Patterns and Algebra

GENERAL INFORMATION

For year levels: 5-8 (can be used for later years if we look at non-linear patterns)

Background/Description:

Patterns can be represented in 5 ways, and the number of ways you choose will depend on the year level or development of the student. We will examine the representation of patterns in the following ways:

1. As a diagram
2. In a verbal description
3. As a chart
4. As an algebraic formula
5. In graphical form

This activity covers the following Australian Curriculum - Mathematics Content:

Year 5: Describe, continue and create patterns with fractions, decimals and whole numbers resulting from addition and subtraction (ACMNA107 - Scootle)

Year 6: Continue and create sequences involving whole numbers, fractions and decimals. Describe the rule used to create the sequence (ACMNA133 - Scootle)

Year 7: Introduce the concept of variables as a way of representing numbers using letters (ACMNA175 - Scootle)

Create algebraic expressions and evaluate them by substituting a given value for each variable (ACMNA176 - Scootle)

Representing Patterns

Students are presented with the following pattern:
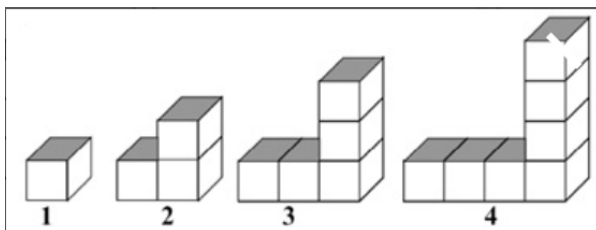
Ask the following questions:

1. How do you see the pattern growing? Explain this verbally and using a diagram
2. What is the next figure in the pattern? How many blocks does it contain?
3. What is the 10th item in the pattern and how many blocks does it contain?
4. Draw a table (chart) like the one below and complete it.

Figure no.(f)	1	2	3	4	5	6	7	8
No. of Blocks(b)	1	3	5	7				

Does this table make it easier to predict how many blocks will be in later figures?

5. How would you go about predicting the number of blocks in the hundredth figure? The 250th? The nth? (now we're starting to go into algebra! Using letters to represent numbers) Not on the year 6 curriculum but don't be scared! Give it a go!
6. Use your chart and predictions to draw a graph. The Figure no. (f) should be on the horizontal (x) axis and the No of Blocks (b) should be on the vertical axis.
7. How can you use your graph to make predictions?
8. Try some other patterns. What do you notice about the patterns that make straight lines? Can you find short cuts to work out the formula? What sorts of shapes can the graphs make? Can we always make predictions?

FURTHER INFORMATION

The site http://www.visualpatterns.org/ has nearly 400 different patterns. Not all are linear, meaning their graphs may not produce straight lines, but they make great challenges.