

NUMBER PATTERNS

GENERAL INFORMATION

Background

Number patterns, like those formed by counting forwards by the same number, continue indefinitely. Students can use their knowledge of numbers to find missing numbers in the sequence or calculate future terms.

Australian Curriculum Link(s):

- Investigate number sequences involving multiples of 3, 4, 6, 7, 8, and 9 ([ACMNA074](#))
- Recall multiplication facts up to 10×10 and related division facts ([ACMNA075](#))

Year Level(s): 3 – 5

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Details:

- Generate number patterns using multiples of 3, 4, 6, 7, 8 and 9, e.g. 3, 6, 9, 12, etc.
- Investigate visual number patterns on a number chart
- Recognise that number sequences can be extended indefinitely
- Determine any patterns in the sequences
- Recognise and explain repeating and growing patterns
- Use the word 'term' when referring to numbers in a number pattern
- Describe the position of each term in a number pattern, e.g. 'The first term is 6'
- Find a term in a number pattern given the other terms, e.g. determine the next term in the pattern 4, 8, 16, 32, 64, etc.
- Describe the rule (or unit) of the pattern, e.g. 3, 6, 8, 12, the pattern is increasing by 3 or $+3$

POSSIBLE ACTIVITIES

Getting started

A great way to begin looking at number patterns with students is through the use of a **counting chart**. Students can be encouraged to use counters to make a simple repeating pattern, such as blue, blue, red, etc. and place these counters onto a chart.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30

Removing the red counters will then reveal the threes skip counting pattern (or multiples of 3). The rule (or function) of this pattern can be described as $+3$. This is also known as the unit of repeat.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30

This pattern can then be recorded in students' books. Encourage students to record the pattern vertically to help them identify any patterns within the sequence. Use this information to predict future terms. Students can then record the pattern horizontally using commas to separate each term.

3, 6, 9, 12, 15, 18, 21, 24, 27, 30, etc.

When introducing patterns to students it is important to remember to include patterns that are counting backwards and patterns that may not begin at zero, for example, starting a pattern with 3-digit numbers such as 102, 105, 108, 111, etc. This can help students to recognise that number patterns can be extended indefinitely in both directions along the number sequence.

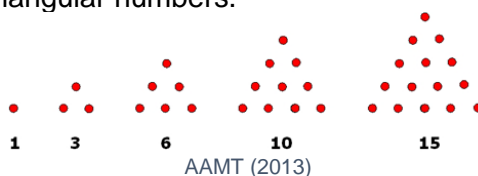
Questions

- What is the first term in the number pattern?
- What is the rule (function or unit) for the pattern?
- What is the next/previous term in the pattern?
- What will be the 20th term in the pattern?
- What is an example of a repeating pattern?
- What is an example of a growing pattern?
- Record three patterns that involve the number 12
- What is the rule (or function) of each of these patterns?

Repeating and Growing Patterns

It is important to recognise that many of the patterns that students experience early in school are repeating patterns, even though the numbers within the pattern may be getting larger.

- **Repeating Patterns** have a *fixed* unit of repeat, i.e. the difference between the terms within the pattern is the same each time, or the set of objects in pattern are used repeatedly. For example, 4, 8, 12, 16, 20 is a repeating pattern where the unit of repeat (or rule) is + 4. The object pattern, ★●★★●★★●★★●★★● the unit of repeat is ★●.
- **Growing Patterns** *do not* have a fixed unit of repeat. Instead they have terms that increase or decrease in a systematic way. For example, in the number pattern 1, 3, 6, 10, 15, the difference between the numbers is increasing by one each time. This pattern can be better described using a model as is known as the triangular numbers.



Games

The following games and warm-up tasks will assist student to begin to recognise patterns in number sequences.

- Number Trails: <https://calculate.org.au/2020/03/04/number-trails-2/>
- Pass the Count: <https://calculate.org.au/2018/09/26/pass-the-count/>
- See and Say: <https://calculate.org.au/2018/10/03/see-say/>

ADDITIONAL RESOURCES

- **AAMT** Top Drawer Teachers – Number Sequences: <https://topdrawer.aamt.edu.au/Patterns/Misunderstandings/Number-sequences>
- **NZMATHS** Building patterns incrementally: <https://nzmaths.co.nz/resource/building-patterns-incrementally>

FURTHER INFORMATION

Australian Mathematical Sciences Institute. (2011). *The improving mathematics education in schools (TIMES) project: Multiplication of whole numbers*. Retrieved from http://amsi.org.au/teacher_modules/multiplication_of_whole_numbers.html

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Australian Curriculum and Assessment Reporting Authority. (2014). *Foundation to Year 10 curriculum: Mathematics*. Retrieved <https://www.australiancurriculum.edu.au/f-10-curriculum/mathematics/>

NSW Government Education Standards Authority. (2018). *Mathematics K-10: Rationale*. Retrieved from <https://educationstandards.nsw.edu.au/wps/portal/nesa/k-10/learning-areas/mathematics/mathematics-k-10/rationale>