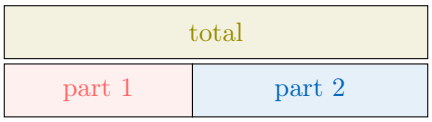
OPERATIONS WITH WHOLE NUMBERS

A ADDITION

Definition **Addition**

Addition is the process of combining two or more numbers to find their total. When we add, we join together part 1 and part 2 to get the total.

$$\text{part 1} + \text{part 2} = \text{total}$$



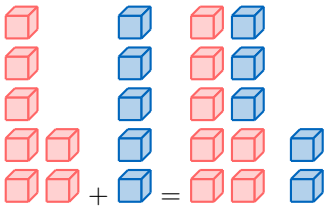
- The + symbol is called the plus sign. It tells us to add the numbers together.
- The = symbol is the equals sign. It shows that the numbers on both sides are the same.

Addition can be represented in different ways:

- **Numbers**:

$$7 + 5 = 12$$

- **Items**:



- **Word form**:

seven plus five equals twelve

Method **Column addition**

When we add larger numbers, we write them in columns with their place values aligned. Then, we add each column from right to left.

Ex: Calculate $189 + 784$

$$\begin{array}{r} {\scriptstyle 1\ 1\ \ } \\ 1\,8\,9 \\ +\,7\,8\,4 \\ \hline 9\,7\,3 \end{array}$$

Answer:

B SUBTRACTION

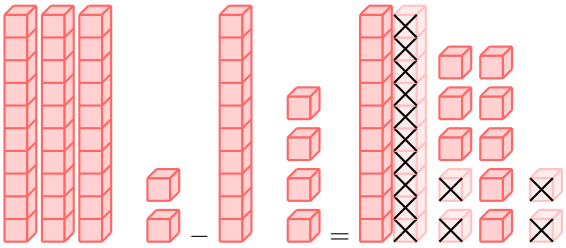
Definition Subtraction

Subtraction is the process of taking away one number from another to find the difference. The $-$ symbol is called the minus sign. It tells us to take one number away from another.
Subtraction can be shown in several ways:

- **Numbers**:

$$32 - 14 = 18$$

- **Visual (Items)**:



- **Words**:

thirty-two minus fourteen equals eighteen

Method Column subtraction

When subtracting larger numbers, write them in columns with the digits aligned by place value. Then subtract each column from right to left.

Ex: Calculate $784 - 189$

$$\begin{array}{r} {}^{7}\not{8}\,{}^{1}\not{4} \\ -\,{}^{1}1\,{}^{1}\not{8}\;9 \\ \hline 5\;9\;5 \end{array}$$

Answer:

C MULTIPLICATION

Definition Multiplication

Multiplication is the process of repeated addition. When we multiply, we add a number to itself a certain number of times. The $\times$ symbol (or "times sign") tells us to multiply the numbers.
Multiplication can be represented in several ways:

- **Numbers**:

$$4 \times 3 = 12$$

- **Groups**:

4 groups of 3 equals 12

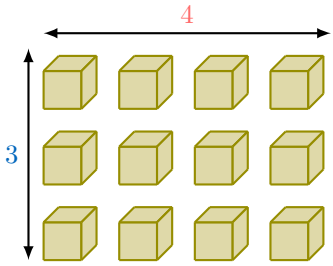
- **Repeated addition**:

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

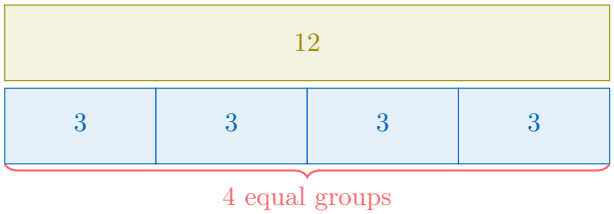
- **Words**:

four times three equals twelve

- **Visual (Items)**:



- **Part-whole model**:



Method Column multiplication

When multiplying larger numbers, write the numbers in columns so the digits align. Multiply the first number by each digit of the second number (starting from the right), then add the results.

Ex: Calculate 123×21

Answer:

$$\begin{array}{r} 1\,2\,3 \\ \times\quad 2\,1 \\ \hline 1\,2\,3 \\ 2\,4\,6\,\cdot \\ \hline 2\,5\,8\,3 \end{array} \begin{array}{l} \\ \\ \longleftarrow 123 \times 1 = 123 \\ \longleftarrow 123 \times 20 = 2460 \\ \longleftarrow 123 + 2460 = 2583 \end{array}$$

D DIVISION

Definition Division

Division is the process of splitting a number into equal parts. In a division expression, the number being divided is called the **dividend**, and the number you divide by is the **divisor**. The result is the **quotient**. The ÷ symbol is the division sign.

$$\text{Dividend} \div \text{Divisor} = \text{Quotient}$$

Division can be represented in several ways:

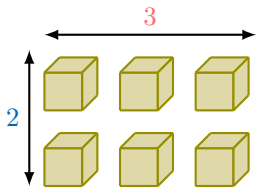
- **Numbers**:

$$6 \div 3 = 2$$

- **Words**:

six divided by **three** equals **two**

- **Items**:



Definition Division with Remainder

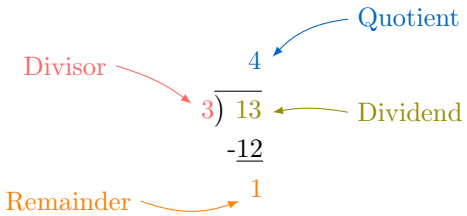
Sometimes a number does not divide evenly. The number left over is called the remainder.

$$13 \div 3 = 4\text{R}1$$

This relationship can also be written as:

$$13 = 3 \times 4 + 1$$

where 13 is the **dividend**, 3 is the **divisor**, 4 is the **quotient**, and 1 is the remainder.
The **long division** algorithm shows how we can compute division step by step.



Method Long division

When dividing larger numbers, we work digit by digit, starting from the left. If a digit (or group of digits) is too small to be divided by the divisor, we bring down the next digit.

Ex: Calculate $125 \div 4$

Answer: Using long division,

$$\begin{array}{r} 31 \\ 4\overline{)125} \\ \underline{12} \\ 05 \\ \underline{4} \\ 1 \end{array}$$

we find:

$$125 \div 4 = 31\text{R}1.$$

E ORDER OF OPERATIONS

Definition **Order of operations**

The **order of operations** tells us the sequence in which to perform different operations in a calculation:

1. Parentheses (or brackets)
2. Multiplication and Division (from left to right)
3. Addition and Subtraction (from left to right)

Ex: Calculate $4 + 2 \times 3$

Answer:

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

F SOLVING PROBLEMS

Method **Solve problems**

To solve a word problem:

1. Read and understand the problem.
2. Identify the steps needed to solve it.
3. Write the mathematical expression.
4. Evaluate the expression.
5. Conclude and check your answer.

Ex: If you have 5 apples, buy 4 more, then give away 2, how many apples do you have left?

Answer:

- **Read**: Notice that buying means addition and giving away means subtraction.
- **Identify the steps**:
  1. Start with 5 apples.
  2. Add 4 apples.
  3. Subtract 2 apples.
- **Write the expression**: $(5 + 4) - 2$
- **Evaluate the expression**:

$$\begin{aligned} (5 + 4) - 2 &= 9 - 2. \\ &= 7 \end{aligned}$$

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