LESSON

1

Shape Up! Sort Me Out!

Years 4 to 8

Familiarisation with MATHOMAT

This lesson presents some activities for student exploration of the stencil shapes on the MATHOMAT. Students will become aware of the range of shapes available for tracing, as well as some possible classifications of these shapes.

In this lesson students will:

- classify and sort geometrical shapes;
- develop their knowledge of mathematical terminology; and
- identify properties of shapes.

Materials Required

For each student:

- a MATHOMAT;
- unlined paper (scrap paper will do);
- a fine-point pen or pencil;
- scissors (optional—see later sections for details); and
- a sheet of A4 paper to display their results (or, if students work in groups, one sheet of A3 card or paper per group to use as a poster).

Lesson Summary

- Introducing the MATHOMAT—free play;
- students group shapes according to categories of their choice;
- sharing and discussion;
- (optional extension) playing Guess My Family; and
- (further extension—if time is available) creating attractive designs with the MATHOMAT.

For the Teacher

The MATHOMAT template contains 40 stencils, as well as a protractor, various drawing guides and rulers.

The shapes include: triangles; rectangles; other quadrilaterals; a regular pentagon; regular hexagons; a regular octagon; circles; and ellipses.

Other drawing aids include: a sin/cos curve; parabolas; a circle centre finder; a protractor; parallel, perpendicular and isometric grid guides; a half regular dodecagon; and various rulers, including a number line and a radian scale.

The large number of features on the template may at first glance present a daunting (although exciting) array for the student. This lesson aims to familiarise students with the various shapes on the MATHOMAT in order to allow them to use it with confidence and ease in future lessons.

In this lesson, students devise their own system for grouping the shapes. They are encouraged to identify different properties of the various shapes and to practise their use of mathematical terminology.

To help students sort the shapes, they can trace the shapes onto paper, cut them out and move them between categories while they are developing their classification system. If you decide to run the lesson this way, students will require a pair of scissors each.

Lesson Outline

1. Introducing the MATHOMAT—free play

Ask students to use their MATHOMAT to make some designs of their choice and name each of the shapes used.

Include a brief sharing and discussion time to allow students to display their work and to alert other students to some of the possibilities.

2. Students group shapes according to their own choice of categories

This activity can be done individually or in groups.

Challenge students to find their own way of grouping the shapes and to produce a display of their results.

There are at least two ways to do this activity—which one you choose will depend on many factors including the year level of the students.

Students can trace all the MATHOMAT shapes onto a single sheet of paper, cut them out with scissors, decide on their categories as they try to sort the shapes, and finally record what they have done by drawing their groups onto a sheet of paper or a poster.

Alternatively, students can decide on their categories in advance, rule columns on a sheet of paper—using each category as a heading—and then draw each MATHOMAT shape directly under the appropriate heading.

In either case, all students should be prepared to describe their categories orally, while older students should also describe their categories in writing.

Do not insist that every shape is used, as some students may find the number of shapes overwhelming.

A few of the many possible ways of grouping the shapes are listed below:

- shapes with straight edges, shapes without straight edges;
- according to the number of vertices;
- shapes which contain parallel lines, shapes which do not; and
- shapes which contain at least two sides of equal length, shapes which do not.

Students often choose quite different and unexpected ways of grouping the shapes. This gives you a glimpse of what students see as compelling or pertinent properties of shapes and can suggest important features to discuss further with the class.

This activity provides an excellent opportunity for students to informally develop mathematical terminology.

3. Sharing and discussion

Select a few students to display their way of grouping the shapes.

Younger students can explain how they grouped their shapes to the rest of the class. With older students, the rest of the class can be challenged to come up with their own (oral or written) descriptions of the categories of the groupings shown.

Students will benefit from the opportunity to explain their sorting categories verbally. They will gain confidence in geometrical terminology and learn that other students may see different features as important when classifying the shapes.

4. (Optional extension) Guess My Family

This is a game for two or more players, which can also be played by the whole class.

A student chooses one of their (hidden) families of shapes and says ‘I have chosen a family. I will answer yes or no if you ask me if a shape is a member

of my family. I challenge you to name my family in as few questions as you can!'

The other students take it in turns to ask questions such as 'Is shape number 5 in your family?' or 'Do all the shapes in your family have straight edges?' The game ends when a student can correctly say 'Your family is …'.
By playing this game, students will be forced to become more precise in their use of mathematical terminology, as well as become more aware of the properties of the shapes with which they are dealing.

5. (Further extension—if time available) creating attractive designs with the MATHOMAT

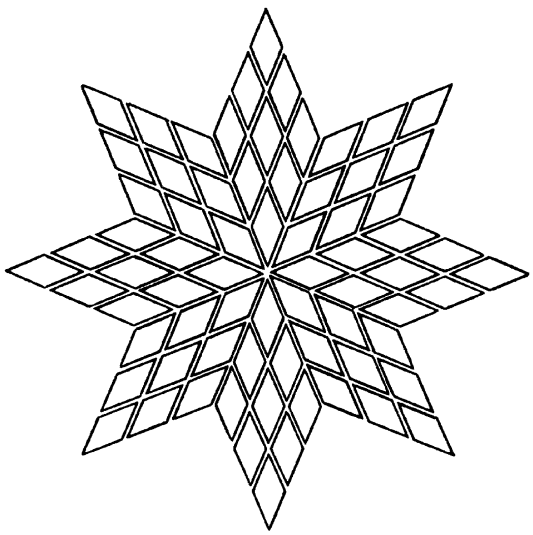
This is an extension of the first part of this lesson.

Challenge students to produce an attractive design using one or more MATHOMAT shapes. Ask students to list the numbers of the shapes used so that other students can reproduce their designs easily if they wish.

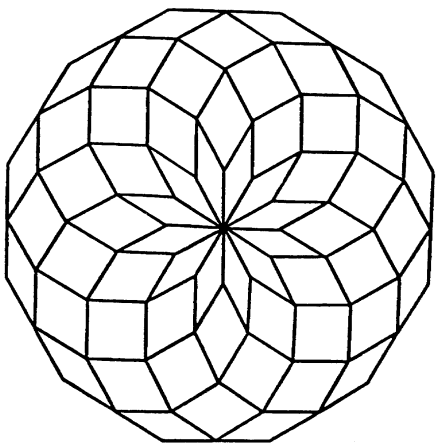
Encourage students to spend some time creating their designs. Their best designs can then be drawn on good quality paper, at home or in class. These designs can then be displayed and discussed in class at a later time.

Some examples of attractive designs can be found on page 7 of the MATHOMAT instruction book. A few of these are included below and overleaf.

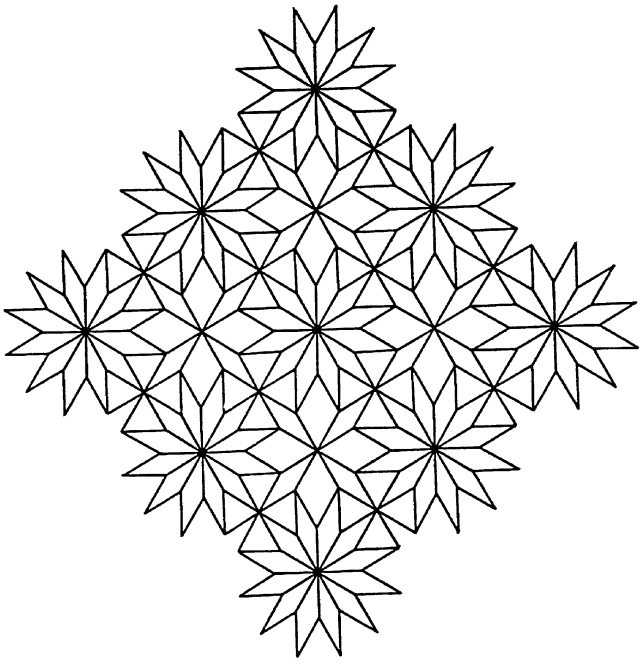
Shape 12 only



Shapes 16, 18, 19



Shapes 16, 19, 38



Shapes 16, 18, 19, 24