

# **Patterning and Algebra**

# Smothered in Chocolate!

## The Task

This task required each student to use interlocking cubes to form larger cubes and to investigate the patterns found when large cubes are made from unit cubes. Students then considered what would happen if they were to submerge the cubes they had made into a container of chocolate. The specific task was to determine how many of the unit cubes would have one face, two faces, or three faces covered with chocolate. Students were also given the opportunity to determine the relationships among the vertices, edges, and faces of cubes. They were requested to express their generalizations algebraically and to sketch cubes on isometric paper.

## Expectations

This task gave students the opportunity to demonstrate their achievement of all or part of each of the following selected overall and specific expectations from the strand Patterning and Algebra. Note that the codes that follow the expectations are from the Ministry of Education's *Curriculum Unit Planner* (CD-ROM).

*Students will:*

1. identify, create, and discuss patterns in algebraic terms (8m75);
2. apply and defend patterning strategies in problem-solving situations (8m78);
3. describe and justify a rule in a pattern (8m79);
4. write an algebraic expression for the  $n$ th term of a numeric sequence (8m80);
5. find patterns and describe them using words and algebraic expressions (8m81).

## Prior Knowledge and Skills

To complete this task, students were expected to have some knowledge or skills related to the following:

- the concepts of surface area and volume
- identifying the relationship between surface area and volume
- discussing patterns in algebraic terms
- identifying various types of prisms
- understanding and identifying the following features of a cube: edge, face, and vertex

*For information on the process used to prepare students for the task and on the materials, resources, and equipment required, see the Teacher Package reproduced on pages 98–102 of this document.*

## Task Rubric – Smothered in Chocolate!

Expectations*	Level 1	Level 2	Level 3	Level 4
<b>Problem solving</b>				
	<b>The student:</b>			
3	– selects and applies a problem-solving strategy that leads to an incomplete or inaccurate solution	– selects and applies an appropriate problem-solving strategy that leads to a partially complete and/or partially accurate solution	– selects and applies an appropriate problem-solving strategy that leads to a generally complete and accurate solution	– selects and applies an appropriate problem-solving strategy that leads to a thorough and accurate solution
<b>Understanding of concepts</b>				
	<b>The student:</b>			
1	– demonstrates a limited understanding of algebraic patterns	– demonstrates some understanding of algebraic patterns	– demonstrates a general understanding of algebraic patterns	– demonstrates a thorough understanding of algebraic patterns
<b>Application of mathematical procedures</b>				
	<b>The student:</b>			
2, 4	– applies mathematical procedures with many errors and/or omissions when analysing the data  – states generalizations and/or algebraic expressions for the $n$ th terms that include many errors and/or omissions	– applies mathematical procedures with some errors and/or omissions when analysing the data  – states generalizations and/or algebraic expressions for the $n$ th terms that include some errors and/or omissions	– applies mathematical procedures with few errors and/or omissions when analysing the data  – states generalizations and/or algebraic expressions for the $n$ th terms that include few errors and/or omissions	– applies mathematical procedures with few, if any, minor errors and/or omissions when analysing the data  – states generalizations and/or algebraic expressions for the $n$ th terms that include few, if any, minor errors and/or omissions
<b>Communication of required knowledge</b>				
	<b>The student:</b>			
5	– uses mathematical language and/or algebraic notation with limited clarity to explain and justify generalizations based on the model	– uses mathematical language and/or algebraic notation with some clarity to explain and justify generalizations based on the model	– uses mathematical language and/or algebraic notation clearly to explain and justify generalizations based on the model	– uses mathematical language and algebraic notation clearly and precisely to explain and justify generalizations based on the model

\*The expectations that correspond to the numbers given in this chart are listed on page 64.

*Note:* This rubric does not include criteria for assessing student performance that falls below level 1.