

# Grade 5 · Patterns and Relationships · Lesson

Common Core 5.OA.B.3 · mathovore.fr

A numerical pattern is a list of numbers that follows a rule, such as "start at 0, add 3." Two patterns made from two rules can be compared term by term. Matching terms form ordered pairs, like (3,6), that can be graphed. Starting at 0, "add 3" and "add 6" make each second term 2 times the first.

## Grade 5 Common Core: 5.OA.B.3

### Key facts:

- A numerical pattern is a list of terms that follows a rule, such as "start at 0, add 3."
- Corresponding terms are in the same position in two patterns.
- Compare every pair of corresponding terms to find a relationship, such as "B is 2 times A."
- An ordered pair  $(x,y)$  is written with the term from pattern A first and the term from pattern B second.
- To graph  $(x,y)$ , move right  $x$  units from the origin, then up  $y$  units.

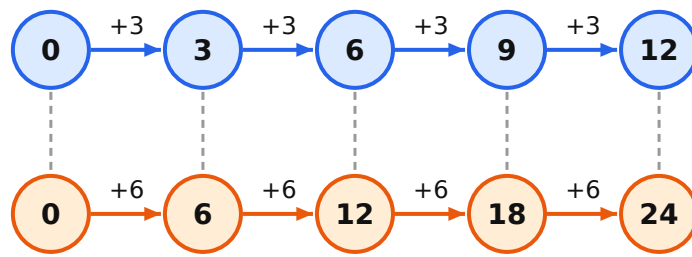
## What is a numerical pattern?

A numerical pattern is a list of numbers, called **terms**, that follows a rule. The rule "start at 0, add 3" gives the terms 0,3,6,9,12. Each term is 3 more than the term before it.

### Corresponding terms

Two patterns can be built from two rules. Terms in the same position are **corresponding terms**: the 1st term of A goes with the 1st term of B, the 2nd with the 2nd, and so on.

**Pattern A: start at 0, add 3**



**Pattern B: start at 0, add 6**

**Dashed lines join corresponding terms**

Two patterns from two rules. Dashed lines join **corresponding terms**.

## How do you generate two patterns from two rules?

Use the rules "start at 0, add 3" for pattern A and "start at 0, add 6" for pattern B.

1. Write the starting number of each pattern.
2. Apply each rule again and again. Pattern A: 0,3,6,9,12. Pattern B: 0,6,12,18,24.
3. Line up corresponding terms in a table, one pattern above the other.

| Term number         | 1      | 2      | 3       | 4       | 5        |
|---------------------|--------|--------|---------|---------|----------|
| <b>A: add 3</b>     | 0      | 3      | 6       | 9       | 12       |
| <b>B: add 6</b>     | 0      | 6      | 12      | 18      | 24       |
| <b>Ordered pair</b> | (0, 0) | (3, 6) | (6, 12) | (9, 18) | (12, 24) |

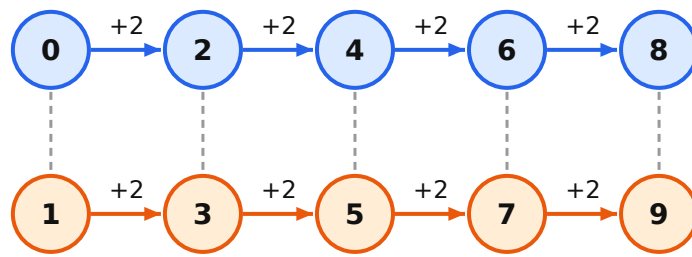
Line up corresponding terms in a table. The last row turns each column into an ordered pair.

## How do you find a relationship between corresponding terms?

Compare each pair of corresponding terms. In the table,  $3 \rightarrow 6$ ,  $6 \rightarrow 12$ , and  $9 \rightarrow 18$ , so each B term is 2 times the A term. This makes sense because adding 6 does twice what adding 3 does. Check every pair, not only one. The idea "B is 3 more than A" fits  $3 \rightarrow 6$  but fails for  $6 \rightarrow 12$ .

Patterns can also start at different numbers. If A is "start at 0, add 2" and B is "start at 1, add 2," every B term is 1 more than the matching A term.

**Pattern A: start at 0, add 2**



**Pattern B: start at 1, add 2**

**Each B term is 1 more than the matching A term**

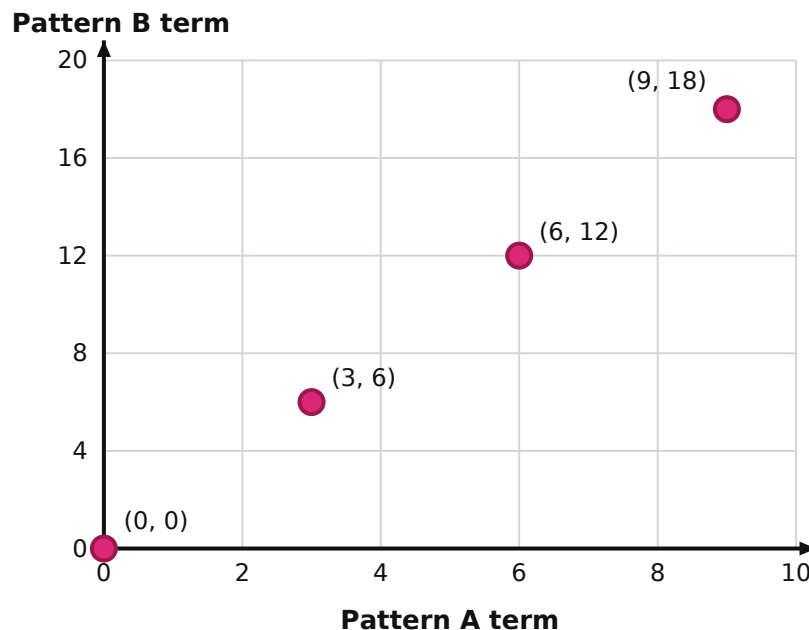
Two patterns with different starting numbers: B is always 1 more than A.

## How do you graph corresponding terms?

### Ordered pair

An **ordered pair**  $(x,y)$  names a point on the coordinate plane. The first number tells how far to move right along the x-axis. The second number tells how far to move up. Pair a term of A with the matching term of B, with A first.

The corresponding terms of A and B above give the ordered pairs  $(0,0)$ ,  $(3,6)$ ,  $(6,12)$ ,  $(9,18)$ , and  $(12,24)$ . Plot each one by moving right first, then up. The points line up along a rising line, which is a picture of "B is 2 times A."



The ordered pairs  $(0,0)$ ,  $(3,6)$ ,  $(6,12)$ , and  $(9,18)$  graphed on the coordinate plane.

## Patterns and Relationships: frequently asked questions

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### What is a term in a pattern?

A term is one number in the list. In the pattern 0,3,6,9, the first term is 0 and the third term is 6. Each term comes from the one before it by following the rule.

### What are corresponding terms?

Corresponding terms are the terms in the same position in two patterns. The 4th term of one pattern corresponds to the 4th term of the other pattern. They are paired to form ordered pairs.

### How do you write an ordered pair from two patterns?

Take one term from each pattern, in the same position, and write them in parentheses with a comma. The term from the first pattern is written first. For example, 6 and 12 give (6,12).

### How do you plot an ordered pair?

Start at the origin (0,0). Move right along the x-axis by the first number, then move up by the second number. Mark the point where you stop.

### How do you know a relationship between two patterns is correct?

Test it on every pair of corresponding terms. If the relationship fails for even one pair, it is not correct. For example, "B is 2 times A" works for  $3 \rightarrow 6$  and  $9 \rightarrow 18$ .