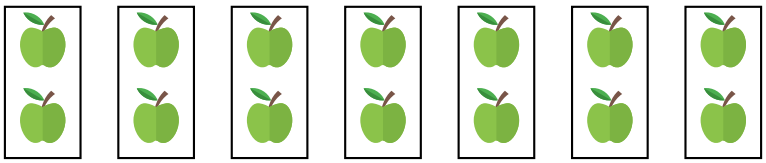
MULTIPLICATION

Multiplication is a very important concept in mathematics. It's a way of adding the same number together many times.

A DEFINITIONS

Discover: Louis loves apples and eats exactly 2 apples every day. He never misses a day because he knows how healthy and tasty apples are.

If Louis eats 2 apples every day, how many apples will he eat in one week (7 days)?



Answer: If we want to know how many apples Louis eats in a week (7 days), we add 2 apples for each day:

$$2+2+2+2+2+2+2$$

We find 14 apples. In this chapter, we will introduce multiplication to make it quicker and easier. When we say 7 groups of 2 apples, we can write it as 7×2. The symbol $\times$ means **multiplied by** or **times**.

$$7 \times 2 = 2+2+2+2+2+2+2$$

Definition **Multiplication**

Multiplication is the process of repeated addition. When we multiply, we calculate the total by adding a number to itself a specified number of times.
Multiplication can be represented in several ways:

- **Numbers**:

$$4 \times 3 = 12$$

- **Groups**:

$$4 \text{ groups of } 3 = 12$$

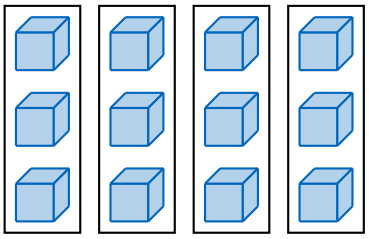
- **Repeated addition**:

$$3 + 3 + 3 + 3 = 12$$

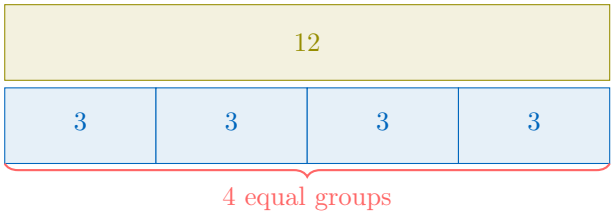
- **Words**:

four times **three** equals **twelve**

- **Items**:



- **Part-whole model**:



Ex: Write the repeated addition $5 + 5 + 5$ as a multiplication.

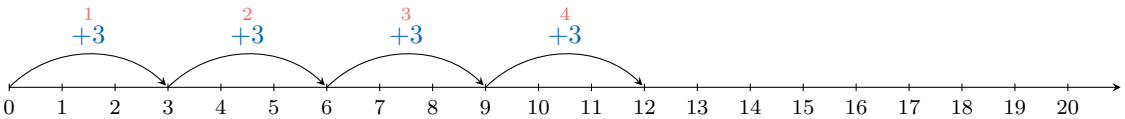
Answer: $5 + 5 + 5 = 3 \times 5$

B IN NUMBER LINE

Discover: Let's consider the multiplication: 4×3 that is

$$3 + 3 + 3 + 3$$

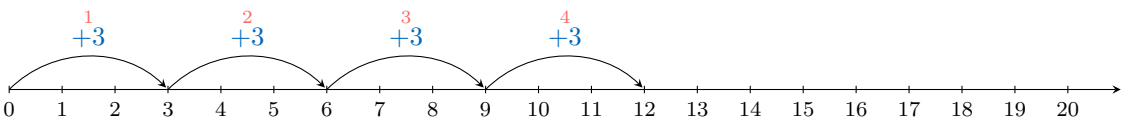
We can visualize this on a number line:



Starting from 0, we move 3 ones to the right 4 times. Each move represents addition: $0 + 3$, $3 + 3$, $6 + 3$, $9 + 3$. As you can see, we end up at 12, which is the result of the multiplication 4×3.

Method **Multiplication in number line**

To evaluate 4×3, we start from 0 and we move 3 ones to the right 4 times.



We end up at 12, which is the result of the multiplication 4×3.

C REPRESENTATION OF MULTIPLICATION IN WORD PROBLEMS

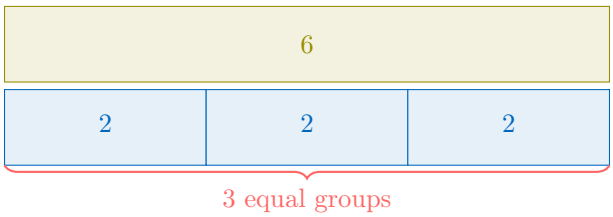
Method **Groups of items**

When we multiply, we often think about groups and the number of items in each group.

$$\text{number of groups} \times \text{number of items in each group} = \text{total}$$

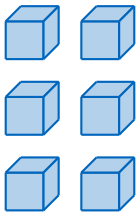
For example, there are 3 bags, and each bag contains 2 apples. The total number of apples is:

$$3 \times 2 = 2 + 2 + 2$$
$$= 6$$



D COMMUTATIVE

Discover: Two brothers, Hugo and Louis, want to count the number of cubes:



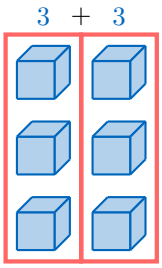
- Louis calculates 2×3 to find the number of cubes.
- Hugo calculates 3×2 to find the number of cubes.

Who is correct?

- Only Hugo
- Only Louis
- Both Hugo and Louis

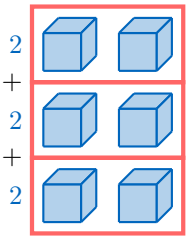
Answer: Both are correct:

- Louis counts 2 groups of 3:



  So, the total is 2×3 cubes.

- Hugo counts 3 groups of 2:



So, the total is 3×2 cubes.

This shows that

$$2 \times 3 = 3 \times 2$$

Proposition **Commutative**