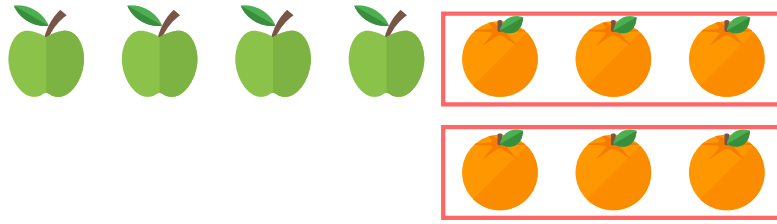# ORDER OF OPERATIONS

In math, we often solve problems that use more than one operation, like addition, subtraction, multiplication, or division. The order in which we do these steps matters. That's why mathematicians made a rule called the **Order of Operations**.

A ORDER OF OPERATIONS

Discover: Hugo has 4 apples and 2 baskets, each containing 3 oranges.

Hugo writes the expression:

$$4 + 2 \times 3$$

- His brother Louis reads it and says: *"I'll add 2 to 4, which gives me 6. Then I'll multiply the result, which is 6, by 3. I get 18 fruits!"*

- Hugo replies: *"No, you must multiply 2 and 3 first, then add 4. I have 10 fruits."*

Who is right, and why?

Answer: To avoid confusion (and maybe an argument between Hugo and Louis!), mathematicians created rules for the **Order of Operations**. These rules say:

<div align="center">

Do multiplication before addition.

</div>

Let's solve $4 + 2 \times 3$ step by step:

- First, multiply:

$$2 \times 3 = 6$$

- Then, add:

$$4 + 6 = 10$$

So, Hugo is correct: there are 10 fruits in total.

> Definition **Order of operations**
>
> The **order of operations** is:
>
> 1. parentheses
>
> 2. multiplication and division (from left to right)
>
> 3. addition and subtraction (from left to right).

Ex: Calculate $4 + 2 \times 3$

Answer:

$$4 + 2 \times 3 = 4 + 6 \quad \text{(evaluate the multiplication } 2 \times 3\text{)}$$
$$= 10 \quad \text{(evaluate the addition } 4 + 6\text{)}$$

B SOLVING PROBLEMS

Discover: Hugo wants to celebrate his birthday! He needs to buy a cake and juice for his party. Here's what he wants to buy:

1. **Cakes**: 2 cakes that cost $10 each

2. **Juice**: 4 cans of juice that cost $3 each

Hugo has $30. Can he buy everything on his list?

Answer: The total cost is:

$$\text{Total cost} = (2 \times 10) + (4 \times 3)$$
$$= 20 + 12$$
$$= 32$$

Hugo needs $32, but he only has $30. So, he cannot buy everything.

When you solve a problem, you can:

1. Read and understand what the problem is about.

2. Find out what steps are needed.

3. Write a math expression.

4. Calculate the answer.

5. Write your conclusion.

Ex: You have 5 apples, you buy 4 more, and then you give 2 away. How many apples do you have left?

Answer:

- **Read**: "buy" means add, and "give away" means subtract.

- **Find the steps**:

    1. Start with 5 apples.
    2. Add 4 apples.
    3. Subtract 2 apples.

- **Write the expression**: $(5 + 4) - 2$

- **Calculate the answer**:
$$(5 + 4) - 2 = 9 - 2$$
$$= 7$$

- **Conclude**: You have 7 apples left.