

# Maths and Me: 2nd Class – Short-Term Plan, Unit 17: Measuring 3 (May: Week 4)

Strand(s) &gt; Strand Unit(s)

Measures &gt; Measuring.

Learning Outcome(s)

Through appropriately playful and engaging learning experiences children should be able to compare, approximate and measure length, weight, capacity and area using appropriate instruments and record using appropriate units of measurement.

| Lesson | Focus of Learning (with Elements)   | CM | Learning Experiences  | Assessment   |
|--------|---|----|---|--|
| 1      | <b>Measuring Area:</b> Devises strategies to measure the area of a wide range of objects (A&PS); Evaluates the reasonableness of measurements with reference to estimations and personal benchmarks (R) |    | <div> <div>D</div> Notice &amp; Wonder L1                     <div>D</div> Think-Pair-Share L1–3                     <div>D</div> Reason &amp; Respond L1–3                     <div>C</div> Measuring Area L1                     <div>C</div> Measuring Area in Square Units L2                     <div>D</div> Three-Act Task L3                     <div>C</div> Making a Square Metre L3                 </div> <div> <b>Print resources</b><br/>                     Pupil's Book pages 104–106<br/>                     Home/School Links Book page 37<br/>                     PCMs 26–27 (from Unit 9)                 </div> | <b>Intuitive Assessment:</b><br>responding to emerging misconceptions<br><br><b>Planned Interactions:</b><br>responding to insights gleaned from children's responses to learning experiences<br><br><b>Assessment Events:</b><br>information gathered from completion of the unit assessment in the Progress Assessment Booklet pages 28–29 |
| 2      | <b>Counting and Comparing Square Units:</b> Compares the measurements of objects, using square units (U&C); Makes comparative statements or judgements (C)  |    |   |  |
| 3      | <b>Square Metres:</b> Identifies the square metre (sq m) as a standard unit for area (U&C); Discusses and records estimations and measurements, using square metres and symbols (e.g. sq m) (C)         |    |   |  |
| 4      | <b>Review and Reflect:</b> Reviews and reflects on learning (U&C)   |    |   |  |

**Key: Elements:** (U&C) Understanding and Connecting; (C) Communicating; (R) Reasoning; (A&PS) Applying and Problem-Solving. **CM:** *Cuntas Míosúil*: please tick when you have completed the focus of learning. **Learning Experiences:**

C

 concrete activity; 




D

 digital activity; 

P

 activity based on printed materials, followed by lesson numbers.

## Additional information for planning

|   |   |
|---|---|
|  <b>Progression Continua</b> | See '2nd Class <i>Maths and Me</i> Progression Continua Overview' for a detailed breakdown of how all progression continua are covered.   |
|  <b>Maths Language</b>       | See '2nd Class <i>Maths and Me</i> Maths Language Overview', individual lesson plans and Unit 17 Maths Language Cards.  |
|  <b>Equipment</b>            | See '2nd Class <i>Maths and Me</i> Maths Equipment Overview' and individual lesson plans.   |
| <b>Inclusive Practices</b>  | <ul style="list-style-type: none"> <li>● See Let's Strengthen and Let's Deepen suggestions throughout lesson plans.</li> <li>● See Unit 17 Let's Strengthen Suggestions for Teachers. (These address the Common Misconceptions and Difficulties listed below.)</li> <li>● See Unit 17 Let's Strengthen PCM.</li> <li>● See Unit 17 Let's Deepen PCM.</li> </ul> |
| <b>Integration</b>  | See individual lesson plans.  |

## Background and rationale

- This unit focuses primarily on attributes of area – the only attribute of measuring that has not been explored in 2nd Class, up to this point. By the end of this unit, all the learning experiences in the progression continua pertaining to measuring will have been addressed, at least once, with many having been addressed in all three measuring units.
- *Maths and Me* has incorporated a developmental progression that is both logical and appropriate to the class levels:
  - JI: Direct comparisons
  - SI: Reviews JI and introduces indirect comparison, i.e. using units to measure
  - 1st Class: Reviews SI and introduces measuring using square units
  - 2nd Class: Reviews 1st Class and introduces measuring using square metres.
- Using standard units for measuring is introduced in 1st Class and developed in 2nd Class. During these years, it is important that the children appreciate that without standard units it is difficult to communicate measurements effectively or compare the measurements of two or more objects.
- As using the  $m^2$  symbol is quite abstract for children at this stage, they will instead encounter 'sq m' as an abbreviation for square metres.

The theme of this unit is **The Playground**.

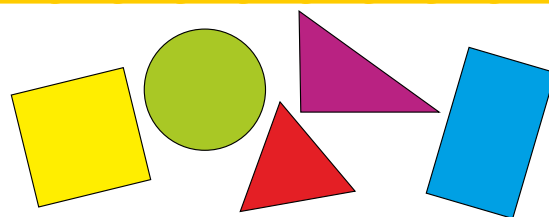
## Common misconceptions and difficulties

- The children might think a shape has a greater area because it's longer. When comparing two similar shapes, have the children line them up evenly (e.g. match a corner and two sides). Another way to compare is to see how many of the same-sized squares it takes to cover each shape.
- They may not understand that, for accuracy, when measuring using multiple non-standard units, the objects being used must: be of uniform shape and size; be laid side by side with no overlaps or gaps between them; fill the whole area/space inside the shape.
- The children may not realise that it is most efficient to use smaller units for measuring smaller areas, and bigger units for measuring bigger areas.
- They may not recognise the relationship between the size of units and the number of units needed to measure area (e.g. more smaller units than bigger units are needed to measure the area of the same object).
- They may confuse area (the space taken up by a flat or 2-D shape) with volume. For example: If asked to compare the area of a lid or box with sides, they may incorrectly judge the one with taller sides to have the greater area.
- They may not understand why squares are the best unit to measure area (i.e. they tessellate without gaps and, when rotated, they look the same and fit in exactly the same space).
- They may not recognise the 'conservation of area' (e.g. when 12 squares are rearranged to form different shapes, their area remains the same).

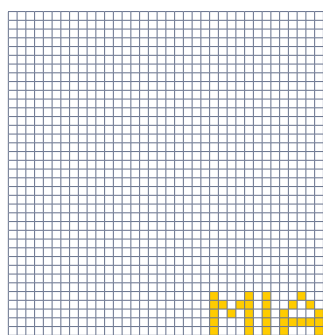
The Unit 17 Let's Strengthen Suggestions for Teachers address the common misconceptions and difficulties listed above.

## Mathematical models and representations

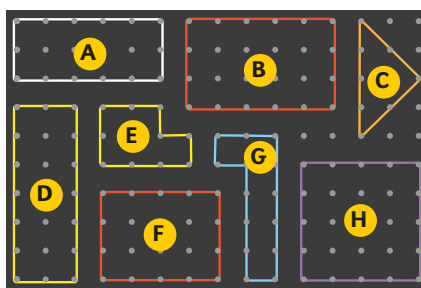
- Various 2-D shapes
- Square grids/dot grids
- Representations of pattern blocks and geoboards
- Representations of real objects (e.g. playing cards)
- Metre rulers and measuring tapes



2-D shapes



Square grid



Geoboard

### Teaching tip

2-D Shapes and Square Grid manipulative printables are available to support this unit. Click on the resources icon on the *Maths and Me* book cover on [edcolearning.ie](http://edcolearning.ie)

## Day 1, Lesson 1

## Measuring Area

## Focus of learning (with Elements)

- Devises strategies to measure the area of a wide range of objects (A&PS)
- Evaluates the reasonableness of measurements with reference to estimations and personal benchmarks (R)

## Learning experiences

- D** Digital activity: The Park (1)  
**MAM Routines: Notice & Wonder, with Think-Pair-Share; Reason & Respond**
- C** Concrete activity: Measuring Area
- P** Pupil's Book page 104: Measuring Area

## Equipment

- Copies
- Playing cards
- Base ten blocks (hundreds/flats)
- Any available resources of uniform shape and size, such as index cards, books, readers, dominoes, sticky notes, envelopes, pages, sheets of paper and paper plates

## Maths language

- area, covers a large/a larger/the largest area, covers less, greatest, least, measure, unit, estimate, row, column

## Warm-up

- D** **Digital activity: The Park (1)**  
**MAM Routines: Notice & Wonder, with Think-Pair-Share**

Display the poster and, using Think-Pair-Share, ask:

- What do you notice?
- What do you wonder?

Record the children's responses to both questions on the board. Allow the children the opportunity to respond to (agree/disagree with or query) others' responses, but do not confirm or reject any of the ideas. Note any 'wonderings' that could become the basis for a subsequent maths investigation.

## Main event

- D** **Digital activity: The Park (1)**  
**MAM Routine: Reason & Respond**

Display the poster. Ask the children to answer the questions below and to give reasons for their responses (some of these questions may have already been answered in the warm-up):

- This is a view of what? Why do you think this?
- This is a view of a playground. What is this type of view called? (aerial view/bird's-eye view; covered in Unit 9: Location and Transformation)
- Which section is larger: the car park or the grass? Explain why.
- Which covers more space: the circular picnic table or the circular pond?

- What is the maths word for the space that a shape covers or the space inside a shape? (the area)
- Which has the greater area: the sand pit or the pond?
- Which part of the park has the greatest area?
- Do all the car parking spaces have the same area?
- Explain why one of the car parking spaces has a greater area.
- What other area questions could be asked about this image?

**C Concrete activity: Measuring Area**

Allow the children to explore and examine the available equipment (see equipment list on previous page). Ask:



- Which of these items might you use to measure the area of your desk? Explain why.
- Which item might not be suitable to measure the area of your desk? Explain why.
- When measuring, what should you do to ensure that your results are reliable? (Units should be of uniform shape and size, should be laid side by side with no gaps or overlaps, and should fill the entire area of the desk.)

**Let's strengthen**

The children may need to be reminded that it is most efficient to use smaller units for measuring small items, and larger units for measuring larger items.

Allow each group to pick a unit with which to measure their desk. Say/ask:

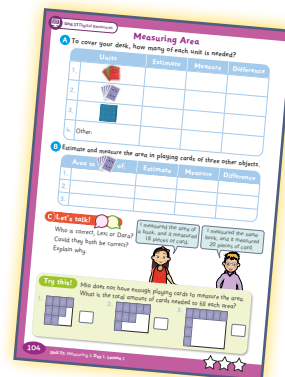
- Estimate the area of your desk in the units you have chosen. Record the estimate on your MWB.
- Place one row of units along the length of your desk. Do you wish to change your estimate? Explain why.
- Place one column of units along the width of your desk. Do you wish to change your estimate? Explain why.
- Finish measuring the area of your desk. What did you find out?
- What strategy did you use to find an answer?
- How did you ensure that your answer was fair and reliable/accurate?
- Find another piece of furniture in the classroom that has an area greater than/less than that of your desk. How could you prove this? (When comparing areas, if the children choose different sized units to measure each, prompt them to consider if this would be a fair comparison.)

**Let's deepen**

Challenge the children to suggest how best to record the area of items that are not equal to whole-number answers:

- What if the measure is four and a bit?
- What can we do about the bit?

Prompt the children to ascertain how much of the unit is being considered: a big bit, a small bit, almost a full piece, about a half, about a quarter? How could this be justified?

**P Pupil's Book page 104: Measuring Area****Teaching tip**

Activity A: As there may not be sufficient resources, the children do not need to do the measuring tasks in the order given. Instead, each group can work with an available set of resources and then change to the next available set. Also, if there are insufficient base ten blocks (hundreds/flats) change to a different available resource of uniform shape and size (see Equipment section for suggestions). Ask the children to place just one of each unit on their desk/maths copy initially and estimate from that.

While the activity asks the children to measure the area of their desk, it does so using different units, thus encouraging the children to recognise the relationship between the size of units and the number of units needed to measure area (e.g. more smaller units than bigger units are needed to measure the area of the same item). They may also begin to realise that it is difficult to compare objects if they are measured with different units. Afterwards, ask:

- Which unit did you need the most/least of? Explain why.
- Which unit was the best for measuring area? Explain why. (Squares: they tessellate and fit in exactly the same space when rotated.)
- Which unit did not work well? Explain why. (Circular objects do not work well because there is lots of space left uncovered.)

**Let's strengthen**

- Activities A and B: The children may benefit from being able to lay out a row and a column of units, along the length and width respectively, before recording their estimate each time.
- **Try this!** Some children may draw the grid lines across the shapes, and write the number of each square within, to keep the count. (See also the Unit 17 Let's Strengthen PCM.)

## Optional consolidation and extension possibilities

**STEM Project** This unit could be used as a springboard into a bigger STEM project, based around the topic of the playground, e.g. exploring the effect of friction on a slide, movement on a swing, designing and making a playground for a small doll or figure, and so on.

**Games Bank** Play 'Estimate'.

**Story** Read *Bigger, Better, Best!* by Stuart J. Murphy, or listen to a reading at: [edco.ie/uffm](http://edco.ie/uffm)

**Mosaic Art** Create expressive mosaic images to represent personal or imaginative life. This can be done with small paper pieces of various 2-D shapes, by repeatedly tracing around, filling in and repositioning the shapes; and/or using digital software/apps, such as: [edco.ie/239z](http://edco.ie/239z) or [edco.ie/cdbd](http://edco.ie/cdbd). Afterwards, depending on the shapes used, the image(s) can be examined through the lens of area (the area of different shapes and/or colours used, etc.).

**Integration** Language: Gaeilge: Caitheamh aimsire, An Aimsir – An Samhradh. Geography: Human environments (The Playground/Park); map skills. Visual Arts: Making, looking at and responding to prints and discussing the area of various prints; Making, looking and responding to mosaics and discussing their area.

**Area Display** Set up a display for area, or add examples of area to an existing Measuring display. The children contribute samples of their own work/constructions from this unit and label them (e.g. Mosaic art above). Include images of the various surfaces the children have covered, as well as appropriate labels (see Unit 17 Maths Language Cards).

**Review and Reflect** Use the Prompt Questions Poster.

### Day 2, Lesson 2

## Counting and Comparing Square Units

### Focus of learning (with Elements)

- Compares the measurements of objects, using square units (U&C)
- Makes comparative statements or judgements (C)

### Learning experiences

- D** Digital activity: Same But Different (1)  
**MAM Routines: Reason & Respond, with Think-Pair-Share**
- D** Digital activity: The Park (2)  
**MAM Routine: Reason & Respond**
- C** Concrete activity: Measuring Area in Square Units
- P** Pupil's Book page 105: Counting and Comparing Square Units

### Equipment

- Squares, such as square tiles\*, squares from pattern blocks, tangram pieces, interlocking cubes, base ten blocks (ones and hundreds), square sticky notes
  - A copy of the same book (for each child)
- \* Square foam/plastic tiles from an educational supplier are ideal for measuring area in square units.

### Maths language

- square units, greater than (>), less than (<)

## Warm-up

- D** Digital activity: Same But Different (1)  
**MAM Routines: Reason & Respond, with Think-Pair-Share**

Display the slideshow. Using Think-Pair-Share, ask the children to propose reasons for why the images are the same and why they are different.



## Main event



### D Digital activity: The Park (2)

**MAM Routine: Reason & Respond**

Display the slideshow, which shows the same image of the park from the previous lesson. Look at Slide 1 and click to play or ask:



- Which part of the park has the greatest area?
- How can we prove which section has the largest area?

Display Slide 2, which includes a grid overlay, and ask:

- What do you notice?
- Does this help to prove which section has the largest area? How?
- What is the area of the playground?
- What is the area of the car park?

### Let's deepen

Challenge the children to consider how they might work out the area of parts of the park that are not rectangular.

### C Concrete activity: Measuring Area in Square Units

Allow the children to explore and examine the available squares. Ensure that each child has a copy of the same book. Then ask:

- Which of the squares might you use to measure the area of the book? Explain why.
- Which squares might not be suitable to measure the area of the book? Explain why.
- When measuring, what should you do to ensure that your results are reliable? (Units should be of uniform shape and size, should be laid side by side with no gaps or overlaps, and should fill the entire area of the book.)

Allow each group to pick a unit to measure their books with. Say/ask:

- Estimate the area of your book in the units you have chosen. Record the estimate on your MWBs.
- Place one row of units along the length of your book. Do you wish to change your estimate? Explain why.
- Place one column of units along the width of your book. Do you wish to change your estimate? Explain why.
- Finish measuring the area of your book. What did you find out?

- What strategy did you use to find an answer?
- How did you ensure that your answer was fair and reliable/accurate?

Repeat as required, using other appropriate items in the room.

### Let's strengthen

The children may need to be reminded to use smaller units for measuring small items, and larger units for measuring larger items.

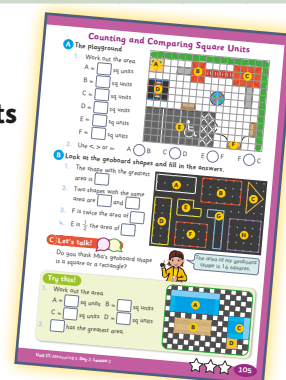
### Let's deepen

Challenge the children to suggest how best to record the area of items that are not equal to whole-number answers:

- What if the measure is four and a bit?
- What can we do about the bit?

Prompt the children to ascertain how much of the unit is being considered: a big bit, a small bit, almost a full piece, about a half, about a quarter? How could this be justified?

### P Pupil's Book page 105: Counting and Comparing Square Units



**Activity B:** After completing the activity, ask the children to justify which has the greatest or least area. If, for example, they say that Shape H has the greatest area because its area is 16, ask them to prove how they know that 16 is the greatest number (e.g. by using a 100 square, number line or base ten blocks).

### Let's strengthen

**Try this!** Some children may draw the grid lines across the shapes, and write the number of each square within, to keep the count. (See also the Unit 17 Let's Strengthen PCM.)

## Optional consolidation and extension possibilities

**Maths Eyes** Look for examples of area in square units at school and at home, e.g. square walls, floors, ceiling tiles and concrete slabs.

**Mosaic Art** Create a house, a robot, or an alien. Use small paper squares, colourful sticky notes or colour grid squares from maths copies and/or the Unit 9 PCM 26: 1 cm Square Grid or PCM 27: 2 cm Square Grid. Digital software/apps can also be used, e.g. [edco.ie/239z](https://edco.ie/239z) or [edco.ie/cdbd](https://edco.ie/cdbd). Afterwards, measure the area in square units.

**Square Drawings** Using PCM 26: 1 cm Square Grid or PCM 27: 2cm Square Grid, the children could create their own square drawings. Afterwards, ask them to work out the area of their drawing and/or the area of each colour used.

**Story** Read *Sam's Sneaker Squares* by Nat Gabriel.

**Games Bank** Play 'Squares' or 'Capture the Area'.

**Home/School Links Book** Page 37 can be done at any stage after this lesson.

**Review and Reflect** Use the Prompt Questions Poster.

### Days 3 and 4, Lesson 3

## Square Metres

### Focus of learning (with Elements)

- Identifies the square metre (sq m) as a standard unit for area (U&C)
- Discusses and records estimations and measurements, using square metres and symbols (e.g. sq m) (C)

### Learning experiences

- D** Digital activity: Same But Different (2)  
**MAM Routines: Reason & Respond, with Think-Pair-Share**
- D** Digital activity: Square Fitting **MAM Routine: Three-Act Task**
- C** Concrete activity: Making a Square Metre
- P** Pupil's Book page 106: Square Metres

### Equipment

- Metre rulers
- Measuring tapes
- Resources to make a square metre (e.g. chalk, non-permanent markers, masking/insulating tape, large pieces of chart paper/wallpaper/newspaper/cardboard, sticky tape, fabric, etc.)

### Maths language

- square metre (sq m)

## Warm-up

- D** Digital activity: Same But Different (2)  
**MAM Routines: Reason & Respond, with Think-Pair-Share**

Display the slideshow. Using Think-Pair-Share, ask the children to propose reasons for why the images are the same and why they are different.

## Main event

- D** Digital activity: Square Fitting  
**MAM Routine: Three-Act Task**

### Act 1: Notice & Wonder

Play the video, which shows a square metre being laid out in metre sticks.  
Using Think-Pair-Share, ask:



- What do you notice?
- What do you wonder?

Record the children's responses to both questions on the board. Allow the children the opportunity to agree/disagree with or query others' responses, but do not confirm or reject any of the ideas.



- (Reveal the focus question.) How many children could fit inside a square metre when standing?

You could also ask:

- Why is this called a 'square metre'?

### Act 2: Productive Struggle

Using Think-Pair-Share, with Write-Hide-Show, click to play or say:

- Write an estimate that is too high on your MWB.
- Write an estimate that is too low.
- Now write a reasonable estimate.

The children work in pairs or small groups to consider the focus question. If necessary, prompt them by asking:

- Do you have enough information? What else do you need to know?

Once the children explain what they feel they also need to know, click to flip the image and play the next video and ask:

- What information do you have now?
- To get an answer, what needs to be done?
- What strategies can you use?

Using Build it; Sketch it; Write it, the children choose their preferred way to mathematically model their strategies/solution(s).

### Act 3: The Big Reveal

The children share and discuss their strategies, solutions and models. Click to play or ask:

- What answer did you get?
- What strategies did you use to get the answer?
- What do you think was the most efficient strategy?

Then click to flip the image and play the 'big reveal' video, which shows that four children could fit inside the square metre when standing.

- Is this the answer that you expected? Why or why not?
- What 'I wonder' questions did you answer?
- Do you have any new 'I wonder' questions?

You could also ask:

- How many square metres would be needed to fit all the children in your class?

### C Concrete activity: Making a Square Metre

Explain to the children that they will work in groups to make a square metre. Ask:

- How did they make a square metre in the video?
- How else could this be done?

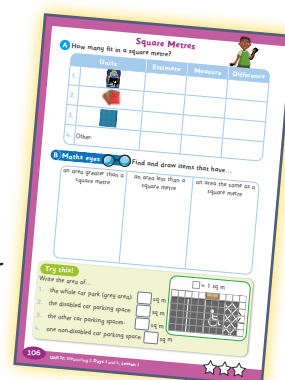
Allow the children time to discuss and consider how they might do it. If required, some of the following suggestions could be considered (many of these will also depend on the resources available):

- Use metre sticks and chalk to draw a square metre outdoors (e.g. lines on the basketball court for two sides).
- Use non-permanent markers to draw a metre square on the classroom/hall floor.
- Use masking tape or insulating tape to mark out a square metre on the floor.
- Use four metre measuring tapes (paper or otherwise), which can be taped to the floor.
- Use large pieces of chart paper/wallpaper/newspaper/cardboard and sticky tape to construct a metre square.
- Cut up large pieces of fabric (e.g. old duvet covers) into square metres.
- When each group has made a square metre, they could choose one of the investigations below.

**Let's Investigate:** How many children fit into a square metre, and how many square metres would be needed to fit the whole class?

**Let's Investigate:** What items are about/less than/greater than a square metre in area? For example: Consider a classroom desk. Then, what about two desks pushed together?

### P Pupil's Book page 106: Square Metres



The children work in pairs or small groups to complete this page.

### Let's strengthen

Have sufficient units to cover the area as, initially, many children will need to see actual reiterations of the same unit to appreciate how the total number equals the area.

### Let's deepen

Challenge the children to come up with reasonable estimates for the area of the classroom in square metres. Explicitly ask the children to justify their estimates, particularly the numbers and operations they used.

## Optional consolidation and extension possibilities

**Measuring Investigation** Conduct a different measuring investigation. (See Unit 13 PCMs 38 and 39 for other suggestions.)

**Games Bank** Play 'Squares', 'Capture the Area' or any of the 'Estimate!' games.

**Maths Journal** The children use images and/or words to record how they conducted the investigation(s), as well as their findings.

**Review and Reflect** Use the Prompt Questions Poster.

### Day 5, Lesson 4

## Review and Reflect

### Focus of learning (with Elements)

- Reviews and reflects on learning (U&C)

### Warm-up

Carry out a warm-up activity of your choice from one of the lessons in this unit.

### Main event

Use this menu of activity ideas to choose how best to structure this last lesson of the unit to suit your needs and the needs of your class.

| Let's talk!  | Let's create!  |
|--|--|
| <p>Review and Reflect Poster: Use Think-Pair-Share alongside the prompt questions to review the unit. The children record what they know in their maths journals (e.g. using a concept map).</p> <p>Individual children could present examples of their own drawings/work/constructions to the class, and talk about what they have learned.</p> | <p>Use art and/or construction materials (e.g. Lego) to explore and respond creatively to area. See the Mosaic Art suggestions listed under Optional Consolidation and Extension Possibilities in Lessons 1 and 2. See also Area in Names in the Unit 17 Let's Deepen PCM.</p>   |
| Maths language   | Maths strategies and models  |
| <p>Ask the children to explain the following terms, perhaps using examples or drawings on MWBs: area, square unit, square metre, greater than (&gt;), less than (&lt;).</p> <p>Use the Unit 17 Maths Language Cards to revise the key terms. For example: if the image and text are cut apart, can the children match them?</p>                  | <p>Ask the children to give examples of the strategies they used in this unit, e.g. how to measure area accurately, using the same size units, with no gaps or overlaps; how to calculate the area if you haven't got enough units to cover the whole shape, etc.</p> <p>Ask the children to give examples of the models they used in this unit. For example: How did they record their findings for the various problem-solving tasks and investigations? What did they build, sketch, write?</p> |

| Progress Assessment Booklet   | Maths eyes   |
|---|--|
| <p>Complete Questions 63–65 on pages 28–29. Alternatively, these can be left to do as part of a bigger review during the next review week.</p>  | <p>Go for a walk through the school and/or locality looking for examples of area. Consider various parts of the school grounds (e.g. yard, carpark, flower/school garden). How can we describe the area of each? Can comparisons be made? How? Can you find square units (e.g. square tiles on walls/floors/ceilings, square concrete slabs)?</p> <p>Bring along a square metre: What items can you find that are about/greater than/less than a square metre? Take photos to display or compile in a digital slideshow for the classroom.</p> |
| Let's strengthen  | Let's deepen   |
| <p>Identify children who might benefit from extra practice with some of the key concepts or skills in this unit. Consult the Unit 17 Let's Strengthen Suggestions for Teachers and/or use the Unit 17 Let's Strengthen PCM.</p> | <p>Use the Unit 17 Let's Deepen PCM.</p>   |