A definition of **Arithmetic**: /əˈrɪθ.mə.tɪk/
Computation using numbers and simple operations such as addition, subtraction, multiplication and division.

1. Basic symbols

= reads « **equals** » or « **is equal to** »
+ reads « **plus** »
− reads « **minus** » /ˈmaɪ.nəs/
× reads « **multiplied by** » or « **times** »
÷ (or **:**) reads « **divided by** »

Addition

a* + *b* = *c reads « ***a*** plus ***b*** equals ***c*** »
c is the **sum** of the two **terms** *a* **and** *b*
you **add** *a* **to** *b*, or you make an addition.

Young children are also used to saying "two and eight are ten" or "three and eight make eleven".

Subtraction

a* − *b* = *c reads « ***a*** minus ***b*** equals ***c*** »
c is the **difference between** the two terms *a* **and** *b*
you **subtract** *b* **from** *a*, or you make a subtraction.

It is also possible to say "thirteen **take away** seven equals six" or "seven **from** thirteen **leaves** six".

Multiplication

a* × *b* = *c reads « ***a*** multiplied by ***b*** equals ***c*** » or « ***a*** times ***b*** is equal to ***c*** »
c is the **product** of the two **factors** *a* **by** *b*
you **multiply** *a* **by** *b*, or you make a multiplication.

You can also say "eight sevens are fifty-six" or "eight sevens is fifty-six" for **8×7=56** .

Division

a* : *b* = *c or ***a* ÷ *b* = *c*** reads « ***a*** divided by ***b*** equals ***c*** »

$\frac{a}{b} = c$ reads « *a* **over** *b* equals *c*»

c is the **quotient of** *a* **by** *b*, /ˈkwəʊ.ʃᵊnt/
a is the **dividend** , /ˈdɪv.ɪ.dend/
b is the **divisor** , /dɪˈvaɪ.zəʳ/
You **divide** *a* **by** *b* . /dɪˈvaɪd/

When you make a **division** /dɪˈvɪʒ.ᵊn/ in the set of natural numbers ℕ, there is often a **remainder**, that is the number remaining when you cannot **divide** a number **into** another an exact number of times.

Example: "4 divides into 20 five times", therefore the remainder of the division 20 ÷ 4 is nought.
Or "you get 5 when you divide 4 into 20".

Vocabulary: to add … to ... – addition – arithmetic – to divide … by ... – to divide (...) into ... – dividend – division – divisor – to equal – equal to – factor – to leave – multiplication – to multiply ... by ... – over – plus – product – quotient of ... by ... – remainder – to subtract ... from ... – subtraction – to take away – sum – term

2. Directed numbers

Sometimes, in the set of natural numbers $\mathbb{N}$, it is impossible to make a subtraction (for instance $7-13$).

In order to enable all subtractions, we need to use **directed** (whole) **numbers** (or **signed numbers**).

The integers are 0 and all the **positive** or **negative** whole numbers. The set of integers is denoted by the capital letter $\mathbb{Z}$. Note that 0 is neither positive, nor negative.

The **opposite** of x is $-x$, it reads « negative x » or « opposite x »

Example : 3 ("three" or "plus three") is a positive integer,
whereas –9 ("**minus** nine" or "**negative nine**") is a negative integer.

Exercises

1) What is the smallest positive integer?
What is the smallest non negative integer?

2) Make the calculations, then write them down, using only letters

a) $5-11=$ *b)* $13+(-8)=$ *c)* $-9-(-17)=$

d) $-19+47=$ *e)* $-21-29=$ *f)* $-9-(-9)=$

3) Read and find the solution to each equation :

a) $x+50=90$ *b)* $x-1.5=1.7$ *c)* $3\times x=21$

d) $1{,}000\,x=100$ *e)* $x\div 5=12$

4) Identify the dividend, divisor, quotient and remainder in the following divisions:

a) $\frac{11}{3}$ *b)* $\frac{121}{11}$ *c)* $\frac{47}{7}$

d) $\frac{101}{99}$ *e)* $\frac{170}{13}$ *f)* $\frac{666}{77}$

5) Complete and read the equalities:

a) $\frac{1.5}{3}=$ *b)* $\frac{1.5+3.5}{5}=$ *c)* $(-1)\times(-1)=$

d) $5\times(-4)+7\times(-2)=$ *e)* $(2x)\times(-4)=$ *f)* $(-3)\times(-5x)=$

6) Read and work out the algebraic sums and say if they are positive or negative numbers:

(i) $S=5-7+3-3.5-0.3$ *(ii)* $S'=50.5-15+4-20.5$ *(iii)* $S''=-1{,}000.05+1{,}005-1{,}000.5+1.000\,5$

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3. Order of operation

The order of operation for integers is the same as for natural numbers :

Brackets, **E**xponents, **M**ultiplication and **D**ivision, **A**ddition and **S**ubtraction

The memory aid for the order of operations is : **BEMDAS**

Vocabulary: BEMDAS – directed numbers – minus – negative – opposite – positive – signed numbers