

Arithmetic Logic

The following is a summary of logic related to an arithmetic¹. An arithmetic relates to how the primary items within a set of [Line Items] is organized and characterized. An arithmetic may be supplemented by use of a dimension to distinguish facts.

Examples

XBRL Cloud: <https://xbrlsite.azurewebsites.net/2019/Prototype/conformance-suite/Production/1000-ConceptArangementPatterns/12-Arithmetic/evidence-package/>

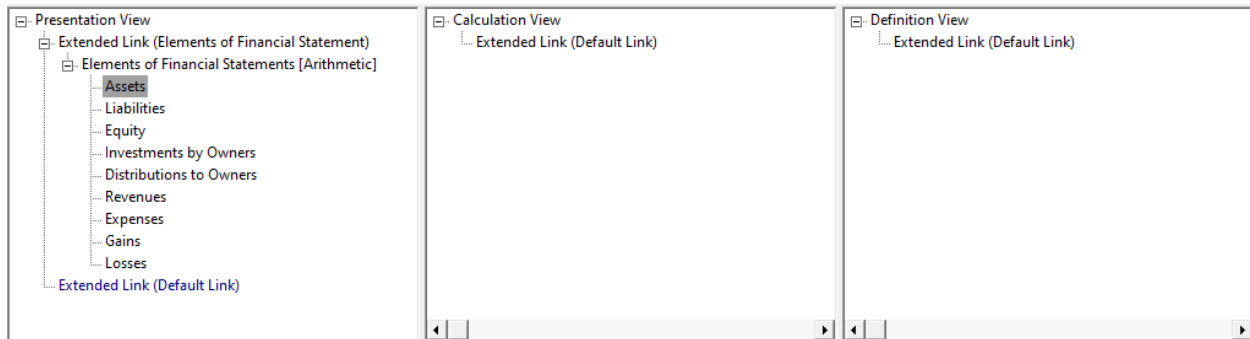
Luca Suite: https://luca.pacioli.ai/luca/view/0f24fd35e961e167a727b663c75a4c5ec9fb7eb86730d6292f46e6e180fc2018_wojTTa6PvqA/index

Test case: <http://xbrlsite.com/seattlemethod/platinum-testcases/24-TestCase-arithmetic.xml>

Pesseract:

Concept [Aspect]	Period [Aspect]	
	2021-12-31	2020-12-31
Balance Sheet [Arithmetic]		
Assets	3,500	0
Liabilities	500	0
Equity	3,000	0

The following is an example of a modeling of an arithmetic logical pattern using XBRL:



An XBRL formula file provides the arithmetic rules used.

¹ Arithmetic, <http://www.xbrlsite.com/seattlemethod/platinum-testcases/arithmetic/>

Brief Description

An **arithmetic** concept arrangement logical pattern represents mathematical relations between the concepts within the logical block.

Elements of Financial Statements [Arithmetic]	Period [Axis]	
	2020-01-01 - 2020-12-31	2019-12-31
Elements of Financial Statements [Arithmetic]		
Assets	3,500	0
Liabilities	0	0
Equity	3,500	0
Investments by Owners	1,000	
Distributions to Owners	500	
Revenues	7,000	
Expenses	3,000	
Gains	1,000	
Losses	2,000	

Axioms

1. An arithmetic is a type of information block object.
2. An arithmetic is one or more mathematical computations between the concepts with the block which contains this concept arrangement pattern.
3. The pseudo mathematical formula is: $Assets = Liabilities + Equity$.
4. The calendar period type of each concept may or may not be the same.
5. The data type of each concept MUST be the same. [CSH: I am pretty sure this is correct; but sometimes a modeling error where the wrong data type is used could cause issues.]
6. The units of each fact in an arithmetic need not be the same.
7. An arithmetic is modeled using XBRL:
 - a. Presentation relations show an [Abstract] element which has the Concepts involved in the arithmetic.
 - b. Calculation relations will not exist.
 - c. Definition relations exist only when a hypercube is explicitly provided and are represented using the rules of XBRL Dimensions.

Earnings per share:

<https://xbrlsite.azurewebsites.net/2019/Prototype/conformance-suite/Production/1000-ConceptArrangementPatterns/07-ComplexComputation/evidence-package/>

Earnings Per Share Components [Line Items]	Period [Axis]	
	2010-01-01 - 2010-12-31	2009-01-01 - 2009-12-31
Earnings Per Share Components [Hierarchy]		
Net Income (Loss)	10,000,000	20,000,000
Weighted Average Common Shares	100,000,000	100,000,000
Earnings Per Share	.10	.20

Other examples: (complex)

id	satisfied	message
CONSISTENCY_sfac6_ElementsOfFinancialStatement (evaluation 1)	satisfied	$0 = ((\$Equity_BalanceStart=0 + ((\$Revenues=7000 - \$Expenses=3000) + (\$Gains=1000 - \$Losses=2000)) + (\$InvestmentsByOwners=1000 - \$DistributionsToOwners=500)) + (\$Liabilities_BalanceEnd=0 - \$Assets_BalanceEnd=3500))$
Arithmetic_BS01 (evaluation 1)	satisfied	$\$Assets=0 = (\$Liabilities=0 + \$Equity=0)$
Arithmetic_BS01 (evaluation 2)	satisfied	$\$Assets=3500 = (\$Liabilities=0 + \$Equity=3500)$
Arithmetic_IS01 (evaluation 1)	satisfied	$\$ComprehensiveIncome=3000 = (\$Revenues=7000 - \$Expenses=3000 + \$Gains=1000 - \$Losses=2000)$
RollForward_SE01 (evaluation 1)	satisfied	$\$Equity_BalanceStart=0 + \$ComprehensiveIncome=3000 + \$InvestmentsByOwners=1000 - \$DistributionsToOwners=500 = \$Equity_BalanceEnd=3500$

http://www.xbrlsite.com/seattlemethod/golden/sfac6/sfac6_ModelStructure.html

<http://www.xbrlsite.com/seattlemethod/golden/sfac6/sfac6-formula-arithmetic-other.xml>

$0 = ((\$Equity_BalanceStart + ((\$Revenues - \$Expenses) + (\$Gains - \$Losses)) + (\$InvestmentsByOwners - \$DistributionsToOwners)) + (\$Liabilities_BalanceEnd - \$Assets_BalanceEnd))$