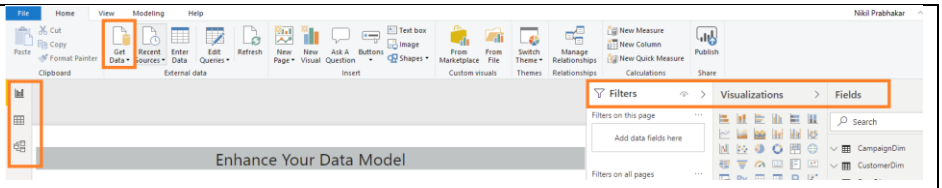
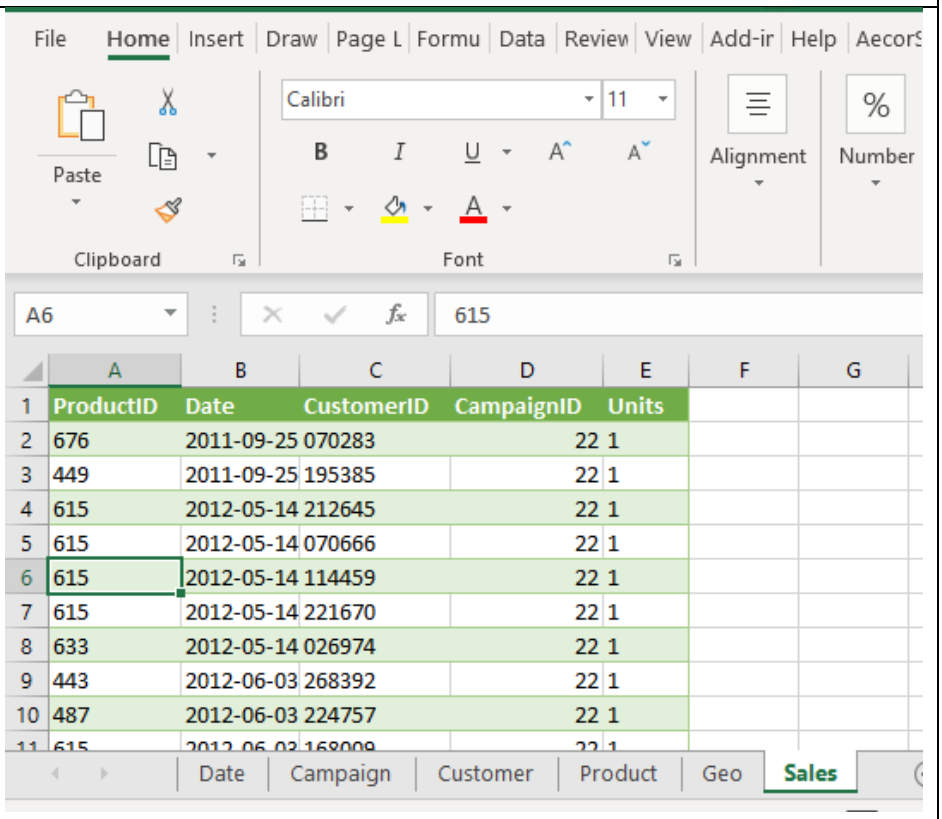
Data Modeling

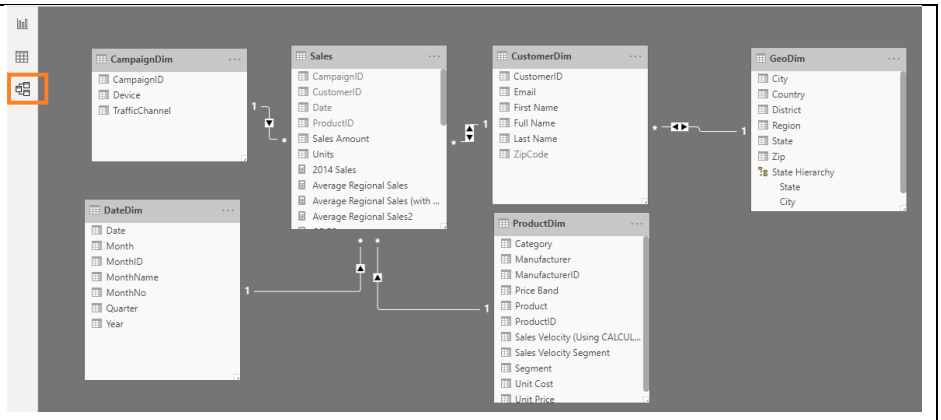
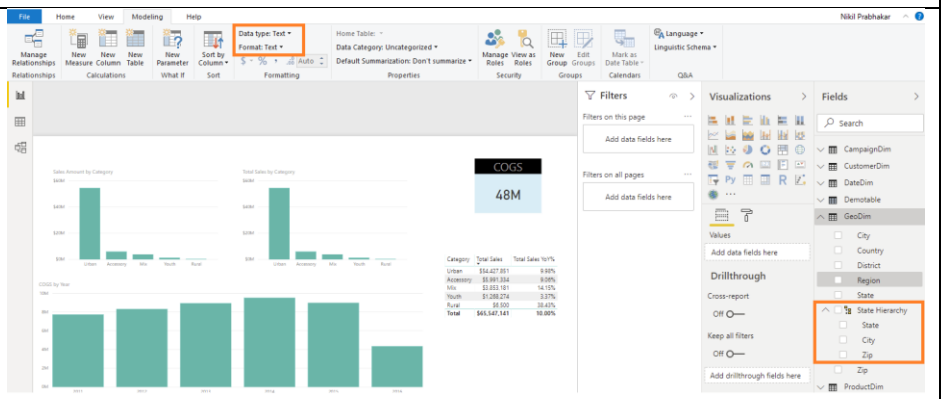
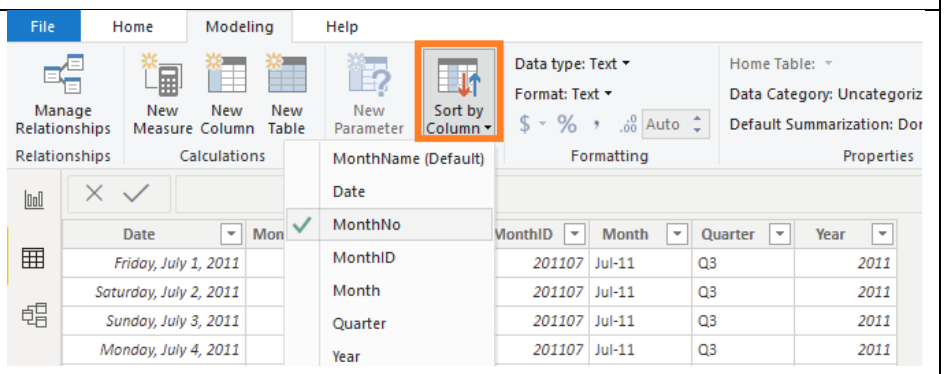
by Power BI Team, Microsoft

Contents

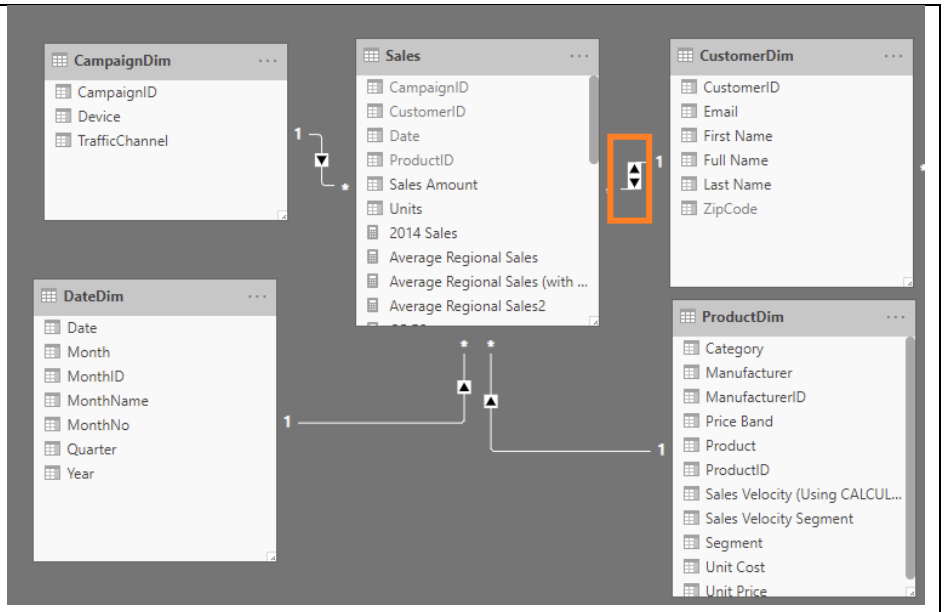
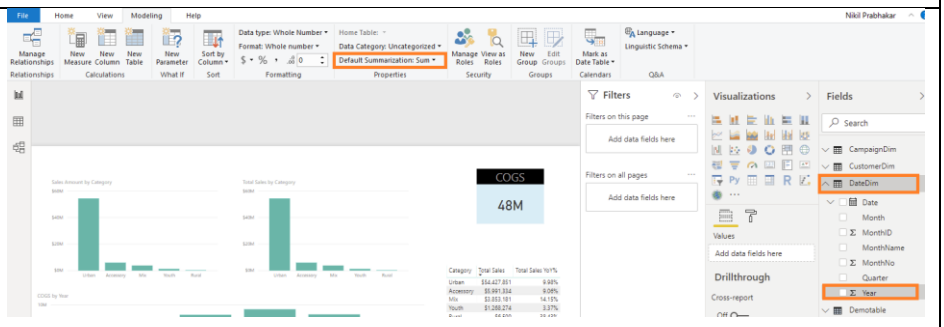
Demo 1 - Introduction

In this section, explore Power BI Desktop

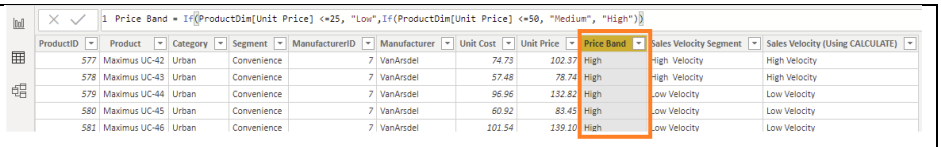
1. Open Instructor Complete Modeling.pbix file. 2. Give a brief introduction of the tool, navigation between **Report, Data and Model** views. 3. Talk about the options available in the **ribbon**. 4. Talk about **Get Data** – variety of data sources Power BI can connect to. 5. Quick overview of Query Editor. 6. Close Query Editor.	
7. Open VanArsdel_Actuals.xlsx file. 8. Talk about the data we will be working with. We have VanArsdel sales data by Date, Product, Customer and Campaign. We also have individual Campaign, Product and Customer information. We also have Geographic information for each Customer.	

9. Navigate back to Power BI file. 10. Navigate to Model view. 11. Talk about the relationships and schema – details are covered in pptx.	
12. Talk about Data types that are available. 13. Using State Hierarchy in Geo Dim talk about hierarchies.	
14. Talk about Sort by Column feature using Month Name field in Date table.	

Demo 2 – Data Modeling

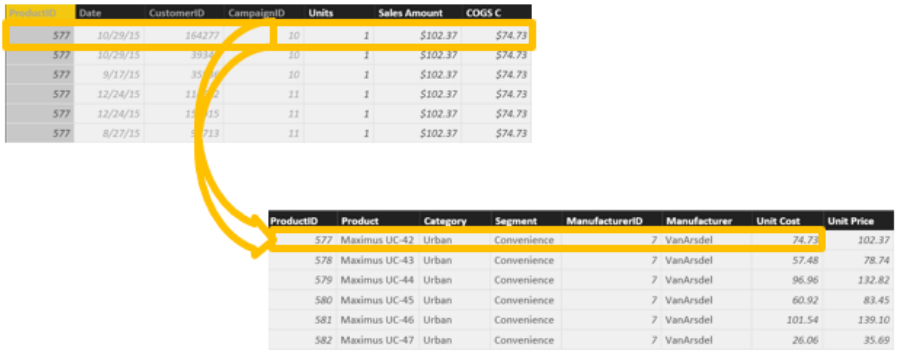
1. Using keys which are integers in each of the Dim table emphasis this helps with compression. 2. Using relationship between CustomerDim and Sales talk about bi-directional filtering.	
3. Using Year field from DateDim table, talk about Default Summarization.	

Demo 3 – Calculated Column

1. In ProductDim use Price Band field to show case Calculated column.	
If a question comes up related to how to create a calculated column in ”M”, then do the following: 2. Open Query editor and create a calculated column using this formula: *if [Unit Price] <= 25 then "Low" else if [Unit Price] <=50 then "Medium" else "High"* Once the column comes in it becomes like any other column in Power BI Desktop file The column is compressed There is a secondary processing for Calculated Columns – Which makes process times slower	

Demo 4 – RELATED Function

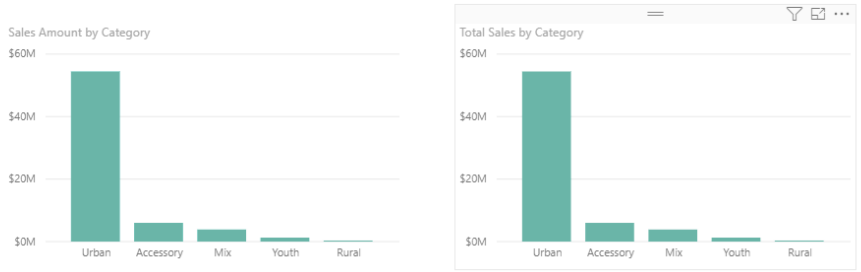
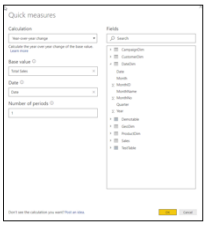
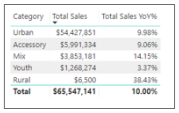
1. In Sales Table write this formula:
   Sales[COGS] =
   RELATED(ProductDim[Unit Cost]) *
   Sales[Units]

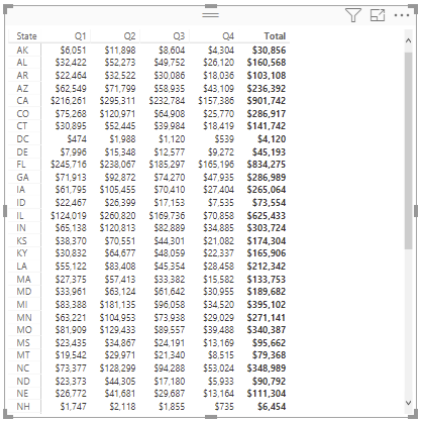


ProductID	Date	CustomerID	CampaignID	Units	Sales Amount	COGS C
577	10/29/15	164277	10	1	$102.37	$74.73
577	10/29/15	3934	10	1	$102.37	$74.73
577	9/17/15	35	10	1	$102.37	$74.73
577	12/24/15	11	11	1	$102.37	$74.73
577	12/24/15	15 15	11	1	$102.37	$74.73
577	8/27/15	7713	11	1	$102.37	$74.73

ProductID	Product	Category	Segment	ManufacturerID	Manufacturer	Unit Cost	Unit Price
577	Maximus UC-42	Urban	Convenience	7	VanArsdel	74.73	102.37
578	Maximus UC-43	Urban	Convenience	7	VanArsdel	57.48	78.74
579	Maximus UC-44	Urban	Convenience	7	VanArsdel	96.96	132.82
580	Maximus UC-45	Urban	Convenience	7	VanArsdel	60.92	83.45
581	Maximus UC-46	Urban	Convenience	7	VanArsdel	101.54	139.10
582	Maximus UC-47	Urban	Convenience	7	VanArsdel	26.06	35.69

Demo 5 – Measures

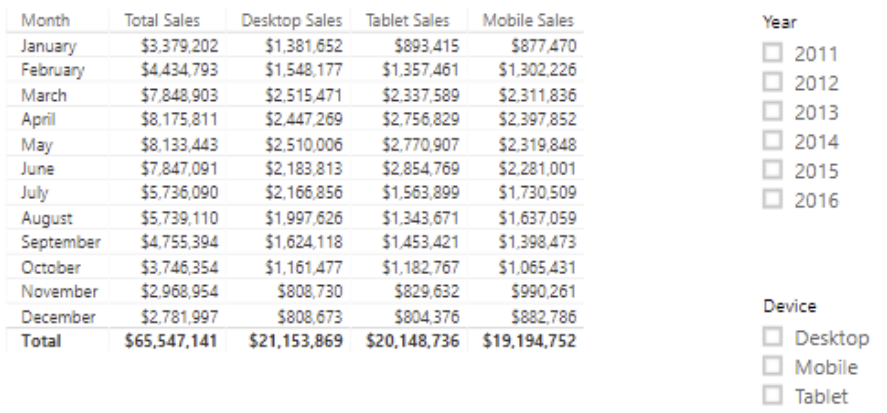
1. From the Modeling Ribbon, show measure called Total Sales and that resolves to the same values as default summarization. Total Sales = SUM(Sales[Sales Amount]) Use visuals in Default Summarization page to talk about this.	
2. Create a Quick Measure like Total Says YoY% and talk about DAX code and error handling.	Quick Measures Power BI **Quick Measures are wizard driven DAX calculations** • Right+Click a table and select **Quick Measures** • Select calculation type and fill-in parameters • DAX is generated automatically • Great way to learn DAX    See Quick Measure gallery: https://community.powerbi.com/t5/Quick-Measures-Gallery/bd-p/QuickMeasuresGallery
3. Create Profit Margin and Profit Margin % measures to explain subtract and DIVIDE functions. 4. You can build a visual as well using these measures.	**Profit Margin = Sales[Total Sales] – Sales[Cogs]** **Profit Margin % = DIVIDE([Profit Margin], [COGS])**
5. Use MobileSalesLastYear formula to talk about use of variables and function like SAMEPERIODLASTYEAR.	**MobileSalesLastYear =** **VAR MobileProducts = FILTER(** **ALL('CampaignDim'[Device]),** **CampaignDim[Device]="Mobile"** **)** **VAR LastYear = SAMEPERIODLASTYEAR('DateDim'[Date])** **RETURN** **CALCULATE(SUM(Sales[Sales Amount]),MobileProducts,LastYear)**

6. Use table in “Filter Context” page to talk about Calculated Table vs Measure.	

State	Q1	Q2	Q3	Q4	Total
AK	$6,051	$11,898	$8,604	$4,304	**$30,856**
AL	$32,422	$52,273	$49,752	$26,120	**$160,568**
AR	$22,464	$32,522	$30,086	$18,036	**$103,108**
AZ	$62,549	$71,799	$58,935	$43,109	**$236,392**
CA	$216,261	$295,311	$232,784	$157,386	**$901,742**
CO	$75,268	$120,971	$64,908	$25,770	**$286,917**
CT	$30,895	$52,445	$39,984	$18,419	**$141,742**
DC	$474	$1,988	$1,120	$539	**$4,120**
DE	$7,996	$15,348	$12,577	$9,272	**$45,193**
FL	$245,716	$238,067	$185,297	$165,196	**$834,275**
GA	$71,913	$92,872	$74,270	$47,935	**$286,989**
IA	$61,795	$105,455	$70,410	$27,404	**$265,064**
ID	$22,467	$26,399	$17,153	$7,535	**$73,554**
IL	$124,019	$260,820	$169,736	$70,858	**$625,433**
IN	$65,138	$120,813	$82,889	$34,885	**$303,724**
KS	$38,370	$70,551	$44,301	$21,082	**$174,304**
KY	$30,832	$64,677	$48,059	$22,337	**$165,906**
LA	$55,122	$83,408	$45,354	$28,458	**$212,342**
MA	$27,375	$57,413	$33,382	$15,582	**$133,753**
MD	$33,961	$63,124	$61,642	$30,955	**$189,682**
MI	$83,388	$181,135	$96,058	$34,520	**$395,102**
MN	$63,221	$104,953	$73,938	$29,029	**$271,141**
MO	$81,909	$129,433	$89,557	$39,488	**$340,387**
MS	$23,435	$34,867	$24,191	$13,169	**$95,662**
MT	$19,542	$29,971	$21,340	$8,515	**$79,368**
NC	$73,377	$128,299	$94,288	$53,024	**$348,989**
ND	$23,373	$44,305	$17,180	$5,933	**$90,792**
NE	$26,772	$41,681	$29,687	$13,164	**$111,304**
NH	$1,747	$2,118	$1,855	$735	**$6,454**

Demo 6 – CALCULATE Function

1. Use “Calculate-Add” page to talk about Filters and Calculate function.



Month	Total Sales	Desktop Sales	Tablet Sales	Mobile Sales
January	$3,379,202	$1,381,652	$893,415	$877,470
February	$4,434,793	$1,548,177	$1,357,461	$1,302,226
March	$7,848,903	$2,515,471	$2,337,589	$2,311,836
April	$8,175,811	$2,447,269	$2,756,829	$2,397,852
May	$8,133,443	$2,510,006	$2,770,907	$2,319,848
June	$7,847,091	$2,183,813	$2,854,769	$2,281,001
July	$5,736,090	$2,166,856	$1,563,899	$1,730,509
August	$5,739,110	$1,997,626	$1,343,671	$1,637,059
September	$4,755,394	$1,624,118	$1,453,421	$1,398,473
October	$3,746,354	$1,161,477	$1,182,767	$1,065,431
November	$2,968,954	$808,730	$829,632	$990,261
December	$2,781,997	$808,673	$804,376	$882,786
Total	**$65,547,141**	**$21,153,869**	**$20,148,736**	**$19,194,752**

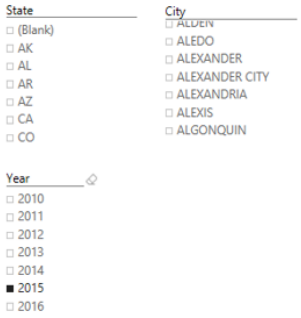
2. Use “Calculate-Ignore” page, use Total Sales and Total Sales All Geo to talk about Calculate and ALL function.

ALL function ignores filter on ANY column from the GeographyDim table, but allows filters from Year.

Discuss that this measure can be used to calculate a % of Total measure.

[Total Sales All Geo] = CALCULATE([Total Sales], ALL(GeographyDim))

State	Total Sales	Total Sales All Geo
UT	$482,268	$65,547,141
VA	$1,609,751	$65,547,141
VT	$42,233	$65,547,141
WA	$1,336,132	$65,547,141
WI	$2,297,199	$65,547,141
WV	$599,850	$65,547,141
WY	$351,374	$65,547,141
Total	**$65,547,141**	**$65,547,141**



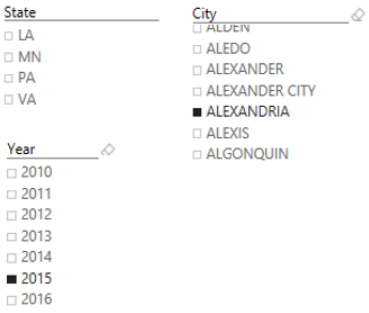
*Ignore filter on ANY column from the GeographyDim table, but allows filters from Year

3. Use “Calculate-Ignore” page, use Total Sales, Total Sales All Geo and Total Sales All State to talk about Calculate and ALL function.

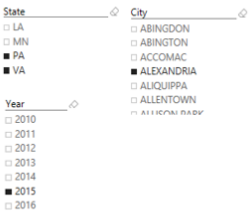
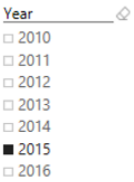
Measure [Total Sales All State] – ignores filter on the STATE column from the GeographyDim table, but allows filters from Year

[Total Sales All States] = CALCULATE([Total Sales], ALL(GeographyDim[State]))

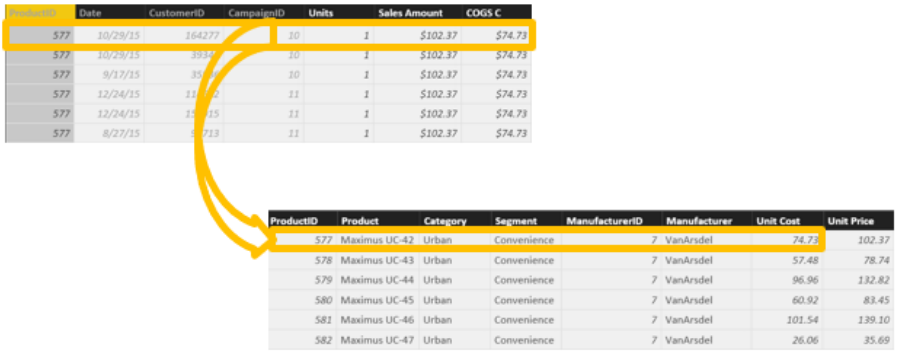
State	Total Sales	Total Sales All Geo	Total Sales All States
AL	$206	$12,304,523	$15,387
IN	$710	$12,304,523	$15,387
KY	$702	$12,304,523	$15,387
LA	$3,343	$12,304,523	$15,387
MN	$2,545	$12,304,523	$15,387
MO		$12,304,523	$15,387
NE		$12,304,523	$15,387
OH		$12,304,523	$15,387
PA	$283	$12,304,523	$15,387
SD		$12,304,523	$15,387
TN	$144	$12,304,523	$15,387
VA	$7,455	$12,304,523	$15,387
Total	**$15,387**	**$12,304,523**	**$15,387**



*Ignore filter on the STATE column from the GeographyDim table, but allows filters from Year

4. Use “Calculate-Ignore” page, use Total Sales, Total Sales All Geo, Total Sales All State and Total Sales All Selected State to talk about Calculate and ALLSELECTED function. Measure [Total Sales All Selected State] – ignores filter on the STATE column from the GeographyDim table, but allows filters from Year	**[Total Sales All Selected States] = CALCULATE([Total Sales], ALLSELECTED(GeographyDim[State]))** | State	Total Sales	Total Sales All Geo	Total Sales All States	Total Sales All Selected States
---	---	---	---	---
PA	$283	$12,304,523	$15,387	$7,737
VA	$7,455	$12,304,523	$15,387	$7,737
Total	**$7,737**	**$12,304,523**	**$15,387**	**$7,737**	  *Ignore filter on the STATE column from the GeographyDim table, but allows filters from Year
5. Use “Calculate-Update” page, to show that the filter context in the measure. Compare Total Sales to 2014 sales and how Year slicer has no effect on 2014 Sales.	**[2014 Sales] = CALCULATE([Total Sales], DateDim[Year] = 2014)** 	Month	Total Sales	2014 Sales
---	---	---
January	$617,594	$624,956
February	$846,436	$817,549
March	$1,382,885	$1,245,627
April	$1,512,488	$1,400,954
May	$1,589,728	$1,510,563
June	$1,402,897	$1,481,390
July	$1,122,721	$1,281,466
August	$1,222,190	$1,273,948
September	$865,028	$1,201,762
October	$712,729	$916,774
November	$562,400	$714,021
December	$467,428	$575,281
Total	**$12,304,523**	**$13,044,290**	  *Ignores filter on the Year Slicer

Demo 7 – CALCULATED Table

1. Create a new Table Demo Table = ALL(GeoDim) Notice a new table is created with a new memory footprint. You can create relationships, etc just like any other table.	
2. Explain difference between HASONEVALUE and SELECTEDVALUE functions	**Header (HASONEVALUE) =** **IF (** **HASONEVALUE (ProductDim[Price Band]),** **CONCATENATE (** **"Report Header for Price Band : ",** **VALUES (ProductDim[Price Band])** **),** **"Overall Report"** **)** **----------** **Header (SELECTEDVALUE) =** **VAR selectedPriceBand =** **SELECTEDVALUE (ProductDim[Price Band])** **RETURN** **IF (** **ISBLANK (selectedPriceBand),** **"Overall Report",** **CONCATENATE ("Report Header for Price Band: ",** **selectedPriceBand)** **)**