

Grade 5 - Patterns to Algebra

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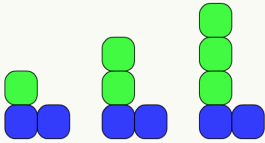
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What to look for from the end of Grade 4	Diagnostic Thinking Tasks: (sample tasks to uncover students' current understandings)
<p>Looking back:</p> <ul style="list-style-type: none">identify and describe repeating and growing patterns, including patterns found in real-life contextsdetermine pattern rules and use them to extend patterns	<p>The first three terms of a pattern look like this:</p>  <p>Explain how you know what term 10 would look like? What would this pattern look like numerically? Can you think of a pattern rule in words that would describe how it grows?</p> <p>Why this task?</p> <ul style="list-style-type: none">it is easily differentiated by choosing different term numbers to extend to (after term 10, students might try term 26 or term 53!)allows students to be reacquainted with manipulative materials and routines (students might build the pattern from tiles or connecting cubes)creates an opportunity for the teacher to observe:<ul style="list-style-type: none">understanding of growing patterns - Do students notice how much it is growing by each term? Are they able to <i>extend</i> and/or <i>predict</i> using that information?students' comfort with describing patterns and pattern rules - Can students <i>explain</i> how a pattern is growing? Do their descriptions help them to generalize and predict future terms?students' comfort with various pattern representations (physical tools, visual, numerical, in words) <p>Alternate task - - explore the Diagnostic Assessments included in the MathUP topics listed below.</p>
<p>Next Steps for Learning:</p> <ul style="list-style-type: none">Based on what you saw and heard, what is next for you and your students?Does a starting point now stand out in the grade-level sample problems or MathUP Connections?	

Resources to Address Grade Level Expectations:

MathUP Connections

Note: To ensure the links below work, first sign into MathUP in a separate tab

- [Patterns. Lessons 1-5](#)

Building Fluency Lessons

[MathUP Number Talks:](#)

- Grade 5 Number Talks: 32, 35, 41

Resource for visual patterns: visualpatterns.org

- Project a visual growing or shrinking pattern, but with one of the terms hidden. What might the missing term in the pattern be? Is there more than one possibility? Can students determine a pattern rule or describe what a graph of the pattern might look like from what is given?

Sample Problems and Explorations:

Which of the following patterns will have a term value greater than 50 first? Show how you know.

- A pattern that starts at 6 and adds 8 each to each term to get the next term.
- A pattern that grows like this: 2, 4, 8, 16...

Represent three different patterns that all have 4 as their first term value. Represent each with pictures (first three terms), in words (the pattern rule), and in a table of values. How are your patterns the same? How are they different?

A Guide to Effective Instruction in Mathematics, Patterning and Algebra, [Growing Weave Designs](#), p 65-76

Here is a growing numeric pattern: 3, 5, 7, 9...

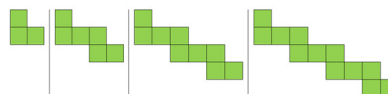
What could it look like if you built it using tiles or cubes?

How could you use colour to help someone see your growing pattern?

How could you predict what term 10 might look like (in tiles or cubes)?



Draw the next two terms in each of the following patterns.



Explain how you see the pattern growing.

The 20th term in a shrinking pattern is in the 500s and the 30th term is in the 300s. What might the pattern rule be? How do you know you are right?

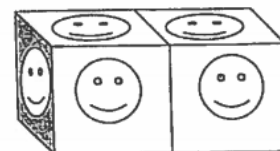
Use connecting cubes to create a model that represents the growing pattern in the table of values shown. How is your pattern growing?

Compare the model you created to a model one of your classmates created.

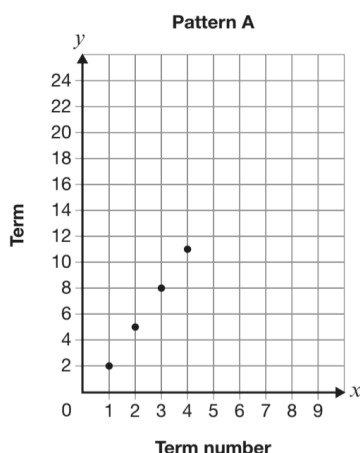
Term Number	Number of Cubes
1	5
2	9
3	13
4	17

A company makes coloured rods by joining coloured cubes in a row and using a sticker machine to put “smiley” stickers on the rods. The machine places exactly 1 sticker on each exposed face of each cube. Every exposed face of every cube has to have a sticker.

The rod of length 2 (2 cubes) would need 10 stickers (show rod with stickers, built with connecting cubes).



How many stickers would you need for a rod of 4 cubes? 10 cubes? 100 cubes?



Pattern B

Start with 7 and add 2 to get the next term.

If both patterns continue the same way, which pattern will reach a term with a value of 23 first? How do you know?

Models and Tools

Concrete Learning Resources Tools:

- number lines
- grid paper
- white boards
- linking cubes in two colours
- colour tiles

Virtual Learning Resources and Tools:

- [number line](#)
- [Desmos online graphing calculator](#)
- [colour tiles](#)

Expectation Cluster:

C1 identify, describe, extend, create, and make predictions about a variety of patterns, including those found in real-life contexts

C1.1 identify and describe repeating, growing, and shrinking patterns, including patterns found in real-life contexts

C1.2 create and translate growing and shrinking patterns using various representations, including tables of values and graphs

C1.3 determine pattern rules and use them to extend patterns, make and justify predictions, and identify missing elements in repeating, growing, and shrinking patterns

C1.4 create and describe patterns to illustrate relationships among whole numbers and decimal tenths and hundredths

Related Mathematical Processes : Representing, Connecting