How arithmetic works in Standard Notation

In Standard Notation, the arithmetic operation of addition is the same as the logical connective of OR. The terms of addition are the precedent number (augend or addend), the antecedent number (addend), and the result (summand or sum). The augend and addend are converted into a format such that the respective positions of digits do not both contain "1". This is effected by the rule before addition that "100" is substituted by "011" in an addend, or conversely after addition that "011" reduces 1's by substitution of "100" in the summand. The rule of reduced 1's is that of standard form where all numbers also end in "1". The summand is then converted into standard form. Here the augend is the larger of the addends. Three worked examples follow.

Example 1: 1 + 1 = 2

Given:	2	=	1 + 1	(1) in base-10
Translated:	10.01	=?	01. + 01.	(2) in base-Phi
Subst. addend:			01. + 00.11	(3)
Added positions:			01.11	(4)
Reduced 1's:	10.01	=	10.01	(5)

Example 2: 2 + 2 = 4

Given:	4	=	2 + 2	(6) in base-10
Translated:	101.01	=?	010.01 + 010.01	(7) in base-Phi
Subst. addend:			010.01 + 001.11	(8)
Subst. addend:			010.01 + 001.1011	(9)
Added positions:			011.1111	(10)
Reduced 1's:			100.1111	(11)
Reduced 1's:			101.0011	(12)
Reduced 1's:	101.01	=	101.01	(13)

Example 3: 3 + 2 = 5

Given:	5	=	3 + 2	(14) in base-10
Translated:	1000.1001	=?	0100.01 + 0010.01	(15) in base-Phi
Subst. addend:			0100.01 + 0010.0011	(16)
Added positions:			0110.0111	(17)

Reduced 1's:			1000.0111	(18)
Reduced 1's:	1000.1001	=	1000.1001	(19)

In Standard Notation, the terms of the arithmetic operation of subtraction are minuend, subtrahend, and difference. The minuend and subtrahend are converted into a format such that the same positions of digits do not contain respectively "0" and "1". This is effected by the rule as with addition that "100" is substituted by "011" in minuend and subtrahend, or conversely after subtraction that "011" reduces 1's by substitution of "100" in the difference. The difference is then converted into standard form.

One example of subtraction suffices:

$$
\begin{aligned}
7 - 2 &= 10000.0001 \quad - 10.01 \\
&= 1100.0001 \quad - 10.01 \\
&= 1011.0001 \quad - 10.01 \\
&= 1010.1101 \quad - 10.01 \\
&= 1000.1001
\end{aligned} \tag{20}
$$

In Standard Notation, the arithmetic operation of addition is the same as the logical connective of OR. The terms are factors to be multiplied where the first is the multiplicand, and the number of multiples is the multiplier. The result is the product. The factors are multiplied in the typical base-10 manner, without carry. The product is then converted into standard form.

One example of multiplication suffices:

$$
\begin{aligned}
2 \times 3 &= 10.01 \quad \times 100.01 \\
&= 1000.1 \quad + 1.0001 \\
&= 1001.1001 \\
&= 1010.0001
\end{aligned} \tag{21}
$$

In Standard Notation, the terms of the arithmetic operation of division are the dividend to be divided, the divisor to be divided into the dividend, and the result as the quotient and a remainder, if any. The quotient multiplied by the divisor plus the remainder equals the dividend. In modular arithmetic, a number has a multiplicative inverse with respect to the modulus. Therefore division may be calculated by multiplication.

No example of division is given.