

4

Garden makeover

Coverage

This unit is about measurement. It covers measuring the lengths and widths of items and introduces perimeter, area and volume.

Use of a calculator is essential to this unit.

Revision of calculator skills is advisable before learners work on the examples.

Area is introduced using the idea of covering a surface area. Volume is introduced in relation to how much a cuboid will hold.

Regular shapes are revised from MSS2/E2.1, E2.2 and E2.3. Learners are introduced to tessellation problems and activities.

Revision of addition, subtraction, multiplication and division of decimals, and rounding in Level 1, Unit 2 might also be required before working with the exercises that use these skills.

Skills

MSS1/L1.4 read, estimate, measure and compare length, weight and capacity using common units and instruments

MSS1/L1.6 add and subtract common units of measure within the same system

MSS1/L1.7 convert units of measure in the same system

MSS1/L1.8 work out the perimeter of simple shapes

MSS1/L1.9 work out the area of rectangles

MSS1/L1.10 work out simple volume (e.g. cuboids)

MSS2/L1.1 solve problems using the mathematical properties of regular 2-D shapes (e.g. tessellation or symmetry)

MSS2/L1.2 draw 2-D shapes in different orientations using grids (e.g. in diagrams and plans)

Resources needed for effective teaching of this unit:

Demonstration	Group	Pair	Individual
Metre measuring tapes	Metre measuring tapes	Tape measures	Calculator
Tape measures	Tape measures	Rulers	Scissors
Rulers	Rulers		Paper
Set of regular shapes	Templates of regular shapes		
OHP and OHP calculator (desirable)			
Flipchart			
Cuboid – no lid			
Cubes or Denes or Multilink cubes			

Reminder

In the Links, H means Help, E means Extension and M means Mini-project.

Remember

Throughout the unit, be aware of the reading needs of learners.

You may need to read out parts of the text.

Words **highlighted in bold** will need particular clarification.

Context

- Discuss the scenario as a group.
- Some learners may be keen on gardening, or someone may have just moved house. Some of the group may be avid TV gardeners.

Stimulus questions

- Do you have a garden?
- Do you know how big your garden is?
- Do you ever watch the gardening programmes on TV?
- What would you do with a garden like Anil and Sam's?
- What maths skills do you think you might need?

Pages 2–3

Measuring the garden

Introduction to activity 1

- Discuss why it might be necessary to measure the garden.
- Remind learners that a square is a special rectangle; discuss the properties of a square and a rectangle.
- Demonstrate how to measure using a metre tape to the nearest cm, m or 0.1 m.
- Encourage the group to estimate the width of the room and then invite them to measure, with your support, and compare the estimate with the measurement.
- Reassure learners that estimation becomes more accurate with practice.
- Discuss Anil and Sam's garden measurements and compare them as a group.
- Work through the example.
- Compare yards and metres.
- Estimate the size of the classroom in yards and, if possible, measure it and compare it with the metric answers.

- Ensure learners know that $\frac{1}{2}$ is 0.5 and how to round this and $\frac{1}{4}$.

Activity 1

- Learners should work in pairs when measuring.
- Ask learners to choose the items they want to estimate, measure, round and record in the table.

Introduction to activity 2

- Discuss fencing with the group.
- Show learners that only three sides of the garden need fencing and explain why.
- Remind learners how to add and subtract decimals by adding digits in the same place value position. Ask learners to explain their methods of doing this without a calculator.
- Remind learners that 18 m is the same as 18.0 m; it can be useful to use the form 18.0 m when subtracting.
- Work through the example as a group, with learners filling in the gaps as answers are reached.
- Discuss why it is important to buy more (rather than less) in this situation.

Activity 2

- Learners work the questions individually or in pairs.

LINKS: H1, H2, M2

Page 4

Making a sandpit

Introduction to activity 3

- Discuss how a sandpit can be made and work through the example as a group.
- Introduce the word **perimeter** – the distance round the outside of a shape. Point out the difference between perimeter and the three sides needed to make a garden fence in activity 2 on the previous page.
- Stress that perimeters are lengths and that the units are m, cm or mm.

Activity 3

- Ask learners to complete the activity individually or in pairs.
- The last question is a short investigation and as such has several possible answers. Make sure that the shape declared matches with the learners' dimensions.

LINKS: H1, H3, E3, M3

Pages 5–6 Putting down a lawn

Introduction to activity 4

- This activity introduces the concept of area as the surface covered.
- Stress the idea of area being the surface covered using objects in the room, e.g. tables, desks, cupboards, the floor.
- Learners have already measured the lengths of some objects so use whole-number approximations to work out the areas and give an idea of the size of 1 m^2 and 1 cm^2 .
- Use the correct expression for the units so that learners get used to the sound.
- Write the units on a large display and point out the important features.
- Work through the example and lead the learners to discover the formula:
 $\text{area} = \text{length} \times \text{breadth}$.
- Work through a few examples.
- Stress that all lengths should be in the same units before calculating areas.

Activity 4

- Ask learners to work individually or in pairs.
- Watch for:
 - learners who ignore the mixed units
 - learners who have problems converting between metric units (covered in unit 2).

Introduction to activity 5

- Activity 5 involves tessellation.
- Make sure learners understand that tessellation means using one shape only and that there must be no gaps and no overlaps in the finished tiling.
- Make sure everyone knows the names of the shapes they are to use – perhaps write them on the board or flipchart alongside the shape.

Activity 5

- Learners can undertake this activity in pairs but should also be encouraged to produce some individual work.
- Learners' tessellations can be shown in a display.
- The questions can be answered as a discussion, but ensure that everyone has the correct answers.

LINKS: H4, H5, E2, E3, M1, M3

Pages 7–8 Soli's bricks

Introduction to activity 6

- This activity introduces the concept of volume.
- If cubes are available, undertake the introduction as a practical group activity. Use the colour scheme of red, blue and yellow so that learners can relate it easily to the work on the page.
- Stress that the volume is the space occupied by a 3-D object or the space within a container.
- Use cuboid objects in the room to give practice in calculating volumes.
- Use the volumes of objects to give an impression of the size of 1 m^3 , and relate 1 cm^3 to the size of a standard die.
- Work through the example.
- Discuss the formula.
- Try some other examples using the formula with simple numbers on a flipchart.
- Make sure that you write down the calculations so that learners understand the process.
- Use the correct units when speaking so that learners get used to the terms.

- Write the units on a display board and remind learners of the salient points relating to area. Explain that they also apply to volume.
- Stress that, as in area, when calculating volume, all lengths should be in the same unit before making any calculations.

Activity 6

- Ask learners to complete the activity individually and then check their work with another person.
- Check that learners are writing the units correctly.

Introduction to activity 7

- Here, the learners must convert one measurement from cm to m before multiplying.
- All measurements involve decimals.
- Point out that height, depth and thickness are all used to describe the third dimension.
- Remind learners that 8 cm is 0.08 m. Use other examples, e.g. 6 cm = 0.06 m; 12 cm = 0.12 m.

Activity 7

- Ask learners to complete the activity by filling in the gaps.
- As they progress through the activity, check that learners are writing the units correctly.
- Point out that these questions give a structure for working out cuboid volumes.

LINKS: H7

Page 9

Tubs for flowers

Introduction to activity 8

- This activity leads from the calculation of volume to capacity.
- The following is one way to differentiate between volume and capacity:
 - If the thing that you want to measure can sit on the ground and keep its shape, you need to work out the volume.

- If the thing you want to measure can't sit on the ground and keep its shape, e.g. compost, water, you need to work out the capacity.
- Discuss the equivalence of 1 cm³ (capacity) and 1 ml (volume).
- Ask how many ml in 1 litre (Entry 3).
- Discuss how to convert from cm³ to ml and to litres.
- Work through some simple examples on a flipchart.

Activity 8

- Learners can complete the activity individually or in pairs, or you can lead the group through the activity.
- Discuss volume and capacity and relate them to everyday situations, e.g. the capacity of a car engine, the volume of a box and even the volume of traffic.

LINKS: H6, E1, M1

Pages 10–11

What does the garden look like?

Introduction to activity 9

- Talk through what the activity is about – discuss when a plan may be useful.
- The scale is very simple – measure on the ground in metres and on paper in cm.
- Discuss the measurements learners made at the start of the unit. Remind them that these measurements were in metres. Discuss how they would draw a plan of the room. Work out the length of the line they would draw to show the length of the room.
- Ask learners to draw the line representing the length of the room on plain paper. They can check each other's work.
- Check that they are all measuring correctly.
- The information learners need for the table is in earlier activities in the unit (path and concrete strip, page 8; lawn, page 5; sandpit, page 4). Encourage learners to find the information for themselves.

Activity 9

- Learners can discuss the work with one another but they should make the measurements and complete the activity for themselves.
- The flowerbed is 0.4 cm wide. Encourage learners to be as accurate as possible but accept answers that are within 0.1 cm.

Activity 10

- Ask learners to do this individually or in pairs.
- Emphasise that some shapes will be more difficult to describe in terms of dimensions.
- Make sure that the learners write the correct units.

LINKS: M2, M3

Page 12 Tiling patterns

Activity 11

- Discuss fitting the tiles together.
- Sketch some ideas on a flipchart.
- Keep the use of square tiles to a minimum.
- Introduce the term 'right angle'.
- Discuss how angles are measured using degrees. Explain that a right angle is 90° .
- Discuss that four right angles fill a full turn with no gaps.
- Explain that two right angles and a straight line leave no gaps and that two right angles fit on a straight line.
- These properties can be related to fractions of turn or degrees, depending on the group or individual.
- Learners complete the activity individually or in pairs.

LINKS: H5, M3

Pages 13–14 Help

H1

- Ask learners to work in pairs or individually.
- Remind learners that the amount of fencing needed is the total of the four sides of a rectangle.

H2

- Ask learners to work in pairs or individually.
- Remind learners that there are 100 cm in 1 metre.
- Remind learners that to change from cm to m, we divide by 100. Revise how to do this.
- Look at the pattern in the first column to help change from m to cm. Discuss what learners should do.

H3

- Ask learners to work individually or in pairs.
- Remind learners that the perimeter is a length and the units are cm or m.
- Revise the properties of a pentagon and hexagon.
- Revise the meaning of 'regular'.

H4

- Ask learners to work individually or in pairs.
- Remind learners that for a rectangle:
 $\text{area} = \text{length} \times \text{width}$.
- Encourage learners to write down the calculation required.
- Remind learners that area is measured in units squared.

H5

- Learners work in pairs using sets of regular shapes.

H6

- Ask learners to work individually or in pairs.
- Remind learners that they must first work out the volume and then the capacity in litres.
- Remind learners to check that their units are correct on each line, as they change in the course of the question.

H7

- Ask learners to work individually or in pairs.
- Remind learners that
 $\text{volume} = \text{length} \times \text{width} \times \text{height}$.
- Remind learners that all lengths should be in the same units before multiplying.

Page 15 Extension

↑ E1

- Ask learners to work individually or in pairs.
- It may be necessary to point out that the volumes have been calculated already.

↑ E2

- Ask learners to work individually or in pairs.
- Check that the units are correct.

↑ E3

- Ask learners to work individually or in pairs.
- Learners may need help to identify the area to be calculated or its dimensions.

Page 16 Mini-projects

M1

- Discuss the method for answering questions 1 and 2.
- Discuss answers to question 3. Is it worth spending £4.99 for such a small amount?
- Discuss any information they bring to the group, together with any relevant questions that may arise.

M2

- Discuss how the information will be recorded.
- Discuss how this would help someone to plan their garden.

M3

- Discuss the details and negotiate with the learner if they would like to do this activity with something other than fencing or slabs, e.g. pathways, trees, play areas etc.

Pages 17–18 Check it

Use these questions to assess how learners have coped with the skills in this unit. Ask learners to indicate the areas in which they would like more help.

How am I doing?

To be completed by learners individually, with teacher support.