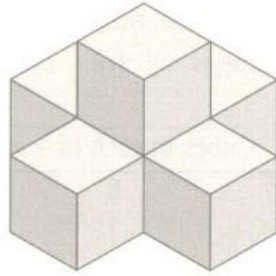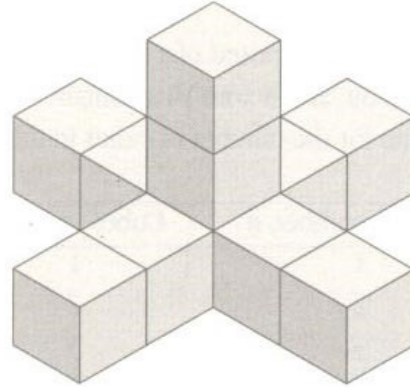# Counting Cubes

Building 1   Building 2   Building 3

1. Determine the number of cubes in each of the first three building.
2. Sketch Building 4 and determine the number of cubes in the building.
3. Determine the number of cubes in Building 10 ***without*** building or sketching it.
4. Write a description that could be used to find the number of cubes in **any** building and explain why it works.
5. Determine which building would contain 681 cubes.
6. Without graphing, describe what you think the graph would look like if Building Number is the independent variable and Number of Cubes is the dependent variable. Explain your reasoning.

Visual Pattern Resources

Articles

Friel, S. N., & Markworth, K. A. (2009). A framework for analyzing geometric pattern tasks. *Mathematics Teaching in the Middle School*, *15* (1), 24-33.

Smith, M.S., Hillen, A.F., & Catania, C. (2007). Using pattern tasks to develop mathematical understandings and set classroom norms. *Mathematics Teaching in the Middle School, 13* (1), 38-44.

URL's for Visual Pattern Tasks

http://www.visualpatterns.org

Elementary/Middle Grades
Investigating Growth Patterns
(http://mathwire.com/algebra/growingpatterns.html)

High School
Skeleton Tower (http://map.mathshell.org/tasks.php?unit=HE07&collection=9)
Table Tiling (http://map.mathshell.org/download.php?fileid=818)
Sidewalk Stones (http://map.mathshell.org/download.php?fileid=822)

Visual Pattern Lessons

http://www.nctm.org/PtAToolkit/

Middle School – Hexagon
Middle School – Counting Cubes
High School – S-Pattern

Smith, M. S., Silver, E. A., Stein, M. K., Henningsen, M. A., Boston, M., & Hughes, E.K. (2005). *Improving instruction in algebra: Using cases to transform mathematics teaching and learning, Volume 2.* New York: Teachers College Press.
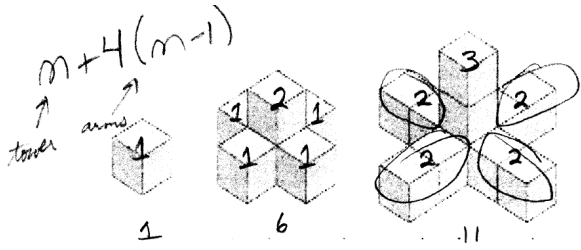
Chapter 2 Examining Linear Growth Patterns: The Case of Catherine Evans an David Young
Chapter 3 Examining Nonlinear Growth Patterns: The Case of Ed Taylor

Schifter, D., Bastable, V., & Russell, S.J. (2015). Patterns, functions, and change. Reston, VA: National Council of Teachers of Mathematics.

Joshua

$$n + 4(n-1)$$

tower ↗   arms ↗

1   6   .11

The first building has one cube. The second building has six cubes and the third building has eleven cubes.

The fourth building has five more cubes, so it has sixteen.

The tower has as many cubes as the building number and the arms have one less. So the tenth building has forty-six cubes.

Marisa

5×1 plus the hidden one

5×2 plus the hidden one

building 1   building 2   building 3
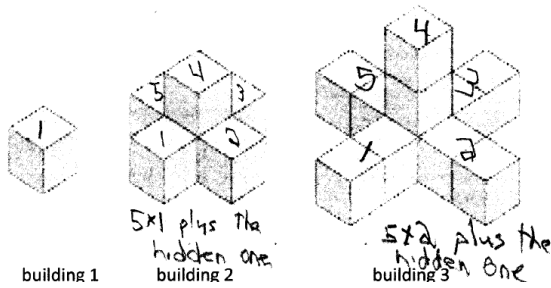
Building	Cubes
1	1
2	6
3	11
4	16
5	21
10	46

4th $5(3) + 1 = 16$

10th $5(9) + 1 = 46$

$5(n-1) + 1$

Darvin

#cubes

Bldg 1	1
Bldg 2	$1 + 5 = 6$
Bldg 3	$6 + 5 = 11$

$1 + 5n$

Bldg 4	$1 + 5(4) = 21$
Bldg 5	$1 + 5(5) = 26$

Bldg 10	$1 + 5(10) = 51$

Tabitha

Building 1 → 1 ⎫ +5
Building 2 → 6 ⎬ +5
Building 3 → 11 ⎭ +5
Building 4 → 16
Building 5 → 21
Building 6 → 26
Building 7 → 31
Building 8 → 36
Building 9 → 41
Building 10 → 46

Add 5 to the number of cubes in the last building.

$n + 5$