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1) **Fundamental Problem with Two Fact Tables :**

i. Here are pictures of the two Fact Tables from our start file named "EMT1493Start.xlsx":

1. This Fact Table has an Invoice Level Grain, where the Shipping and Discount Amounts are for the whole invoice:

<b>fInvoiceHeader</b> = Invoice Fact Table = Invoice Level				
Dimension Table for fLineItemInvoiceDetail				
One Side for fLineItemInvoiceDetail Fact Table				
Date	Invoice Number	Invoice Shipping	Invoice Discount	
1/1/17	125447	98.7	144.18	
1/2/17	125448	26.25	73.06	
1/3/17	125450	207.55	437.62	
1/4/17	125451	262.15	542.26	

2. This Fact Table has an Invoice Line Grain (or Product Grain), where the Units and Price Amounts for individual lines in an invoice:

<b>fLineItemInvoiceDetail</b> = Line Item Invoice Detail Fact Table = Line Item Level				
Fact Table for fInvoiceHeader				
Fact Table for dProduct				
Invoice Number	Product	Quantity	Unit Price	
125447	Sunbell	21	22.36	
125447	Crested Beaut	88	14.97	
125447	Kangaroo	35	12.32	
125448	Quad	53	27.57	
125450	Carlota Doublers	25	48.75	
125450	Crested Beaut	34	16.22	
125450	Sunset	200	13.03	

- ii. The fundamental problem is that you can not use the Invoice Grain Numbers (Shipping and Discount) and the Invoice Grain Numbers (Quantity and Units Price) in the same report with the Product in the Row Area of the report.
- iii. If our goal is a report like the one listed below, we must merge the two fact tables, or allocate the Invoice Grain Numbers (Shipping and Discount) down to the Invoice Grain Fact Table.

Product	Sum of Line Discount	Sum of Line Shipping
Aspen	\$14,970.04	\$5,478.60
Carlota	\$15,346.03	\$5,427.69
Carlota Doublers	\$37,571.46	\$7,378.59
Crested Beaut	\$11,386.60	\$6,268.43
Eagle	\$8,166.87	\$5,855.60
Kangaroo	\$10,028.41	\$4,723.41
Majestic Beaut	\$14,905.66	\$8,703.31
Quad	\$22,657.89	\$3,483.46
Sunbell	\$14,213.91	\$8,200.96
Sunset	\$13,958.21	\$7,347.25
Yanaki	\$16,178.83	\$6,910.81
<b>Grand Total</b>	<b>\$179,383.93</b>	<b>\$69,778.10</b>

Product	Sum of Line Discount	Sum of Line Shipping
Aspen	\$14,970.04	\$5,478.60
Carlota	\$15,346.03	\$5,427.69
Carlota Doublers	\$37,571.46	\$7,378.59
Crested Beaut	\$11,386.60	\$6,268.43
Eagle	\$8,166.87	\$5,855.60
Kangaroo	\$10,028.41	\$4,723.41
Majestic Beaut	\$14,905.66	\$8,703.31
Quad	\$22,657.89	\$3,483.46
Sunbell	\$14,213.91	\$8,200.96
Sunset	\$13,958.21	\$7,347.25
Yanaki	\$16,178.83	\$6,910.81

## 2) Excel Worksheet Formula Solution :

Picture of Final Table with Formula Columns and Final Report:

fInvoiceHeader = Invoice Fact Table = Invoice Level Dimension Table for fLineItemInvoiceDetail One Side for fLineItemInvoiceDetail Fact Table								fLineItemInvoiceDetail = Line Item Invoice Detail Fact Table = Line Item Level Fact Table for InvoiceHeader Fact Table for dProduct								dProduct = Dimension/Lookup Table Dimension Table for fLineItemInvoiceDetail One Side			
[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]	[16]	[17]	[18]	[19]	[20]
Date	Invoice Number	Invoice Shipping	Invoice Discount	Invoice Sale	% Sales Discount	Invoice Weight	Invoice Number	Product	Quantity	Unit Price	Line Discount	Line Shipping	Line Weight	Product	Manufacturer	Category	Weight oz.		
1/1/17	125447	36.7	144.18	2218.12	0.065000932	743	125447	Sunbell	21	22.36	30.52186572	18.13263795	136.5	Quad	Gel Booms	Freestyle	3		
1/2/17	125448	26.25	73.06	1461.21	0.043939658	159	125447	Crested Beaut	88	14.97	85.6237066	64.23448183	484	Aspen	Colorado Booms	Beginner	4		
1/3/17	125450	207.55	437.62	4376.23	0.093939314	1562	125447	Kangaroo	35	12.32	28.02842768	16.27288022	122.5	Sunset	Gel Booms	Australian Round	6		
1/4/17	125451	262.15	542.26	5422.56	0.100000738	2236.5	125448	Quad	53	27.57	73.06	26.25	153	Eagle	Channel Craft	Beginner	5		
1/4/17	125452	159.25	381.63	3816.3	0.1	1456	125450	Carlota Doublers	25	48.75	121.8741645	23.25304097	175	Crested Beaut	Colorado Booms	Beginner	5.5		
1/8/17	125456	18.025	33.51	957.52	0.034396658	284.5	125450	Crested Beaut	34	16.22	55.14762195	24.84753521	187	Majestic Beaut	Gel Booms	Australian Round	7		
1/9/17	125457	36.4	114.08	1755	0.065002949	252	125450	Sunset	200	13.03	260.5982135	153.4494238	1200	Yanaki	Colorado Booms	Australian Round	5		
1/11/17	125458	114.45	323.62	3236.24	0.093939764	1058	125451	Carlota	223	11.68	260.4553213	91.45563725	780.5	Kangaroo	Channel Craft	Beginner	3.5		
1/11/17	125459	106.05	742.87	7428.7	0.1	1300	125451	Sunbell	234	12.58	281.7940787	170.6641628	1456	Sunbell	Gel Booms	Australian Round	6.5		
1/12/17	125461	7.35	7.43	371.7	0.019398239	91	125452	Majestic Beaut	38	18.82	71.516	23.09375	266	Carlota	Gel Booms	Freestyle	3.5		
1/13/17	125462	3.15	0	74.85	0	16.5	125452	Yanaki	238	13.03	310.114	130.15625	1190	Carlota Doublers	Gel Booms	Freestyle	7		
1/16/17	125463	103.775	315.19	3151.96	0.100001269	806	125456	Majestic Beaut	23	23.16	18.6420198	10.20043937	161						
1/18/17	125464	288.325	658.78	6587.8	0.1	2125	125456	Sunbell	19	22.36	14.8679802	7.824560633	123.5	[7]					
1/19/17	125465	146.825	593.46	5934.6	0.1	1195	125457	Carlota Doublers	36	48.75	114.08	36.4	252	Product	Sum of Line Discount	Sum of Line Shipping			
1/19/17	125466	13.125	8.72	435.96	0.020001835	73.5	125458	Majestic Beaut	37	18.82	63.63313932	28.01753308	259	Aspen	\$14,970.04	\$5,478.60			
1/20/17	125467	7.35	5.42	271.15	0.019398936	38.5	125458	Crested Beaut	38	16.22	61.63523818	22.60874291	209	Carlota	\$15,346.03	\$5,427.69			
1/22/17	125469	77.525	204.32	2732.27	0.074393909	1158.5	125458	Crested Beaut	68	14.97	101.7947418	40.45775047	374	Carlota Doublers	\$37,571.46	\$7,378.59			
1/26/17	125471	12.775	66.13	1322.5	0.050003781	196	125458	Aspen	54	16.77	90.5568807	23.36593753	216	Crested Beaut	\$11,386.60	\$6,288.43			
1/27/17	125473	25.725	116.8	1796.88	0.065001558	287	125459	Majestic Beaut	34	18.82	63.968	19.41530769	238	Eagle	\$8,166.87	\$5,855.60			
1/27/17	125474	117.775	191.74	2556.56	0.074393218	1096	125459	Yanaki	51	17.37	88.587	20.80211538	255	Kangaroo	\$10,028.41	\$4,723.41			
1/28/17	125475	31.85	283.06	2830.59	0.100000353	444	125459	Quad	37	29.87	110.519	9.055038462	111	Majestic Beaut	\$14,905.66	\$8,703.31			
1/28/17	125476	17.325	3.61	480.48	0.020000833	136.5	125459	Quad	232	20.68	479.776	56.77753846	696	Quad	\$22,657.89	\$3,483.46			
1/29/17	125477	107.625	413.8	4138.01	0.093939758	730.5	125461	Sunbell	14	26.55	7.43	7.35	91	Sunbell	\$14,213.91	\$8,200.96			
2/5/17	125479	49	299.01	2990.08	0.100000669	896	125462	Crested Beaut	3	24.35	0	3.15	16.5	Sunset	\$13,958.21	\$7,347.25			
2/5/17	125480	504.875	1127.94	11279.42	0.093939823	3654.5	125463	Quad	47	29.87	140.3907817	18.15418734	141	Yanaki	\$16,178.83	\$8,910.81			
2/5/17	125481	205.625	847.19	8471.98	0.100000236	1400	125463	Eagle	91	11.97	108.3238324	58.58266123	455	Grand Total	\$179,383.93	\$69,778.10			
2/5/17	125482	6.125	7.64	381.92	0.020000489	108.5	125463	Sunset	35	18.82	65.87083595	27.03815136	210	[8]					
2/7/17	125483	138.25	525.17	5251.65	0.100000952	1093	125464	Quad	26	29.87	77.662	10.60524706	78	Product	Sum of Line Discount	Sum of Line Shipping			
2/9/17	125484	52.675	181.8	2424	0.075	542.5	125464	Yanaki	234	13.03	304.902	159.0787059	1170	Aspen	\$14,970.04	\$5,478.60			
2/9/17	125485	46.2	66.95	1339.08	0.043937013	372	125464	Aspen	188	12.58	249.084	107.6840471	792	Carlota	\$15,346.03	\$5,427.69			
2/9/17	125486	142.8	705.26	7052.64	0.093939433	1193.5	125464	Eagle	17	15.36	27.132	11.557	85	Carlota Doublers	\$11,386.60	\$6,288.43			
2/11/17	125488	163.625	411.5	4115.02	0.093939514	1259	125465	Sunbell	80	16.77	134.16	63.89037657	520	Crested Beaut	\$11,386.60	\$6,288.43			
2/13/17	125489	63.35	66.29	1325.79	0.050000377	454.5	125465	Quad	225	20.68	465.3	82.93462343	675	Eagle	\$10,028.41	\$4,723.41			
2/15/17	125490	19.6	7.34	367.08	0.019395641	115	125466	Carlota	21	20.76	8.72	13.125	73.5	Kangaroo	\$14,905.66	\$8,703.31			
2/18/17	125493	63	57.71	1154.22	0.043939134	356	125467	Carlota	11	24.65	5.42	7.35	38.5	Quad	\$22,657.89	\$3,483.46			
2/19/17	125494	216.825	303.79	3037.92	0.093909342	1488	125469	Crested Beaut	1	24.95	1.871247717	0.36805136	5.5	Majestic Beaut	\$14,213.91	\$8,200.96			
2/19/17	125495	30.275	77.6	1551.95	0.050001611	346.5	125469	Eagle	215	8.98	144.8023233	71.93731118	1075	Sunset	\$13,958.21	\$7,347.25			
2/20/17	125496	31.675	23.92	854.76	0.035000378	227.5	125469	Quad	26	29.87	58.24642894	5.219637462	78	Yanaki	\$16,178.83	\$8,910.81			
2/21/17	125497	222.95	823.99	8239.92	0.093939757	2810	125471	Carlota Doublers	17	60	51.00385633	7.75625	119	Product	Sum of Line Discount	Sum of Line Shipping			
2/22/17	125498	48.3	288.6	2886	0.1	619	125471	Majestic Beaut	11	27.5	15.12614367	5.01875	77	Aspen	\$14,970.04	\$5,478.60			
2/23/17	125499	5.25	6.41	320.45	0.020000321	45.5	125473	Majestic Beaut	18	23.16	27.09784961	11.23390244	126	Carlota	\$15,346.03	\$5,427.69			
2/24/17	125500	35.525	58.7	1173.9	0.0500004253	455	125473	Carlota Doublers	23	60	89.70215039	14.43109156	161	Eagle	\$8,166.87	\$5,855.60			
2/25/17	125501	187.325	308.46	3084.6	0.100000323	1377.5	125474	Eagle	40	12.97	38.303659414	21.49176892	200	Grand Total	\$179,383.93	\$69,778.10			

1] (05:45 in video) Worksheet Formula for “Invoice Sales” Column in the flInvoiceHeader Fact Table using SUMPRODUCT function, is seen in the below picture:

```
=SUMPRODUCT(fLineItemInvoiceDetail[Quantity],fLineItemInvoiceDetail[Unit Price],
--(fLineItemInvoiceDetail[Invoice Number]=[@[Invoice Number]]))
```

2] (09:23 in video) Worksheet Formula for “% Sales Discount” Column in the flInvoiceHeader Fact Table using division:

```
=[@[Invoice Discount]]/[@[Invoice Sales]]
```

3] (10:00 in video) Worksheet Formula for “Line Discount” Column in the fLineItemInvoiceDetail Fact Table using VLOOKUP and multiplication:

```
=VLOOKUP([@[Invoice Number]],fInvoiceHeader[[Invoice Number]:[% Sales Discount]],5,0)
*[@Quantity]*[@Unit Price]
```

4] (13:27 in video) Worksheet Formula for Invoice “Line Weight” Column in the fLineItemInvoiceDetail Fact Table using VLOOKUP and multiplication:

```
=VLOOKUP([@Product],dProduct,4,0)*[@Quantity]
```

5] (14:30 in video) Worksheet Formula for “Invoice Weight” Column in the flInvoiceHeader Fact Table using SUMIFS:

```
=SUMIFS(fLineItemInvoiceDetail[Line Weight],
fLineItemInvoiceDetail[Invoice Number],[@[Invoice Number]])
```

6] (15:04 in video) Worksheet Formula for “Line Shipping” Column in the fLineItemInvoiceDetail Fact Table using VLOOKUP and multiplication

```
=[@[Line Weight]]/
VLOOKUP([@[Invoice Number]],fInvoiceHeader[[Invoice Number]:[Invoice Weight]],6,0)
*VLOOKUP([@[Invoice Number]],fInvoiceHeader[[Invoice Number]:[Invoice Shipping]],2,0)
```

7] (17:03 in video) Standard PivotTable Report

Product	Sum of Line Discount	Sum of Line Shipping
Aspen	\$14,970.04	\$5,478.60
Carlota	\$15,346.03	\$5,427.69
Carlota Doublers	\$37,571.46	\$7,378.59
Crested Beaut	\$11,386.60	\$6,268.43
Eagle	\$8,166.87	\$5,855.60
Kangaroo	\$10,028.41	\$4,723.41
Majestic Beaut	\$14,905.66	\$8,703.31
Quad	\$22,657.89	\$3,483.46
Sunbell	\$14,213.91	\$8,200.96
Sunset	\$13,958.21	\$7,347.25
Yanaki	\$16,178.83	\$6,910.81
<b>Grand Total</b>	<b>\$179,383.93</b>	<b>\$69,778.10</b>

8] (17:53 in video) Worksheet Formula Report

[8]			
Product	Sum of Line Discount	Sum of Line Shipping	
Aspen	=SUMIFS(fLinItemInvoiceDetail[Line Discount],fLinItemInvoiceDetail[[Product]:		
Carlota	[Product]],\$Q40)		
Carlota Doublers	\$37,571.46	\$7,378.59	
Crested Beaut	\$11,386.60	\$6,268.43	
Eagle	\$8,166.87	\$5,855.60	
Kangaroo	\$10,028.41	\$4,723.41	
Majestic Beaut	\$14,905.66	\$8,703.31	
Quad	\$22,657.89	\$3,483.46	
Sunbell	\$14,213.91	\$8,200.96	
Sunset	\$13,958.21	\$7,347.25	
Yanaki	\$16,178.83	\$6,910.81	

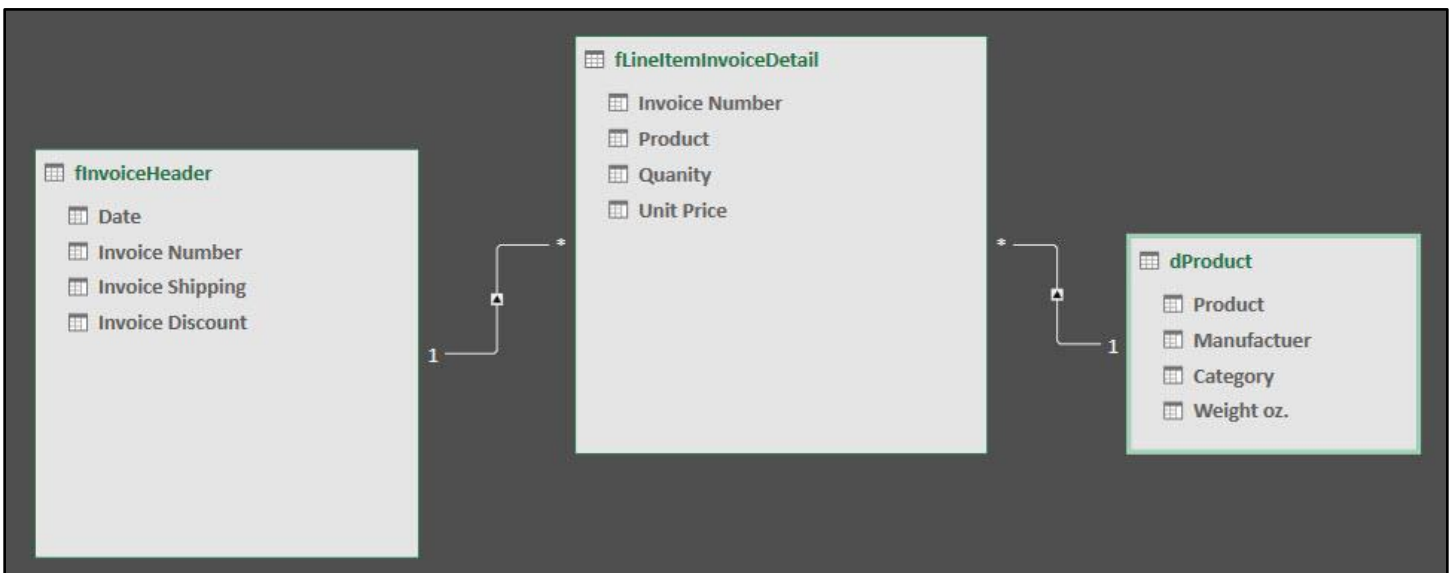
9]

### 3) DAX Formula Solution in Power Pivot

1] Here is a picture of our three Excel Tables in the Excel Workbook file named "EMT1494Start.xlsx".

Date	Invoice Number	Invoice Shipping	Invoice Discount	Invoice Number	Product	Quantity	Unit Price	Product	Manufacturer	Category	Weight oz.
1/1/17	125447	98.7	144.18	125447	Sunbell	21	22.36	Quad	Gel Booms	Freestyle	3
1/2/17	125448	26.25	73.06	125447	Crested Beaut	88	14.97	Aspen	Colorado Booms	Beginner	4
1/3/17	125450	207.55	437.62	125447	Kangaroo	35	12.32	Sunset	Gel Booms	Australian Round	6
1/4/17	125451	262.15	542.26	125448	Quad	53	27.57	Eagle	Channel Craft	Beginner	5
1/4/17	125452	159.25	381.63	125450	Carlota Doubler	25	48.75	Crested Beaut	Colorado Booms	Beginner	5.5
1/8/17	125456	18.025	33.51	125450	Crested Beaut	34	16.22	Majestic Beaut	Gel Booms	Australian Round	7
1/9/17	125457	36.4	114.08	125450	Sunset	200	13.03	Yanaki	Colorado Booms	Australian Round	5
1/11/17	125458	114.45	323.62	125451	Carlota	223	11.68	Kangaroo	Channel Craft	Beginner	3.5
1/11/17	125459	106.05	742.87	125451	Sunbell	224	12.58	Sunbell	Gel Booms	Australian Round	6.5
1/12/17	125461	7.35	7.43	125452	Majestic Beaut	38	18.82	Carlota	Gel Booms	Freestyle	3.5
1/13/17	125462	3.15	0	125452	Yanaki	238	13.03	Carlota Doublers	Gel Booms	Freestyle	7
1/16/17	125463	103.775	315.19	125456	Majestic Beaut	23	23.16				
1/18/17	125464	288.925	658.78	125456	Sunbell	19	22.36				

2] After you import the Excel Tables into the Power Pivot Data Model and create relationships, the starting Data Model looks like this:



3] Picture of Finished InvoiceHeader Fact Table with DAX Calculated Columns:

	Date	Invoice Nu...	Invoice Discount	Invoice Shipping	Invoice Sales	% Invoice Discount	Invoice Weight
1	1/1/17 ...	125447	144.18	98.7	2218.12	0.0650009918309199	743
2	1/2/17 ...	125448	73.06	26.25	1461.21	0.0499996578178359	159
3	1/3/17 ...	125450	437.62	207.55	4376.23	0.0999993144784438	1562
4	1/4/17 ...	125451	542.26	262.15	5422.56	0.100000737658966	2236.5
5	1/4/17 ...	125452	381.63	159.25	3816.3	0.1	1456
6	1/8/17 ...	125456	33.51	18.025	957.52	0.0349966580332526	284.5
7	1/9/17 ...	125457	114.08	36.4	1755	0.065002849002849	252
8	1/11/1...	125458	323.62	114.45	3236.24	0.0999987639977258	1058
9	1/11/1	125459	742.87	106.05	7428.7	0.1	1300

4] Picture of Finished fLineItemInvoiceDetail Fact Table with DAX Calculated Columns & DAX Measures:

Invoice Nu...	Product	Quantity	Unit Price	Line Discount	Line Shipping
1	125447 Sunbell	21	22.36	30.5218657241267	18.1326379542396
2	125447 Crested Beaut	88	14.97	85.6297065983806	64.2944818304172
3	125447 Kangaroo	35	12.32	28.0284276774927	16.2728802153432
4	125448 Quad	53	27.57	73.06	26.25
5	125450 Carlota Doublers	25	48.75	121.874164520603	23.2530409731114
6	125450 Crested Beaut	34	16.22	55.1476219485722	24.8475352112676
7	125450 Sunset	200	13.03	260.598213530824	159.449423815621
8	125451 Carlota	223	11.68	260.465921336048	91.4858372456964
9	125451 Sunbell	224	12.58	281.794078663952	170.664162754304
10	125452 Majestic Beaut	38	18.82	71.516	29.09375
11	125452 Yanaki	238	13.03	310.114	130.15625
12	125456 Majestic Beaut	23	23.16	18.642019801153	10.2004393673111
				Discount On Invoice: \$179,383.93	
				Shipping On Invoice: \$69,778.10	

5] (26:56 in video) DAX Calculated Column Formula for “Invoice Sales” Column in the fInvoiceHeader Fact Table using SUMX and RELATEDTABLE functions:

```
=SUMX(RELATEDTABLE(fLineItemInvoiceDetail),
fLineItemInvoiceDetail[Unit Price]*fLineItemInvoiceDetail[Quantity])
```

6] (29:40 in video) DAX Calculated Column Formula for “% Invoice Discount” Column in the fInvoiceHeader Fact Table using DIVIDE function:

```
=DIVIDE(fInvoiceHeader[Invoice Discount],fInvoiceHeader[Invoice Sales])
```

7] (30:50 in video) DAX Calculated Column Formula for “Line Discount” Column in the fLineItemInvoiceDetail Fact Table using RELATED function and multiplication:

```
=RELATED(fInvoiceHeader[% Invoice Discount])
*fLineItemInvoiceDetail[Quantity]*fLineItemInvoiceDetail[Unit Price]
```

8] (31:57 in video) DAX Measure for “Discount On Invoice” in the Measure Grid below the fInvoiceHeader Fact Table:

```
Discount On Invoice:=SUM(fLineItemInvoiceDetail[Line Discount])
```

9] (34:22 in video) DAX Calculated Column Formula for “Invoice Weight” Column in the fInvoiceHeader Fact Table using SUMX, RELATEDTABLE and RELATED:

```
=SUMX(RELATEDTABLE(fLineItemInvoiceDetail),
fLineItemInvoiceDetail[Quantity]*RELATED(dProduct[Weight oz.]))
```

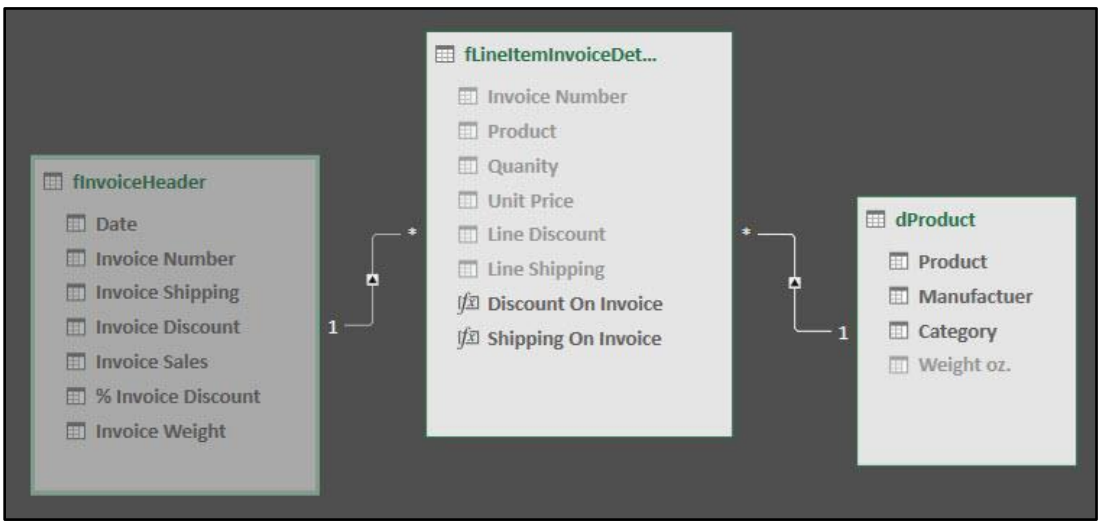
10] (36:52 in video) DAX Calculated Column Formula for “Line Shipping” Column in the fLineItemInvoiceDetail Fact Table using RELATED and multiplication and division. Three RELATED function in one formula:

```
=(fLineItemInvoiceDetail[Quantity]*RELATED(dProduct[Weight oz.]))/
RELATED(fInvoiceHeader[Invoice Weight])
*RELATED(fInvoiceHeader[Invoice Shipping])
```

11] (39:03 in video) DAX Measure for Total Shipping in the Measure Grid below the fInvoiceHeader Fact Table:

```
Shipping On Invoice:=SUM(fLineItemInvoiceDetail[Line Shipping])
```

12] Note: In video we did not hide columns that were not required in PivotTable Area, and we did not hide the fInvoiceHeader Fact Table. In Design view in the Power Pivot window you can right-click each element and click on “Hide In Client Tool”. If you do that, the final Data Model would look like this:



13] (39:25 in video) Final Data Model PivotTable looks like this:

Product	Discount On Invoice	Shipping On Invoice
Aspen	\$14,970.04	\$5,478.60
Carlota	\$15,346.03	\$5,427.69
Carlota Doublers	\$37,571.46	\$7,378.59
Crested Beaut	\$11,386.60	\$6,268.43
Eagle	\$8,166.87	\$5,855.60
Kangaroo	\$10,028.41	\$4,723.41
Majestic Beaut	\$14,905.66	\$8,703.31
Quad	\$22,657.89	\$3,483.46
Sunbell	\$14,213.91	\$8,200.96
Sunset	\$13,958.21	\$7,347.25
Yanaki	\$16,178.83	\$6,910.81
<b>Grand Total</b>	<b>\$179,383.93</b>	<b>\$69,778.10</b>

**PivotTable Fields**

Active All

Choose fields to add to report:

Search

- ∑ fLineItemInvoiceDetail
  - f: Discount On Invoice
  - f: Shipping On Invoice
- dProduct
  - Category
  - Manufacturer
  - Product

Drag fields between areas below:

**Filters**

**Columns**

∑ Values

**Rows**

Product

∑ Values

Discount On Invoice

Shipping On Invoice

Defer Layout Update Update



#### 4) Power Query Solution in Power BI

- 1] Create a new Power BI Desktop file and import (Power BI File, Import, Excel Power Pivot option) the Excel Power Pivot Data Model from the file named "EMT1498-SourceModel.xlsx".
- 2] (45:40 in video) Power Query Formula to calculate "Sales" Column in the fLineItemInvoiceDetail Fact Table using Table.AddColumn function:

Queries [5] < X ✓ fx = Table.AddColumn(#"Changed Type", "Sales", each [Quantity] \* [Unit Price], type number)

	1.2 Invoice Number	A <sup>B</sup> C Product	1.2 Quantity	1.2 Unit Price	1.2 Sales
1	125447	Sunbell	21	22.36	469.56
2	125447	Crested Beaut	88	14.97	1317.36
3	125447	Kangaroo	35	12.32	431.2
4	125448	Quad	53	27.57	1461.21
5	125450	Carlota Doublers	25	48.75	1218.75
6	125450	Crested Beaut	34	16.22	551.48
7	125450	Sunset	200	13.03	2606
8	125451	Carlota	223	11.68	2604.64
9	125451	Sunbell	224	12.58	2817.92

QUERY SETTINGS

PROPERTIES  
Name  
fLineItemInvoiceDetail

APPLIED STEPS  
Source ✖  
Navigation ✖  
Changed Type ✖  
X Inserted Multiplication ✖

- 3] (46:53 in video) Power Query Merge – Top Table = Previous Step, Bottom Table = dProduct, Merge Column = Product, Join Kind = Left Outer:

Queries [5] < X ✓ fx Table.NestedJoin(#"Inserted Multiplication",{"Product"},dProduct,{"Product"},"dProduct",JoinKind.LeftOuter)

	ty	1.2 Unit Price	1.2 Sales	dProduct
1	21	22.36	469.56	Table
2	88	14.97	1317.36	Table
3	35	12.32	431.2	Table
4	53	27.57	1461.21	Table
5	25	48.75	1218.75	Table
6	34	16.22	551.48	Table
7	200	13.03	2606	Table

QUERY SETTINGS

PROPERTIES  
Name  
fLineItemInvoiceDetail

APPLIED STEPS  
Source ✖  
Navigation ✖  
Changed Type ✖  
Inserted Multiplication ✖  
X Merged Queries ✖

- 4] (47:00 in video) Expand the dProduct Column to get "Weight oz." Column (no picture).
- 5] (47:26 in video) Power Query Formula to calculate "Line Weight" Column in the fLineItemInvoiceDetail Fact Table using Table.AddColumn function:

The screenshot shows the Power Query Editor interface. The formula bar contains the following M code:

```
= Table.AddColumn("#Expanded dProduct", "Line Weight", each [#"Weight oz."] * [Quantity], type number)
```

The data table below shows the results of this operation:

	1.2 Unit Price	1.2 Sales	1.2 Weight oz.	1.2 Line Weight
1	21	22.36	469.56	6.5
2	224	12.58	2817.92	6.5
3	53	27.57	1461.21	3
4	88	14.97	1317.36	5.5
5	34	16.22	551.48	5.5
6	35	12.32	431.2	3.5
7	200	13.03	2606	6
8	25	48.75	1218.75	7
9	38	18.82	715.16	7

The right-hand pane shows the Query Settings for 'fLineItemInvoiceDetail', with the 'Applied Steps' list including 'Inserted Multiplication1'.

- 6] (47:42 in video) Power Query Group By feature to aggregate Invoice Sales, Invoice Shipping Weight and all rows in Invoice Line Grain Table for each Invoice Number (names of each group by column can be seen in below formula):

The screenshot shows the Power Query Editor interface. The formula bar contains the following M code:

```
= Table.Group("#Inserted Multiplication1", {"Invoice Number"}, {"Invoice Sales", each List.Sum([Sales]), type number}, {"Invoice Weight", each List.Sum([Line Weight]), type number}, {"Invoice Records", each _, type table})
```

The data table below shows the results of this operation:

	1.2 Invoice Number	1.2 Invoice Sales	1.2 Invoice Weight	Invoice Records
1	125447	2218.12	743	Table
2	125451	5422.56	2236.5	Table
3	125448	1461.21	159	Table
4	125450	4376.23	1562	Table
5	125452	3816.3	1456	Table
6	125456	957.52	284.5	Table
7	125457	1755	252	Table
8	125458	3236.24	1058	Table
9	125459	7428.7	1300	Table
10	125461	371.7	91	Table

The right-hand pane shows the Query Settings for 'fLineItemInvoiceDetail', with the 'Applied Steps' list including 'Grouped Rows'.

7] (49:52 in video) Power Query Merge – Top Table = Previous Step, Bottom Table = fInvoiceHeader, Merge Column = Invoice Number, Join Kind = Left Outer:

	1.2 Invoice Number	1.2 Invoice Sales	1.2 Invoice Weight	Invoice Records	fInvoiceHeader
1	125447	2218.12	743	Table	Table
2	125451	5422.56	2236.5	Table	Table
3	125448	1461.21	159	Table	Table
4	125450	4376.23	1562	Table	Table
5	125452	3816.3	1456	Table	Table
6	125456	957.52	284.5	Table	Table
7	125457	1755	252	Table	Table
8	125458	3236.24	1058	Table	Table
9	125459	7428.7	1300	Table	Table
10	125461	371.7	91	Table	Table
11	125462	74.85	16.5	Table	Table
12	125463	3151.86	806	Table	Table
13	125464	6587.8	2125	Table	Table
14	125465	5994.6	1195	Table	Table

8] Expand the fInvoiceHeader Column to get the columns: Date, SalesRepID, Shipping Costs and Invoice Discount.

9] (50:52 in video) Power Query Formula for “Invoice % Discount” Column in the fLineItemInvoiceDetail Fact Table using Table.AddColumn function:

	epID	1.2 Shipping Costs	1.2 Invoice Discount	1.2 Invoice % Discount
1	9	98.7	144.18	0.065000992
2	15	262.15	542.26	0.100000738
3	28	26.25	73.06	0.049999658
4	4	207.55	437.62	0.099999314
5	23	159.25	381.63	0.1
6	22	18.025	33.51	0.034996658
7	25	36.4	114.08	0.065002849
8	1	114.45	323.62	0.099998764
9	8	106.05	742.87	0.1
10	8	7.35	7.43	0.019989239
11	21	3.15	0	0
12	6	103.775	315.19	0.100001269

10] Expand the Invoice Record Column to get the columns: Product, Quantity, Sales and Line Weight (no picture).

11] Add correct Data Types to each column (no picture).

12] (54:16 in video) Power Query Formula for "Discount" Column in the fLineItemInvoiceDetail Fact Table using Table.AddColumn function and Number.Round:

**Queries [5]**

- dDate
- dProduct
- dSalesRep
- fInvoiceHeader
- fLineItemInvoiceDe...

= Table.AddColumn(#"Changed Type1", "Discount", each Number.Round([#"Invoice % Discount"] \* [Sales],2), Currency.Type)

	1.2 Invoice Discount	1.2 Invoice % Discount	\$ Discount
1	98.7	144.18	0.065000992
2	98.7	144.18	0.065000992
3	98.7	144.18	0.065000992
4	262.15	542.26	0.100000738
5	262.15	542.26	0.100000738
6	26.25	73.06	0.049999658
7	207.55	437.62	0.099999314
8	207.55	437.62	0.099999314
9	207.55	437.62	0.099999314
10	159.25	381.63	0.1
11	159.25	381.63	0.1
12	18.025	33.51	0.034996658
13	18.025	33.51	0.034996658
14	36.4	114.08	0.065002849
15	114.45	323.62	0.099998764

**QUERY SETTINGS**

**PROPERTIES**

Name: fLineItemInvoiceDetail

[All Properties](#)

**APPLIED STEPS**

- Source
- Navigation
- Changed Type
- Inserted Multiplication
- Merged Queries
- Expanded dProduct
- Inserted Multiplication1
- Grouped Rows
- Merged Queries1
- Expanded fInvoiceHeader
- Inserted Division
- Expanded Invoice Records
- Changed Type1
- X Inserted Multiplication2

13] (54:49 in video) Power Query Formula for “Shipping” Column in the fLineItemInvoiceDetail Fact Table using Custom Column with Table.AddColumn function and Number.Round:

The screenshot shows the Power Query Editor interface. At the top, a formula bar contains the following M code:

```
= Table.AddColumn(#"Inserted Multiplication2", "Shipping", each
    Number.Round([Line Weight]/[Invoice Weight]*[Shipping Costs],2),
    Currency.Type)
```

Below the formula bar is a data table with the following columns: Discount, 1.2 Invoice % Discount, \$ Discount, and \$ Shipping. The table contains 16 rows of data.

	Discount	1.2 Invoice % Discount	\$ Discount	\$ Shipping
1	144.18	0.065000992	30.52	18.13
2	144.18	0.065000992	85.63	64.29
3	144.18	0.065000992	28.03	16.27
4	542.26	0.100000738	281.79	170.66
5	542.26	0.100000738	260.47	91.49
6	73.06	0.049999658	73.06	26.25
7	437.62	0.099999314	55.15	24.85
8	437.62	0.099999314	260.6	159.45
9	437.62	0.099999314	121.87	23.25
10	381.63	0.1	71.52	29.09
11	381.63	0.1	310.11	130.16
12	33.51	0.034996658	18.64	10.2
13	33.51	0.034996658	14.87	7.82
14	114.08	0.065002849	114.08	36.4
15	323.62	0.099998764	69.63	28.02
16	323.62	0.099998764	61.64	22.61

On the right side, the 'QUERY SETTINGS' pane shows the query name 'fLineItemInvoiceDetail' and a list of applied steps, including 'Added Custom' at the bottom.

14] (57:23 in video) Remove all column we do not need in final Fact Table (no picture).

15] (58:08 in video) Load Tables to Data Model, except Invoice Level Table (no picture).

16] (59:15 in video) In Data (Table) view, select the fLineItemInvoiceDetail Fact Table and create DAX Measures for Shipping, Discounts and Sales:

Total Shipping = SUM(fLineItemInvoiceDetail[Shipping])

Total Discount = SUM(fLineItemInvoiceDetail[Discount])

Total Sales = SUM(fLineItemInvoiceDetail[Sales])

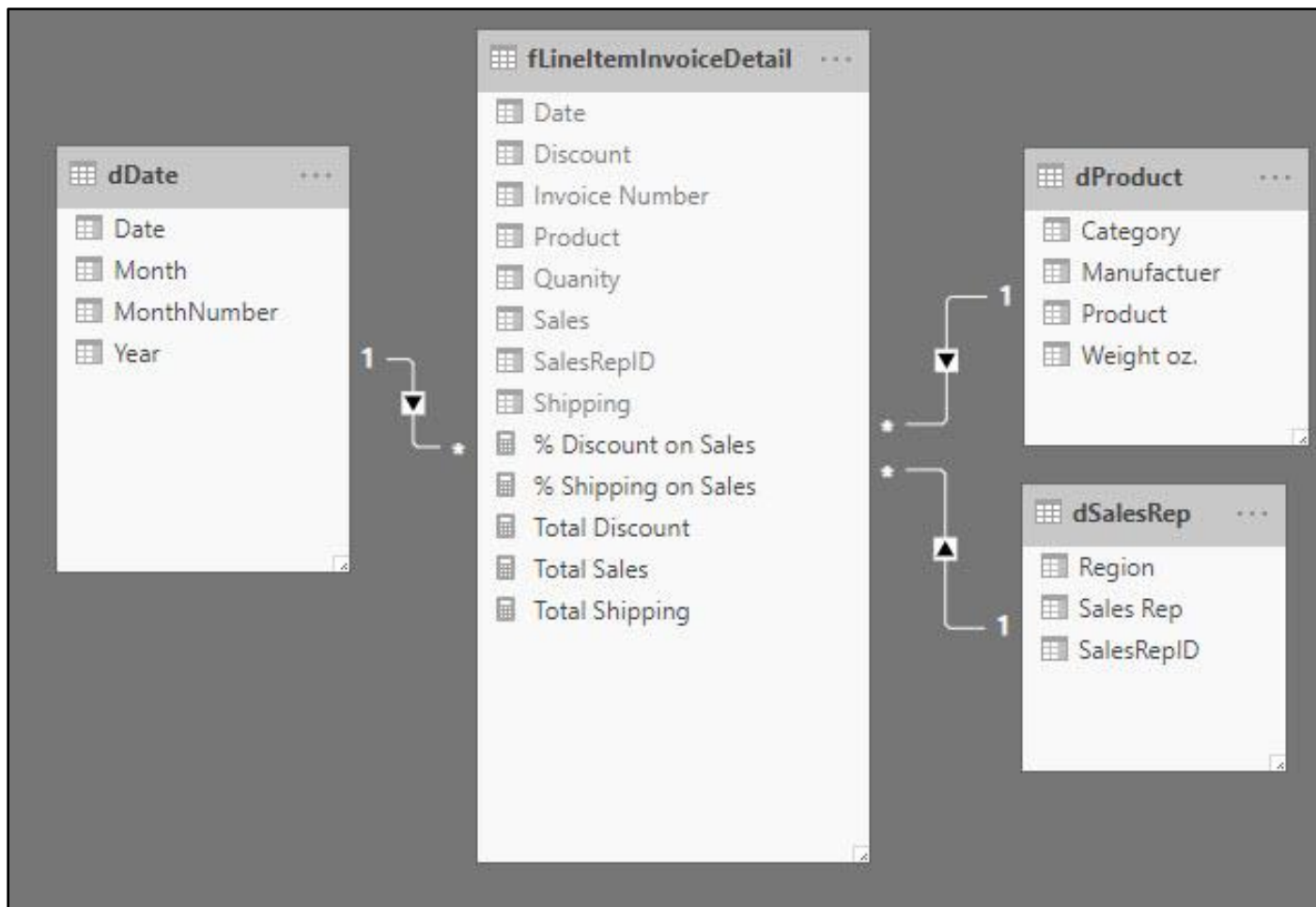
17] (01:00:10 in video) In Data (Table) view, select the fLineItemInvoiceDetail Fact Table and create % DAX Measures for Shipping and Discount as a percent of sales. Use the DIVIDE DAX Function, as seen here:

```
% Discount on Sales = DIVIDE([Total Discount],[Total Sales])
```

```
% Shipping on Sales = DIVIDE([Total Shipping],[Total Sales])
```

18] (01:01:15 in video) Hide Columns from Report View (no picture).

19] (01:01:33 in video) Look at Final Data Model, as seen here:



**Year**

- 2019
- 2018
- 2017

**Manufacturer**

- Channel Craft
- Colorado Booms
- Gel Booms

**Sales Rep**

- Apryl Denny
- Augustine Brandon
- Caprice Honeycutt
- Chung Aguiar
- Clarissa Rickard
- Dusty Shinn
- Edythe Landers
- Fernande Ludwig
- Florene Swift
- Floria Thurman
- Galina Furr
- Gilda Markham
- Jamika Rubio
- Kandace Ayers
- Kenia Fierro
- Lidia Stacy
- Marcela Tripp
- Margert Cockrell
- Meggan Davison
- Mia Bird
- Rebecca Beals
- Rosann Snodgrass
- Rosette Florence
- Shalonda Dunlap
- Tiffani Keys
- Valeria Ashcraft
- Wan Huynh
- Yadira Wilhite

Product	Total Sales	Total Shipping	% Shipping on Sales	Total Discount	% Discount on Sales
Carlota	\$6,123.31	\$156.48	2.56%	\$452.06	7.38%
Carlota Doublers	\$20,520.00	\$348.72	1.70%	\$1,801.14	8.78%
Majestic Beaut	\$13,844.04	\$689.57	4.98%	\$1,201.74	8.68%
Quad	\$12,512.43	\$148.94	1.19%	\$989.98	7.91%
Sunbell	\$5,218.51	\$227.22	4.35%	\$439.77	8.43%
Sunset	\$10,011.96	\$343.25	3.43%	\$800.89	8.00%
<b>Total</b>	<b>\$68,230.25</b>	<b>\$1,914.18</b>	<b>2.81%</b>	<b>\$5,685.58</b>	<b>8.33%</b>