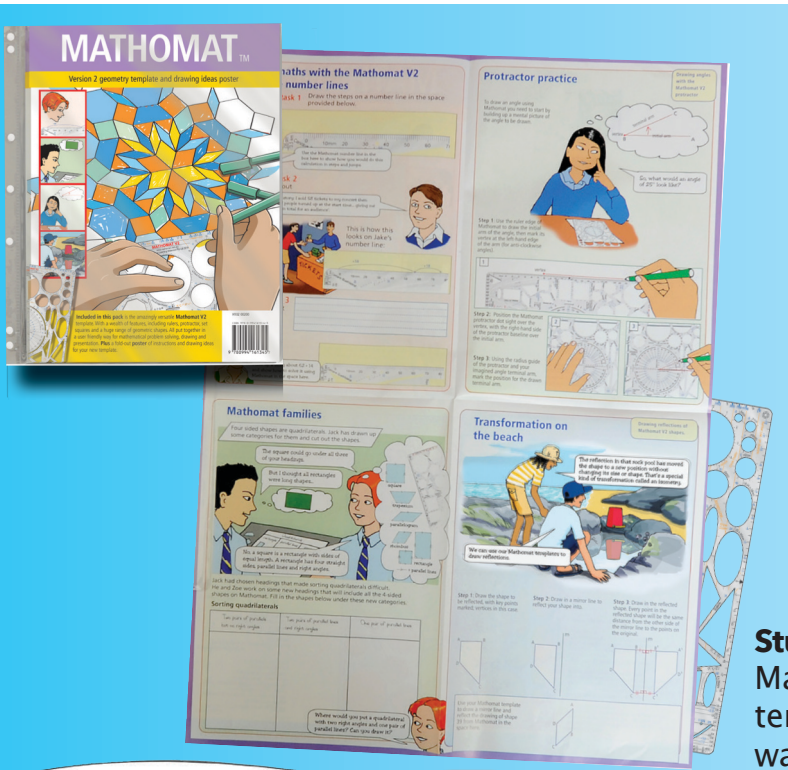
The Mathomat V2 template: pack options



Class pack
40 Mathomat V2 templates in storage wallet with illustrated student book.

H41 10600021

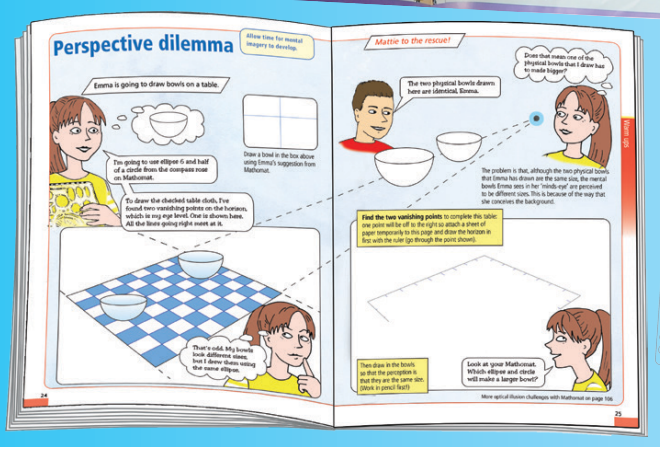
Our specially designed folder holds templates securely without scratching. Compact bookshelf storage.

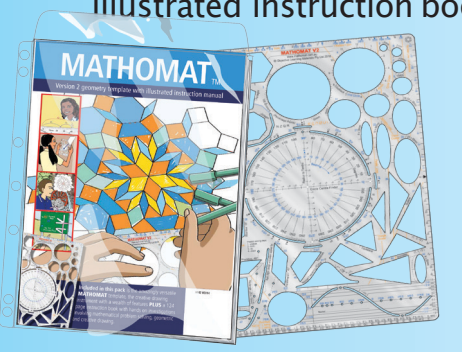


Mathomat V2 template in storage wallet with fold out poster.

H41 10200200

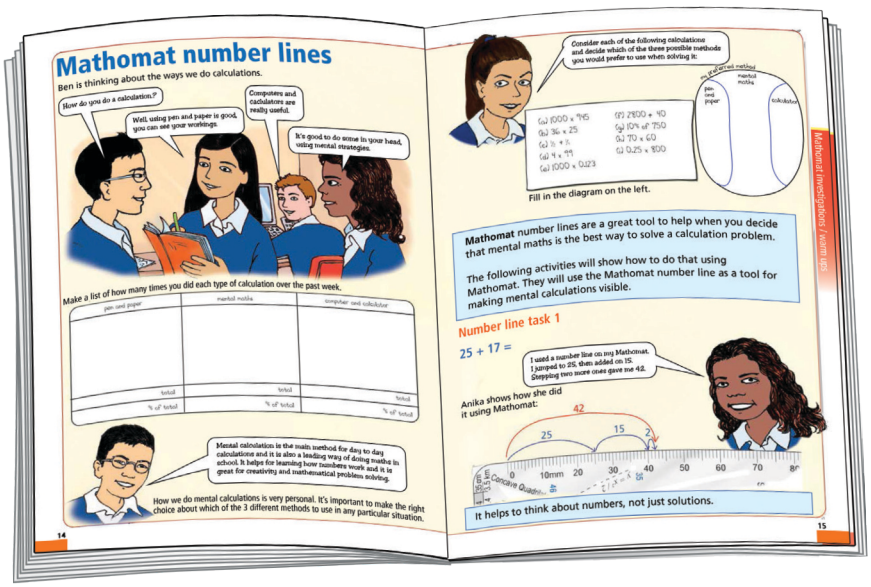
Student pack H41 10200800
Mathomat V2 template in storage wallet with 116 page illustrated instruction book





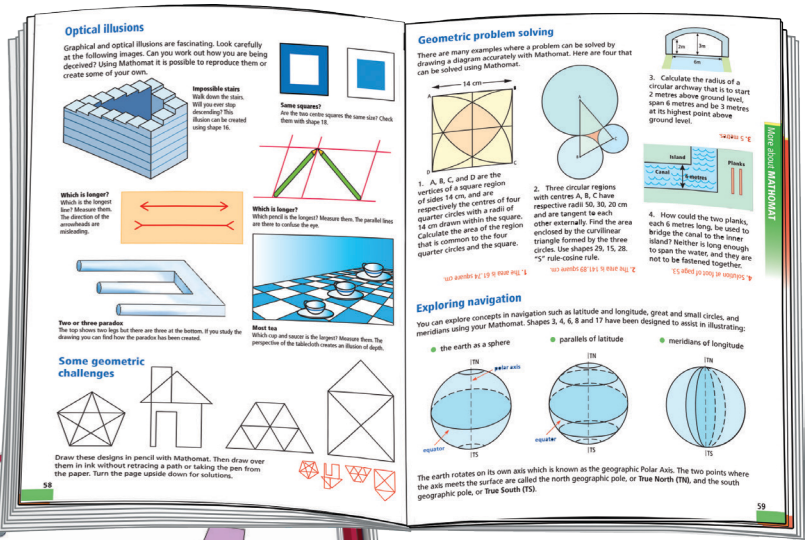
The Mathomat V2 template instruction book

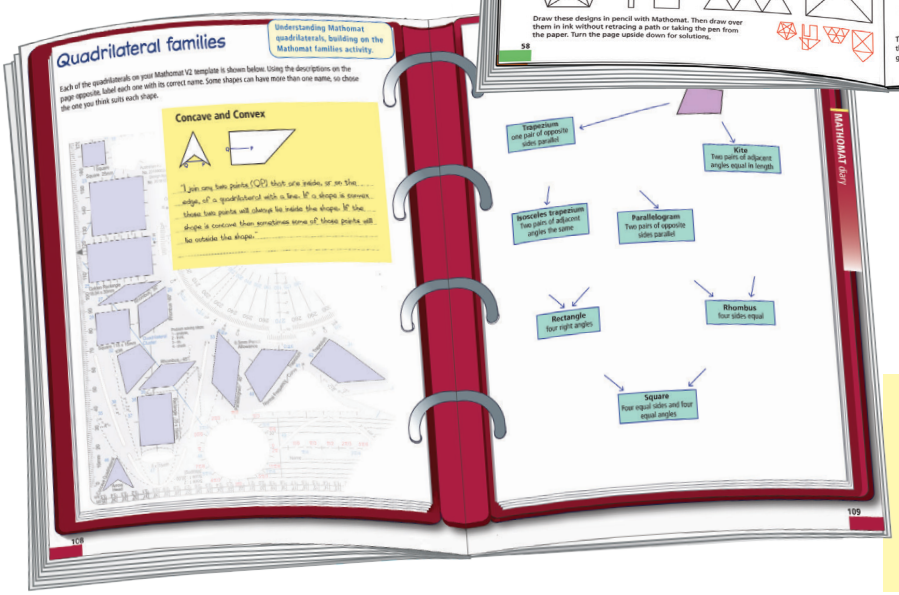
116 pages, in three sections



Section 1: 40 illustrated investigations with the Mathomat V2 template with contexts that put students 'into' a situation so they can make sense of the mathematical relationships and operations involved. This helps in forming and operating on the mental imagery that is central to mathematical thinking.

Section 2: More about Mathomat. 14 pages of further investigations with the Mathomat V2 template. These less contextualised activities encourage students to build on the investigations from section1.



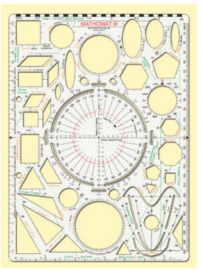


Section 3: Mathomat V2 diary. New diary section to promote reflection and develop new skills, such as scientific classification of Mathomat drawings.

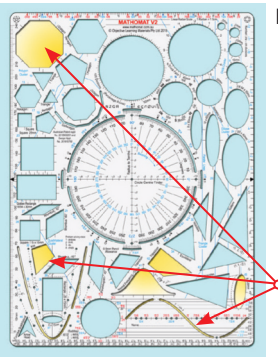
See pages 20–25 of this product catalogue for a discussion of themes in the illustrated Mathomat student book.

Special MATHOMAT features

What's new in the Mathomat V2 template:



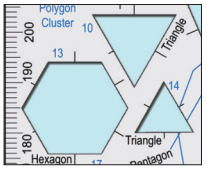
Original Mathomat

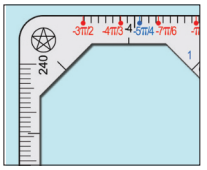


New V2 Mathomat

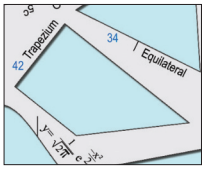
A more powerful design. The Mathomat V2 template is the same size as the original Mathomat, with the same features, plus the following new features:

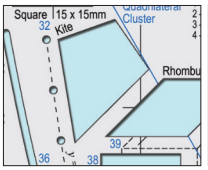
New and enlarged features (highlighted in yellow)

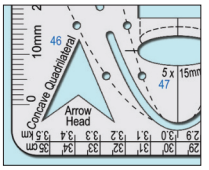




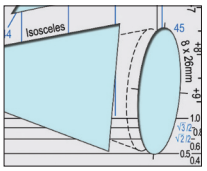
Larger regular polygons with 15mm sides compliment the very popular 10mm sided polygons in the original Mathomat. Use these new shapes for "eye-smacking" full page 2-Dpattern drawings.

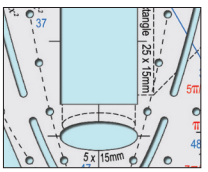


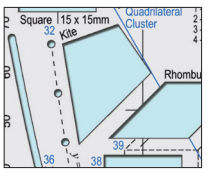




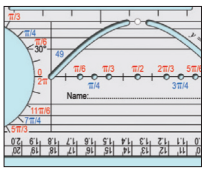
New quadrilaterals. A non-isoscelestrapezium, kite and arrow-head (concave quadrilateral) have been added to the Mathomat V2 template to create an even more diverse range of shapes in this difficult to master category of polygons.



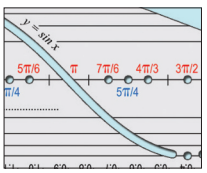


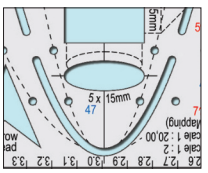


Improved 3-D sketching with new ellipse for use with isoscelestriangle for sketching cones, repositioned ellipse for use with rectangle for sketching cylinders. The new kite is ideal for sketching square based pyramids.

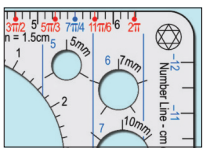


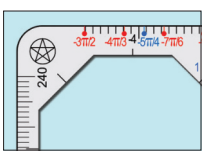
Trig graphing cluster. The unit circle and sine curve are now grouped along with new x-axisinput and y-axisoutput scales to promote unit circle based visualisation of trigonometry problems. See lesson plan 11 "unwrapping the circle" in the free resources section of www.mathomat.com.au



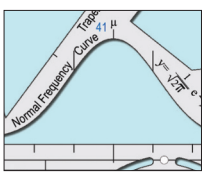


Larger parabola and sine curve for bigger and more usable senior school classwork and projects.

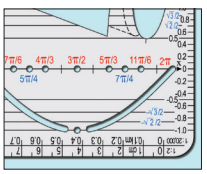




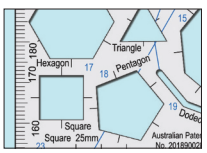
Prompts to explore the intriguing properties of the hexagram and pentagram. See lesson plan 10 'Stars, circles and mystic signs' (*Groves and Grover 1999*) in the free resources section of www.mathomat.com.au



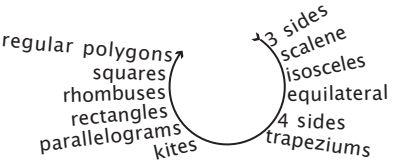
Normal frequency curve for neat, fast sketching of probability and statistics problems involving this important relationship.



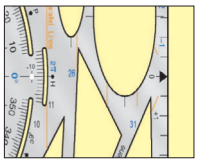
Scale ruler now has 1:2 ratio for detailed engineering drawings as well as a 1:20000 mapping scale.



Polygons in the Mathomat V2 template appear in hierarchical order to promote thinking in terms of subtle differences between these often difficult to understand shapes.

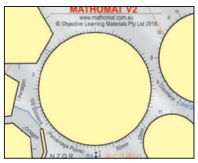


The Mathomat V2 template has the same huge range of useful features as the original Mathomat template, including the following:



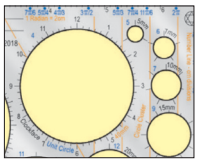
A number line (right-hand edge)

Positive and negative integers for directed numbers.
This edge can also be used for the quick drawing of axes of graphs.



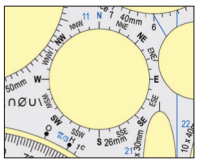
Circle chart (shape 3)

The circumference of this circle has been divided into 100 equal parts and is ideal for quickly representing percentages, particularly in relation to displaying statistical information in the form of a circle chart or pie graph.



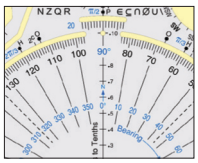
Clock face (shape 4)

This circle has been marked to represent the 60 divisions of a clock face. You can use it for clock drawings to show different times of the day. It is also useful for marking any circle evenly with divisions that are factors of 60.



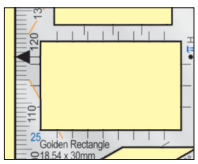
The compass rose (shape 11)

This circle shows the 16 main points of the compass. Use with lesson plan 8, 'Where are we?' (*Groves and Grover 1999*) in the free resources section of www.mathomat.com.au



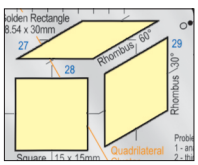
Bearings (inner circle on the protractor)

The circular protractor contains a true bearings scale measuring clockwise from north from 0° to 360° shown in red.



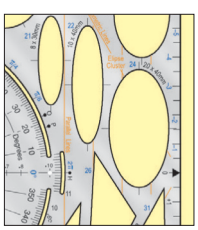
Golden rectangle (shape 25)

The ratio of this special rectangle (shape 25 on your Mathomat) is used in art and architecture as well as being linked to the *Fibonacci numbers*.



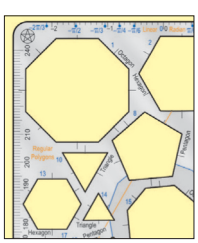
Prism clusters

Shape clusters for sketching square and rectangular based prisms.



Isometric lines (in each quarter)

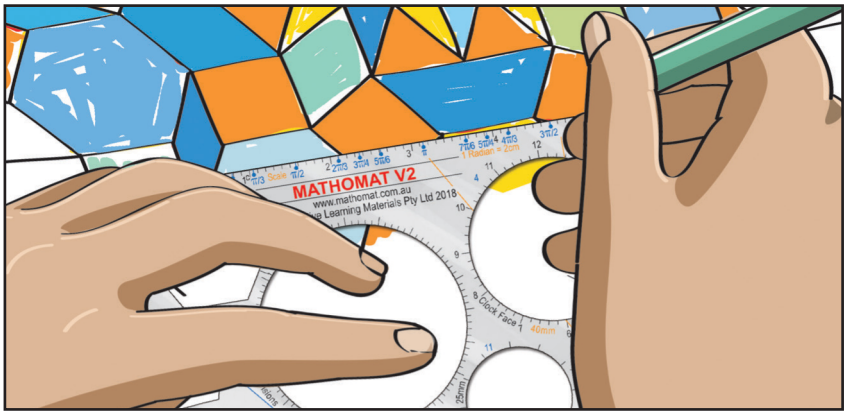
One of the isometric guides can be found running through shapes 6 and 10, with three more across each of the other corners. They enable the drawing of an isometric grid, used for producing technical and architectural drawings that give the effect of perspective while preserving measurements. Use with parallel lines, central Cartesian axes and protractor in Mathomat.



A linear radian scale (upper edge)

Here, a 1.5cm interval represents 1 radian and is divided into tenths. The scale is also divided into fractions of 1/6th of pi (30 degrees) with graduations marked with dots. Two pi on the linear radian scale corresponds to the circumference of circle 48. This scale can be used in sketching trigonometric functions and in solving trigonometric equations containing algebraic terms using graphs and tables. Use with the new trig graphing cluster.

Exploring 2-D and 3-D pattern with the

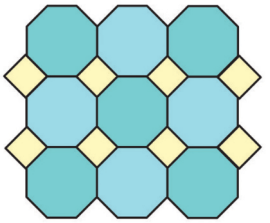


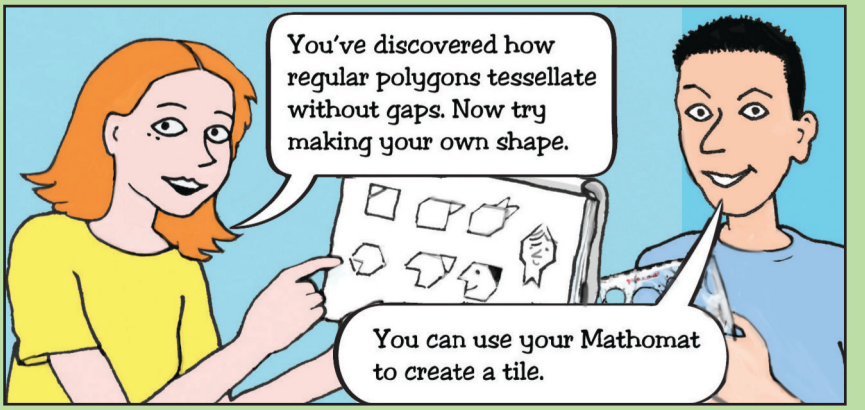
Mathomat shapes are designed to work together for creative drawing.

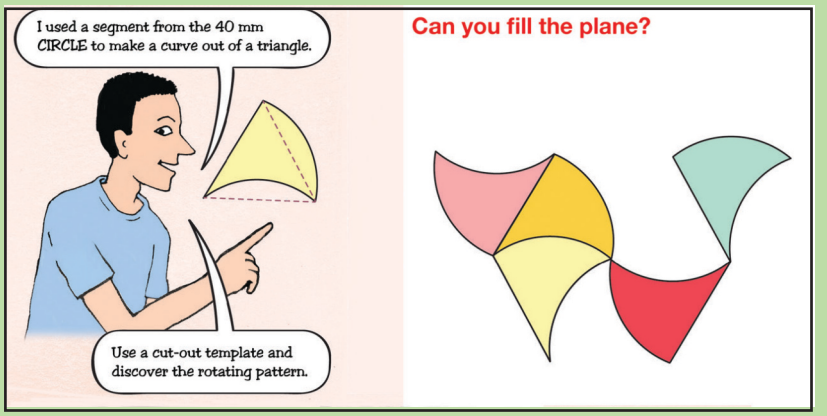
Exploring 2-D and 3-D pattern in the classroom:

- Builds knowledge of basic ideas in geometry
- Encourages appreciation of the role of geometry in art, design and history
- Improves student confidence, through production of creative designs and development of accurate construction skills
- Provides a rich source of lesson ideas.

Homogeneous tessellation: Using Mathomat V2 shapes 15 and 17 (small) and 1 and 28 (large).



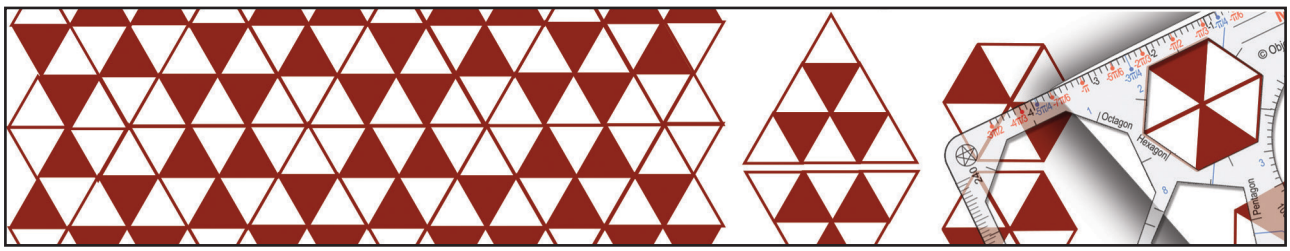




Above and left:
From the 'Get Creative' investigation on page 46 of the illustrated student book for the Mathomat V2 template.

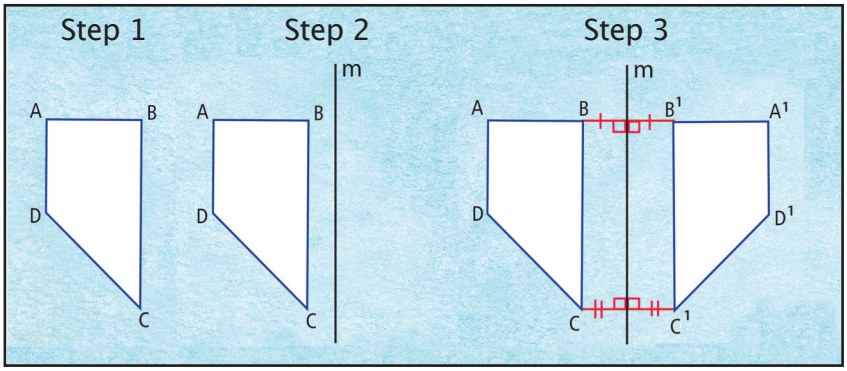
See also lesson 2, Tiles, Tiles and more Tiles in the free resources section of www.mathomat.com.au

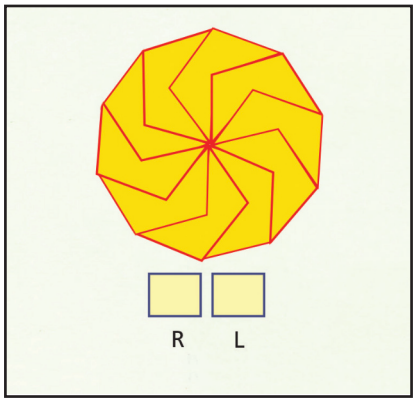
Mathomat V2 and related publications



Exploring the floor tiling pattern from a Roman house using Mathomat (from the 'More about Mathomat' section of the V2 illustrated student book).

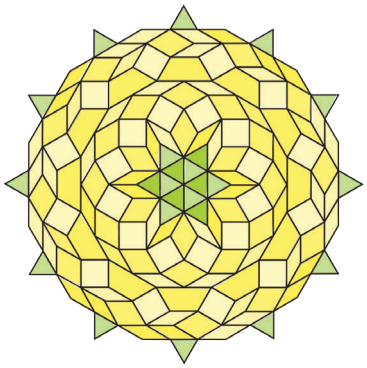
Right: Steps for reflecting shape 42 in the Mathomat V2 template (from page 50 of the illustrated Mathomat V2 student book).

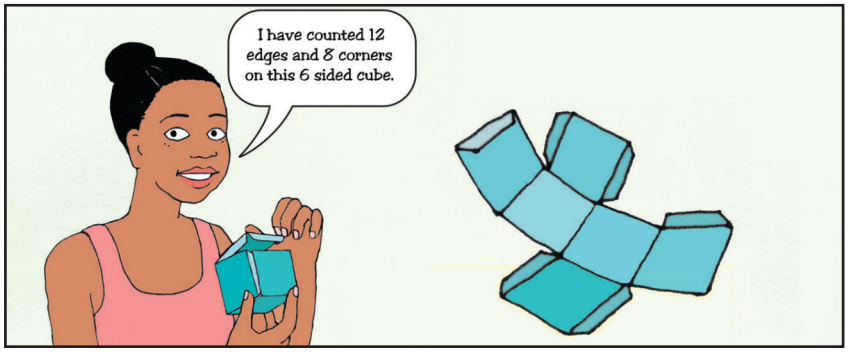




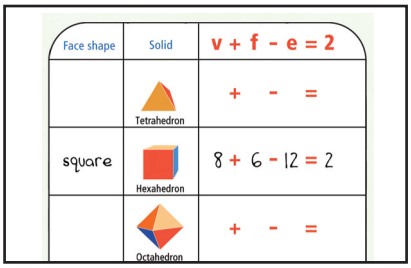
Left: Find the number of line and rotational symmetries in this pattern drawn with Mathomat (from the illustrated student book for the Mathomat V2 template page 57).

Right: One of the many interesting patterns to draw with Mathomat V2 in the Mathomat student books.





Above: Part of an investigation from 'Plato's polyhedra' (pages 60–61of the illustrated student book for the Mathomat V2 template).



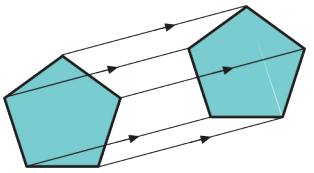
Above: The more about Mathomat section of the illustrated Mathomat V2 student book explores Schlalfi coding of polyhedra vertices.

Drawing and action learning with Mathomat

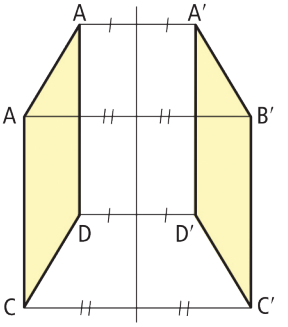
Mathematics became dynamic in the period between the Renaissance and the invention of calculus by Newton and Leibnitz. It evolved in this way because of its use as a tool to model the dynamic, changing world around us. Drawing is central to this modelling process, and to the development of mathematics concepts. We reflect on our actions while drawing and this forms the basis for learning.

In school Mathomat can be a powerful modelling tool, readily available to assist students with routine problem solving in mathematics, with project work and for drawing in subjects such as geography, art, science and graphic design.

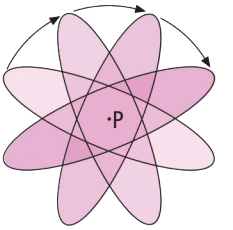
Modelling motion with Mathomat



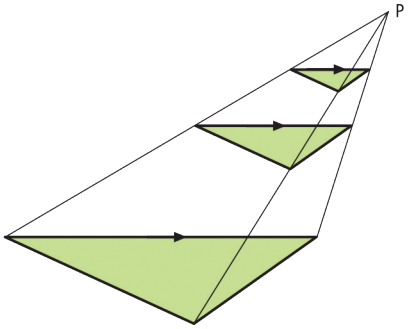
Translation with shape 8



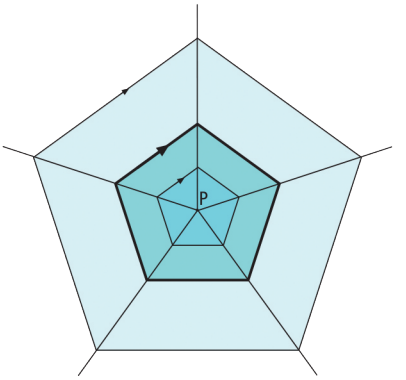
Reflection with shape 33



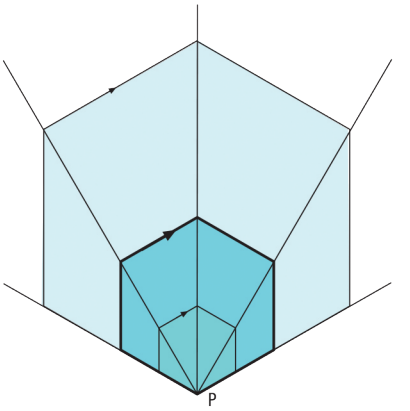
Rotation with shape 22



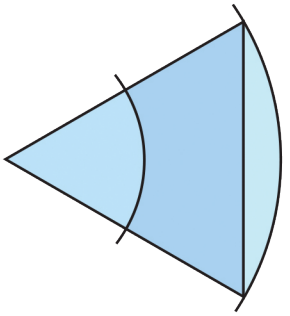
Dilation with shape 26



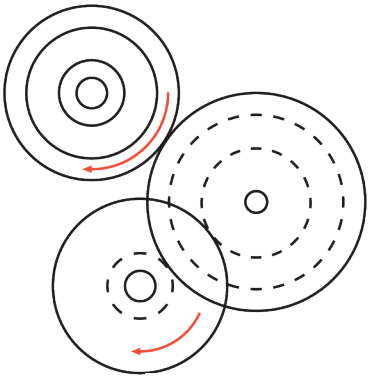
Dilation with shapes 18 and 8



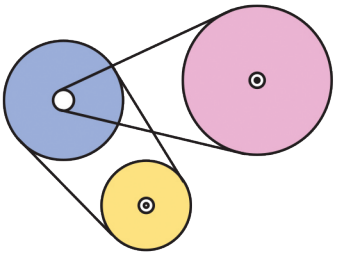
Dilation with shapes 13 and 2



Drawing sectors/segments using shapes 4 and 22



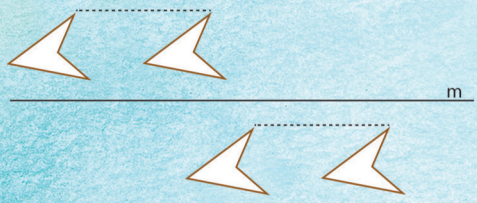
Using gears



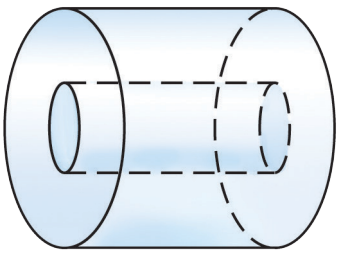
And pulley systems using some of the many Mathomat circles

V2 template and related publications

Glide reflection from the illustrated student book for the Mathomat V2 template (page 51).

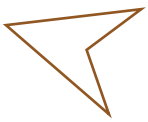


Drawing shapes that roll

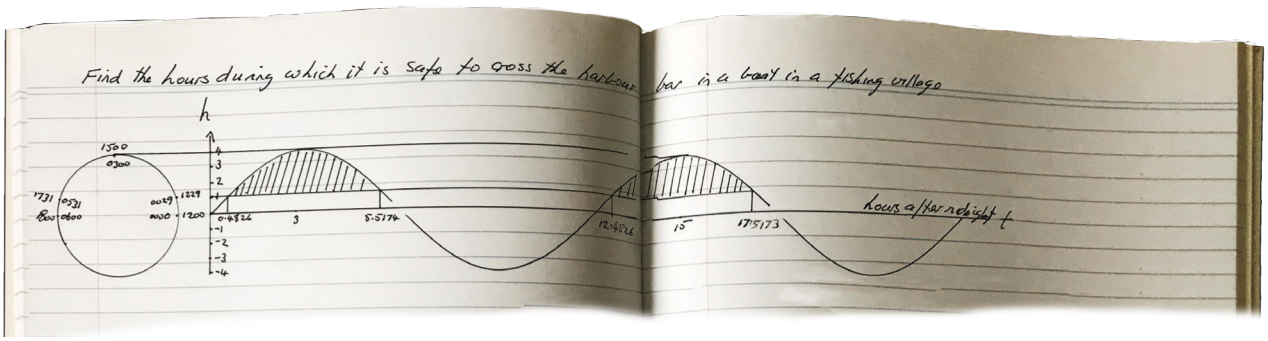


hollow cylinder using shapes 47 & 48

Use Mathomat V2, shape 46, to complete this glide reflection



m

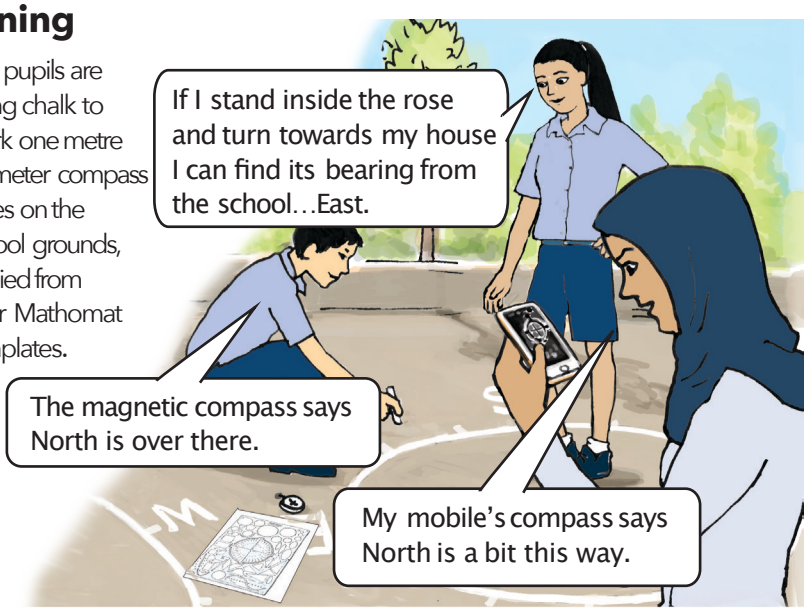


Understanding angle as turning

Above: **Using the trigonometry graphing cluster in the Mathomat V2 template to model tidal flow.**

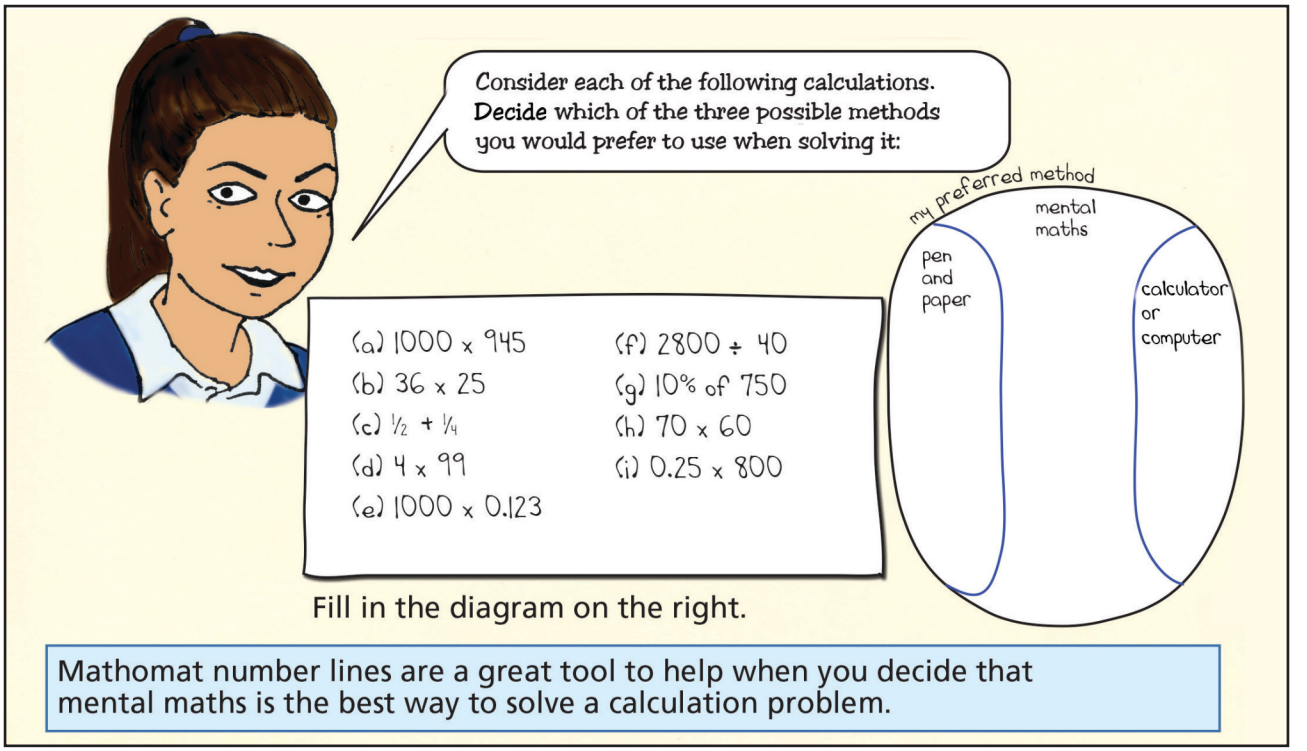
Right: **Exploring bearings in the Mathomat V2 student manual (page 68).**

The pupils are using chalk to mark one metre diameter compass roses on the school grounds, copied from their Mathomat templates.



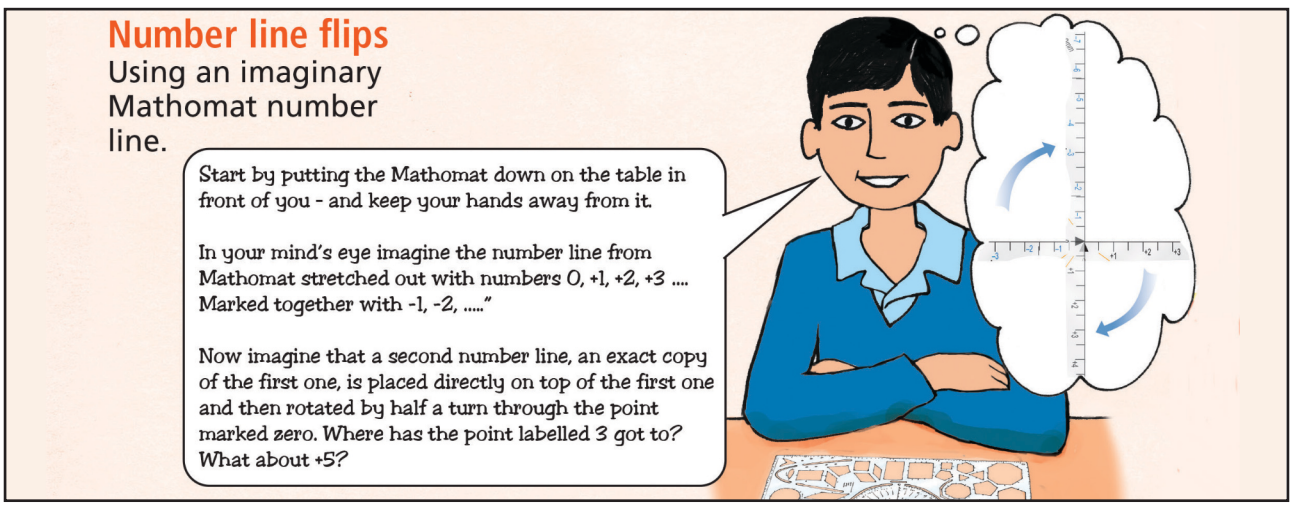
Number line warm ups

Number line warm ups using Mathomat (from the illustrated student book for the Mathomat V2 template pages 14–17).



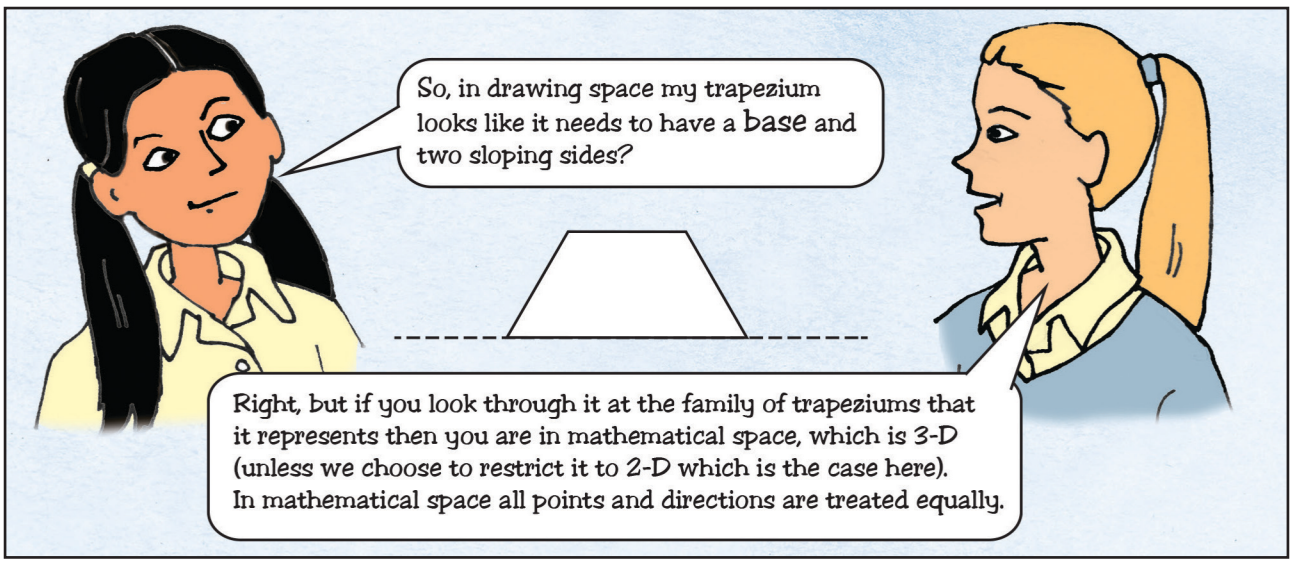
Students learn to use the rich collection of number lines on their Mathomat V2 template to make mental calculations visible, as drawings on paper.

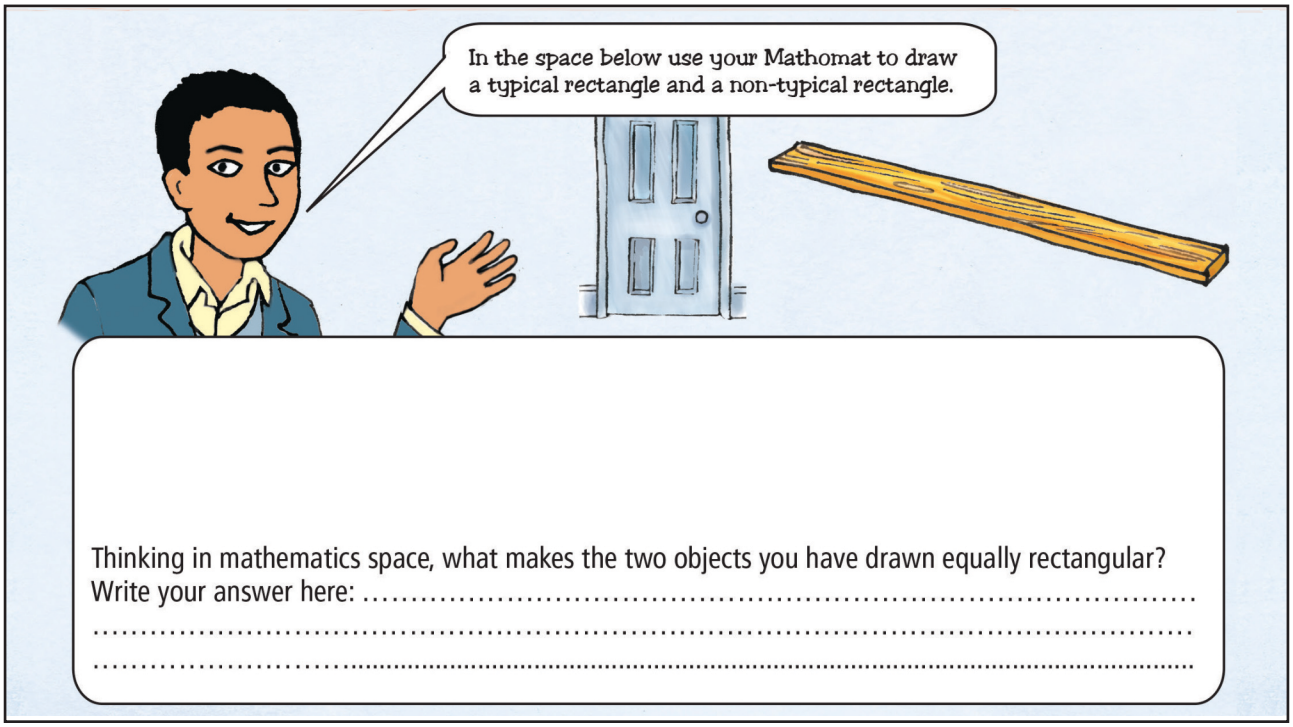
Students are encouraged to think about numbers and to explore number relationships in the student book by being asked to tell a story about the problem they are working on.



In the number line flips activity students are made aware of the existence of mental imagery – by being encouraged to use their physical Mathomat as a model for construction of a mental number line.

Studies such as PISA* and TIMMS** indicate that a significant proportion of middle school students have difficulty recognising and naming the properties of 2D and 3D geometric shapes. Successful learning of shape property in geometry involves students in developing entirely new ways of reasoning. In the 'Breaking out of drawing space' activity in the Mathomat V2 student manual (shown below) students are challenged to change from thinking in terms of visual shape prototypes to reasoning in terms of the properties of Mathomat shapes.





Quadrilaterals are a difficult group of polygons for students to learn about. Carrying Mathomat in their folders gives students access to a set of physical quadrilaterals to model their thinking on as routine activity.

*Program for International Student Assessment(PISA). National PISA report 2015.ACER research. www.acer.org
** Trends in International Mathematics and Science Study. TIMMS 2015.ACER research. www.acer.org

Themes in the MATHOMAT V2 instruction

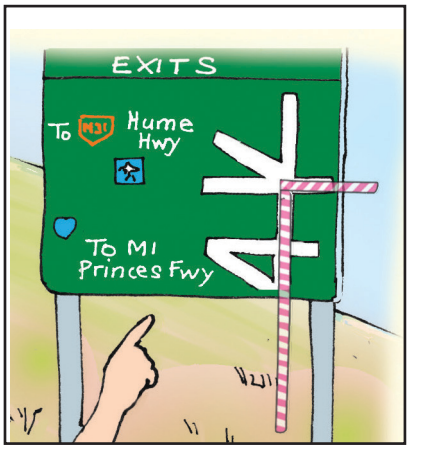
"Understanding angles and their measure is complicated by the absence of a single definition of target quantity" (*Smith and Barrett 2017*)*. In the Mathomat V2 student manual, a series of 5 investigations introduce students to common angle concepts used in middle school. The investigations then demonstrate how to use the Mathomat protractor for measurement in degrees. Investigation titles are:

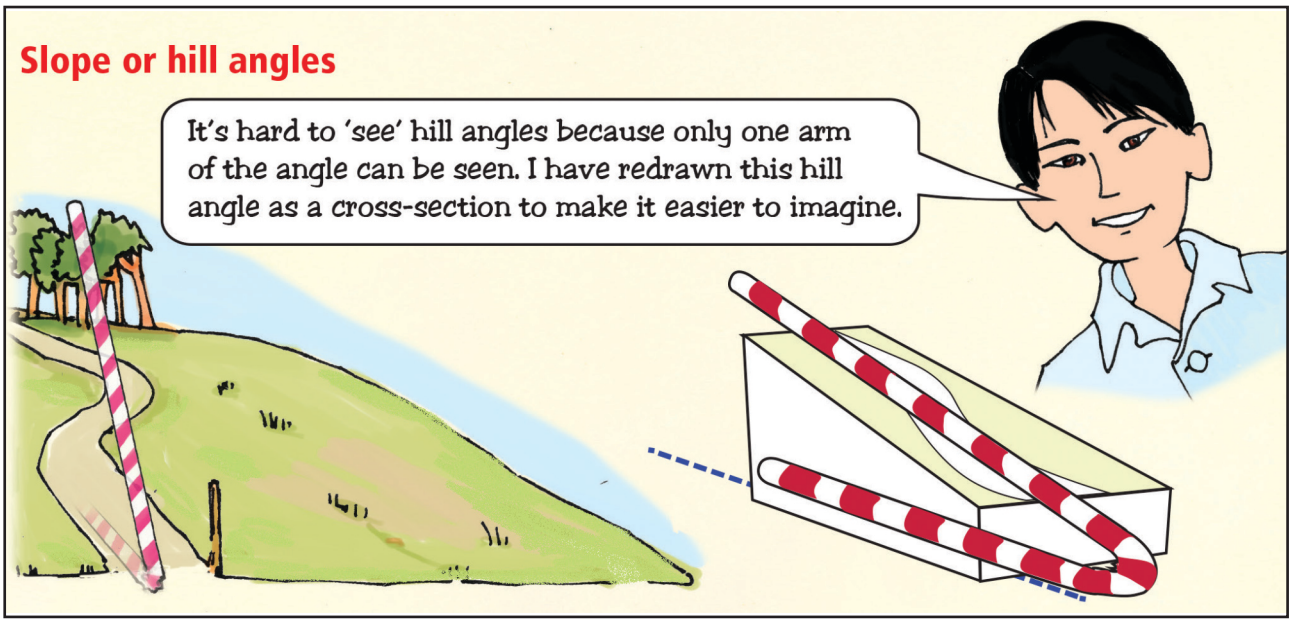
- Corner and slope angles (pp 22–23)
- Angles as rotation (pp 24–25)
- Understanding angles by size (pp 26–27)
- Protractor practice (pp 28 –29)
- More protractor practice (pp 30–31)

The corner and slope angles investigation reflects research** showing three distinct angle contexts involved in the development by students of an angle concept;

Corner angles, in which both arms of the angle are visible.
Slope angles, in which only one arm of the angle can be physically seen.
Turning angles, requiring both arms of the angle to be imagined.

Students use Mathomat in this investigation to recognise and estimate the magnitude of angles in situations reflecting each of these contexts.

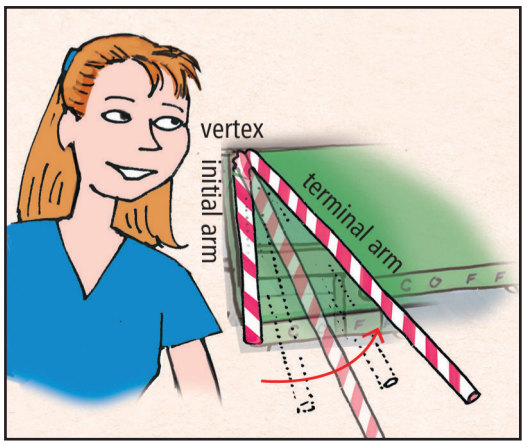


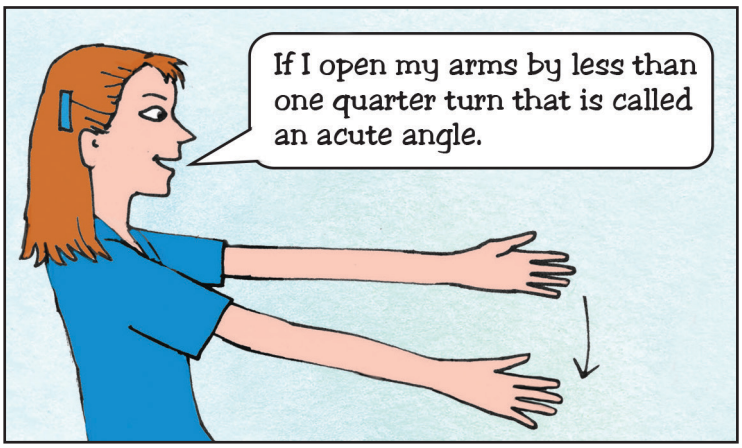


* Smith, J and Barrett J: *Learning and teaching measurement: Coordinating quantity and number*. In the Compendium for research in mathematics education. NCTM 2017. Page 372
**Mitchelmore, M.C, & White, P. (2000). Development of angle concepts by progressive abstraction and generalisation. Educational Studies in Mathematics. 41 (3), 209–238.

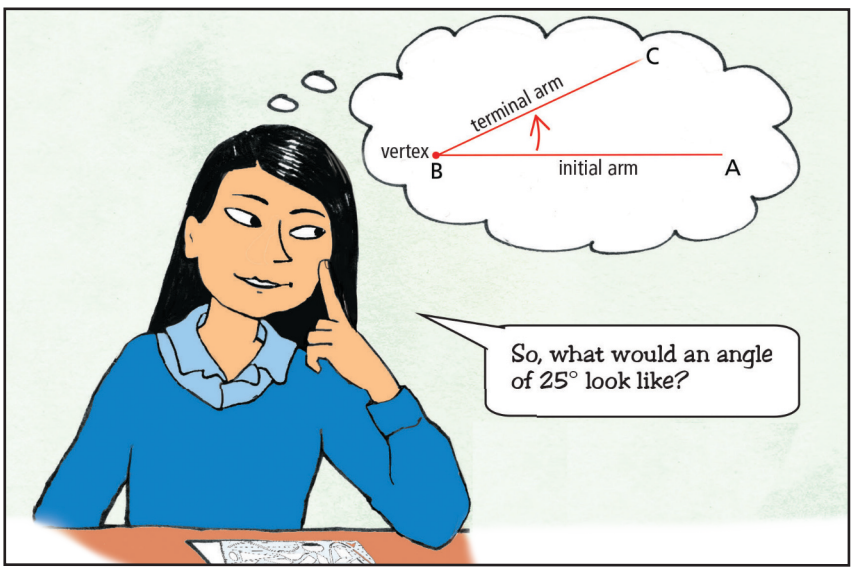
book: Introducing the protractor

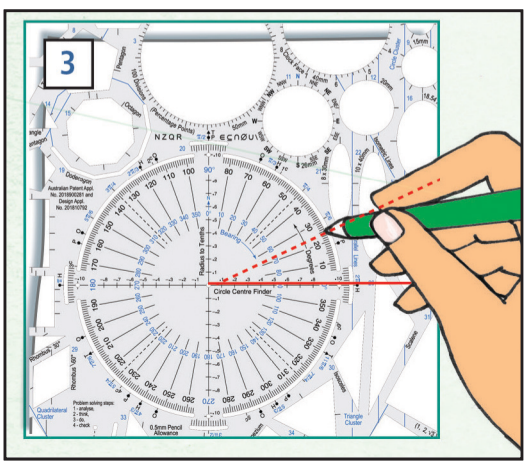
In the 'Angles as rotation' investigation (pages 24 –25) students are introduced to angles as rotation, and are asked to consider three angle concepts (corner, slope and rotation) in the same situation. The following investigation 'Understanding angles by size' (pages 26 –27) asks students to consider various angle magnitudes (acute, obtuse, reflex and full revolution) using the right angle as a unit of measure.





Protractor practice and More protractor practice investigations: students are introduced to angle measurement using the Mathomat protractor.



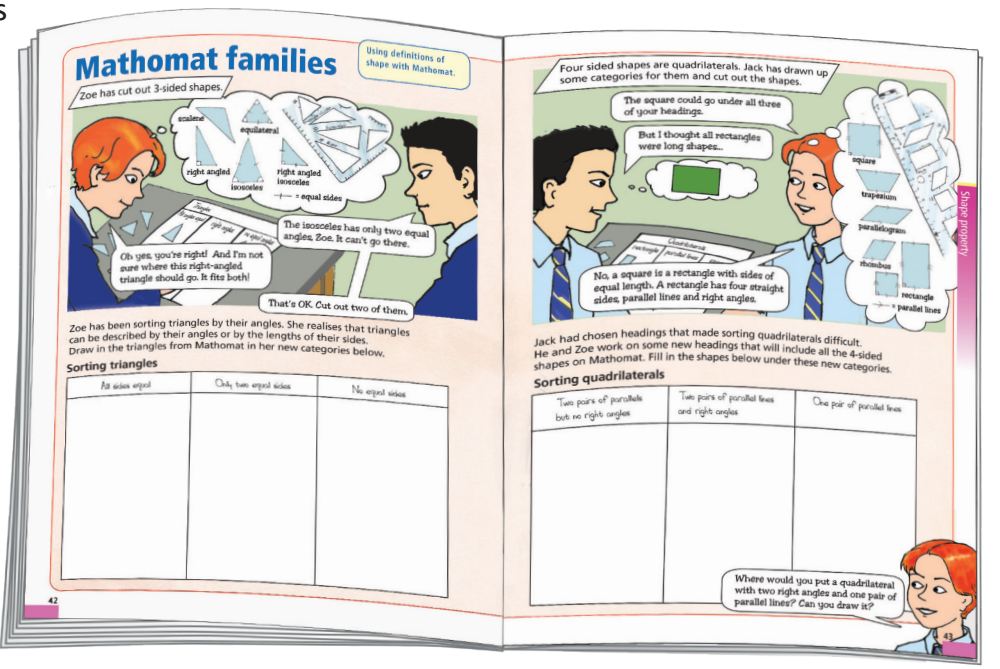


The sequence of physical and mental steps involved in protractor use is identified, including the often difficult task of locating the second, terminal, arm of the angle to be measured on the protractor.

MATHOMATVersion 2 template - illustrated student book

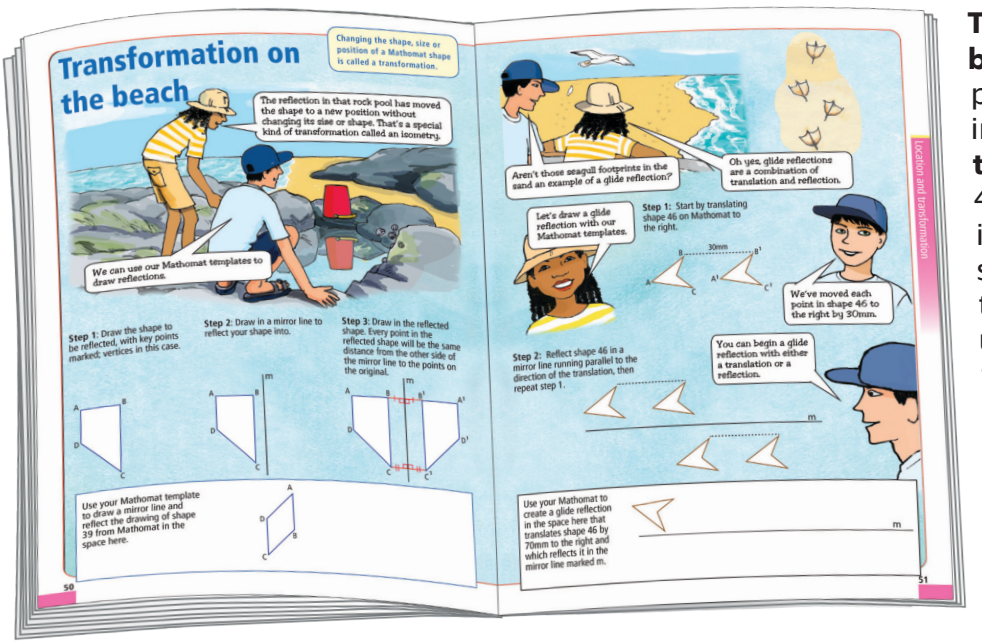
Operating on Mathomat shapes

The Mathomat families activity (on pages 42–43of the illustrated student book for Mathomat) asks students to think analytically about Mathomat shapes by classifying them.



The two investigations which follow (Get tessellating and Get creative) explore the creativity involved in tessellation design with Mathomat. Students begin to transform Mathomat shapes in these activities, approaching the task intuitively.

The isometries of the plane

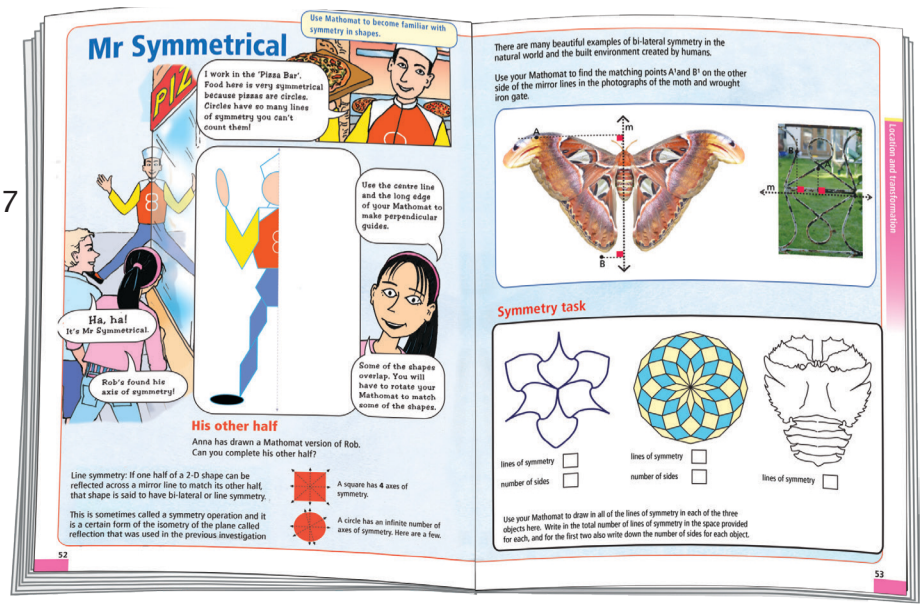


Transformation on the beach, and the preceding investigation **Get transforming** (pages 48 –51of the illustrated Mathomat student book) explore the mathematics underlying earlier tessellation designs.

This is done by using Mathomat to define each of the four isometries of the plane (translation, rotation, reflection and glide reflection) which collectively can fully account for transformation of the tiles involved in tessellation work.

Understanding symmetry operations with Mathomat

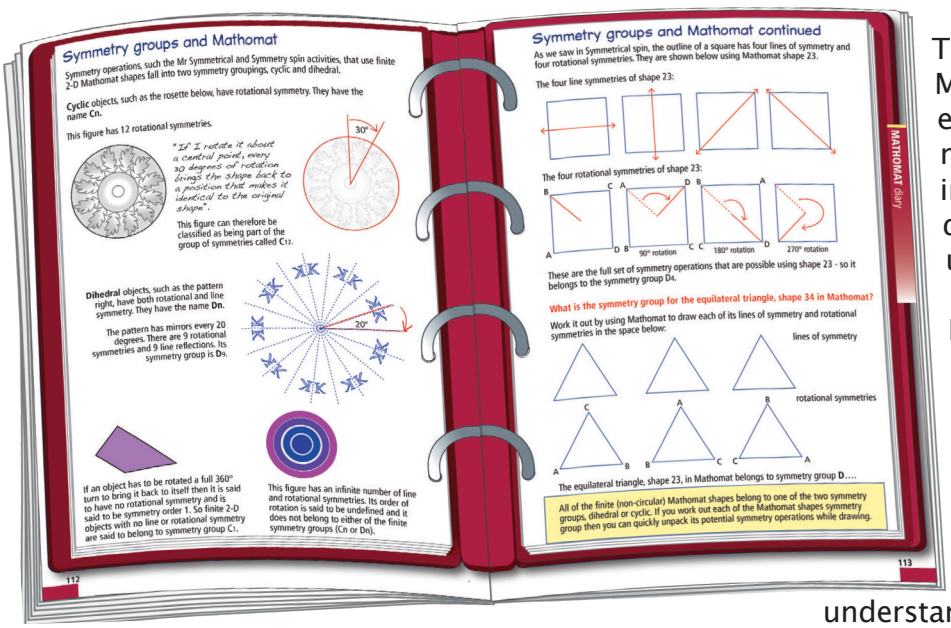
In this series of three investigations (Mr Symmetrical, Symmetrical spin and More rotational symmetry, pages 52–57 of the illustrated Mathomat student book) the two symmetry operations of bi-lateral (line) symmetry and rotation symmetry are introduced.



These two forms of isometry of the plane are important for understanding the design process because they are operations that can permute all of the points in an object while leaving the whole figure unchanged. Our investigations challenge students to find line and rotation symmetry in real-life situations, including in the shapes in their Mathomat templates.

See also lesson 5 **'This looks like that'** and lesson 9 **'Round and round the circle'** (*Groves and Grover 1999*) in the free resources section of www.mathomat.com.au

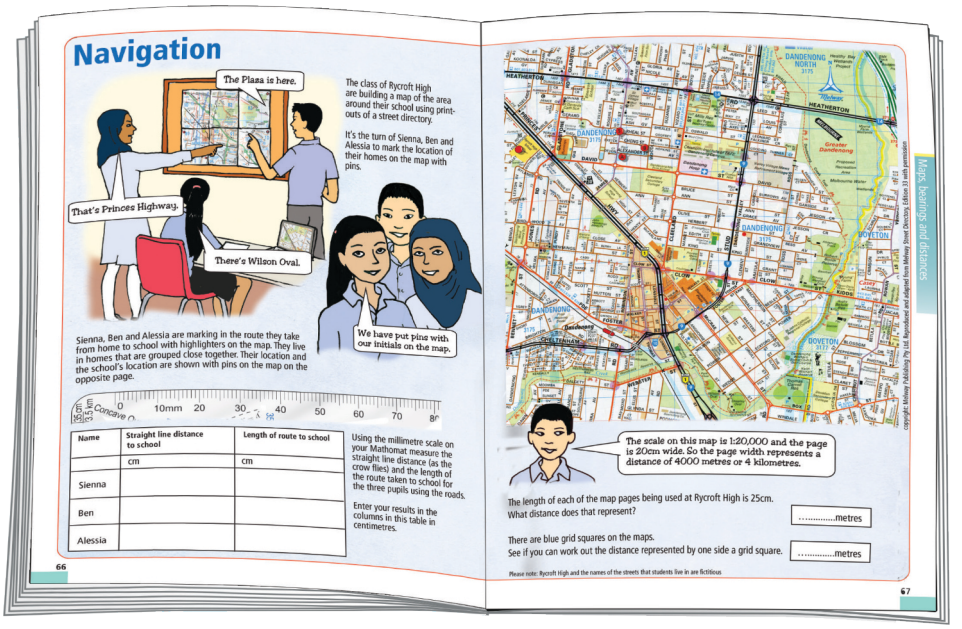
The Mathomat V2 student book diary section



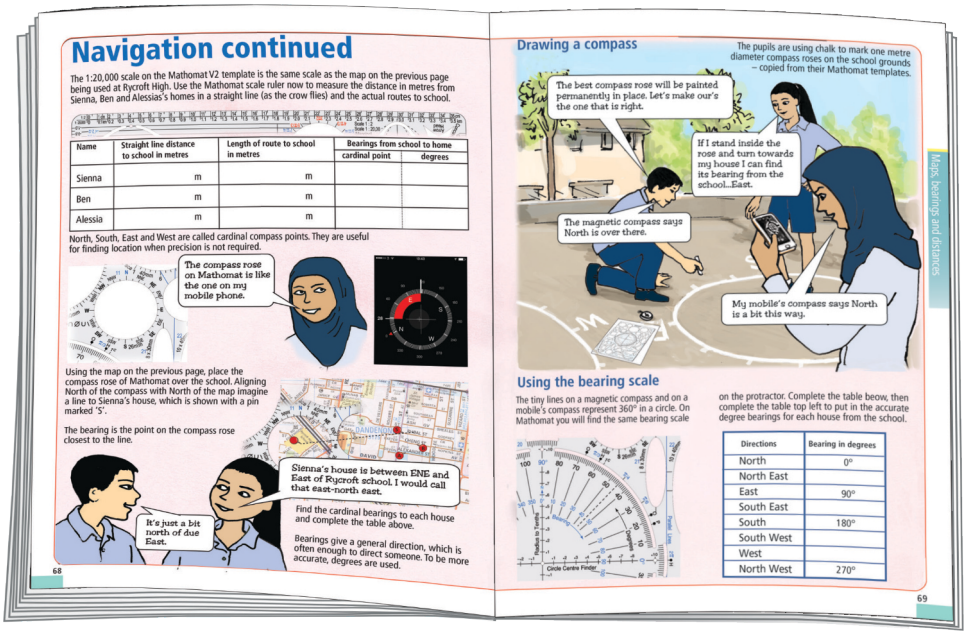
The **diary section** of the Mathomat V2 student book encourages students to reflect on earlier activities in the book, and to develop a more abstract understanding of them.

In the example activity shown here students learn to unpack the potential symmetry operations (line and rotational symmetries) in Mathomat and real world objects. This requires an understanding of symmetry that is broader (involving the isometries of the plane) and deeper (using symmetry operations) than is required by the Australian Curriculum Mathematics (ACMMG 114).

Themes in the Mathomat V2 manual:



The new **Navigation** and **Navigation continued** investigations (pages 67–69of the illustrated Mathomat student book) introduce students to the cardinal point and the more precise 360 degrees methods for specifying bearings on maps.



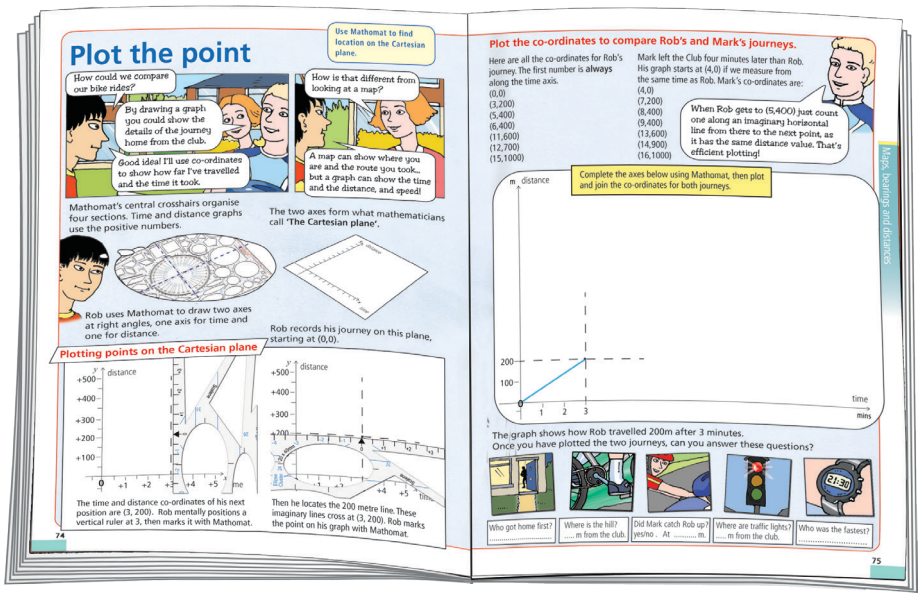
These activities draw on Lesson plan 8 from the Maths with Mathomat lesson plan series, called Where are we? (*Groves and Grover 1999*) (available in the free resources section of www.mathomat.com.au), which are used as a framework for these investigations.

Students begin by identifying familiar locations on a map of the area around their school. Students use their Mathomat ruler to measure these distances before discussingthe idea of scale, and the same map distances in metres.

The compassrose on Mathomat is introduced in these investigations along with the idea of bearing calculation before asking students to measure bearings precisely in degrees using the Mathomat protractor.

understanding maps, bearings and distances

In the **Sailing around Sydney** and **First there** activities on pages 70 –73of the illustrated Mathomat student book, students are asked to use the millimetre and scale rulers on Mathomat, together with the compass rose and protractor to measure distances and bearings in a real life scenario.



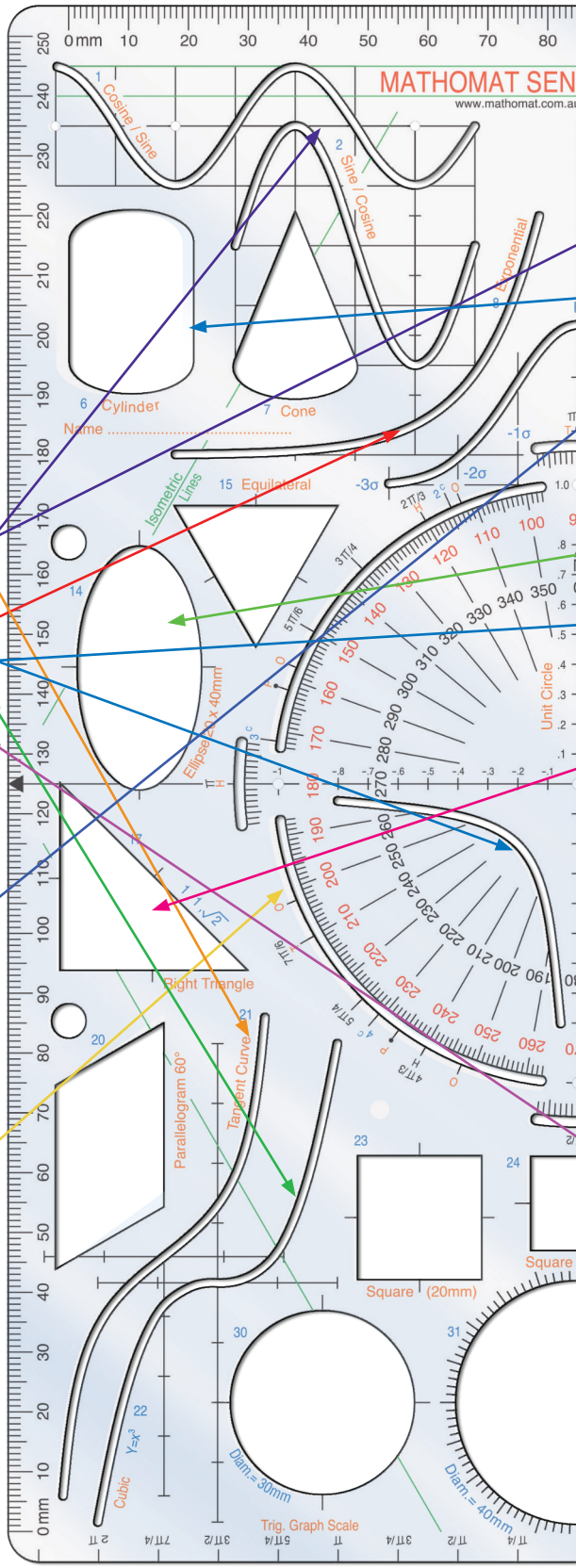
In **Plot the point** activity on pages 74–75 of the illustrated student book for Mathomat, students mark their journey on a Cartesian plane created using the Mathomat to measure distance travelled over time.

MATHOMATVersion 2 template - illustrated student book

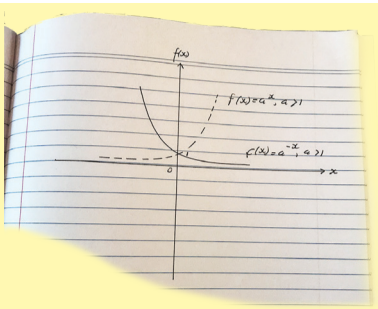
Mathomat Senior

The Mathomat Senior template has a central protractor surrounded by a series of important geometric shapes. These include key graphing curves. Mathomat Senior enables efficient, precise and neat presentation of classwork; and it promotes the use of more effective visualisation of mathematics problems by students, by providing them with concrete models of the theoretical relationships under study in senior school mathematics.

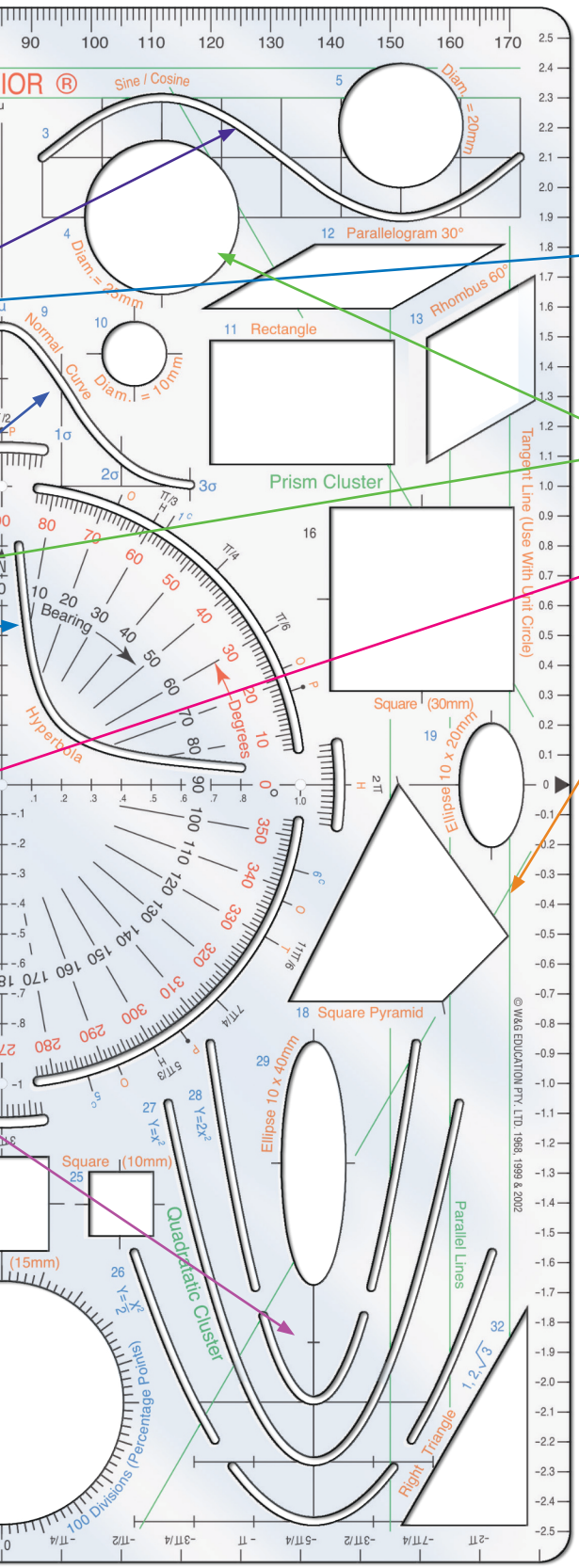
- Curves for graphing the following functions:
  - Sine and cosine in various amplitudes and periods
  - Tan
  - Exponential
  - Hyperbola
  - Cubic
  - Quadratic
- Statistical analysis can be represented using the normal frequency curve
- Full circle protractor. Centrally located for balance and precision when using the template for drawing. Scales for degrees, bearings, radians and for measuring sine and cosine.

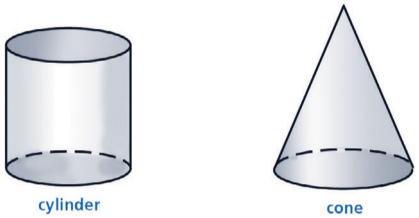


Neat, fast sketching of routine senior school mathematics classroom problems, and for project work over a wide range of subjects.



The precision in hand drawn sketches using Mathomat Senior encourages more skilful and creative presentation of classwork.



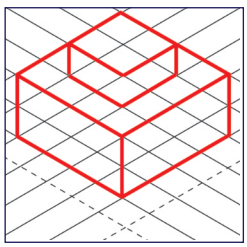


Special stencil shapes for sketching cylinder, cone and square pyramid. Assistsstudents with understanding surface area and volume relationships by drawing solids.

Range of useful shapes for drawing prisms, circles and ellipses.

Special triangles for trigonometry.

Perpendicular, parallel and isometric lines for technical and creative drawing.

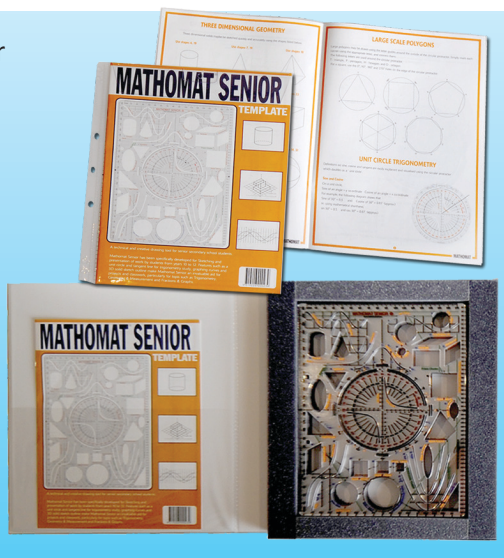


Mathomat Senior template with instruction in storage wallet.

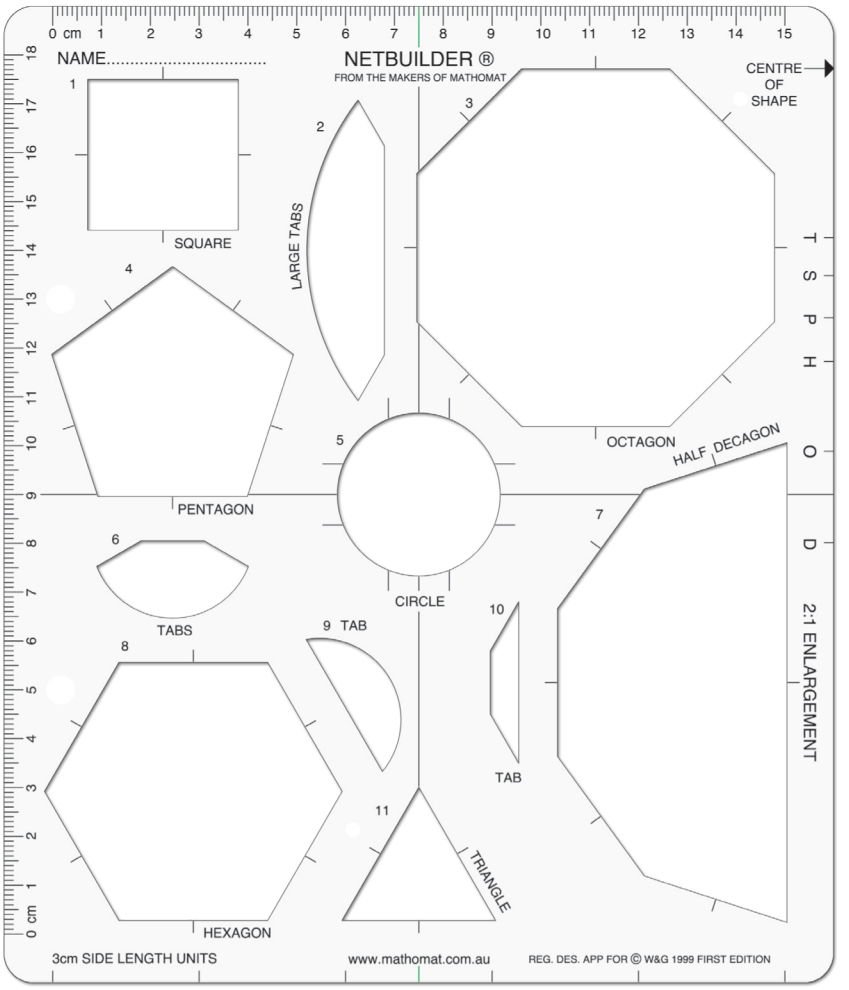
H4110200011

Class folder of 40 Mathomat Senior Templates.

H4110600006

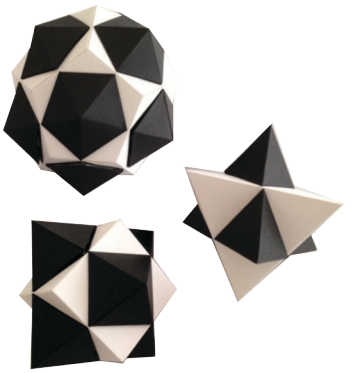


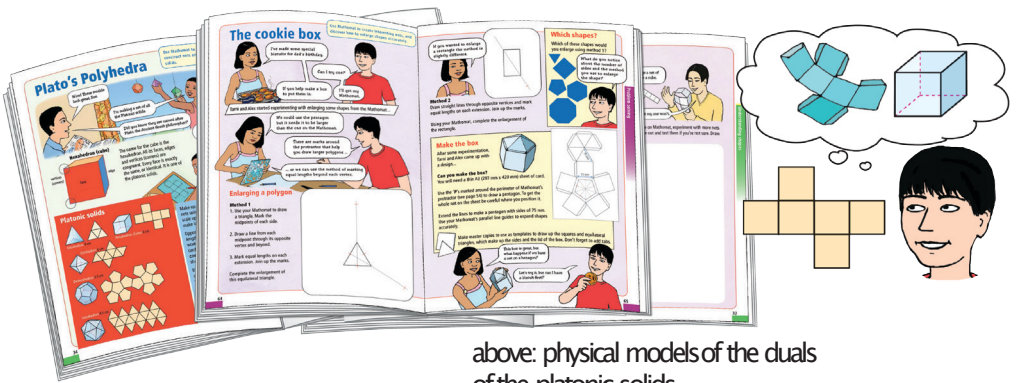
NETBUILDER™ template



Use the Netbuilder template to design and construct polyhedron and other solids.

Using Netbuilder develops students understanding of basic geometry concepts, improves ability to visualise solids and fosters an appreciation of the role of geometry in history.



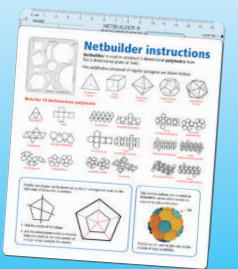


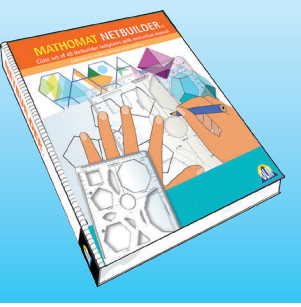
Netbuilder templates and rulers can be used to expand on investigations in the Mathomat V2 student book.

above: physical models of the duals of the platonic solids

Netbuilder in cardboard sleeve with instructions.

H4110200020



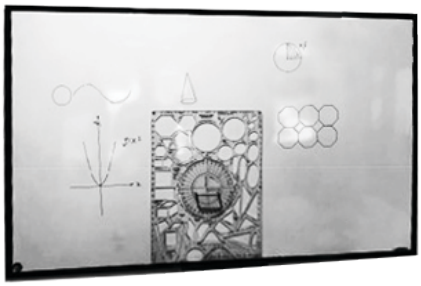


40 Netbuilder templates in storage folder.

H4110600010

Mathomat for whiteboards

The new Mathomat for whiteboards drawing tool is designed for large scale whiteboard sketches to discuss, or demonstrate, Mathomat activities in class – or simply for use as a helpful whiteboard tool in its own right.



Magnetic grip

The Mathomat WB-1 has magnetic patches to enhance its stability when used with magnetic whiteboards.

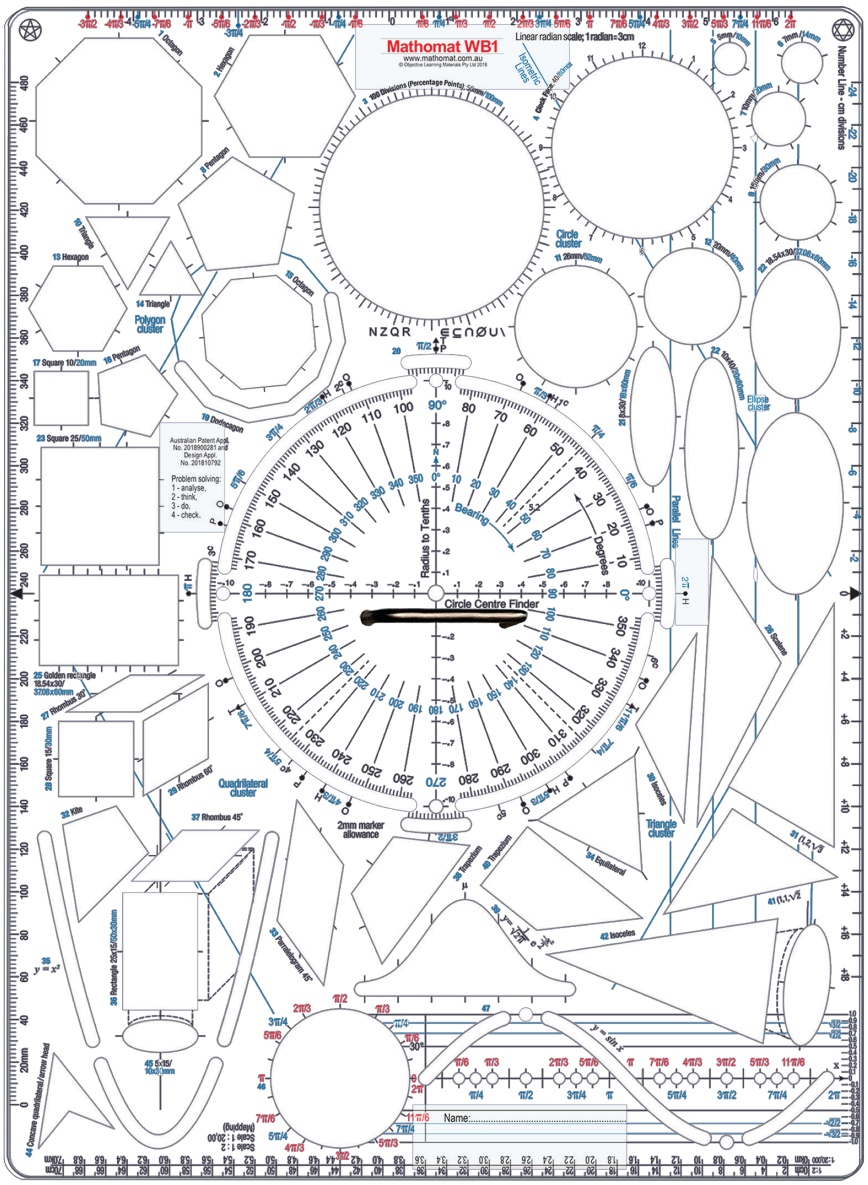
These help to prevent lateral shifting when drawing against the edges of the tool.

The Mathomat WB-1 is subject to Australian Patent number* 2018101269 and Australian design registration number 201810792

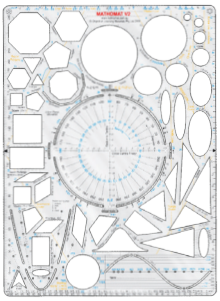
*further patent protection applied for.

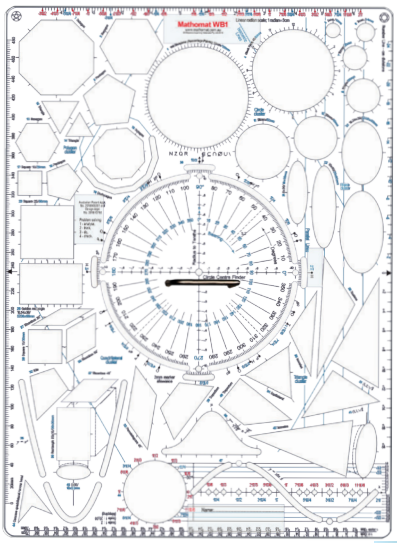
Mathomat WB-1 whiteboard template

H4110700900



The 190x260 mm normal Mathomat size in comparison with the 380x520mm Mathomat WB-1 size.





Mathomat: The Teacher's Manual

Chapter 1

Angles

Angles are used to define shape properties. They have proven to be the key to understanding many other geometrical ideas such as; concruency, similarity and tessellation, to name but a few.

Although angles and protractors go hand in hand, the formal measurement will only be covered in the last section of this chapter.

This chapter was written to deal with angles from where the student encountered them in solid 2D shapes as outside angles to where they are introduced as being on the inside of the polygon as well. We take it further than polygons and explore the close relationship that angles have with circles.

After all of the investigations on what precisely an angle is, where they are found and how we categorise them, the chapter is concluded by the formal measurement of an angle.

This chapter may be used as a stand-alone section on working with angles or to complement existing lessons on angles.

In Chapter 1

- What is an angle?
- Create an angle
- Visualizing and drawing
- Types of angles
- Identify by polygon properties
- Visualizing Angles
- Find and Measure Angles
- Transversals
- Conclusions

Vocabulary

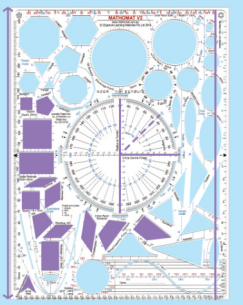
- Vertices
- Acute
- Obtuse
- Right-angled
- Reflex
- Straight line
- Vertically Opposite
- Corresponding
- Co-Interior
- Alternate

Revise before starting:

- Shape Properties 2D shapes
- Parallel lines
- Perpendicular lines
- Intersecting lines
- 90° Vertex of a square & rectangle
- Regular & Irregular shapes
- Clock-wise & anti-clockwise
- Properties of half a square

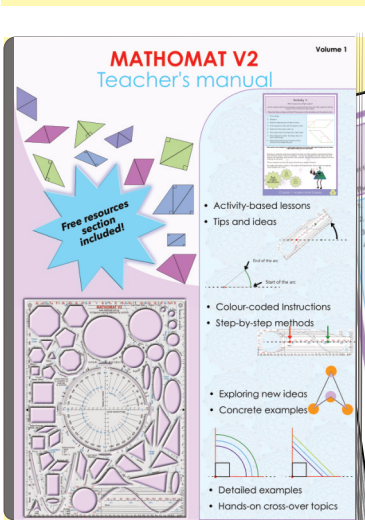
On the template:

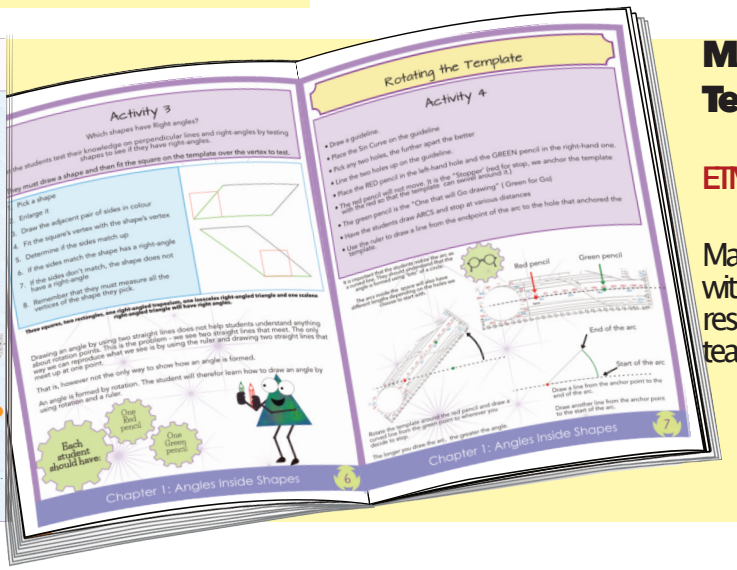
The shapes used in this chapter



Content summary and special focus

Checklist: Materials required and topic coverage





MATHOMAT Teacher's Manual

ETM 100 00001

Mathomat V2 Manual with lesson plans and a resource – section for teachers.

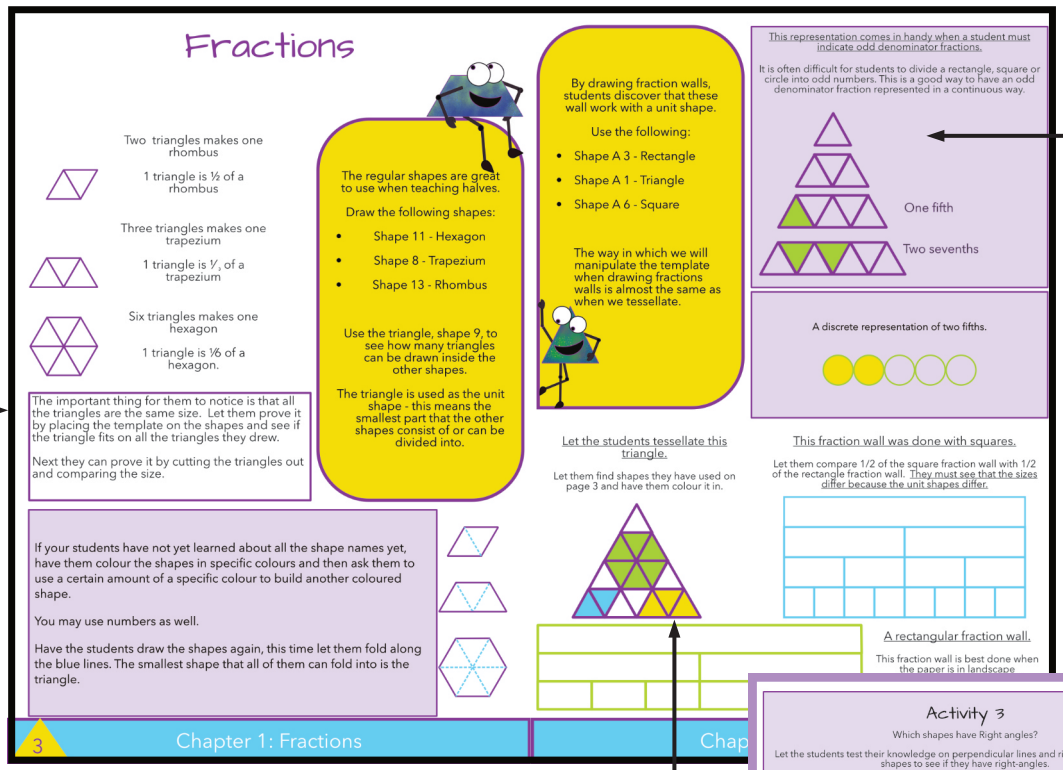
Some Excerpts from the Teacher's Manual

Structure:

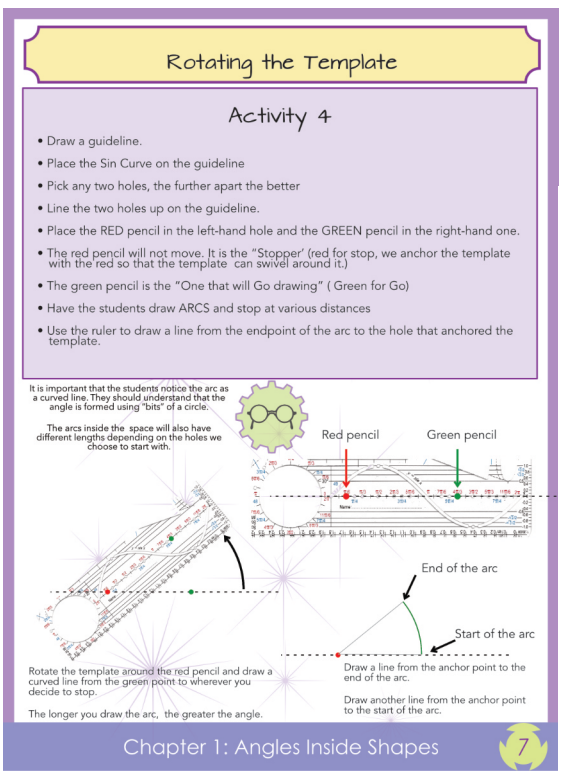
Practical ideas to build one topic into the next.

Examples

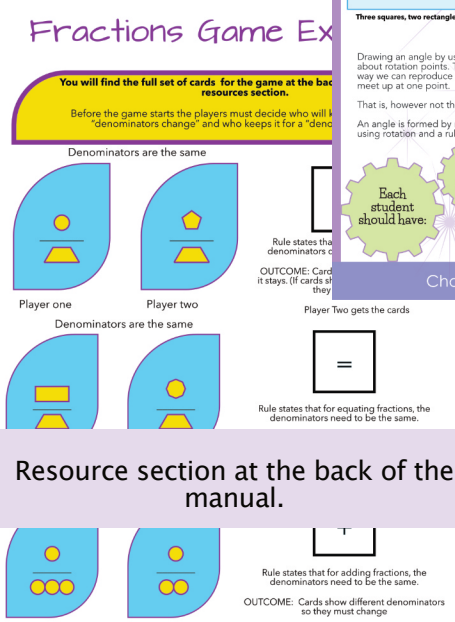
Main idea and focus area of topic along with practical application.



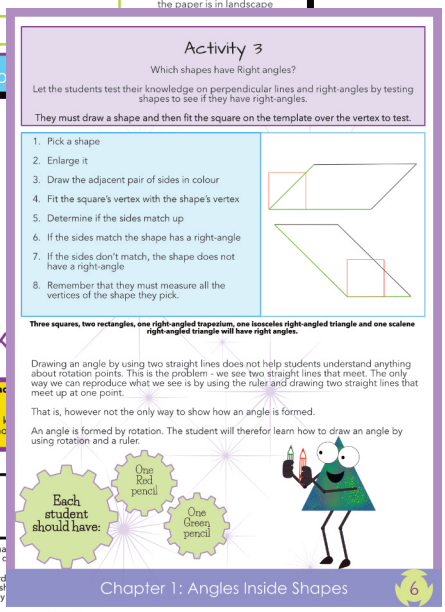
Bridging into different fields.



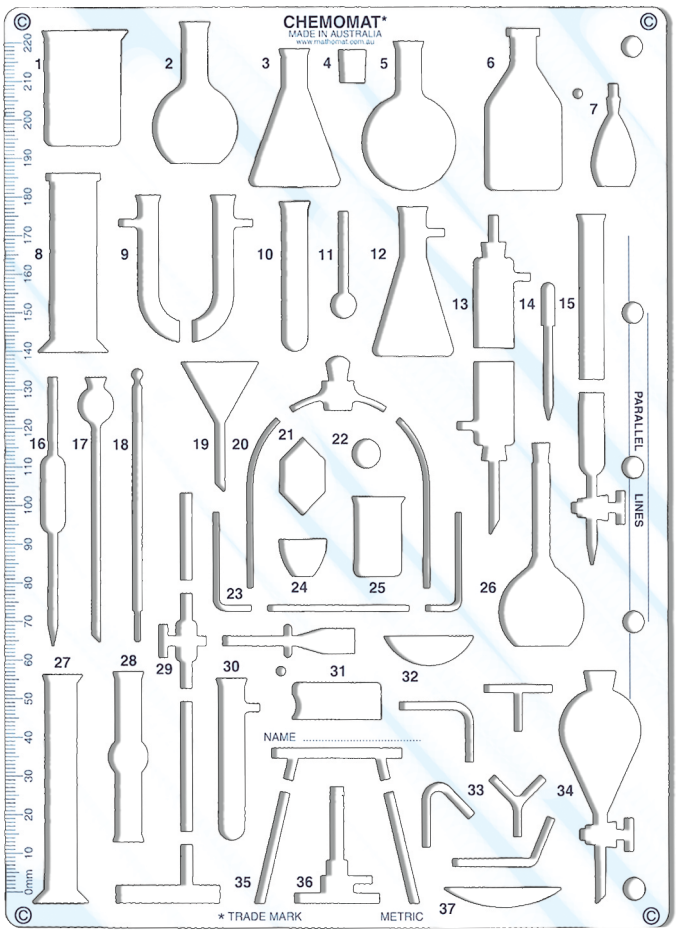
Easy to follow instructions.



Resource section at the back of the manual.



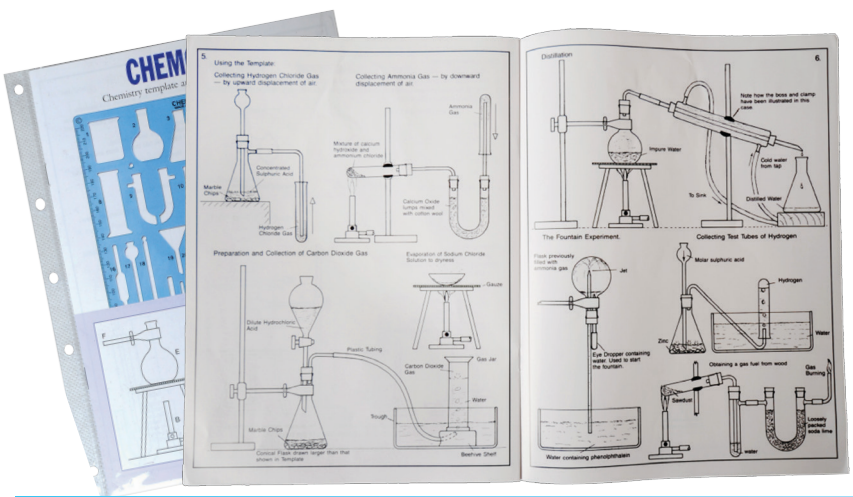
Lesson material seamlessly integrates with curriculum.



Chemomat template in storage wallet with instructions.

The **Chemomat** template is designed to help teachers and students of science and chemistrywith their notes, recording of experiments and presentation of findings.

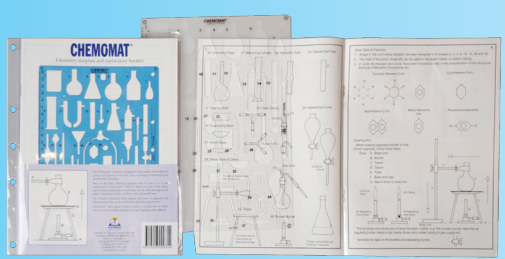
Most of the basic chemistry apparatus used in years 6 to 12 are represented in Chemomat. These 37 shapes are made in fine detail, and in correct proportion to each other, on the template. They are designed for optimal use on A4 paper. Chemomat includes a 220mm ruler, and parallel lines.



The illustrated instruction book that is supplied with Chemomat explains each piece of apparatus and illustrates how they can be combined in chemistry experiments. Chemomat offers greater freedom in presentation of school science work, by making detailed drawing of apparatus more efficient.

Chemomat template with instruction book in storage wallet.

H41 102 00003



Order form MATHOMAT

Tear out and use for conference and workshop orders, or scan and email from the office.
ERA - Distributors

Goods collected at conference ☐
Goods to be delivered to address below ☐ Ordernumber…….....Date……..
Deliverto: .....
.....
.....

Title code	Title	Unit price	Qty	Total value
Mathomat Primary geometry template				
H41 102 00050	Template in storage wallet with drawing ideas poster			
H41 102 00051	Template in storage wallet with illustrated instruction book			
H41 106 00008	Class set of 40 templates in storage folder with instructions			
Mathomat Version 2 geometry template				
H41 102 00200	Template in wallet with drawing ideas poster			
H41 102 00720	Template in wallet with 28 page instruction book			
H41 102 00800	Template in wallet with 116 page illustrated instruction book			
H41 106 00021	Class set of 40 templates in storage folder with illustrated instruction book			
Netbuilder template				
H41 102 00020	Netbuilder template in cardboard storage sleeve			
H41 106 00010	Class folder of 40 Netbuilder templates			
Mathomat for whiteboards				
H41 107 00900	Mathomat WB–1 whiteboard template 400 x 550mm			
Teaching with Mathomat				
ETM 100 00001	Teacher's manual – Volume 1			
Senior school templates				
H41 102 00011	Mathomat Senior template in wallet with instruction book			
H41 106 00006	Class set of 40 Mathomat Senior templates in storage binder with instruction book			
H41 102 00007	Forty Mathomat Senior templates in wallets. Bulk packed			
Classroom kits of templates				
H41 106 00011	Class set of 40 Mathomat V2 templates with four teacher resource books			
H41 106 00012	Four class sets of 40 templates (Mathomat V2, Mathomat Primary, Mathomat Senior and Netbuilder) with four teacher resource books			
H41 106 00013	Same as H41 106 00012 above but templates supplied in individual sleeves instead of folders			
	sub total			

Contact form MATHOMAT

Tear out and use for conference and workshop orders, or scan and email from the office.
ERA - Distributors

Goods collected at conference

Goods to be delivered to address below Ordernumber…….....Date……..

Deliver to:.....

.....

.....

Client information;

School / Institution: .....

Position: (Teacher, principal, parent etc) .....

District: .....
Province: .....
Cellphone: .....
Landline: .....

Email:

Credit card authority:
Mastercard ☐ Visa ☐

Expiry ☐☐☐☐

Card number ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

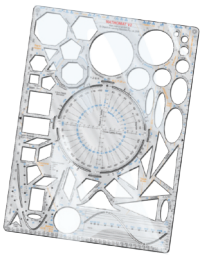
Security number ☐☐☐☐

Signature……..

sub total

Postage (To be calculated – please contact us for assistance)

Total



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North American Office

Darryl Moodley Mobile +1 2247039067 darryl@education-era.com

MATHOMAT®

Designedand developedin Australia by Objective Learning Materials Pty Ltd

A.T.F The Lawton Family Trust ABN 94 773 634 482

www.mathomat.com.au, www.lat-olm.com.au and www.wgaustralia.com.au

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