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ACTIVITY 03 · AT A GLANCE

Growing Patterns

Pairs build the first three steps of a growing pattern with cubes, such as an L-shape that grows by two each step. They predict step 10, then step 100, write a rule in words and then in algebra, and justify it by pointing to the pattern's structure. Pairs then create a pattern for others to solve.

Learning outcomes

By the end of the session students can:

- describe how a pattern grows;
- write a rule in words and symbols;
- use the n th term to predict;
- justify a rule using structure.

KEY WORDS

sequence · term · n th term · linear · coefficient · generalise

CURRICULUM LINKS

Science: patterns in data. Art: tessellation. Computing: loops and rules.

1**NOTICE**

What do we see?

2**REPRESENT**

Concrete, picture, symbol

3**EXPLORE**

Try and look for patterns

4**CONJECTURE**

What might always be true?

5**JUSTIFY**

Explain why

6**CONNECT**

Where else does it apply?

Materials (per pair)

- Interlocking cubes
- Pattern cards
- Squared paper
- Worksheets 1, 2 and 3

Before the session

- Prepare three pattern cards.
- Bag cubes.
- Plan pairs.
- Print worksheets.

SAFETY

Keep cubes on desks. No throwing equipment.

ACTIVITY 03 · SESSION PLAN

Step by step

Ask “Where is the n in your pattern?” to link algebra to structure.

Time	What happens	Say or ask
0–8 min Hook	Show steps 1–3.	<i>“What comes next?”</i>
8–20 min Build	Build and tabulate.	<i>“How does it grow?”</i>
20–35 min Generalise	Predict step 10 and 100.	<i>“Can you avoid counting?”</i>
35–48 min Justify	Link rule to shape.	<i>“Where is $2n$ in the pattern?”</i>
48–60 min Create	Make patterns for others.	<i>“Can they find your rule?”</i>

CHALLENGE CARD (print or copy onto the board)

Find the n th term of a growing pattern, use it to predict step 100 and justify the rule using the structure of the pattern.

ACTIVITY 03 · FACILITATOR NOTES

The maths know-how in brief

A linear sequence grows by the same amount each step. Its n th term has the form $an + b$, where a is the constant difference and b adjusts for the starting value.

Seeing the rule in the pattern, for example two arms of n cubes plus one corner cube giving $2n + 1$, turns a rule into a justified generalisation rather than a guess.

Common ideas to listen for

- “Step 10 is double step 5.” Only if there is no constant.
- “The difference is the whole rule.” Add the adjustment.
- “Algebra is separate from shapes.” It describes the structure.

Adapting the activity

Support

Use a table with differences highlighted.

Stretch

Explore a quadratic pattern such as square numbers.

WORKSHEET 1

Pattern table

Name: _____

Class: _____ Date: _____

Record your pattern.

Pattern table

Step	1	2	3	4	10
Cubes					

WORKSHEET 2

Rule

Describe the rule.

Rule

Form	Our rule
In words	
In algebra	
Step 100	

WORKSHEET 3

Justification

Explain using the shape.

Where each part of the rule appears

FOR THE TEACHER

Assessment checklist

Use during the session. One sheet covers up to eight students; copy as needed.

Student	Describes growth	Writes nth term	Justifies with structure

Suggested codes: W = working towards · E = expected · G = greater depth

ABOUT THIS ACTIVITY

Growing Patterns is a sample activity from the EduTrend Contents Edutech Mathematics programme (middle school, level: intermediate). Every activity in the programme follows the same format: a practical challenge, a clear session plan, facilitator notes and ready-to-print worksheets, so that teachers, club leaders and parents can run it without extra preparation.

Full 15-, 20- and 32-week programmes are available from EduStore at edutrend.org.

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