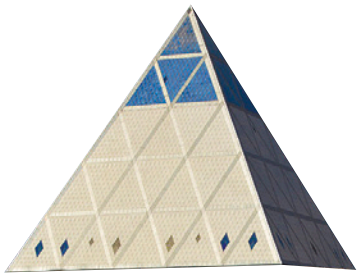
WONDERful Buildings

Teacher's Guide



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Line Masters

This Teacher's Guide includes access to modifiable and PDF line masters.

To access these Mathology Little Book Line Masters, please log in at Pearson Places, www.pearsonplaces.com.au and select the Mathology Little Books icon. The Line Masters can be found in the 'Explore Resources' section.

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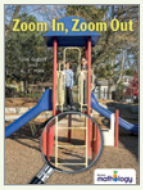
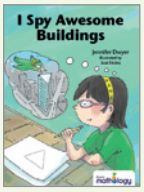
Mathology Little Books

This series recognizes that children's understanding of maths concepts develops over time, and so the series allows you to choose the book that best matches a child's or group's level of mathematical understanding. The books engage children at just the right level in a wide range of mathematical ideas, thinking, and activities in a variety of real world and imaginary contexts.

WONDERful Buildings engages children in conversations, investigations, and activities that help to develop their understanding of the big maths idea that "Shapes and solids can be explored and compared based on attributes."

Big Idea: Numbers are related in many ways
(Compare, order and count. Read, write and model numbers)

TITLE	KEY MATHS FOCUS	MATHS SKILLS	STRATEGIES	ADDITIONAL FOCUS
	Identify shapes Locate objects	Describe, name and create 2-D shapes Sort and re-sort 2D shapes Relate 2-D shapes to 3-D objects Describe location of objects using positional language Follow and give directions Locate and describe location on a grid		Comparing quantities Comparing height
	Explore, describe, and compare shapes and solids Create and describe 3-D structures	Recognise and describe shapes and solids using geometric attributes Make connections between shapes and solids and objects in the environment Follow directions to create structures	Describe and sort solids based on how they move Use understanding of attributes of solids when building Apply prior knowledge and experience when building and rebuilding	Count and compare quantity Compare measures Use positional language to describe location
	Find and describe shapes and solids Explore and classify shapes and solids	Recognize 2-D shapes embedded in other images or objects and in the environment Analyse geometric attributes of 2-D shapes and 3-D solids	Classify and name 2-D shapes and 3-D solids based on attributes	Compare size and length
	Compare quantities to 100 Estimate and count to 100	Estimate and count in different ways Determine how many more/less	Use benchmarks to estimate Skip Count Doubles Use equal groupings	Compare height Explore increasing/decreasing patterns
	Identify, describe and compare 2-D shapes and 3-D solids Compose and decompose 2-D shapes and 3-D solids	Classify, name construct and compare 2-D shapes and 3-D solids Compose 2-D shapes by combining or partitioning 2-D shapes Construct 3-D solids from nets	Use geometric properties to classify and compare 2-D shapes and 3-D solids	Estimate measurements Explore perimeter Collecting data

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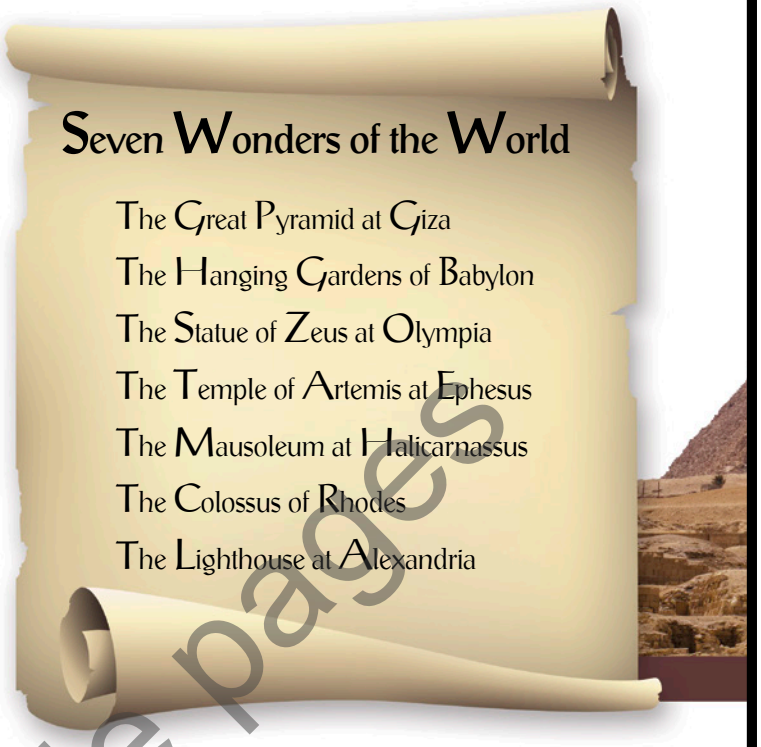
Describing 2-D shapes and 3-D solids

- What do you notice about the pyramid on page 3? How would you describe it to someone who has not seen a photograph of it?
- What do you notice about the triangular faces? Can you call these equilateral triangles? Why or why not? What do you notice about the 3 angles that form at each vertex?

Wonders of the World

More than 2000 years ago, a Greek writer created this list. At the time, it was like a travel guide of things you must see.



The only **wonder** on this ancient list that still exists is the Great Pyramid at Giza. To this day, the planning and building of this pyramid is a mystery.

2

CONNECTING TO MEASUREMENT

Estimating Measures: Engage children in understanding the size of the Great Pyramid at Giza. Move to a space where you can work together to measure a length of 10 metres (or longer). Discuss how that length compares to the length of one edge of the pyramid (230 metres). Connect with other lengths, such as of a soccer field (about 100 metres from end to end) or of a baseball diamond (about 28 metres between bases).

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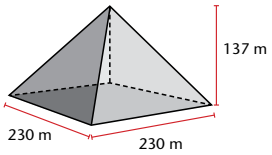
The Great Pyramid at Giza

This pyramid was the tallest structure in the world for more than 3800 years.



More than 2 million stone blocks were used to build it.

It may have taken up to 20 years to build.

The Great Pyramid in Giza, Egypt

Imagine creating a new list of "Wonders of the World." What if the buildings that follow were possible entries? Which one would you vote for?

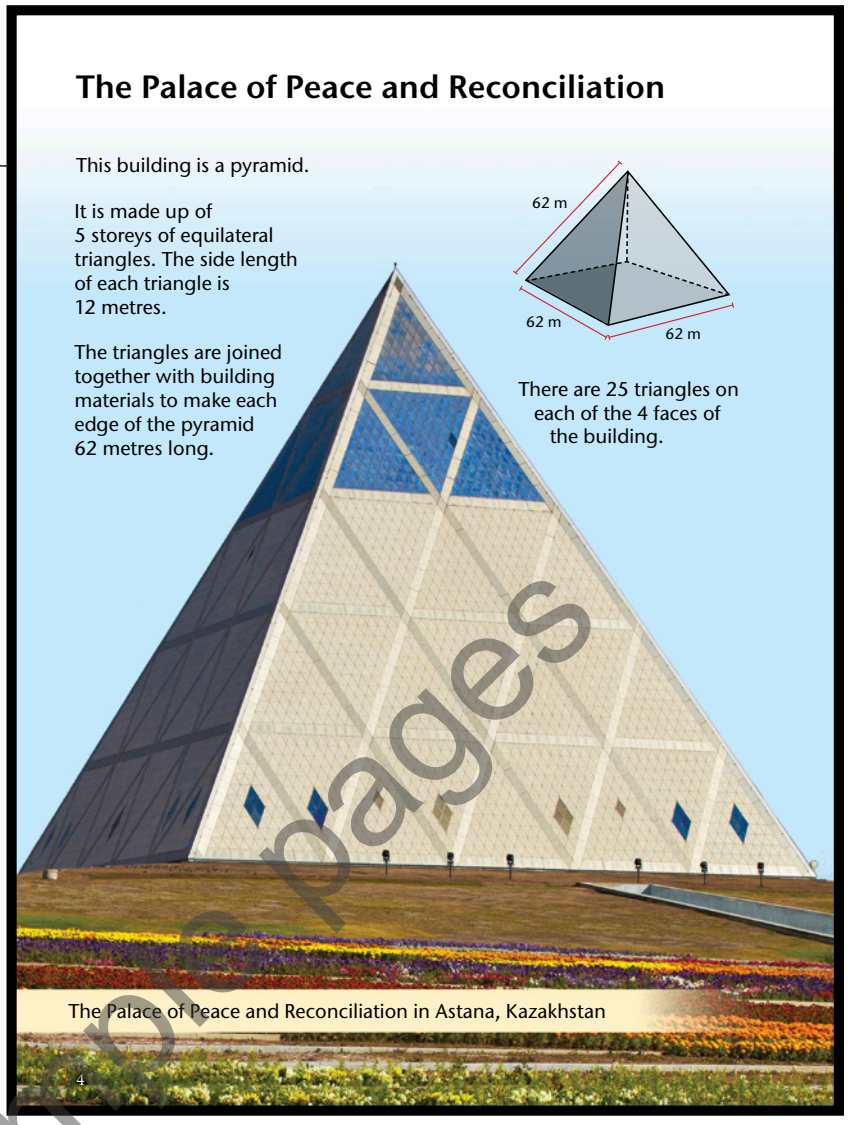
3

Composing and decomposing 3-D solids

- We read that more than 2 million stone blocks were used to build this pyramid. When you think of a block, what shape do you picture? How might blocks be placed to create a pyramid?
- We still have a lot to learn about how the blocks were moved and placed. Suppose you travelled back in time. What questions would you like to ask the builders about how the pyramid was constructed?

Identifying and comparing 2-D shapes and 3-D solids

- What shape is the base of the building? *(square)* How many triangular faces does the building have? *(4)*
- We learn that each face is made from 25 equilateral triangles. What do you know about equilateral triangles? (Refer children to the glossary, if necessary.) Is each face of the pyramid an equilateral triangle? How do you know?
- How is this building the same as the Great Pyramid at Giza? How is it different?



CONNECTING TO MEASUREMENT

Perimeter: Engage children in finding the perimeter of the square base and each triangular face. Ask: **How long is each edge of the base?** *(62 metres)* **What is the perimeter of the base?** *(4 sides in a square, so 62 + 62 + 62 + 62 = 248 metres or 4 × 62 = 248 metres)* **What is the length of each edge of the triangular faces?** *(62 metres)* **What is the perimeter of each triangular face?** *(3 sides in the triangle, so 62 + 62 + 62 = 186 metres or 3 × 62 = 186 metres)*

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Large Group Options

If you read ***WONDERful Buildings*** to a large group or whole class, you might project the book to facilitate reading aloud and better engage children in appreciating the unique and interesting buildings. These activities engage children in exploring and communicating their understanding of properties of 2-D shapes and 3-D solids, and how they can be combined and transformed to create structures; choose the activities that best address your children's learning needs.

GREAT PYRAMIDS

ENGAGE

Focus attention on the pyramids in ***WONDERful Buildings*** (the Great Pyramid at Giza on pages 2–3, the Palace of Peace and Reconciliation on pages 4–5, and the Muttart Conservatory on pages 8–9). Ask:

- **What do all of these pyramids have in common? How are they different from each other?**
- **We agree these buildings are pyramids. What makes a building a pyramid?**

Through discussion, establish that all pyramids have triangular faces that meet at a point (an apex or a vertex).

WORK ON IT

Provide straws, modelling clay, and scissors. Great Pyramids (LM 4) is a recording option. Ask:

- **How many straws and balls of clay do you think you need to create a square pyramid like those in *WONDERful Buildings*?**

Children can describe the faces (4 triangles, 1 square) and the number of edges (8 straws) and vertices (5 clay balls) in their completed pyramids, and then continue to investigate pyramids. Say:

- **You made square pyramids. Suppose the base is not a square face. What other types of pyramids can you build?**

Review that all pyramids have triangular faces that meet at an apex. As they are working, explain to children that they can modify the lengths of the straws by cutting them or joining them together.

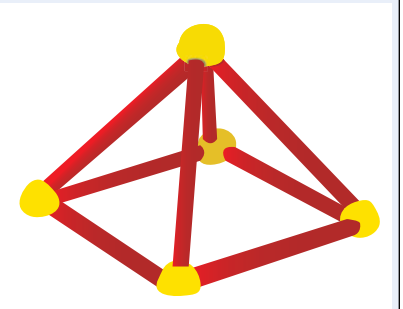
SHARE AND REFLECT

Discuss completed pyramids, focusing attention on the faces and the number of edges and vertices.

- **What shape is the base of your pyramid? Who else has a triangle base like (Morgan)? Who has a different shape of base?**
- **How many edges are in your triangular (rectangular, pentagonal) pyramid? How many faces? Vertices?**
- **Suppose you build a pyramid with a (hexagon) as a base. How many faces do you think it will have? How might you build one to check?**

MATHS FOCUS: identify and compare pyramids; construct pyramids and describe their properties including number and type of faces and number of edges and vertices

MATERIALS: ***WONDERful Buildings***, pp. 2–5 and pp. 8–9; straws; modelling clay; scissors; Great Pyramids (LM 4—optional)



WATCH FOR...

- Do children identify and name faces in their pyramids?
- Are children able to accurately count the edges and vertices?
- Are children able to recognize the criteria (triangular faces meeting at a point) that make a 3-D solid a pyramid?

DIFFERENTIATE: Leave materials available for children who are interested in further investigating pyramids.

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Options for Independent Work

These activities help build geometric thinking and spatial sense during independent work; offer those that meet your children's needs. Most children will need some introduction to the activities. Include all selected activities at once or only one or two at a time, adding others regularly. You may also add Small Group activities (pages 33–35). Visit children as they are working to keep them on task and provide further direction. Validate and encourage their work through questions and comments. Use conversation starters and open-ended prompts such as those below to support children to reflect and make connections in the moment.

- Tell me about the (game you are playing, story you are writing, problem you are solving). Do you have any questions?
- How is the (game, problem solving, writing, inquiry) going? What have you learned? What do you wonder?
- What advice would you give to someone starting out at this centre? and/or What is (challenging, easy, fun, surprising) for you?
- I notice you are (recording your work, using a strategy when..., solving a problem, thinking of many ways to...). What did you discover?
- How do you know...? or How will you show what you have learned about...? or Show me how you know that...
- What would happen if...? or How is this (same as, different from)...?

A GAME FOR PRACTICE

DRAWING SHAPES

- Children play in pairs and share Dot Paper (LM 10). Each child needs his/her own copy of Drawing Shapes (LM 11) and pencils.
- After deciding who goes first, players take turns drawing horizontal, diagonal, or vertical lines to join dots to make any of the shapes given on LM 11. When a player completes a shape, he/she writes his/her initials in it. Play continues until there is no room to enclose shapes.
- Each player calculates the score for each shape he/she completed; 1 point for each vertex and a bonus point for each with interior dots.

MATHS FOCUS: construct 2-D shapes; identify number of vertices

MATERIALS: Dot Paper (LM 10); Drawing Shapes (LM 11); pencils

INDEPENDENT INQUIRY

A MODEL COMMUNITY

- Discuss which type of buildings are needed in a "model community." List ideas (for example: homes, schools, stores, hospitals, and libraries).
- Set aside a space to build and display a "model community." Offer materials such as Nets (LM 6), empty containers, card stock, construction paper, and drawing materials.

MATHS FOCUS: identify and compare 3-D solids; construct 3-D solids from nets; describe 3-D solids

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