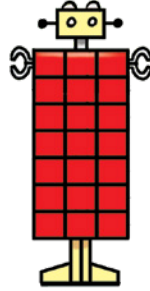


The Best Surprise

Teacher's Guide



Lalie Harcourt and Ricki Wortzman

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.

If the icon doesn't appear or if you are new to Pearson Places, please contact our digital helpdesk at help@pearson.com.au and we will set up a teacher account for you.

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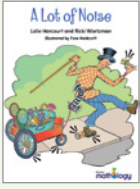
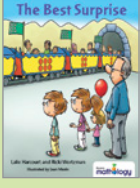
Mathology Little Books

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.

The Best Surprise engages children in conversations, investigations, and activities that help to develop their understanding of the big maths idea that "Patterns can be described mathematically."

Big Idea: Patterns can be described mathematically

(Sort and Classify. Copy, continue and create patterns.)

	KEY MATHS FOCUS	MATHS SKILLS	STRATEGIES	ADDITIONAL FOCUS
	Identify and extend repeating patterns Reproduce and create repeating patterns	Find the repeating core of a pattern Distinguish between repeating and non-repeating sequences. Represent the same pattern in different ways (action, colour, shape)	Predict a missing element	Count how many Recognise 2-D shapes
	Identify and describe repeating patterns Compare and create patterns	Identify the repeating core of a pattern Distinguish repeating and non-repeating patterns Represent patterns in different ways Identify missing elements Sort, create and describe patterns	Use the repeating core to extend patterns	Use positional language to describe location Count by 2s
	Explore growing and shrinking patterns Investigate number patterns	Identify, describe, extend and create number patterns (including increasing and decreasing patterns) Make connections to addition and subtraction	Identify missing terms and pattern rules	Story problems Addition strings to show pattern Combining 2-D shapes Identifying congruent shapes

Emma and Ethan each try an overhand toss and miss.

“The bottles are so close together. That makes it tricky,” says Emma with a sigh.

Next, they each try an underhand toss and miss.

“It’s really tricky! Let’s give our famous wrist flick a try,” suggests Ethan.

Carefully and gently, they each flick their wrist to toss the ring toward the bottles.



Extending number patterns

Trace the appropriate row(s) of bottles with your finger, starting with the horizontal, middle row of 5 (with the red bottle). Ask:

- How many bottles are in this middle row? (5) How many bottles are in the rows above and below the row of 5? (4 in each) In the rows above and below those rows of 4? (3) Above and below those rows of 3? (2) And then? (single bottles; rows of 1)

You might record children’s responses to help track the pattern. Say:

- We read that 3 rings cost 1 ticket. How many rings would the children get if they use 2 tickets? (6) 3 tickets? (9) 4 tickets? (12) Look at the numbers of rings I recorded. How can you describe this pattern? (e.g., count by 3s; add 3)

CONNECTING TO NUMBER

Operational Sense: You can use the arrangement of bottles to prompt a number string for a number talk. For example, you might record the number of bottles in each row horizontally (1 + 2 + 3 + 4 + 5 + 4 + 3 + 2 + 1). Ask: **How many bottles are in the display?** (25) **How did you figure out your answer? Who has a different way of finding the answer?**

Identifying and describing growing and shrinking patterns

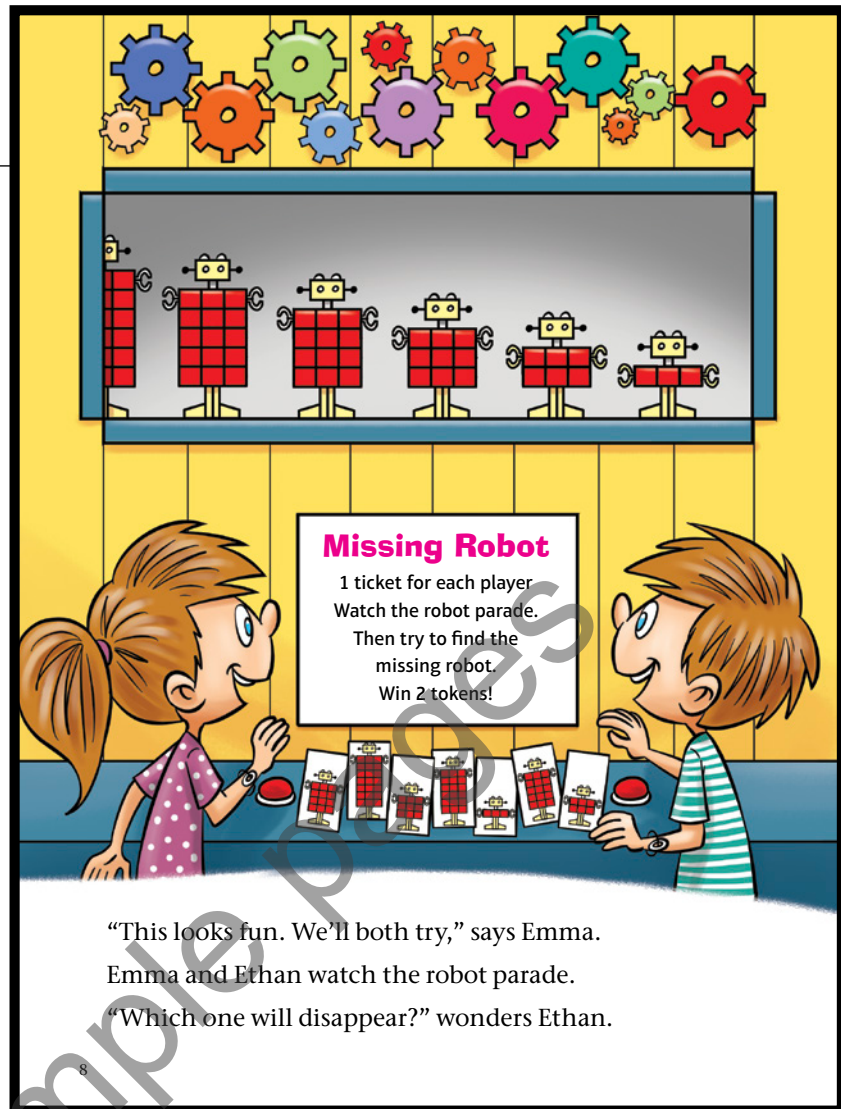
- What patterns can you find in the “Missing Robot” booth?
(accept any answer the child can justify)

Extending and completing number patterns

Point to the robots on page 8 and move your hand from right to left. You might record children’s responses to help track the pattern.

- How can you use numbers to describe the squares in the robots’ bodies? (3, 6, 9, 12, 15)
What do you think the pattern rule is for making a robot that belongs in this booth? (add 3)

Repeat, but move your hand from left to right while pointing to the robots.



“This looks fun. We’ll both try,” says Emma.

Emma and Ethan watch the robot parade.

“Which one will disappear?” wonders Ethan.

CONNECTING TO GEOMETRY

Combining Shapes: Engage children in describing the robots using geometric terms. Ask: **What shape is each row in the robots’ bodies?** (all are rectangles) **Which robot has a body that is square?** (the one that is 3 rows of 3, the one with 9 squares) **How many rectangles can you trace in this robot?** (Encourage children to combine squares and rectangles to find as many of the 36 rectangles as they can.) **How many of these rectangles are squares?** (Encourage children to find as many of the 14 squares as they can.)

Large Group Options

If you read *The Best Surprise* to a large group or whole class, you might project the book to facilitate reading aloud and better engage children in viewing the various growing and shrinking visual patterns. These activities engage children in exploring and communicating their understanding of how growing and shrinking patterns can be extended and created with materials and numbers; choose the activities that best address your children's learning needs.

A NEW BOOTH

ENGAGE

Project Emma's pattern shown on page 2 of *The Best Surprise* or display at least 4 terms of a similar growing pattern, made from cubes. Ask:

- **How do we know that these cubes make a pattern?** (e.g., *we know we get 1 more block in each new row*) **Why do you think we call patterns like these growing (increasing) patterns?** (e.g., *the number of cubes grows*)
- **As the pattern grows, what changes?** (the number of cubes in a row; the total number of cubes) **What stays the same?** (that we always add 1 more cube when we make a row)

Draw attention to a term in the pattern, and say:

- **Let's call each part of the pattern a term. Suppose we decide to make the pattern longer. What is the next term?**

Follow descriptions to extend the pattern by 1 or more terms. Then, play "What's Missing?". Invite children to close their eyes as you remove or cover 1 term. Then, encourage them to describe the missing term. Replace or uncover the missing term to confirm their answers.

WORK ON IT

Provide small cubes and invite children to create a growing or shrinking pattern with at least 4 terms. Say:

- **Make a pattern that grows (increases) or shrinks (decreases), and has at least 4 terms.**

SHARE AND REFLECT

Lead a gallery walk to view displayed patterns. Each display can be treated as a game booth, like those in the book. Children may decide to invite visitors to their game booth to play "What's Missing?" before presenting their patterns. If so, each pattern's creator secretly removes or covers a term, and then asks visitors "What's missing?"

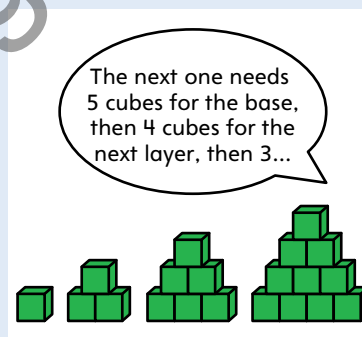
After (or instead of) playing, prompt discussion of the patterns. Ask:

- **Tell us about your pattern. How does it grow (shrink)? What changes in your pattern? What stays the same?**
- **Suppose (Josh) makes his pattern longer. What would he build?**

You might photograph each display and encourage children to write about and promote their game booths.

MATHS FOCUS: identify, describe, extend, and create a growing or shrinking pattern; identify a missing term

MATERIALS: *The Best Surprise*, p. 2; small cubes such as ones cubes or linking cubes



WATCH FOR...

- Does the child describe how the pattern grows or shrinks? Can she/he articulate a pattern rule?
- Can the child extend a pattern that someone else has created?
- Can the child identify a missing term?

DIFFERENTIATE: Some children may benefit from having the first term of their pattern defined and then being offered a specific pattern rule (e.g., add or subtract 2). Others may be ready to solve problems based on their pattern, such as: **How many (cubes) would there be in the next term of your pattern?**

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The Best Surprise

Line Master 1

(Assessment Master)

Name: _____

Problem Solving and Reasoning	Not observed	Sometimes	Consistently
Identifies and describes increasing and decreasing patterns			
Identifies increasing and decreasing patterns			
Identifies increasing patterns			
Identifies decreasing patterns			
Identifies and describes number patterns			
Identifies and explains number patterns			
Identifies increasing number patterns			
Identifies decreasing number patterns			
Identifies number patterns			
Identifies and explains number patterns			

Strengths: _____

Next Steps: _____

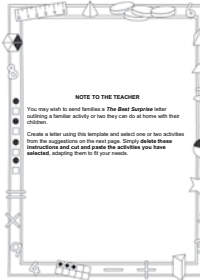
A customizable e-Chart White Cloud Assessment monitoring sheet is also available on [Teacher Tools](#)

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Connecting Home and School

Line Master 2-1



NOTE TO THE TEACHER

You may wish to send families a *Play Board* template letter outlining a family activity or task they can do at home with their child(ren).

1. Create a letter using this template and select one or two activities from the suggestions on the next page. Simply duplicate these instructions and cut and paste the activities you have selected, providing them to 10-year students.

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The Best Surprise
Maths Mat

Line Master 3

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Tokens and Tickets

Line Master 4

Name: _____

Tokens					Tickets				
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50

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Pattern Starters

Use the pattern starters below to create a tessellation.

Line Master 5-1













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Make a Change Machine

Line Master 8-1

Materials

- 2 lengths cardstock
- 2 cardboard or lightweight paper, size 7 cm x 20 cm and one 7 cm x 20 cm ruler
- measuring tape or shut tape
- compass or utility knife
- correction pencil

Instructions

Note: Change Machines should be made only by the teacher.

1. Cut the top of the paper sheet. Cut off two of the short edges. Cut off the short edges. Cut off the short edges. Cut off the short edges.
2. Draw two rectangular slots, each about 6 cm wide and 10 cm high. Cut out the slots. Cut out the slots. Cut out the slots. Cut out the slots.



The diagram shows a perspective view of a rectangular box representing a change machine. It has two large rectangular slots on the front face, one above the other. To the right of these slots is a narrow vertical slot for inserting coins. The top of the box is slightly recessed, and there are lines indicating the internal structure or the way the box is assembled from the materials listed.

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What's the Number?

Line Master 7

Start Number



Pattern Rule



How to play:

- Find your start number. Write it on a card.
- Find your pattern rule. Decide if you will make your pattern grow or if you will make your pattern shrink.
- Create 5 more cards by writing a different number that belongs to your pattern on each card.
- Put your cards in order in a row beside your start card.
- Ask your partner, "What's the number?"

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Pattern Challenges		Line Master 8-1
X	2, 4, 6, 8, 10, 12	
	The pattern rule is _____	
X	5, 10, 15, 20, 25, 30	
	The pattern rule is _____	
X	13, 16, 19, 22, 25, 28	
	The pattern rule is _____	
X	40, 80, 120, 160, 200, 240	
	The pattern rule is _____	
X	20, 18, 16, 14, 12, 10	
	The pattern rule is _____	
X	45, 40, 35, 30, 25, 20	
	The pattern rule is _____	
X		

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