

0.1 Multiplication of natural numbers

0.1.1 Definition

Multiplication can be defined by:

$$\forall a \in \mathbb{N}(a.0 = 0)$$

$$\forall ab \in \mathbb{N}(a.s(b) = a.b + a)$$

0.1.2 Example

Let's calculate 2.2.

$$2.2 = 2.s(1)$$

$$2.s(1) = 2.1 + 2$$

$$2.1 + 2 = 2.s(0) + 2$$

$$2.s(0) + 2 = 2.0 + 2 + 2$$

$$2.0 + 2 + 2 = 2 + 2$$

$$2 + 2 = 4$$

0.1.3 Commutative property of multiplication

Multiplication is commutative:

$$xy = yx$$

0.1.4 Associative property of multiplication

Multiplication is associative:

$$x(yz) = (xy)z$$

0.1.5 Distributive property of multiplication

Multiplication is distributive over addition:

$$a(b + c) = ab + ac$$

$$(a + b)c = ac + bc$$