

# Rules and Properties

**Strand:** Algebra

**Strand unit:** Rules and Properties

## Curriculum Objectives

- 521** Explore and discuss simple properties and rules about brackets and priority of operation.
- 522** Identify relationships and record verbal and simple symbolic rules for number patterns.

## Looking back: What the 4th class programme covered

1. Exploring, recognising and recording patterns in numbers from 0 to 9,999.
2. Exploring, extending and describing the rules for sequences.
3. Using patterns as an aid in the memorisation of number facts.



## Maths skills used in this topic

1. **Applying and problem-solving:** Apply the concept of brackets and priority of operations in a variety of contexts, select and apply a variety of strategies to complete number patterns and sequences.
2. **Communicating and expressing:** Listen to and discuss other children's mathematical descriptions on the order of operations, recognise mathematics in the environment, recognise and apply mathematical ideas in other areas of the curriculum.
3. **Reasoning:** Making hypotheses on number sequences and test them, search for and investigate mathematical patterns and relationships.
4. **Implementing:** Use mental strategies and procedures for carrying out mathematical tasks.

## Concrete materials

Calculators

## Vocabulary

Pattern, sequence, frame, order, brackets, add, subtract, multiply, divide, operations, rule



## Teaching points

1. Before beginning the target board, the teacher may revise simple number sequences that the students will have encountered previously, e.g. counting up in 2s; multiples of 3, 4, 5; counting down in 10s; counting in 100s; counting in  $\frac{1}{2}$ s.

- The target board will introduce the concept of sequences following multiple types of patterns that may be outside students' previous experiences.
- Exploratory activities involving the use of brackets will draw students' attention to the possible different outcomes to a computation depending on the location of the brackets.

## Oral and mental activities



### Fans:

What square number is the 2nd multiple of 2, the 7th multiple of 7, the 3rd multiple of 3, the 6th multiple of 6, etc?

### Counting stick:

Go forwards and backwards on the stick with different multiples. For example 6, 12, 18, 24, 30, 24, 18, 12. Use this strategy with different tables.

## Topic suggestions

- Look for patterns in mobile phone numbers. Examine the use of patterns in phone numbers, for example, in the context of banking or radio programmes.
- Explore patterns outside of mathematics, for example in the case of the 'golden ratio' used in the art of Leonardo da Vinci.

## Activity A

### What is the rule for each pattern?

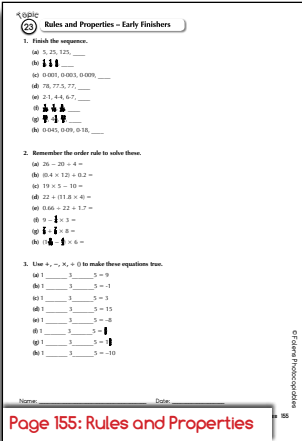
- 10,000, 1,000, 100, 10. (divide by 10)
- 25, 30, 35, 40. (add 5)
- 16, 8, 4, 2. (divide by 2)
- 1, 7, 49, 343, 2,401. (multiply by 7)
- $1, 3\frac{1}{2}, 6, 8\frac{1}{2}$ . (add  $2\frac{1}{2}$ )
- 2, 3, 4, 6, 7, 8, 10. (1, 1, 2)
- 25, 6, 9.5, 13. (add 3.5)
- 20, 18.5, 17, 15.5. (subtract 1.5)
- $\frac{11}{4}, 2, 2\frac{3}{4}, \frac{31}{2}$ . (add  $\frac{3}{4}$ )
- 1, 3, 5, 8, 10, 12, 15. (2, 2, 3)
- 12, 24, 36, 48. (multiples of 12)
- 2, 3, 7, 11. (prime numbers)

## Differentiation

### Higher attainers:

- More difficult number patterns and sequences.
- 'Challenge Yourself' activity on page 144, Activity D on page 144 and Activity C on page 146 will provide a stretch for higher attainers.





## Linkage

**Number:** Operations – Adding, subtracting, multiplying and dividing values

**2D Shapes:** Pattern using shapes, tessellations

## Integration

**Visual arts:** Patterns in art (e.g. patterns in Islamic Art at <http://www.patterninislamicart.com>), Oriental carpets, frieze patterns in cast iron (e.g. ‘Sydney lace’)

**SESE History:** Patterns in standing stones and stone circles, patterns inside court and passage tombs, patterns inside caves (e.g. the Cave of Lascaux)

**English:** Use of brackets in sentence structures

## Maths at home/parental involvement

Children should be encouraged to observe patterns in their environment, e.g. in the built environment (architecture, garden designs, home furnishings), in nature (plants, on animals such as butterflies, cobwebs) and in art (M.C. Escher, Sol Lewitt, Josef Albers). Exploring number patterns through mathematical puzzles, such as sudoku, will enable children to extend and apply the content of this unit.

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