

Book 5

Key Stage 2 - Ages 9/10

Measurement in Mathematics Series

**Practical measuring activities for the
classroom.**

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OVERVIEW

This set of activities is designed to complement the teaching of measurement concepts in mathematics and to meet the requirements of the Numeracy Strategy as set down in Strategy documents. As such the book covers the concepts outlined below directed towards meeting curriculum references for:

- * *Making sense of number problems; Problems involving measures (length; mass; volume; time; capacity; area); Data handling.*
- * *Shape and space: Properties of 2D shapes; Properties of 3D shapes.*

The aim of providing such a set of activities is to foster the following attitudes in the student:

- ☐ Confidence in problem solving and experimentation and a willingness to express individual ideas and discoveries;
- ☐ An awareness of the relevance of maths in the everyday world;
- ☐ Pride in the levels of mathematical development achieved;
- ☐ An enjoyment in the pursuit of mathematical ideas and knowledge.

Specifically, the learning outcomes that are desired for a measurement strand involve not just an understanding of mathematical ideas and relationships but an understanding of the relationships of time in the metric system of measurement.

Ideally, after completion of this book, 9 - 10 year old students will be able to use many of the standard units to measure length, area, time, volume and capacity, and mass.

These activities assume exposure to and general mastery and development of the attitudes, understanding and skills of previous years. They are, wherever possible, relevant to real-life situations and are discovery based. It is hoped that they will engender enthusiasm and spirited discussion within the classroom.

Most of the activities in this book can be completed on the worksheet, however grid paper and pad paper are sometimes required. Each activity carries instructions that tell the student what will be required to complete the activity.

The activities have been designed so that each student can be responsible for the collection of the relevant materials for each worksheet. I have tried to use materials that would be readily available in the classroom when designing the activities.

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SUGGESTIONS FOR TEACHERS

The following suggestions relate to the various worksheets in each section.

LENGTH

Page 8 - Ribbon Riddles

Discuss how curved lines can be measured. Help will be needed to complete the recording stage of the activity. A suitable scale for recording the length of the ribbons in mm and cm will need to be discussed. The horizontal axis of the graph is used to record the number of ribbons that have a particular length; i.e. if there are two ribbons at 5 cm in length, then two 5 cm columns will be recorded on the graph. Children will need access to string for measuring.

Page 9 - Do You Measure Up?

Children will need to decide on a way of measuring the length of arms from shoulder to tip of middle fingers, face perimeter and waists.

Page 10 - Measuring Made Easy

Teachers will need to discuss the type of table and column headings needed to complete the activity. Also the function of a trundle wheel will need to be revised.

Page 11 - String Struggles

Children will need to work in pairs to complete a display chart showing estimated perimeter and actual perimeter of a closed curve using a method other than a ruler.

Page 12 - Using Circumference

Teachers will need to ensure children understand that perimeter is the distance around any shape and that circumference is a special term used for the perimeter of a circle.

At this stage, string used to measure circumference is appropriate, as are flat shapes like lids and bases of circular containers for initial measuring.

A large sheet of squared paper can be made by joining four A4 sheets together.

Page 13 - Using Squares

Children should record the shapes they have made onto squared paper, along with estimates and information about actual area and perimeter.

AREA

For most of the activities in this section, if wooden cubes are not available, paper or card squares cut from grid paper are appropriate.

VOLUME AND CAPACITY

Page 23 - I Wonder?

This activity requires three different containers with similar capacities but different shapes.

Page 25 - Lost In Space

When an object is placed in a container of water, the amount of water displaced is the volume of the object.

Displacement is an easy way to measure the volume of an irregular object. Similar sorts of activities as these can be undertaken later using a beaker calibrated in millimetres.

This activity examines the three ways to measure displacement:

1. Partly fill a container, mark the water level, place in the object and measure the distance the water level has risen.
2. Place the object in an empty container, fill or partly fill the container, mark the water level, remove the object, mark the new water level and measure the difference.
3. Fill a container to the top with water, place in the object, catch and measure the overflow.

MASS

Page 31 - Mystery Parcels

The concept here is to examine the relationship between surface area and mass. Choose containers that have roughly the same surface area but a different shape (single serve cereal boxes, margarine/butter containers with taped on lids, are ideal). Place a 'mystery object' inside each 'parcel' e.g. a lump of Plasticine will give a heavier result than an eraser. Allocate a red or blue spot to each container as a means of identification.

TIME

Page 37 - 24 Hours In Every Day

Verbalisation of readings using the 24 hour clock must be approached carefully. Children will need to be encouraged to find common usages of the 24 hour clock (e.g. bus timetables, police messages etc.). Reasons for the use of a 24 hour timetable need to be explored.

Name

LONG DISTANCE DRIVERS

You will need: blackboard ruler or tape measure,
toy car,
grid paper,
coloured pencils

Choose a car. From a starting line PUSH and release your car as far as you can (remember don't roll it over). Measure and record the distance it travelled.

Each member of the group needs to have 3 turns. Choose your best distance.

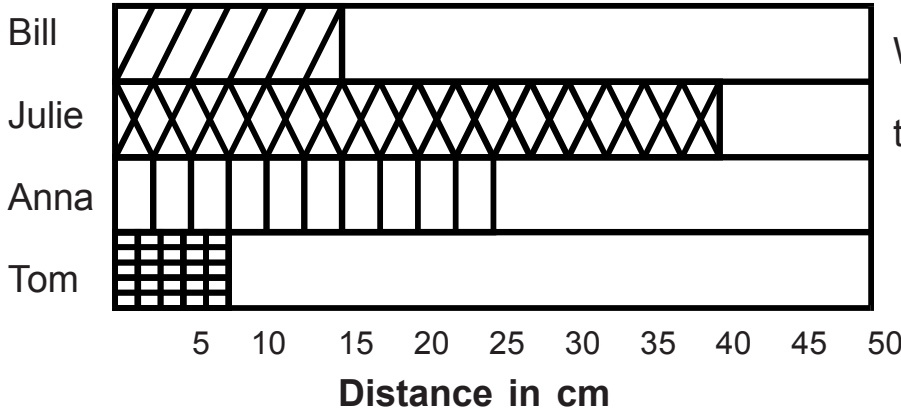
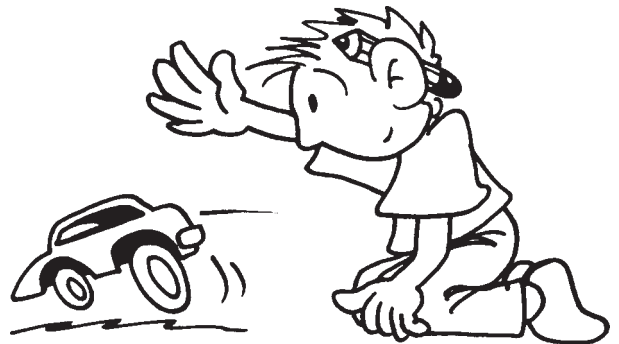
1.

2.

3.

Best Distance:

Show your group results in a graph like this.



What could you call this graph?

Now try it again with a rounded stone.

How far can you roll it?

1.

2.

3.

Best Distance:.....

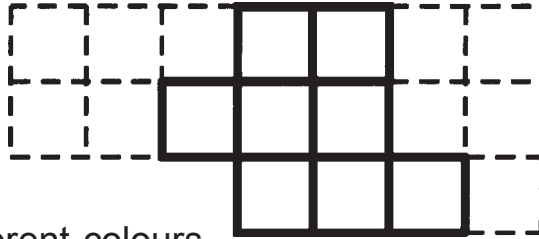


Name

USING SQUARES

- ☐ You will need: 1 cm grid paper,
coloured pencils

Your mission is to use only eight squares to make as many shapes on squared paper as you can.



- ☐ Colour each shape using different colours.

1. How will you calculate the perimeter of each of these shapes?

.....

2. Next to each of the shapes you have made on the squared paper, write the perimeter - remember to give your answers in cm.

What do you notice about the shape with the largest perimeter?

.....

3. Find the area of each of the shapes you have drawn. What do you notice?

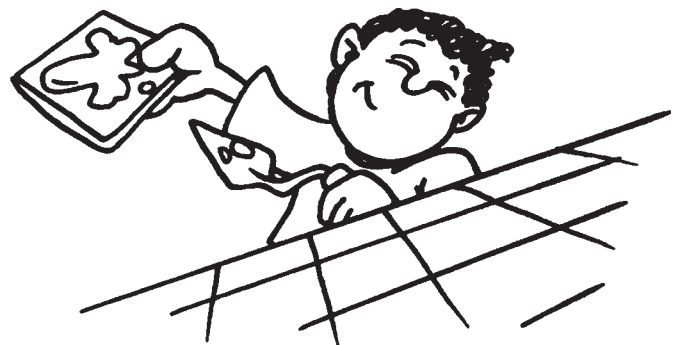
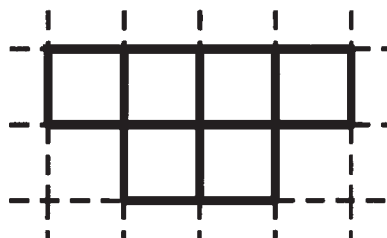
.....

4 Write a rule about finding the area of the shapes you have drawn.

.....

- ☐ Make as many shapes as possible using only 6 squares. Find the perimeter and area of each shape.

Try it out.



What did you find?

.....

Name

PERIMETER PROBLEMS

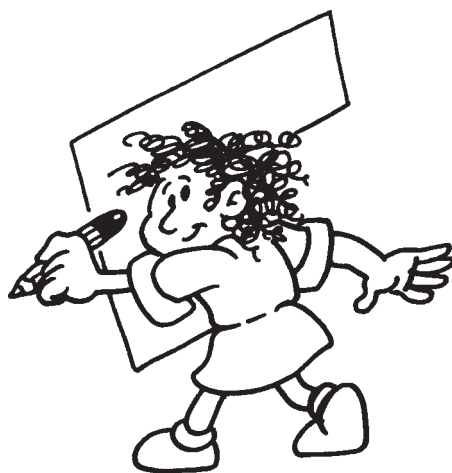
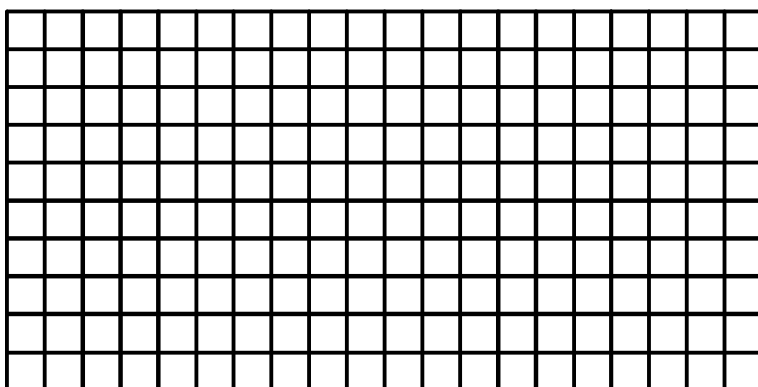
- ☐ You will need: thin card,
a piece of 1 cm grid paper,
scissors

Area means the amount of surface covered.

Area can be measured in millimetres squared (mm^2), centimetres squared (cm^2), metres squared (m^2) or kilometres squared (km^2).

Why do we need to know the area of a surface when we go to buy floor carpet or wall paint?

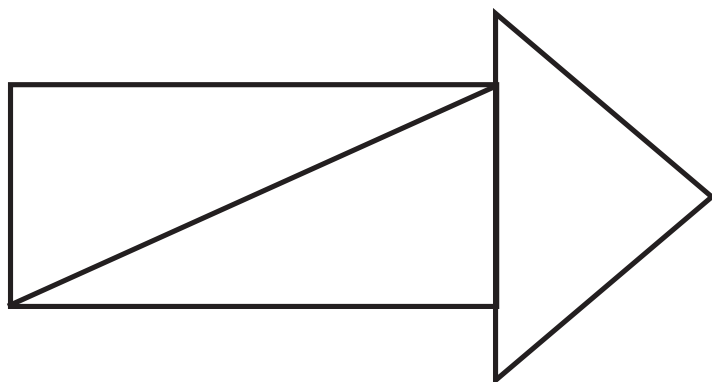
- ☐ On the grid below, see how many different shapes you can draw using only five squares. Use a coloured pen or marker.



Does the perimeter change with each shape?

What happens to the area of each shape?

- ☐ Copy this shape onto the thin card and cut it out.
How many different shapes can you make using just 3 pieces?



Trace around them
onto the back of this
sheet.

Does the perimeter change with each shape?

Does the area change each time?

Can you make this shape tessellate (cover a surface without overlapping and without leaving gaps)? Try it out on a sheet of squared paper.

Name

USING PART SQUARES 1

- ☐ You will need: a piece of 1 cm grid paper,
scissors,
sticky tape

When we measure area we use square units, but what happens when we have lots of part squares? How can we use them to help us find the area of a surface? Let's try.

- ☐ On your grid paper, draw a triangle that is 4 squares high and 4 squares wide.

Estimate the area of this triangle:..... square units.

Colour the full squares red and count them: square units.

Number the part squares 1, 2, 3, 4 as in the diagram.

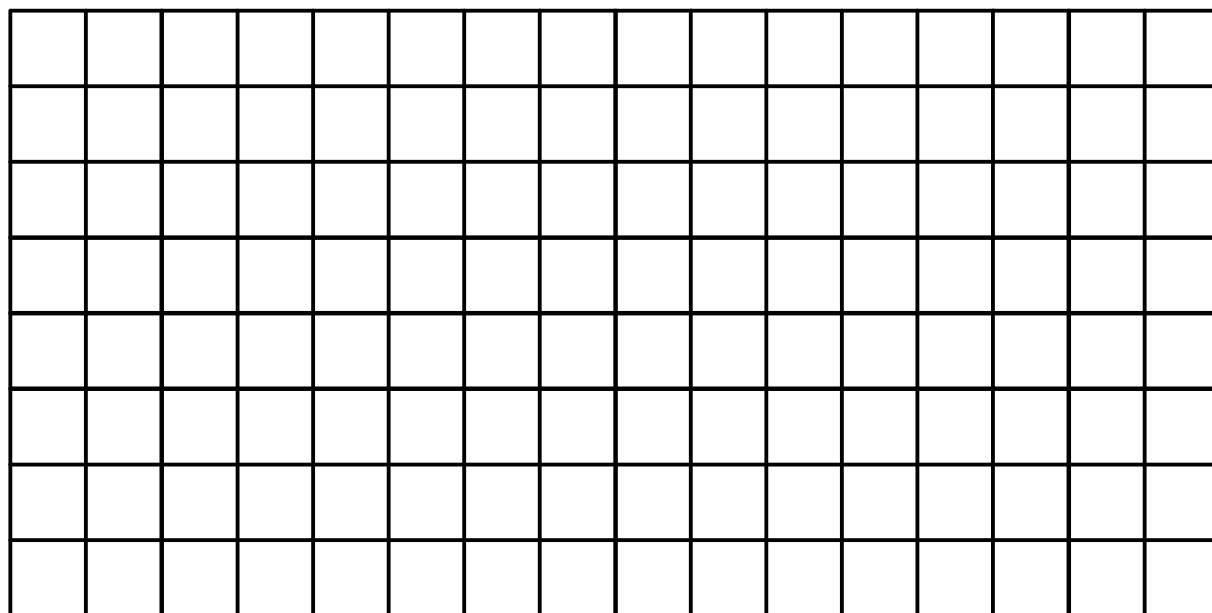
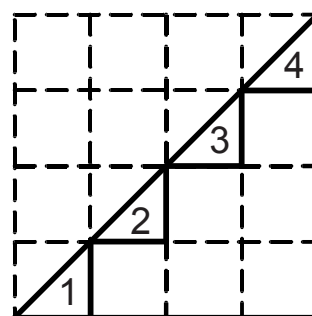
Cut out number 1 and make a full square by adding it to 2.

Try the same with 3 and 4.

Now how many full square units have you made?

What is the area of the triangle? square units.

- ☐ Use the grid below and draw another triangular shape.



Estimate the area: square units.

Count the full squares: square units.

Now you can add the part squares together to make full squares.

How many have you got now?

The surface area of the shape is square units.

Try This!

Draw another shape of your choice. Can you use the same method to find out the surface area in square units?

Name

mL or L?

When you see the letters *milli* in front of another word - like millilitre - it means thousand.

So it follows that there must be millilitres in one litre.

The short way to write these measures is to use the letter 'L' for litres and 'mL' for millilitres.

☐ See if you can complete the following table. Add one of your own examples.

SHORT	LONG
	one litre
27 mL	
15 mL	
	twenty millilitres

☐ The measurements used below are shown in different ways.

Can you work them out?

Bottle A holds 421 mL

Bottle B holds one litre and seventy-eight millilitres

Bottle C holds four hundred and thirty millilitres

Bottle D holds 704 mL

Which bottle holds the most?

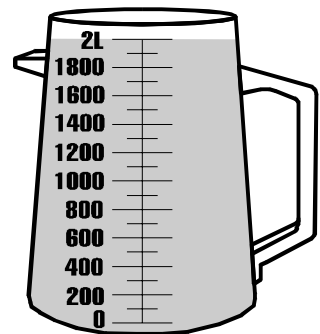
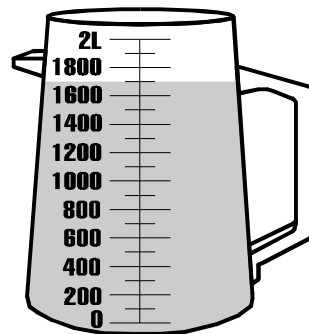
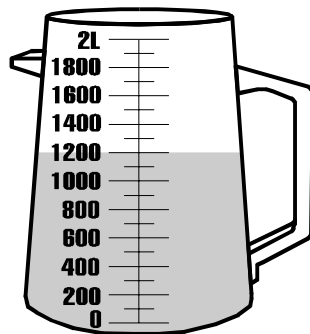
Which bottle holds the least?

Put them in order of capacity from least to most.



Brain Teasers

If 1000 mL is the same as 1 litre, approximately how many mL is each of these jugs holding?



What sort of containers hold about 1L of liquid?

What would you be likely to find in containers of 5L or more?