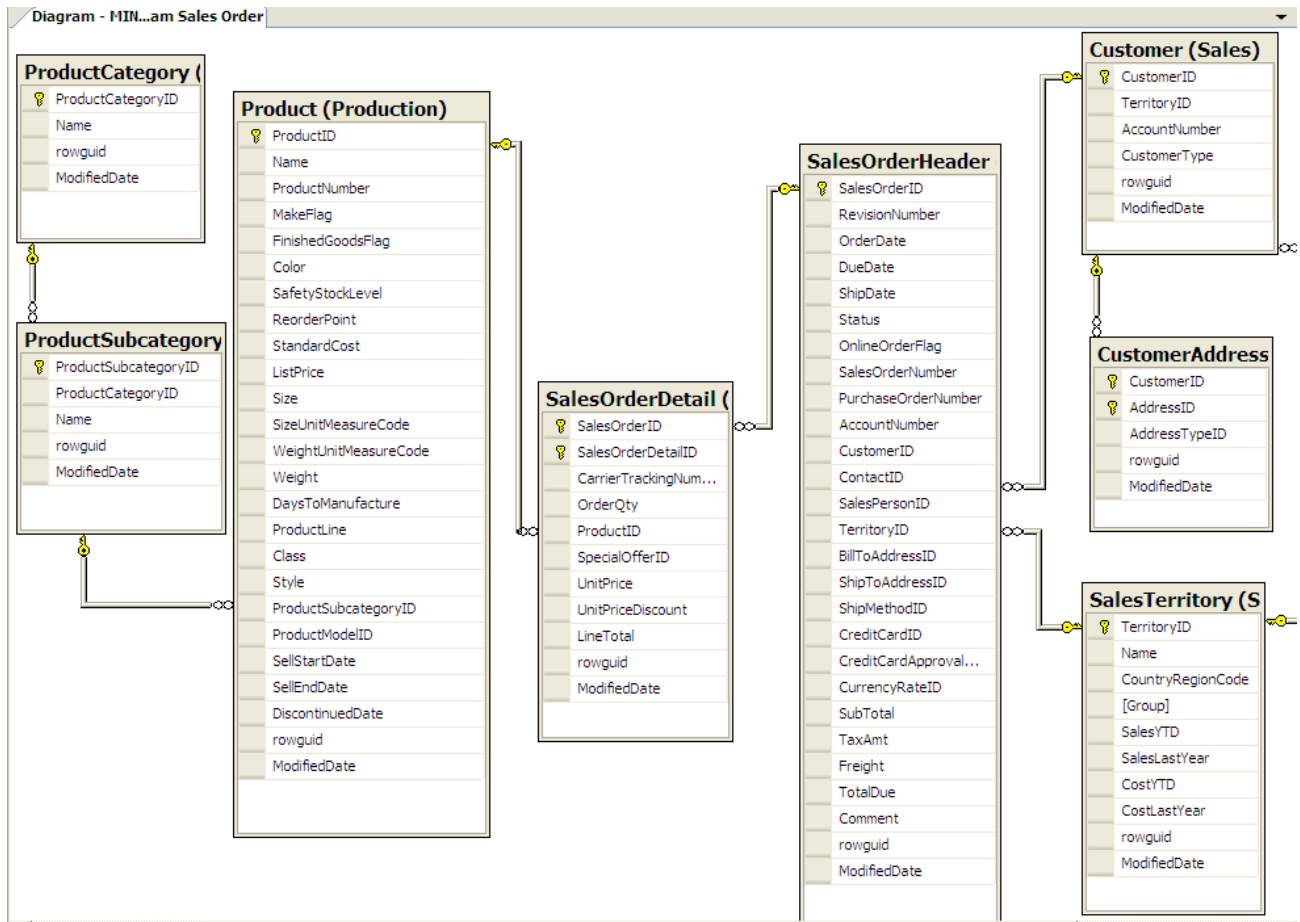


## QuickReference PowerPivot DAX (Data Analysis eXpressions)



## Calculated Columns

### Row Context

PowerPivot for Excel - Contoso Sample DAX Formulas.xlsx

[Margin] = [SalesAmount] - [TotalCost]

TotalCost	SalesAmount	ETLLoadID	LoadDate	UpdateDate	Margin
\$728.40	\$1,544.40	1	1/1/2010	1/1/2010	\$816.00
\$40.60	\$78.61				\$38.01
\$1,881.27	\$3,628.50				\$1,747.23
\$1,063.20	\$2,254.20				\$1,191.00
\$3,468.48	\$10,207.08				\$6,738.60

Each row provides a separate Row Context for evaluating the Margin. In other words, each row has a different value for SalesAmount and TotalCost.

DimChannel DimDate DimGeography DimProduct DimProductCategory FactSales

Record: 1 of 3,406,089

```

= [Quantity] * [UnitPrice]
= [FirstName] & " " & [LastName]

= RELATED (Subcategory[Name])
= LOOKUPVALUE (Product[StockLevel], [ProductName], "Mountain-400-W Silver, 46")

= SUMX (
    RELATEDTABLE (SalesOrderDetail),
    SalesOrderDetail[UnitPrice] * SalesOrderDetail[Quantity])

= YEAR ([OrderDate])
= MONTH ([OrderDate])
= FORMAT ([OrderDate], "mmm dd yyyy ddd hh:mm")
  
```

### Operators

```

AND      &&
OR       ||
CONCATENATE &
  
```

```

= IF ([EnglishDayNameOfWeek] = "Saturday"
    ||
    [EnglishDayNameOfWeek] = "Sunday", "Weekend", "Working Day")

= IF ( RELATED (ProductSubcategory[Name]) = BLANK (), "Unknown", RELATED (ProductSubcategory[Name]))
  
```

## Measures

### Filter Context

Contoso Sample DAX Formulas - Microsoft Excel

PivotTable Tools: Options, Design

File Home Insert Page Layout Formulas Data Review View PowerPivot

C4 769217765.999

1	Sales	Column Labels			
2	Row Labels	2007	2008	2009	Grand Total
3	Asia	\$ 726,887,376.46	\$ 944,715,987.80	\$ 1,028,600,621.89	\$ 2,700,203,986.15
4	Europe	\$ 959,554,446.45	\$ 769,217,766.00	\$ 697,375,893.85	\$ 2,426,148,106.30
5	North America	\$ 2,875,499,132.11	\$ 2,397,299,780.89	\$ 2,014,506,603.43	\$ 7,287,305,516.43
6	Grand Total	\$ 4,561,940,955.02	\$ 4,111,233,534.68	\$ 3,740,483,119.18	\$ 12,413,657,608.89
7					
8	This PivotTable evaluates a single DAX formula (measure) in sixteen (16) different filter contexts.				
9	For example, the highlighted cell has a filter context with two filters: Continent=Europe and Year=2008.				
10					

Ready SalesByCountry SalesByPeriod Inventory 100%

```
SalesTotal := SUM( SalesOrderDetail[LineTotal] )
SalesTotal2 := SUMX( SalesOrderDetail , [OrderQty] * [UnitPrice] )
```

```
HighestPrice := MAX( SalesOrderDetail[UnitPrice] )
LowestPrice := MIN( SalesOrderDetail[UnitPrice] )
NumberOfSubCat := COUNT( ProductSubcategory[ProductSubcategoryID] )
NumberOfRows := COUNTROWS( SalesOrderDetail )
```

**CALCULATE**( <expression>, <filter1>, <filter2>,...)

```
USASales := CALCULATE( [SalesTotal], Region[Country] = "USA" )
(All Filters on Region table stay active)
```

```
USASales := CALCULATE( [SalesTotal], ALL(Region[Country]), Region[Country] = "USA" )
(Reset Filter Context on Country column, all other filters stay active f.e.: Province, City!)
```

```
USASales := CALCULATE( [SalesTotal], ALL(Region) , Region[Country] = "USA" )
(Reset Filter Context on all columns in Region table)
```

```
HighMarginSales := CALCULATE( [SalesTotal], FILTER(Product, Product[UnitPrice] >= Product[UnitCost]*2) )
(User Filter function to filter on two columns)
```

```
HighMarginSales := CALCULATE( [SalesTotal], FILTER(ALL(Product),
Product[UnitPrice] >= Product[UnitCost]*2))
(Reset all Product filters)
```

### VALUES

```
CountActiveSubCat := COUNTROWS( VALUES(Product[SubCat]) )
SubCatIsActive := ISFILTERED( Product[SubCat] )
```

```
PercSalesOfCatSales := [SalesTotal] / CALCULATE( [SalesTotal], ALL(Product) , VALUES(Product[Cat]) )
"" := [SalesTotal] / [SalesTotal]( ALL(Product) , VALUES(Product[Cat]) )
"" := DIVIDE([SalesTotal] , [SalesTotal]( ALL(Product) , VALUES(Product[Cat]) ) )
(DIVIDE: Performs division and returns alternate result or BLANK() on division by 0.)
```

```
PercSalesOfCatSalesTot:= IF([SubCatIsActive], [PercSalesOfCatSales] , BLANK())
```

### USERELATIONSHIP

```
Total value Shipped := CALCULATE( SUMX('OrderPipeline', [Total value] ) ,
USERELATIONSHIP( OrderPipeline[BookDate], DimDate[Date] ) )
```

### Time Intelligence

```
PreviousMonthSales := CALCULATE( [SalesTotal],
All(SalesOrderHeader[OrderDate]),
PREVIOUSMONTH( VALUES(SalesOrderHeader[OrderDate]) ) )
```

```
PreviousYearMonthSales:= CALCULATE( [SalesTotal],
All(SalesOrderHeader[OrderDate]),
PARALLELPERIOD( VALUES(SalesOrderHeader[OrderDate]) , -12, MONTH ) )
```

```
YTDSales := CALCULATE( [SalesTotal],
All(SalesOrderHeader[OrderDate]),
DATESYTD( VALUES(SalesOrderHeader[OrderDate]) ) )
```

```
" := TOTALYTD( [SalesTotal],
All(SalesOrderHeader[OrderDate]),
VALUES(SalesOrderHeader[OrderDate]) )
```

```
YTDPreviousYearSales := CALCULATE( [SalesTotal],
All(SalesOrderHeader[OrderDate]),
SAMEPERIODLASTYEAR(
DATESYTD( VALUES(SalesOrderHeader[OrderDate]) ) ) )
```

**CALCULATETABLE:** Evaluates a table expression in a context modified by the given filters.

CALCULATETABLE(<expression>,<filter1>,<filter2>,...)

```
AvgSubCatSales      := AVERAGEX ( CALCULATETABLE (
                        DISTINCT(Product[SubCat]), ALL(Product) , VALUES(Product[Cat] ) ) , [SalesTotal] )
```

**SUMMARIZE:** Returns a summary table for the requested totals over a set of groups.

SUMMARIZE(<table>,<groupBy\_columnName>[, <groupBy\_columnName>]...[, <name>,<expression>]...)

```
SUMMARIZE(ResellerSales_USD
, DateTime[CalendarYear]
, ProductCategory[ProductCategoryName]
, "Sales Amount (USD)", SUM(ResellerSales_USD[SalesAmount_USD])
, "Discount Amount (USD)", SUM(ResellerSales_USD[DiscountAmount])
)
```

DateTime[CalendarYear]	ProductCategory[ProductCategoryName]	[Sales Amount (USD)]	[Discount Amount (USD)]
2008	Bikes	12968255.42	36167.6592
2005	Bikes	6958251.043	4231.1621
2006	Bikes	18901351.08	178175.8399
2007	Bikes	24256817.5	276065.992
2008	Components	2008052.706	39.9266
2005	Components	574256.9865	0
2006	Components	3428213.05	948.7674
2007	Components	5195315.216	4226.0444
2008	Clothing	366507.844	4151.1235
2005	Clothing	31851.1628	90.9593

```
MA3Months := AVERAGEX (
    SUMMARIZE (
        CALCULATETABLE (
            SalesOrderHeader ,
            ALL(SalesOrderHeader) ,
            DATESBETWEEN (
                SalesOrderHeader[OrderDate] ,
                FIRSTDATE ( DATEADD( VALUES(SalesOrderHeader[OrderDate]) ,-2, MONTH ) ) ,
                LASTDATE ( VALUES( SalesOrderHeader[OrderDate])) )
        ) ,
        SalesOrderHeader[Jaar] ,
        SalesOrderHeader[Maand] ,
        "SalesPerMonth",
        SUM(SalesOrderDetail[LineTotal])
    ) ,
    [SalesPerMonth]
)
```

## Role Based Security:

### - Row Filters

Table	DAX expression
Region	= Region[Country] = "USA"
ProductCategory	= ProductCategory[Name] = "Bicycles"
Transactions	= Transactions[Year] = 2008

### - Dynamic Filters

```
LOOKUPVALUE(<result_columnName>,
    <search_columnName>, <search_value>[,
    <search_columnName>, <search_value>]...)
```

### 1 to many

```
= dimDepartment[DepartmentId] = LOOKUPVALUE( dimEmployees[DepartmentId],
dimEmployees[LoginId], USERNAME() )
```

#### dimEmployees

LastName	FirstName	LoginID	DepartmentId
Brown	Kevin	Adventure-works\kevin0	7
Bradley	David	Adventure-works\david0	7
Dobney	JoLynn	Adventure-works\JoLynn0	4
Baretto DeMattos	Paula	Adventure-works\Paula0	2

DepartmentId	DepartmentName
1	Corporate
2	Executive General and Administration
3	Inventory Management
4	Manufacturing

### many to many

```
= ProductCategory[ProductCategoryID]
= LOOKUPVALUE( SecurityEmployeeCategory[CategoryID],
    SecurityEmployeeCategory[CategoryID], ProductCategory[ProductCategoryID],
    SecurityEmployeeCategory[Login], USERNAME() )
```

