

Structuring sevens

Purpose

To strengthen the relationship between multiplication facts

Outcomes

NS1.3: Uses a range of mental strategies and concrete materials for multiplication and division

NS2.3: Uses mental and informal strategies for multiplication and division

PAS1: Creates, represents and continues a variety of number patterns, supplies missing elements in a pattern and builds number relationships

PAS2.1: Generates, describes and records number patterns using a variety of strategies and completes simple number sentences by calculating missing values.

MA1-6NA, MA2-6NA, MA1-8NA, MA2-8NA

Framework reference

To move students to Multiplication and division level 5

Materials

Structured number strips or the Notebook: *Structured number strips*

Paper

Teaching point



- *To learn structure, in short, is to learn how things are related.*
Hiebert, J. (1984). Children's mathematics learning: The struggle to link form and understanding. *Elementary School Journal*, 84, 497-513.
 - Encourage students to explain their thinking regarding the structure of rows and columns when modelling multiplication.
- *If concrete materials are going to be useful, frequent, explicit links must be made between the physical and symbolic representations... It is not just the use of concrete materials that improves mathematical understanding, but rather the explicit construction of links between understood actions on the objects and related symbol procedures.* (Hiebert, 1984, p. 509)
 - It is expected in Stage 2 that students use the equals sign to record equivalent number relationships and to mean 'is the same as'. Multiplication facts need to be recognised as being equivalent, i.e. $5 \times 3 = 3 \times 5$ (PAS2.1).




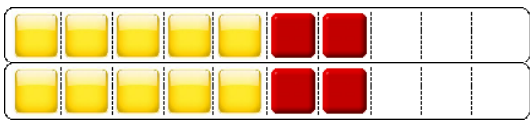
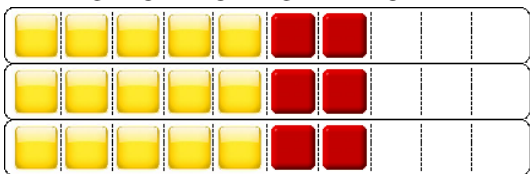
Suggested *Short*, focussed, frequent activity

	Outline	Questions
Introduction	<p>Draw three rows of five stars on the board.</p> <p>***** ***** *****</p> <p>Using a different colour, draw a row of two stars beside each row of five stars.</p> <p>***** ** ***** ** ***** **</p>	<p><i>What do you think the lesson will be about?</i> <i>How many stars are on the board?</i> <i>How do you know?</i></p>



	Outline	Questions
	<p>Have the students write a word sentence to explain how they know that $3 \times 7 = 21$</p> <p>At this point in the lesson, students do not need to write a number sentence for this explanation.</p>	<p><i>How many additional stars have been drawn?</i></p> <p><i>How could you use these answers to work out how many stars would be in three rows of seven stars?</i></p>
Concept development	<p>Display five number strips each showing seven composed of five and two.</p>  <p> Organise the students into small groups and provide each group with paper. Have the groups record as many multiplication facts as they can using the structured number strips.</p> <p>Have each group then identify the number facts represented by the yellow squares and then by the red squares.</p> <p>Select students to share their group's findings and explain how the number facts are represented by the model.</p> <p>Record on the board the number facts represented by the yellow squares and then by the red squares.</p> <p>If the students identify multiplication number facts other than those of two, five and seven, have them explain their thinking.</p> <p>Have the class determine the multiplication facts for seven and record them on the board.</p>	<p><i>What other multiplication facts could be represented by the model? How?</i></p>



Outline	Questions
<p>As a class, discuss and record how the parts of the structured number strips representing multiplication facts for five and two can be combined to represent the multiplication facts for seven.</p> <div data-bbox="236 434 767 560"> $1 \times 5 = 5$ $1 \times 2 = 2$  $1 \times 7 = 7$ </div> <div data-bbox="236 613 767 797"> $2 \times 5 = 10$ $2 \times 2 = 4$  $2 \times 7 = 14$ </div> <div data-bbox="236 851 767 1088"> $3 \times 5 = 15$ $3 \times 2 = 6$  $3 \times 7 = 21$ </div> <p>Continue for the representations up to 5×7. Add another structured number strip for the number seven to the display.</p>	
Strengthening the concept	<p>Have each student record the multiplication facts that are represented by the model.</p> <p>Have several students share their recordings.</p> <p>Repeat the process for each number fact to 10×7.</p> <p>Organise the students into pairs and have them explain to each other how the multiplication facts for seven can be determined from the multiplication facts for five and two.</p> <p>Select one pair of students to share its explanation.</p>

