Revision Notes for Class 6 Maths

Chapter 1 – Patterns in Mathematics

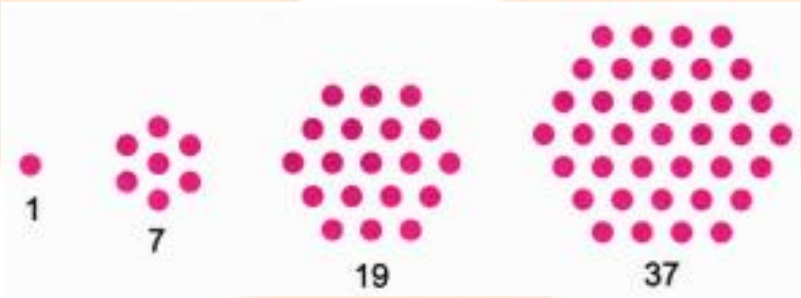
Key Topics

What is Mathematics?

- Mathematics involves the search for patterns and understanding why they exist.
- Patterns are found everywhere in nature, science, and daily life, like in weather, games, and technology.

Patterns in Numbers:

- Patterns in whole numbers are studied in number theory.
- Examples include sequences like counting numbers (1, 2, 3...), odd numbers (1, 3, 5...), and squares (1, 4, 9...).



Visualising Number Sequences:

- Number sequences can be represented pictorially to enhance understanding.

- Square numbers and triangular numbers are examples of sequences that can be visualised.

Relations Among Number Sequences:

- Some sequences are related, like adding consecutive odd numbers results in square numbers.
- For example: 1 + 3 = 4 (a square), 1 + 3 + 5 = 9 (a square), and so on.

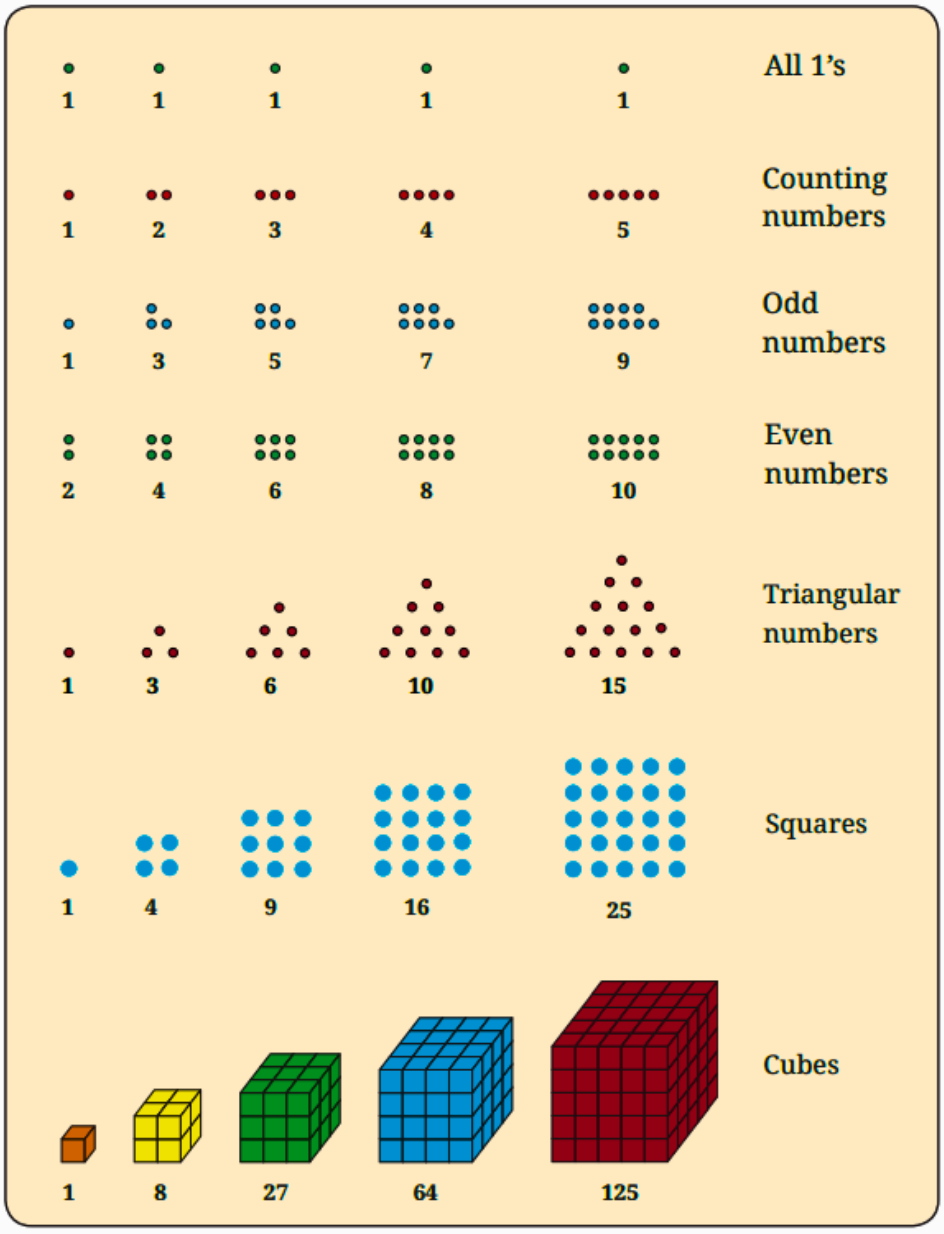
Patterns in Shapes:

- Shapes can also follow patterns, like sequences of regular polygons (triangle, square, pentagon, etc.).
- Stacked triangles and squares are common examples of shape patterns.

Relationship Between Number and Shape Sequences:

- Shape sequences often relate to number sequences, like the number of sides in polygons corresponding to counting numbers (triangle = 3, square = 4, etc.).

Table 2 Pictorial representation of some number sequences



Example 1: Sum of Odd Numbers

By arranging dots in a square grid, you can see that the sum of consecutive odd numbers (1, 3, 5, 7, 9, 11) forms square numbers. For example, the sum of these odd numbers equals 36,

which is the square of 6. This pattern holds for any number of odd numbers, meaning the sum of the first 10 odd numbers will also form a square.

Example 2: Adding Up and Down

When you add counting numbers in a sequence (like 1 + 2 + 1 or 1 + 2 + 3 + 2 + 1), you can see that the result is also a square number. For example:

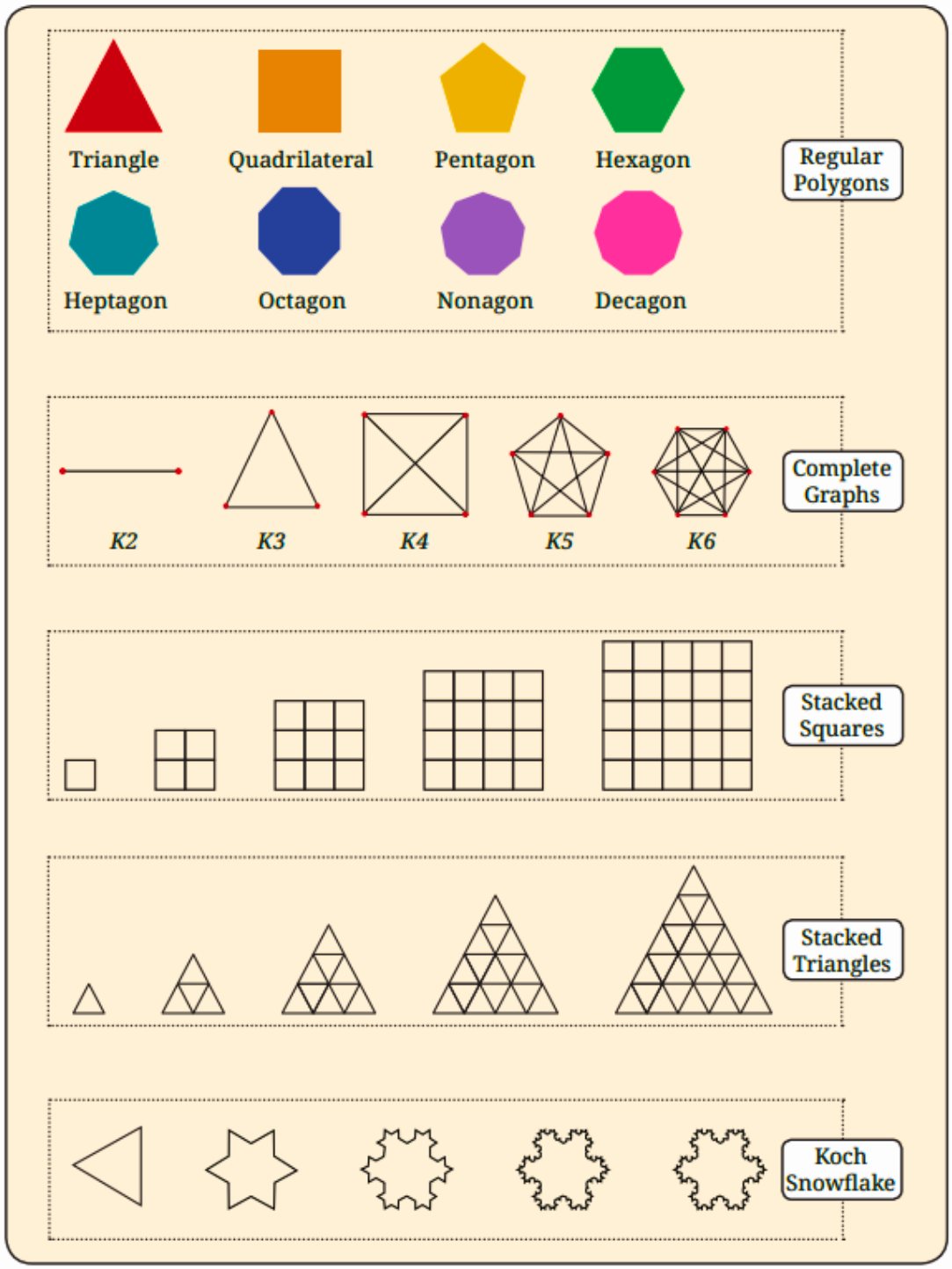
- 1 = 1
- 1 + 2 + 1 = 4
- 1 + 2 + 3 + 2 + 1 = 9
  This pattern continues, and the sequence of numbers added up and then down forms square numbers like 4, 9, 16, 25, and so on.

Both examples show different ways of visualising and understanding how sequences of numbers can create square numbers.

Relation to Number Sequence

Shape sequences are often connected to number sequences, revealing interesting patterns that help in understanding both. For example, in regular polygons, the number of sides follows counting numbers starting from 3 (triangle) and continues as 4 (quadrilateral), 5 (pentagon), 6 (hexagon), and so on. These shapes, called regular because their sides and angles are equal, demonstrate the relationship between shapes and number sequences. More about angles will be covered in the next chapter.

Table 3 Examples of shape sequences



Chapter Overview

1. **Mathematics and Patterns**: Math is about finding patterns and understanding why they exist.

2. **Basic Number Patterns**: Common number sequences include counting numbers, odd and even numbers, square numbers, triangular numbers, cube numbers, Virahānka numbers, and powers of 2.

3. **Connections Between Sequences**: Number sequences can have interesting relationships, like how adding odd numbers starting from 1 gives square numbers.

4. **Using Pictures for Clarity**: Visualising number sequences with pictures helps to better understand the sequences and their connections.

5. **Shape Sequences**: Shapes, like regular polygons, graphs, stacked shapes, and Koch snowflake iterations, form sequences that show patterns and also link to number sequences.