



Pearson

**mathology**

F-2

Teaching Companion:
**Measurement,
Geometry, Statistics
and Probability**





F-2 Teaching Companion:
Measurement,
Geometry, Statistics
and Probability

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Introduction

We use maths every day, but our relationship with the subject tends to be complicated. Most of us have a story from our school days that sets the tone for how we feel about maths. Whether your story is positive or negative, it tends to stick.

As a teacher, the pressure of getting maths “right” in the early years, combined with your own maths stories, can make teaching maths today quite daunting.

Many teachers feel they do not have the expertise or the pedagogical practices necessary to confidently teach maths, especially with students of so many different skill levels in one class.

Long working hours and multiple curriculum demands only add to the problem.

Welcome to Pearson Mathology F–2

Pearson Mathology is a comprehensive maths resource with real-world applications that help educators engage and teach students across all skill levels.

- Co-created with teachers, **Pearson Mathology** offers differentiated learning resources based on classroom reality, as well as effective teacher support.
- Every **Pearson Mathology** activity has been classroom tested and optimized.
- **Pearson Mathology** provides teacher assistance every step of the way, offering customizable solutions and practical supports for planning and teaching.
- **Pearson Mathology** is flexible and gives teachers the opportunity to incorporate their own lesson assets at any time.
- Based on the solid foundation of a research-based learning progression, **Pearson Mathology** combines insights from teacher interviews, focus groups and classroom observations with the best of academic research and pedagogical approaches.

Pearson Mathology's goal is to empower students and teachers to grow in their mathematical capabilities, gain confidence and cultivate an affinity for maths.

Pearson Mathology F–2 Components

Mathology Little Books and Teacher's Guides

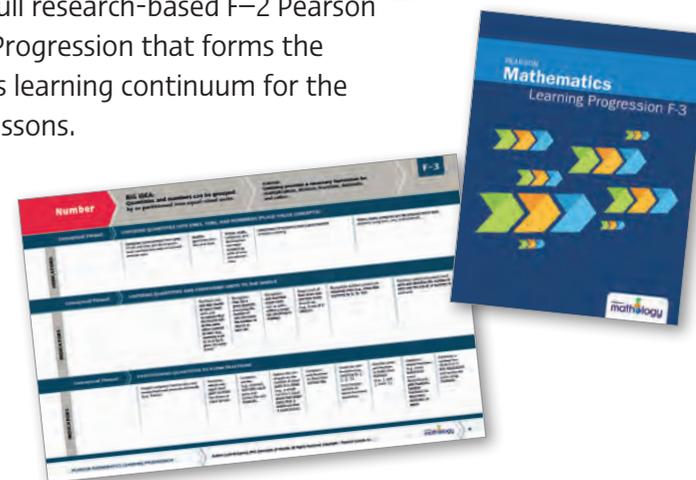
The series of **Mathology Little Books** and corresponding **Teacher's Guides** for F–2 allows teachers to match books to a child's or group's level of maths understanding, providing rich opportunities for teaching and learning.

The series:

- contains 54 fiction and non-fiction books
- is organized around the key big ideas within each maths strand: Number Sense, Patterning and Algebra, Measurement, Geometry, Data Management and Probability
- allows students to consolidate a building block of understanding within a big idea, priming them for the next building block
- contains fun, engaging stories to put maths in real-life contexts
- comes with digital versions of the **Mathology Little Books**, including audio and an interactive activity.

Learning Progression Booklet

A printed guide to the full research-based F–2 Pearson Mathematics Learning Progression that forms the underlying mathematics learning continuum for the **Pearson Mathology** lessons.



Teaching Companions

Two printed *Pearson Mathology F-2 Teaching Companion* books: one for the Number, Patterning and Algebra strands and the other for the Measurement, Geometry, Data and Probability strands are designed to be used alongside the *Mathology TEACH* digital tool.

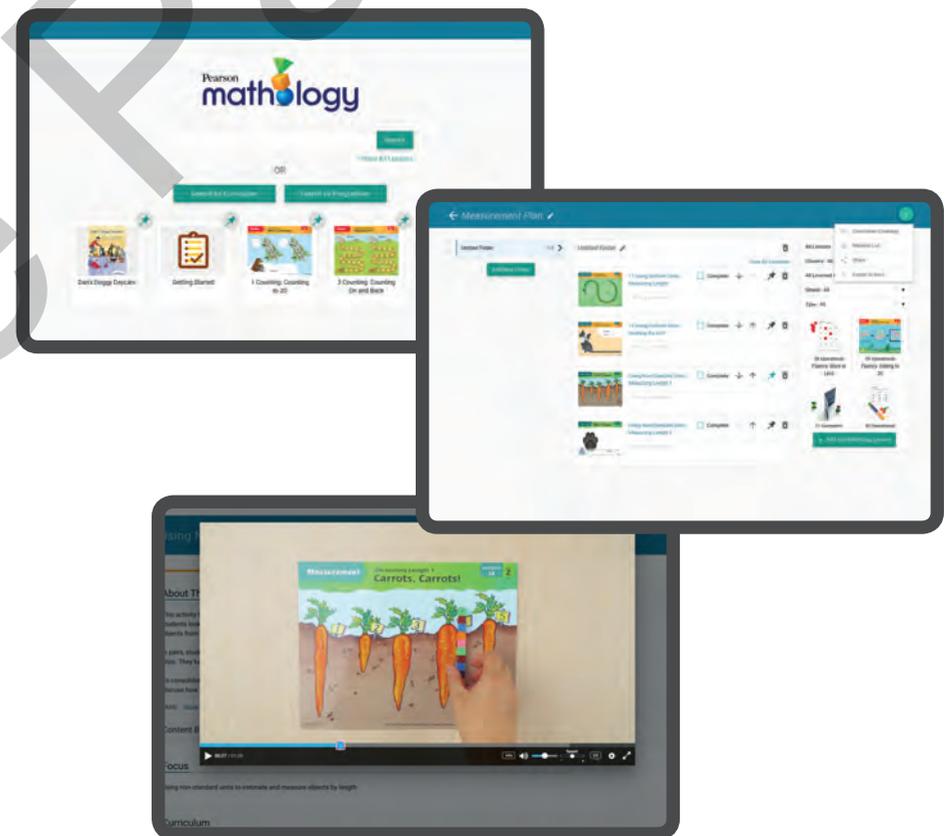
These Teaching Companions provide printed Australian Curricula guidance, pedagogical and implementation advice, and formative assessment rubrics for each **Pearson Mathology** lesson. These lessons comprise easy-to-implement, engaging and hands-on activities and games to help teachers save time, create meaningful learning experiences, and promote understanding of the big ideas in maths.

The Teaching Companions present these lessons by maths strand and topic, and provide additional class Warm-up and Exit Ticket ideas for each topic.



Pearson Mathology TEACH

Mathology TEACH F-2 is an online teacher resource that helps you search for curriculum-focused lessons, quickly and easily find what you need to differentiate lessons, plan teaching sequences and conduct effective formative assessment in your F-2 Maths classrooms with confidence. It contains the rich **Pearson Mathology** lesson activities, Little Books, pedagogical supports and professional learning all with simple and effective classroom planning and formative assessment functionality. It allows you to upload and use your own lesson assets whenever you want and provides constant curriculum references to help you address your state and territory expectations.



Using this Teaching Companion

This Teaching Companion is designed to be used alongside the *Mathology TEACH* digital tool and provides the teaching and formative assessment guidance for each **Pearson Mathology** lesson.

Finding the Content You Need

Pearson Mathology is a flexible resource and each topic and lesson can be used in any sequence and alongside any other content a teacher may wish to use.

This Teaching Companion presents the F–2 lesson activities and teacher guidance by maths strand and topic with the order informed by the underlying Learning Progression and Australian curricula. The lessons are numbered progressively within each topic to reflect a logical learning progression, but the activities can be taught in any order to suit your individual class.

Similarly, **Pearson Mathology** does not prescribe the use of any lessons with a particular year level. Instead it presents the F–2 resources together and provides suggested year levels in the Table of Contents as a guide for teachers should they need it. The comprehensive Table of Contents on pages iii and iv makes it easy to find an activity suited to the topic you want to teach.

Curriculum Correlation

Curriculum correlations for each Australian state or territory are provided on pages xii to xxiv. These show the broad alignment of the **Pearson Mathology** content to the Australian Curricula.

Each topic opening section then provides a more detailed look at the specific Australian Curricula alignment for each **Pearson Mathology** lesson.

Lesson Activities and Teaching Guidance

A series of engaging activities are provided for each topic-based cluster of lessons within each strand. These activities range from quick class warm-ups, full maths lessons and innovative Exit Ticket tasks. Full teaching guidance is provided for each activity.

Warm-Ups

A choice of quick whole-class warm-up activity ideas are provided at the start of each topic. These are quick activities designed to introduce or reinforce maths ideas in the classroom at the beginning of a class or when the class is starting on a new topic. The warm-ups make use of common classroom items and focus on promoting active participation for all students regardless of age or learning level.

Measurement: Using Uniform Units

Warm-up Ideas

All About Time

Materials & Organization

- An A4 or A3 copy of clock sectioned into 5 minutes like the image below and blank paper of the same size



- Scissors and glue
- Sit students in pairs or groups

The Task

- Write down all the things you can tell me about this clock (12 numbers evenly sectioned, etc.)
- Cut out the clock along the segments so you have 12 parts.
- Mix them up and pass them to another group to put the clock back together again.
- Label your clock.

Good Questions

- What did you have to think about when putting the clock together?
- What are the important things to label on a clock?

Variation

- Explore what happens when folding a clock in half and quarters (4 equal sections with 15 minutes in each section).

Find Your Partner

Materials & Organization

- Time pair cards (available on Mathology TEACH)



The Task

- Count by 5 to 60 and write the counting pattern on the board.
- Give each child a time card and they are to move around and find their partner, e.g., 11:15 / 1/4 past 11.
- Once they find their partner give each group the blank clock card and they are to show their time on the clock.
- Get the students to then order their times from 11:00 to 12:00 by lining up out the front and then calling out their time, e.g., 11:00, 11:05, 11:10, etc.

Good Questions

- What do you think your partner's card may look like?
- What time is 5 minutes before or 5 minutes after?

Variations

- Use just 1/2 of the clock, the half and quarter hour times and include the time written in words at the bottom of the chart and ask student to find your trio.
- Match temperatures.

Game: 20 Questions

Materials & Organization

- Calendar

The Task

- Decide on the parameters of time or temperature you wish to include: seasons, months, reading time, calendar days, etc.
- Begin with the sentence 'I am thinking of...' e.g., a date in July... (show a calendar page).
- Students then ask questions requiring only 'yes' or 'no' answers.

Good Questions

- Is it on a Monday?
- Is it in the fourth week of the month?
- Is it double digits?
- Does it come after the middle of the month?

Variations

- I'm thinking of a time where the big hand is on the 6 (1/2 past) and children can ask, is it a time you may be eating/sleeping/working/playing?
- Ask students to guess my time/date or temperature by giving clues that progressively point to only one date or time.

45

Lessons

Each **Pearson Mathology** F–2 lesson comes with at-a-glance teacher support, specific lesson and activity notes, and all the information you need to plan for the lesson and facilitate learning.

Measurement

Using Uniform Units: Measuring Length

ACTIVITY 4

FOCUS: Estimating and measuring objects with different uniform, non-standard units.

ACTIVITY TIME: 45–50 min

GROUP SIZE: Small group or individual

PROFICIENCIES: Problem Solving, Reasoning, Understanding, Communicating



Silly Snake!

MATERIALS

- Student Card 4
- Items of different lengths (e.g., paper clips, short lengths of straws, different lengths of pipe cleaners, string, linking cubes) (one set per group)
- Master 7: Paper Snake
- Master 8: Silly Snake Recording Sheet
- Master 9: Assessment

Also available: The Boys in Shoes; The Amazing Scent; Animal Measures; Getting Ready for School; The Discovery

BIG IDEAS

- Many things in our world have attributes that can be measured and compared.
- Assigning a unit to a continuous attribute allows us to measure and make comparisons.

1 INSTRUCTIONS

Before

Show students the Paper Snake (Master 7). Ask, “I wonder how long the snake is?” Measure its length using multiples of one item. Repeat with other items that won’t be used by students. Each time say, “Look, it’s ___ long!” Draw out the importance of the unit (“6 long” doesn’t mean anything if we don’t know the unit) and measuring with the same unit. Familiarise students with the measuring units by laying them down from shortest to longest.

What to Do (25–30 min): Use **Student Card 4A**.

Note: Give each pair a set of items and a recording sheet (Master 8). Look at the Silly Snake. Choose an item as a unit to measure with.

- How long do you think the snake is? Make a prediction and write it down. Measure the length of the snake by lining up the same items end-to-end along the length of the snake. Write down your measure.
- How close was your prediction to your measure?
- Repeat the activity using a different item as the unit.
- What do you notice about your two measures?

How to Differentiate

Enable: Draw a shorter, straighter snake on construction paper and limit the number of units to choose from.

Extension: Use the longer snake on Side B.

Combined Grades Extension: Give students two units to measure with, one half the length of the other. Students measure and discuss results.

2 PROBING QUESTIONS

- How long do you think the snake is? How many long is it?
- How close was your prediction?
- What did you find hard about measuring the
- Why were your counts different when you used

3 CONSOLIDATION

- Make a T-chart. On the left side, make a list of the units students used to measure, in order from longest to shortest. On the right side, record the counts that students found for each. Ask, “What do you notice?” If time permits, show how a rope with knots at equal intervals could be used to measure the snake and how the length of the interval affects the count.

Highlight for Students

- To measure, we use units of the same size lined up end-to-end.
- The longer the unit, the lower the count. The shorter the unit, the higher the count. When we use a long unit, we don’t need as many.

4 WHAT TO LOOK FOR

- Do students align the items with no gaps or overlaps?
- Do students use the same uniform items for the entire length of the snake or do they mix items?
- How do students deal with measuring around the curves of the snake? Do they continue to align the units as much as possible? Do they use an item that also curves, such as a pipe cleaner?
- Do students recognize that the count is higher when the unit is short and lower when the unit is long, and describe the relationship?

Activities, stories and maths talks that engage students and activate thinking.

Instructions written in student-friendly language.

Suggestions for differentiation to help pace the learning within the same class activity, depending on your observation of student and class needs.

Sample questions to probe student understanding that can be added to your own repertoire of effective questioning.

A list of **Mathology Little Books** that further support maths instruction and differentiation.

Highlights of intended learning, connections to prior learning, and misconceptions to help students reflect on their own learning and the strategies they use.

Practical, in-the-moment assessment prompts that help you gather evidence of understanding and uncover partial concepts/misconceptions.

Measurement

Using Uniform Units: Helping Students to Progress

What You Might See/Hear and Next Steps

ACTIVITY 4

Measuring Length Behaviours/Strategies		
<p>Student uses a random assortment of items/units to measure the snake.</p>  <p>Next Step Remind student that we have to use items/units of the same size to get a measure that other people will understand.</p>	<p>Student places items along the length of the snake but leaves gaps or makes overlaps.</p>  <p>Next Step Encourage student to increase the accuracy of his or her measure by placing the items/units end-to-end.</p>	<p>Student chooses an item that doesn't accommodate the curves of the snake.</p>  <p>Next Step Some things aren't easy to measure! Talk to students about why a bendable item/units might better match the length of the snake. Student may want to use string to match the entire length of the snake, then measure the string.</p>
<p>Student chooses an item that accommodates the curves of the snake and makes a good measure.</p>  <p>Next Step Have student measure the snake using a different item/unit, then look at the relationship between the two measures.</p>	<p>Student believes that the longer the unit, the higher the count, and/or the shorter the unit, the lower the count.</p>  <p>Next Step Provide students with a straight object. Have student measure the length of the object with pipe cleaners and with linking cubes, then compare the two counts. Draw attention to the length of the units.</p>	<p>Student realizes that when the unit of measure is longer, fewer items will be needed.</p>  <p>Next Step Give students two units with which to measure, one that is half the length of the other (e.g., straws 3 cm and 6 cm long). Student measures and discusses the results with a partner.</p>

A quick glimpse into potential student behaviours and strategies linked to the big ideas in the lesson; supports formative assessment and helps you move students forward to the next logical step along a mathematics learning progression.

Exit Tickets

Exit tickets are "... a means for teachers to gauge progress toward the established success criteria." They "... allow students to summarise or synthesise their thinking about some aspect of their learning" and in so doing, make the task "more visible to students and their teachers."

John Hattie, *Visible Learning for Maths K-12*, p. 64.

A choice of quick, simple Exit Ticket activity ideas are provided at the start of each topic in this Teaching Companion. These give students a voice to indicate understanding or misunderstanding to their teachers, and provide opportunities to make connections with other maths strands or Key Learning Areas.

Measurement: Comparing Objects

Exit Ticket Ideas

Length of Our Name
Make a credit tower to match the number of letters in your first name. Line the class up in order from least number of letters to most by comparing the towers. Let the students share in that order.
Purpose: Encourages the students to directly compare objects in relation to the attribute of length.
Variations
• Make a class graph to match using Post-Its to match the length of your name and make a comparison statement about the graph before you go, e.g., "Name's name is 2 letters longer than Sam's."
• Use their first and second name.

My Hand
Print hands and make a print or trace around each student's hand. Ask students to find one thing in the classroom that is longer than their pinky finger but shorter than their hand length.
Purpose: Provides insight into whether the students understand important comparative words like longer than and shorter than.
Variations
• Find something that is the same length as your hand and pinky length.
• Find something that fits into the length of your hand about 4 times.
• Find something twice as long as the length as your hand.

Icy pole Thoughts
Give the students 2 icy pole sticks. On each icy pole stick, they write 1 piece of helpful advice that we need to remember when measuring and comparing.
Examples
• Use the same unit to measure
• Line up along the same line if comparing length
• Have no gaps when measuring with tools
• Write down the item being used to measure, e.g., 10 paper clips
Purpose: Encourages the students to identify and reason about what makes an accurate comparative measure. Repository of collective wisdom written by the students.
Variation
• Share the sticks and, as a group, decide on the 1 or 2 most important things you need to remember when measuring.

Exit Tickets

1	2	3	4
5	6	7	8
10	11	12	13
15	16	17	18
20	21	22	23
26	27	28	29

Sometimes a Exit Ticket activity may suggest the use of an Exit Ticket Chart. The Exit Ticket Chart is a great way to collect and organise a range of Exit Ticket ideas. Students are allocated a number and can stick their Exit Ticket activity response on their number on this laminated chart using a sticky note or other means. Using numbers rather than names provides a level of anonymity among the peer group, which will increase the chances of receiving authentic responses. This chart can be set out, laminated or displayed in any way that suits your classroom.

Templates for teacher-made resources/tickets suggested within Exit Ticket activities will be available to print directly from the "Practice" tab on *Mathology TEACH*.

Formative Assessment

Pearson Mathology does not rely on summative assessment, instead it takes advantage of the maths learning progression structure to provide a unique mechanism for facilitating effective formative assessment aimed at helping students to progress.

Mathology TEACH provides an automated tool for recording teacher observations, effectively mapping students' learning progress through important maths concepts, and providing in-the-moment next step ideas to consolidate learning and address misconceptions.

The formative assessment rubrics and next step activities are also provided in this Teaching Companion for each **Pearson Mathology** lesson.

Rubrics

These identify the student behaviours teachers might witness when working on a **Pearson Mathology** activity. These behaviours illustrate a progression of some of the most common misconceptions, partial concepts, and strategies students may display while learning. Teachers can use these rubrics for each lesson to identify where on the learning progression their students are working for a particular concept at any point of time.

Next steps

For each progression point, an in-the-moment next step idea is provided for teacher reference. These are designed to help students progress through the progression point stages, with the final stage indicating a deep understanding of and/or fluency with that concept.

Measurement Comparing Objects: Helping Students to Progress What You Might See/Hear and Next Steps **ACTIVITY 7**

Comparing Area Behaviours/Strategies

<p>Next Step Students cover the rectangular surface with no gaps or overlaps that has already been ordered the surfaces from greatest to least area.</p>	<p>Next Step Students cover the rectangular surface with no gaps or overlaps that has already been ordered the surfaces from greatest to least area.</p>	<p>Next Step Students cover the rectangular surface with no gaps or overlaps that has already been ordered the surfaces from greatest to least area.</p>
<p>Next Step Students cover the rectangular surface with no gaps or overlaps that has already been ordered the surfaces from greatest to least area.</p>	<p>Next Step Students cover the rectangular surface with no gaps or overlaps that has already been ordered the surfaces from greatest to least area.</p>	<p>Next Step Students cover the rectangular surface with no gaps or overlaps that has already been ordered the surfaces from greatest to least area.</p>

Using Pearson Mathology TEACH

Mathology TEACH is a simple, time-saving online planning tool for teachers, containing rich maths activities and pedagogical supports.

It helps teachers:

- search for high-quality **Pearson Mathology** lessons by curriculum or topic and/or add their own favourite lessons
- create their own lesson plans or use pre-set plans
- teach using **Pearson Mathology** lessons, **Mathology Little Books**, projectable/printable assets and digital tools
- assess and track students with a simple-to-use, practical and powerful formative assessment tool
- access short, in-the-moment professional learning videos anytime, anywhere.

Getting started with Mathology TEACH

To arrange an annual subscription to *Mathology TEACH*, please contact your sales representative or contact Customer Care: schools.pearson.com.au. To self-register for a 16-day trial, please visit <https://mathology.pearsonplaces.com.au/>

Once you log in, you are taken immediately to the Home page where you can access pre-set, adaptable teaching plans or search for **Pearson Mathology** activities or **Mathology Little Books** by curriculum code, learning progression or by typing in key maths terms or concepts.

A list of assets will appear. Click on an asset to view all the teacher guidance and content, add it to a plan or your favourites and/or click the thumb tack symbol to pin it to the **Pearson Mathology** Home page so that you can access it immediately during your class.

Planning

Once you have selected your assets, you can adapt the preset lessons plans or create your own plans to suit your school's planning schedule: separate ability groups, weekly class plans, full year plans or any structure that suits you best. Easily populate these plans by dragging selected **Pearson Mathology** activities into them, add your own notes and upload any links to your own favourite classroom activities.

-  Selecting this symbol in any plan allows you to see the curriculum outcomes your plan is covering, view the list of materials required, share the plan with other teaching colleagues and download the plan to be stored in your school system.

Setting up a class

Teachers can set up as many classes or groups as they like on *Mathology TEACH* by clicking on their name on the top right-hand corner, selecting "Student Management", creating and naming a class or group and then inputting student names or identifiers.

These student identifiers are only required when using the assessment and analytics functions.

Accessing lesson guidance

When you select a lesson in *Mathology TEACH*, you can choose to access four levels of lesson guidance.

- 1 About:** overview details about the lesson's maths and background focus, the curriculum outcomes it relates to, and where it sits on the maths learning progression.
- 2 Details:** digital version of the specific teacher guidance for the lesson with direct links to any appropriate line master resources and interactive tools. Projectable or printable versions of the lesson card, rubrics and any associated student assets are provided here. Teachers can choose to project or print and laminate these assets to suit their class.
- 3 Differentiated Support:** a choice of projectable or printable mini-lessons to consolidate, enable or extend understandings. Any common misconceptions for the maths topic/concept are identified with tips on what to do to address them, and After the Lesson activities for in class and at home are also provided in printable formats.
- 4 Practice:** projectable and printable assets for use with warm-up and exit ticket activities.

Helping students to progress

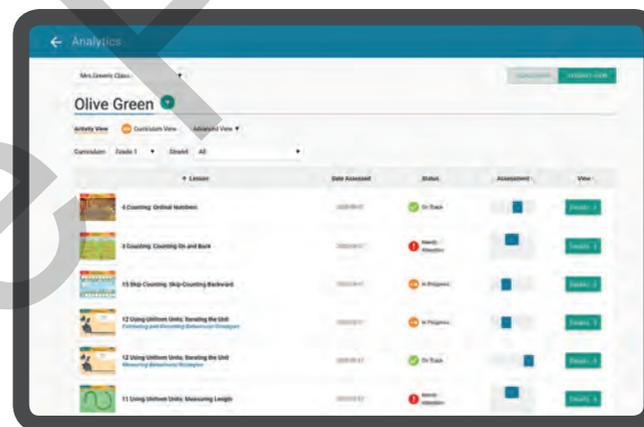
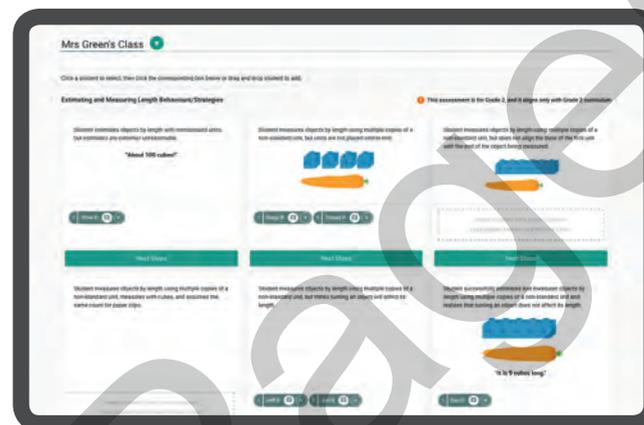
Within each lesson on *Mathology TEACH* you can select an Assessment tab. This gives you an interactive version of the formative assessment rubric for that lesson. Using any device, select the class or group you want to assess and drag your student names to the appropriate rubric cell based on your observations of how they are working. Note that you can change your assessment at any time by dragging the student name to later progression points as you observe their “light bulb” moments.

Teachers can also access in-the-moment teaching ideas designed to address any misunderstandings or misconceptions and help students progress along the learning progression.

Clicking on the “Analytics” tab at the top of the page provides class or individual student reports of progress that can be used for reporting and downloaded as required.

Professional learning videos

For each **Pearson Mathology** lesson there is a professional learning panel at the right-hand side of the screen. Learning Connections videos for relevant big maths ideas can be found here and viewed at any time (each is about 5 minutes long). In addition, bite-sized Learning Highlights videos offer glimpses of the specific learning you may expect to encounter in the lesson.



Curriculum Correlation

Pearson Mathology F-2: Measurement, Geometry, Statistics and Probability

Australian and West Australian Curriculum				Pearson Mathology	
Year	Sub-strand	Code	Description	Mathology Activities	Mathology Little Books
Foundation/ Pre-Primary	Using units of measurement	ACMMG006	Use direct and indirect comparisons to decide which is longer, heavier or holds more, and explain reasoning in everyday language	Comparing Objects: 1 Predicting and Comparing Length 2 Comparing Length 3 Comparing Capacity 5 Making Comparisons 6 Comparing Objects Review	<i>To Be Long</i> <i>The Best in Show</i> <i>The Amazing Seed</i>
Foundation/ Pre-Primary	Using units of measurement	ACMMG007	Compare and order duration of events using everyday language of time	Time and Temperature: 1 Days and Duration 2 Passage of Time	
Foundation/ Pre-Primary	Using units of measurement	ACMMG008	Connect days of the week to familiar events and actions	Time and Temperature: 1 Days and Duration	
Year 1	Using units of measurement	ACMMG019	Measure and compare the lengths and capacities of pairs of objects using uniform informal units	Using Uniform Units: 1 Matching Lengths 2 Iterating the Unit 3 Exploring the Metre 6 Measuring Capacity 7 Reviewing Uniform Units Using Non-standard Units: 2 Measuring Length 2	<i>Animal Measures</i> <i>The Amazing Seed</i>
Year 1	Using units of measurement	ACMMG020	Tell time to the half-hour	Time and Temperature: 3 Telling Time	
Year 1	Using units of measurement	ACMMG021	Describe duration using months, weeks, days and hours	Time and Temperature: 4 Days and Weeks 5 Months in a Year 6 Relating to Seasons 7 The Calendar 10 Combining Time and Temperature	
Year 2	Using units of measurement	ACMMG037	Compare and order several shapes and objects based on length, area, volume and capacity using appropriate uniform informal units	Using Uniform Units: 4 Measuring Length 5 Measuring Area 6 Measuring Capacity 7 Reviewing Uniform Units Using Non-Standard Units: 1 Measuring Length 1 2 Measuring Length 2 3 Measuring Distance Around 5 Measuring Area 6 Measuring Capacity 7 Non-Standard Units	<i>Getting Ready for School</i> <i>The Discovery</i>

MEASUREMENT

Victorian Curriculum				Pearson Mathology	
Year	Sub-strand	Code	Description	Mathology Activities	Mathology Little Books
Foundation/ Pre-Primary	Using units of measurement	VCMMG078	Use direct and indirect comparisons to decide which is longer, heavier or holds more, and explain reasoning in everyday language	Comparing Objects: 1 Predicting and Comparing Length 2 Comparing Length 3 Comparing Capacity 5 Making Comparisons 6 Comparing Objects Review	<i>To Be Long</i> <i>The Best in Show</i> <i>The Amazing Seed</i>
Foundation	Using units of measurement	VCMMG079	Compare and order duration of events using everyday language of time	Time and Temperature: 1 Days and Duration 2 Passage of Time	
Foundation	Using units of measurement	ACMMG080	Connect days of the week to familiar events and actions	Time and Temperature: 1 Days and Duration	
Year 1	Using units of measurement	VCMMG095	Measure and compare the lengths, masses and capacities of pairs of objects using uniform informal units	Comparing Objects: 4 Comparing Mass Using Uniform Units: 1 Matching Lengths 2 Iterating the Unit 3 Exploring the Metre 6 Measuring Capacity 7 Reviewing Uniform Units Using Non-standard Units: 2 Measuring Length 2	<i>Animal Measures</i> <i>The Amazing Seed</i>
Year 1	Using units of measurement	VCMMG096	Tell time to the half-hour	Time and Temperature: 3 Telling Time	
Year 1	Using units of measurement	VCMMG097	Describe duration using months, weeks, days and hours	Time and Temperature: 4 Days and Weeks 5 Months in a Year 6 Relating to Seasons 7 The Calendar 10 Combining Time and Temperature	
Year 2	Using units of measurement	VCMMG115	Compare and order several shapes and objects based on length, area, volume and capacity using appropriate uniform informal units	Using Uniform Units: 4 Measuring Length 5 Measuring Area 6 Measuring Capacity 7 Reviewing Uniform Units Using Non-Standard Units: 1 Measuring Length 1 2 Measuring Length 2 3 Measuring Distance Around 5 Measuring Area 6 Measuring Capacity 7 Non-Standard Units	<i>Getting Ready for School</i> <i>The Discovery</i>

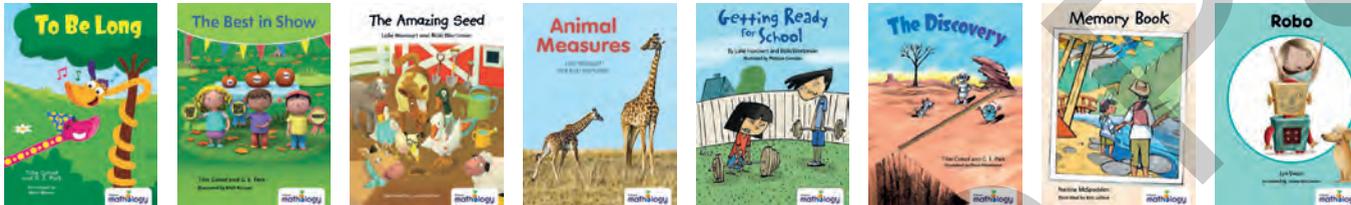
NSW Curriculum					Pearson Mathology	
Year	Sub-strand	Code	Outcome	Description	Mathology Activities	Mathology Little Books
ES1	Length	MAe-9MG	Describes and compares lengths and distances using everyday language.	Use direct and indirect comparisons to decide which is longer, and explain their reasoning using everyday language (ACMMG006)	Comparing Objects: 1 Predicting and Comparing Length 2 Comparing Length 3 Comparing Capacity 5 Making Comparisons 6 Comparing Objects Review	<i>To Be Long</i> <i>The Best in Show</i> <i>The Amazing Seed</i>
ES1	Area	MAe-10MG	Describes and compares areas using everyday language	Use direct comparison to decide which shape has a larger area and explain their reasoning using everyday language	Comparing Objects: 6 Comparing Objects Review 7 Comparing Area	
ES1	Volume and Capacity	MAe-11MG	Describes and compares the capacities of containers and the volumes of objects or substances using everyday language	Use direct and indirect comparisons to decide which holds more, and explain their reasoning using everyday language (ACMMG006)	Comparing Objects: 3 Comparing Capacity 6 Comparing Objects Review	
ES1	Mass	MAe-12MG	Describes and compares the masses of objects using everyday language	Use direct and indirect comparisons to decide which is heavier, and explain their reasoning using everyday language (ACMMG006)	Comparing Objects: 6 Comparing Objects Review 4 Comparing Mass	<i>The Best in Show</i>
ES1	Time	MAe-13MG	Sequences events, uses everyday language to describe the durations of events, and reads hour time on clocks	Compare and order the duration of events using the everyday language of time (ACMMG007)	Time and Temperature: 1 Days and Duration 2 Passage of Time	
				Connect days of the week to familiar events and actions (ACMMG008)	Time and Temperature: 1 Days and Duration	
				Tell time on the hour on analog and digital clocks	Time and Temperature: 3 Telling Time	
S1	Length 1	MA1-9MG	Measures, records, compares and estimates lengths and distances using uniform informal units, metres and centimetres.	Measure and compare the lengths of pairs of objects using uniform informal units (ACMMG019)	Using Uniform Units: 1 Matching Lengths 2 Iterating the Unit 3 Exploring the Metre 4 Measuring Length 7 Reviewing Uniform Units Using Non-standard Units: 2 Measuring Length 2	<i>Animal Measures</i> <i>The Amazing Seed</i>

Measurement

Pearson Mathology delivers the Measurement content through the following Big ideas:

- Many things in our world have attributes that can be measured and compared
- Assigning a unit to a continuous attribute allows us to measure and make comparisons

Also Available



Topic Clusters

Comparing Objects	4
Using Uniform Units	22
Time and Temperature	42
Using Non-Standard Units	68
Using Standard Units	86

Sample Pages

Measurement: Using Non-Standard Units

Big Ideas

- Assigning a unit to a continuous attribute allows us to measure and make comparisons
- Many things in our world have attributes that can be measured and compared
- Numbers tell us how many and how much

In this topic, students directly and indirectly compare two or more objects by length, distance around, mass, area, and capacity. Students need many opportunities to measure objects to understand that an object can have many different measurable attributes.

Cross-Strand Connections: Number

	Maths Focus	Curriculum			
1 Measuring Length 1 p.72 	Using non-standard units to estimate and measure objects by length	2	AC, WA, VIC	ACMMG037, VCMMG115	Compare and order several shapes and objects based on length, area, volume and capacity using appropriate uniform informal units
		S 1	NSW	MA1-9MG	Measures, records, compares and estimates lengths and distances using uniform informal units, metres and centimetres.
2 Measuring Length 2 p.74 	Iterating (repeating) a single unit to estimate, measure, and compare objects by length	2	AC, WA, VIC	ACMMG037, VCMMG115	Compare and order several shapes and objects based on length, area, volume and capacity using appropriate uniform informal units
		S 1	NSW	MA1-9MG	Measures, records, compares and estimates lengths and distances using uniform informal units, metres and centimetres.
3 Measuring Distance Around p.76 	Using non-standard units to estimate, measure, compare, and order distances around	2	AC, WA, VIC	ACMMG037, VCMMG115	Compare and order several shapes and objects based on length, area, volume and capacity using appropriate uniform informal units
		S 1	NSW	MA1-9MG	Measures, records, compares and estimates lengths and distances using uniform informal units, metres and centimetres.
4 Measuring Mass p.78 	Using non-standard units to estimate, measure, compare, and order objects by mass	2	AC, WA, VIC	ACMMG038, VCMMG116	Compare masses of objects using balance scales
		S 1	NSW	MA1-12MG	Measures, records, compares and estimates the masses of objects using uniform informal units

Measurement: Using Non-Standard Units

	Maths Focus	Curriculum			
5 Measuring Area p.80 	Using non-standard units to estimate, measure, and compare objects by area	2	AC, WA, VIC	ACMMG037, VCMMG115	Compare and order several shapes and objects based on length, area, volume and capacity using appropriate uniform informal units
		S 1	NSW	MA1-10MG	Measures, records, compares and estimates areas using uniform informal units.
6 Measuring Capacity p.82 	Using an intermediary object to estimate, measure, compare, and order objects by capacity	2	AC, WA, VIC	ACMMG037, VCMMG115	Compare and order several shapes and objects based on length, area, volume and capacity using appropriate uniform informal units
		S 1	NSW	MA1-11MG	Measures, records, compares and estimates volumes and capacities using uniform informal units
7 Non-Standard Units p.84 	Reviewing measuring with non-standard units	2	AC, WA, VIC	ACMMG037, VCMMG115	Compare and order several shapes and objects based on length, area, volume and capacity using appropriate uniform informal units
		S 1	NSW	MA1-9MG	Measures, records, compares and estimates lengths and distances using uniform informal units, metres and centimetres
				MA1-10MG	Measures, records, compares and estimates areas using uniform informal units.
MA1-11MG	Measures, records, compares and estimates volumes and capacities using uniform informal units				

Measurement: Using Non-Standard Units

Warm-up Ideas

Mystery Muffin Thief

Materials & Organization

- Trace the foot of a fellow staff member (make sure that their footprint is different to yours). Photocopy a printout for each pair.
- A collection of non-standard units to measure the area of the footprint, e.g., Unifix, buttons, counters, teddies
- A4 paper and markers for tracing feet

The Task

- Tell the students that a thief came and stole my muffin from my desk at break time. The only clue they left was this footprint and some crumbs.
- Ask the students to help you find the culprit by measuring the footprint and comparing it to their own.
- Discuss the merits of different non-standard units to measure area.
- Invite different members of staff to visit and have their shoes measured and compared.
- Make a table to record and compare the different measurements.

Good Question

- How can we make sure that we measure accurately?

Variation

- Continue to collect shoe measurement data over several days.

Measure a Shoe

Materials & Organization

- Non-standard units for measuring such as counters, tiles, balance scales, Unifix, string, coins, etc
- Paper or maths books if they choose to trace their shoe

The Task

- Ask students to measure one of their shoes in as many different ways as they can.

Good Questions

- Who measured their shoe in a similar way? Who found a different way to measure their shoe?

Variation

- Measure your pencil case in as many different ways as you can.

Rectangle Garden

Materials & Organization

- Give each pair of students 12 tiles to investigate the different combinations

The Task

- I used 12 tiles to make a rectangular garden. What might it have looked like?

Good Questions

- How many different gardens can be made? How do you know that you have found them all?

Variation

- Draw the different combinations using grid paper.

Measurement: Using Non-Standard Units

Exit Ticket Ideas

Line up the Poles

Write an "I Agree" (sign) pole at one end of the room and an "I Disagree" pole at the other and ask students to consider the following statement: *Sometimes when we measure it is more important to be close than to be exact.*

Ask the students to find a place on the line between the poles that shows what they think about this startling statement. Invite students from different points along the line to explain their position. If students are convinced by the arguments of their peers, encourage them to move along the line to show this.

Purpose: Develops reasoning skills as students learn to use evidence to support an argument. It also gives teachers an opportunity to promote the practice of changing one's mind when new information is evident.

Variation

- Re-use this exit ticket to challenge startling statements as they arise: e.g., being good at maths means being fast.

Too High, Too Low, About Right

Write three different estimates for the distance around a drink bottle.

Too High	Too Low	About Right

Purpose: Demonstrates students' fluency in their capacity to make reasonable estimates.

Variations

- Do the same activity using capacity of the drink bottle.
- Estimate distance around the classroom, time it would take to draw a cube, length of the whiteboard, etc.

About the Same As...

Ask students to complete this sentence:

The area of an A4 piece of paper is about the same as...

Allow students access to any reasonable non-standard units in the room to measure the area of an A4 piece of paper.

Examples:

- ... 12 post-it notes
- ... 24 dominoes
- ... 2 pencil cases.

Purpose: Students have an opportunity to connect one way they already know with a range of other ways to demonstrate the maths.

Variations

- Record some of the solutions on the board.
- Have three possible answers on the board for students to choose from. One that is way off, one a little off and one that fits the area exactly.

Measurement

Using Non-Standard Units: Measuring Length 1

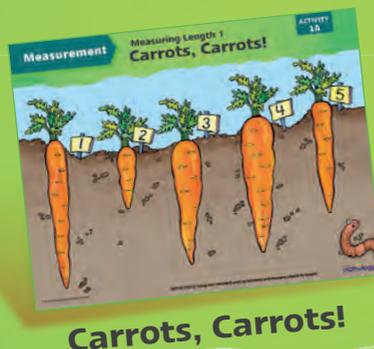
ACTIVITY 1

 **FOCUS:** Using non-standard units to estimate and measure objects by length

 **ACTIVITY TIME:** 45–50 min

 **GROUP SIZE:** Pairs

 **PROFICIENCIES:** Reasoning, Understanding



MATERIALS

- Student Card 1
- Objects of different lengths (e.g., pencil, marker, craft stick, crayon, straw) (5)
- Centicubes (25 per pair)
- Paper clips (10 per pair)
- Rulers (for *Combined Grades Extension*)
- Master 1: *Measuring Carrots Recording Sheet*
- Master 2: *Assessment*

Also available: *The Amazing Seed*, *Animal Measures Getting Ready for School*

BIG IDEAS

- Assigning a unit to a continuous attribute allows us to measure and make comparisons.
- Numbers tell us how many and how much.

INSTRUCTIONS

Before

Place five objects lengthwise (not aligned along a baseline) on the carpet. Ask: “Which do you think is the biggest? the shortest? How do you know?” Discuss the attributes of the objects and how they can be compared. Say, “Let’s focus on comparing them by length.” Have students order the objects from shortest to longest. Align ends along a baseline to check. Rotate the objects and ask whether the lengths of the objects have changed.

What to Do (15–20 min): Use Student Card 1A

Note: Give each pair 25 centicubes, 10 paper clips, and a recording sheet (Master 1).

- Take a handful of centicubes.
- Estimate how many cubes long the first carrot is. Write your estimate.
- Use cubes to measure its length. Write your answer.
- Estimate and then measure the lengths of the rest of the carrots. How close were your estimates to your measures?
- Repeat the activity using paper clips to measure. What do you notice?
- Turn the card and measure the carrots again. What do you notice?

How to Differentiate

Enabler: Students use centicubes to measure the carrot on card 1B.

Extension: Make a new unit using two cubes or two paper clips. Students estimate and measure the carrots using the new unit, then compare findings. Or have students order the carrots from shortest to longest.

Combined Grades Extension: Students use a ruler to measure the lengths of the carrots in centimetres.

CONSOLIDATION

- Discuss how students’ estimates compared to the actual measures. Together, create a chart similar to the one on Master 1 to record the results. If there is a discrepancy, measure together to check. Draw students’ attention to the length of each unit and the counts. Ask, “Why are the counts different?” Point out the relationship between the length of the unit and the count (the shorter the unit, the higher the count). Ask: “What if we used a longer unit, such as a pencil, to measure? What would happen to the count?” Discuss how turning an object does not affect its length.

Highlight for Students

- The count for the length of an object depends on the unit we are using. The longer the unit, the lower the count.
- Turning an object does not affect its length.

WHAT TO LOOK FOR

- Do students place the cubes/paper clips end-to-end when they measure?
- Are students’ estimates reasonable? Do they improve with practice?
- Are students measuring the length of the carrots and not the width?
- Do students demonstrate an understanding that the length of the measuring tool/unit is related to the count?

PROBING QUESTIONS

• Did you place the cubes/paper clips end-to-end? Show me.

• Were your estimates close? Did they get closer with practice?

• How much longer is the longest carrot than the shortest carrot?

• Why do we get a different number when we use a different unit?

Estimating and Measuring Length Behaviours/Strategies

- 1 Student estimates objects by length with non-standard units, but estimates are extreme/unreasonable.

“About 100 cubes!”

Next Step

Show student how to use a benchmark such as the tip of his or her little finger (which is similar in length to the centicube) to estimate. Or prompt student to look closely at the length of a cube/paper clip and then visually compare it with the length of the carrot. Place the referent beside the carrot to help. If estimate is still unreasonable, place cubes in the middle of the carrot and ask how many more would be needed to reach the end of the carrot.

- 2 Student measures objects by length using multiple copies of a non-standard unit, but units are not placed end-to-end.



Next Step

Encourage student to place cubes/paper clips end-to-end. Remind student that it is important to fill the length of the item being measured to be able to say how long it is. Otherwise, everyone will get different counts. Suggest that student could snap the centicubes together.

- 3 Student measures objects by length using multiple copies of a non-standard unit, but does not align the base of the first unit with the end of the object being measured.



Next Step

For each carrot, draw a baseline on the student card that student can line the first cube/paper clip up against.

- 4 Student measures objects by length using multiple copies of a non-standard unit, measures with cubes, and assumes the same count for paper clips.

Next Step

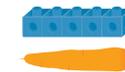
Place units side-by-side to compare. Discuss how the longer unit will require fewer repetitions to measure the same length. Line up each unit alongside a carrot to show that it takes more of the shorter unit to cover the length of the carrot.

- 5 Student measures objects by length using multiple copies of a non-standard unit, but thinks turning an object will affect its length.

Next Step

Provide student with several opportunities to turn and measure objects to help her or him learn to trust that length stays the same no matter how an object is turned.

- 6 Student successfully estimates and measures objects by length using multiple copies of a non-standard unit and realizes that turning an object does not affect its length.



“It is 5 cubes long.”

Next Step

Have student make a new unit using two cubes or two paper clips. Student estimates and measures the carrots using the new unit and then compares findings. Or have student order the carrots from shortest to longest. Or use a ruler to measure the lengths of the carrots in centimetres.