

## dbo.Sales\_data:

	Order_ID	Order_Date	Ship_Date	Ship_Mode	Customer...	Customer_Na...	Segment	Country	City	State	Postal_Code	Region	Product...	Category	Sub_Category	Product_Name	Sales
1	CA-20...	2017-06...	2017-0...	Second Class	DV-13045	Darin Van Huff	Corporate	United States	Los Angeles	California	90036	West	OFF-LA...	Office ...	Labels	Self-Adhesive Ad...	14 6199...
2	CA-20...	2018-04...	2018-0...	Standard Cl...	AA-10480	Andrew Allen	Consumer	United States	Concord	North Car...	28027	South	OFF-PA...	Office ...	Paper	Xerox 1967	15 5520...
3	CA-20...	2017-12...	2017-1...	Standard Cl...	IM-15070	Irene Maddox	Consumer	United States	Seattle	Washingt...	98103	West	OFF-BI...	Office ...	Binders	Fellowes PB200 ...	407 976...
4	CA-20...	2015-11...	2015-1...	Standard Cl...	PK-19075	Pete Kriz	Consumer	United States	Madison	Wisconsin	53711	Central	OFF-ST...	Office ...	Storage	Stur-D-Stor Shelv...	665 880...
5	CA-20...	2015-05...	2015-0...	Second Class	AG-10270	Alejandro Gro...	Consumer	United States	West Jordan	Utah	84084	West	OFF-ST...	Office ...	Storage	Fellowes Super S...	55 5
6	US-20...	2018-07...	2018-0...	Second Class	SF-20065	Sandra Flana...	Consumer	United States	Philadelphia	Pennsylv...	19140	East	FUR-CH...	Furniture	Chairs	Global Deluxe St...	71 3720...
7	CA-20...	2016-09...	2016-0...	Standard Cl...	EB-13870	Emily Burns	Consumer	United States	Orem	Utah	84057	West	FUR-TA...	Furniture	Tables	Bretford CR4500 ...	1044 63...
8	CA-20...	2018-10...	2018-1...	Second Class	MA-17560	Matt Abelman	Home Of...	United States	Houston	Texas	77095	Central	OFF-PA...	Office ...	Paper	Easy-staple paper	29 4720...
9	CA-20...	2018-09...	2018-0...	Standard Cl...	LC-16930	Linda Cazami...	Corporate	United States	Naperville	Illinois	60540	Central	TEC-PH...	Techno...	Phones	Panasonic Kc-TS...	147 167...
10	CA-20...	2017-07...	2017-0...	Standard Cl...	RA-19885	Ruben Ausman	Corporate	United States	Los Angeles	California	90049	West	OFF-ST...	Office ...	Storage	Eldon Base for st...	77 8799...
11	CA-20...	2018-09...	2018-0...	Standard Cl...	ES-14080	Erin Smith	Corporate	United States	Melbourne	Florida	32935	South	OFF-ST...	Office ...	Storage	Advantus 10-Dra...	95 6159...
12	CA-20...	2015-10...	2015-1...	Second Class	PO-18865	Patrick O'Don...	Consumer	United States	Westland	Michigan	48185	Central	OFF-ST...	Office ...	Storage	Gould Plastics 9...	211 960...
13	US-20...	2016-04...	2016-0...	Standard Cl...	PS-18970	Paul Stevenson	Home Of...	United States	Chicago	Illinois	60610	Central	FUR-CH...	Furniture	Chairs	Global Value Mid...	213 115...
14	CA-20...	2017-06...	2017-0...	First Class	KD-16270	Karen Daniels	Consumer	United States	Springfield	Virginia	22153	South	OFF-PA...	Office ...	Paper	Snap-A-Way Blac...	75 8799...
15	CA-20...	2017-09...	2017-0...	Standard Cl...	HM-14980	Henry MacAlli...	Consumer	United States	New York ...	New York	10009	East	OFF-BI...	Office ...	Binders	Avery Binding Sys...	4 61600...
16	CA-20...	2018-09...	2018-0...	Second Class	TB-21520	Tracy Blumst...	Consumer	United States	Jackson	Michigan	49201	Central	OFF-PA...	Office ...	Paper	Telephone Messa...	19 0499...
17	US-20...	2015-11...	2015-1...	Second Class	JE-15745	Joel Eaton	Consumer	United States	Houston	Texas	77070	Central	FUR-FU...	Furniture	Furnishings	Eldon Expression...	19 2999...
18	CA-20...	2016-09...	2016-0...	Standard Cl...	JC-16105	Julie Creighton	Corporate	United States	Durham	North Car...	27707	South	OFF-EN...	Office ...	Envelopes	Jet-Pak Recycled ...	200 983...
19	US-20...	2018-11...	2018-1...	First Class	CS-12400	Christopher S...	Home Of...	United States	Chicago	Illinois	60623	Central	OFF-ST...	Office ...	Storage	Safo Industrial	230 376...
20	CA-20...	2018-05...	2018-0...	Second Class	PO-18865	Patrick O'Don...	Consumer	United States	Columbia	South Ca...	29203	South	FUR-CH...	Furniture	Chairs	Novimex Swivel F...	301 959...
21	CA-20...	2017-04...	2017-0...	Second Class	GM-14455	Gary Mitchum	Home Of...	United States	Houston	Texas	77095	Central	OFF-ST...	Office ...	Storage	Eldon Portable M...	158 367...
22	US-20...	2018-11...	2018-1...	Standard Cl...	RB-19705	Roger Barco	Home Of...	United States	Portland	Oregon	97206	West	OFF-BI...	Office ...	Binders	Flexible Leather...	5 68200...
23	CA-20...	2018-11...	2018-1...	Second Class	PN-18775	Parhena Norris	Home Of...	United States	New York ...	New York	10009	East	FUR-FU...	Furniture	Furnishings	9-3/4 Diameter R...	96 5299...
24	CA-20...	2018-06...	2018-0...	First Class	KD-16345	Katherine Du...	Consumer	United States	San Franci...	California	94122	West	OFF-BI...	Office ...	Binders	Trimflex Flexible P...	51 3120...
25	CA-20...	2017-09...	2017-0...	Standard Cl...	ER-13855	Elpida Ritten...	Corporate	United States	Saint Paul	Minnesota	55106	Central	OFF-AP...	Office ...	Appliances	Fellowes Basic H...	77 8799...

## 1. Data Cleaning

### Remove duplicates:

```
WITH CTE AS (  
    SELECT *, ROW_NUMBER() OVER (PARTITION BY Order_ID ORDER BY Order_ID) AS rn  
    FROM dbo.Sales_data  
)  
DELETE FROM CTE WHERE rn > 1;
```

### Handle NULL values:

```
SELECT * FROM dbo.Sales_data WHERE Sales IS NULL;  
UPDATE dbo.Sales_data SET Sales = 0 WHERE Sales IS NULL;
```

### Format Date:

```
SELECT  
    CONVERT(DATE, Order_Date) AS Clean_Order_Date,  
    CONVERT(DATE, Ship_Date) AS Clean_Ship_Date  
FROM dbo.Sales_data;
```

## 2. Basic KPIs

Total Sales, Average Order Value:

```
SELECT
    Round(COUNT(DISTINCT Order_ID),2) AS Total_Orders,
    Round(SUM(Sales), 2) AS Total_Sales,
    Round(AVG(Sales), 2) AS Avg_Order_Value
FROM dbo.Sales_data;
```

Results		Messages	
	Total_Orders	Total_Sales	Avg_Order_Value
1	2499	520694.86	208.36

## 3. Aggregates by Category/Segment

Sales by Segment and Category:

```
SELECT
    Segment,
    Category,
    ROUND(SUM(Sales), 2) AS Total_Sales
FROM dbo.Sales_data
GROUP BY Segment, Category
ORDER BY Total_Sales DESC;
```

Results		Messages	
	Segment	Category	Total_Sales
1	Consumer	Furniture	97100.11
2	Consumer	Technology	92449.98
3	Consumer	Office Supplies	90585.33
4	Corporate	Furniture	63252.07
5	Corporate	Office Supplies	50860.85
6	Corporate	Technology	42846.45
7	Home Office	Furniture	33261.07
8	Home Office	Technology	27292.83
9	Home Office	Office Supplies	23046.16

## 4. Regional Analysis

### Top 5 States by Sales:

```
SELECT TOP 5
    State,
    SUM(Sales) AS Total_Sales
FROM dbo.Sales_data
GROUP BY State
ORDER BY Total_Sales DESC;
```

Results Messages		
	State	Total_Sales
1	California	96152.32
2	New York	74953.06
3	Texas	32772.7
4	Illinois	28582.03
5	Washington	26784.6

## 5. Time Series Analysis

### Monthly Sales Trend:

```
SELECT
    FORMAT(Order_Date, 'yyyy-MM') AS Month,
    SUM(Sales) AS Monthly_Sales
FROM dbo.Sales_data
GROUP BY FORMAT(Order_Date, 'yyyy-MM')
ORDER BY Month;
```

Results Messages		
	Month	Monthly_Sales
1	2015-01	1302.73
2	2015-02	1022.13
3	2015-03	7082.05
4	2015-04	5858.55
5	2015-05	8278.3
6	2015-06	7464.33
7	2015-07	4416.95
8	2015-08	7903.36
9	2015-09	14812.63
10	2015-10	9152.69

## Quarterly Sales:

```
SELECT
    CONCAT(YEAR(Order_Date), '-Q', DATEPART(QUARTER, Order_Date)) AS Quarter,
    SUM(Sales) AS Quarterly_Sales
FROM dbo.Sales_data
GROUP BY YEAR(Order_Date), DATEPART(QUARTER, Order_Date)
ORDER BY Quarter;
```

	Quarter	Quarterly_Sales
1	2015-Q1	9406.91
2	2015-Q2	21601.19
3	2015-Q3	27132.94
4	2015-Q4	42765.7
5	2016-Q1	18866.41
6	2016-Q2	20076.79
7	2016-Q3	23764.31
8	2016-Q4	42093.15
9	2017-Q1	14602.88

## Total Sales by Year

```
SELECT
    YEAR(Order_Date) AS Sales_Year,
    SUM(Sales) AS Total_Sales
FROM dbo.Sales_data
GROUP BY YEAR(Order_Date)
ORDER BY Sales_Year;
```

	Sales_Year	Total_Sales
1	2015	100906.74
2	2016	104800.66
3	2017	145306.17
4	2018	169681.29

## Total Sales by Month (across years)

```
SELECT
    FORMAT(Order_Date, 'yyyy-MM') AS Sales_Month,
    SUM(Sales) AS Total_Sales
FROM dbo.Sales_data
GROUP BY FORMAT(Order_Date, 'yyyy-MM')
ORDER BY Sales_Month;
```

	Sales_Month	Total_Sales
1	2015-01	1302.73
2	2015-02	1022.13
3	2015-03	7082.05
4	2015-04	5858.55
5	2015-05	8278.3
6	2015-06	7464.33
7	2015-07	4416.95
8	2015-08	7903.36
9	2015-09	14812.63
10	2015-10	9152.69
11	2015-11	12830.65

## 6. Window Functions

### Running Total by Year:

```
WITH YearlySales AS (
    SELECT
        YEAR(Order_Date) AS Sales_Year,
        SUM(Sales) AS Total_Sales
    FROM dbo.Sales_data
    GROUP BY YEAR(Order_Date)
)
SELECT
    Sales_Year,
    Total_Sales,
    SUM(Total_Sales) OVER (ORDER BY Sales_Year) AS Running_Total_Sales
FROM YearlySales;
```

Results		Messages	
	Sales_Year	Total_Sales	Running_Total_Sales
1	2015	100906.74	100906.74
2	2016	104800.66	205707.4
3	2017	145306.17	351013.57
4	2018	169681.29	520694.86

## YoY Comparison:

WITH YearlySales AS (

SELECT

YEAR(Order\_Date) AS Sales\_Year,

SUM(Sales) AS Total\_Sales

FROM dbo.Sales\_data

GROUP BY YEAR(Order\_Date)

)

SELECT

Sales\_Year,

Total\_Sales,

LAG(Total\_Sales, 1) OVER (ORDER BY Sales\_Year) AS Previous\_Year\_Sales,

Total\_Sales - LAG(Total\_Sales, 1) OVER (ORDER BY Sales\_Year) AS Sales\_Difference,

ROUND(

(Total\_Sales - LAG(Total\_Sales, 1) OVER (ORDER BY Sales\_Year))

\* 100.0 / NULLIF(LAG(Total\_Sales, 1) OVER (ORDER BY Sales\_Year), 0),

2

) AS YoY\_Percent\_Change

FROM YearlySales;

Results Messages

	Sales_Year	Total_Sales	Previous_Year_Sales	Sales_Difference	YoY_Percent_Change
1	2015	100906.74	NULL	NULL	NULL
2	2016	104800.66	100906.74	3893.92	3.86
3	2017	145306.17	104800.66	40505.51	38.65
4	2018	169681.29	145306.17	24375.12	16.78

## 8. Top Customers by Revenue

```
SELECT Top 10
  Customer_ID,
  Customer_Name,
  SUM(Sales) AS Total_Spent
FROM dbo.Sales_data
GROUP BY Customer_ID, Customer_Name
ORDER BY Total_Spent DESC;
```

Results		Messages	
	Customer_ID	Customer_Name	Total_Spent
1	AB-10105	Adrian Barton	11258.76
2	HL-15040	Hunter Lopez	11013.9
3	TB-21400	Tom Boeckenhauer	7081.16
4	JH-15985	Joseph Holt	6411.64
5	AC-10450	Amy Cox	5433.57
6	JM-15865	John Murray	4972.54
7	QJ-19255	Quincy Jones	4870.02
8	BD-11320	Bill Donatelli	4863.53
9	TP-21415	Tom Prescott	4751.72
10	LW-17215	Luke Weiss	4084.29

## 9. Sales % by Category

```
SELECT
  Category,
  SUM(Sales) AS Category_Sales,
  ROUND(SUM(Sales) * 100.0 / (SELECT SUM(Sales) FROM dbo.Sales_data), 2) AS
Sales_Percentage
FROM dbo.Sales_data
GROUP BY Category
ORDER BY Sales_Percentage DESC;
```

Results		Messages	
	Category	Category_Sales	Sales_Percentage
1	Furniture	193613.25	37.18
2	Office Supplies	164492.35	31.59
3	Technology	162589.26	31.23

## 10. Segmenting Products by Sales Range

### Product Sales Segmentation

```

SELECT
Product_ID,
Product_Name,
Sales,
CASE
WHEN Sales < 100 THEN 'Low'
WHEN Sales BETWEEN 100 AND 300 THEN 'Medium'
ELSE 'High'
END AS Sales_Segment
FROM dbo.Sales_data;

```

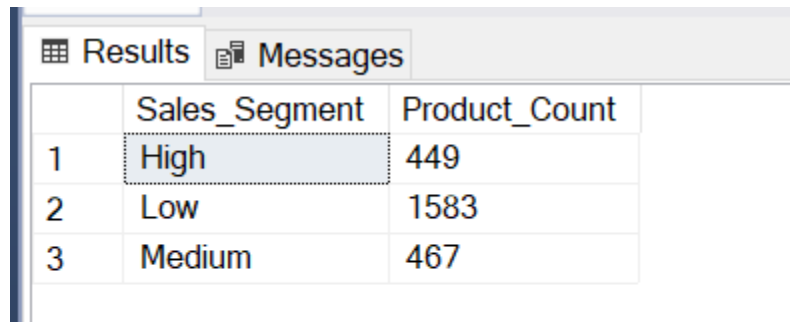
Results Messages

	Product_ID	Product_Name	(No column name)	Sales_Segment
1	OFF-LA-10000240	Self-Adhesive Address Labels for Typewriters by Univ...	14.62	Low
2	OFF-PA-10002365	Xerox 1967	15.55	Low
3	OFF-BI-10003656	Fellowes PB200 Plastic Comb Binding Machine	407.98	High
4	OFF-ST-10004186	Stur-D-Stor Shelving, Vertical 5-Shelf: 72"H x 36"W x...	665.88	High
5	OFF-ST-10000107	Fellowes Super Stor/Drawer	55.5	Low
6	FUR-CH-10002774	Global Deluxe Stacking Chair, Gray	71.37	Low
7	FUR-TA-10000577	Bretford CR4500 Series Slim Rectangular Table	1044.63	High
8	OFF-PA-10000249	Easy-staple paper	29.47	Low
9	TEC-PH-10004093	Panasonic Kx-TS550	147.17	Medium



## Count of Products in Each Segment

```
SELECT
CASE
    WHEN Sales < 100 THEN 'Low'
    WHEN Sales BETWEEN 100 AND 300 THEN 'Medium'
    ELSE 'High'
END AS Sales_Segment,
COUNT(*) AS Product_Count
FROM dbo.Sales_data
GROUP BY
CASE
    WHEN Sales < 100 THEN 'Low'
    WHEN Sales BETWEEN 100 AND 300 THEN 'Medium'
    ELSE 'High'
END;
```

A screenshot of the SQL Server Enterprise Manager interface. At the top, there are two tabs: 'Results' and 'Messages'. The 'Results' tab is active, displaying a table with three columns: 'Sales\_Segment', 'Product\_Count', and an unlabeled column with values 1, 2, and 3. The 'High' segment has a product count of 449, 'Low' has 1583, and 'Medium' has 467.

	Sales_Segment	Product_Count
1	High	449
2	Low	1583
3	Medium	467

## Customer Lifespan Segmentation

```
WITH Customer_Summary AS (
    SELECT
        Customer_ID,
        Customer_Name,
        COUNT(Order_ID) AS Total_Orders,
        SUM(Sales) AS Total_Sales
    FROM dbo.Sales_data
    GROUP BY Customer_ID, Customer_Name
)
SELECT
    Customer_ID,
    Customer_Name,
    Total_Orders,
    Total_Sales,
    CASE
        WHEN Total_Sales >= 5000 THEN 'VIP'
        WHEN Total_Sales BETWEEN 2000 AND 4999 THEN 'Regular'
```

```

ELSE 'New'
END AS Customer_Segment
FROM Customer_Summary;

```

Results		Messages			
	Customer_ID	Customer_Name	Total_Orders	Total_Sales	Customer_Segment
1	AB-10015	Aaron Bergman	1	12.62	New
2	AH-10030	Aaron Hawkins	3	154.56	New
3	AS-10045	Aaron Smayling	5	834.21	New
4	AB-10060	Adam Bellavance	4	147.2	New
5	AH-10075	Adam Hart	5	1059.09	New
6	AS-10090	Adam Shillingsburg	2	48.62	New
7	AB-10105	Adrian Barton	6	11258.76	VIP
8	AH-10120	Adrian Hane	3	314.5	New
9	AS-10135	Adrian Shami	1	4.18	New

## 11. Forecasting using Historical Averages in SQL

```

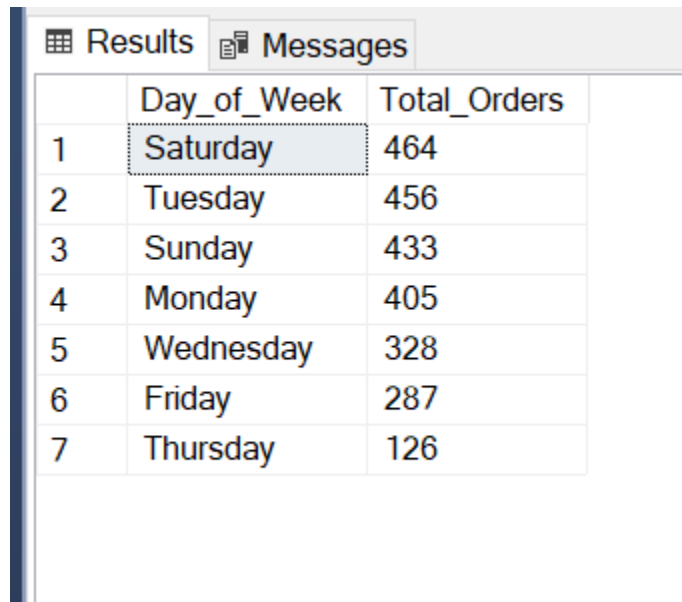
SELECT
  ROUND(AVG(Monthly_Sales), 2) AS Forecast_Next_Month_Sales
FROM (
  SELECT
    FORMAT(Order_Date, 'yyyy-MM') AS Sales_Month,
    SUM(Sales) AS Monthly_Sales
  FROM dbo.Sales_data
  GROUP BY FORMAT(Order_Date, 'yyyy-MM')
) AS MonthlySummary;

```

Results		Messages			
	Forecast_Next_Month_Sales				
1	10847.81				

## 12. Highest Order Volume by Day of Week

```
SELECT
    DATENAME(WEEKDAY, Order_Date) AS Day_of_Week,
    COUNT(Order_ID) AS Total_Orders
FROM dbo.Sales_data
GROUP BY DATENAME(WEEKDAY, Order_Date)
ORDER BY Total_Orders DESC;
```



The screenshot shows a SQL Server query results window with two tabs: 'Results' and 'Messages'. The 'Results' tab is active, displaying a table with three columns: an index, 'Day\_of\_Week', and 'Total\_Orders'. The data is sorted by 'Total\_Orders' in descending order. The first row, 'Saturday' with 464 orders, is highlighted with a blue selection bar.

	Day_of_Week	Total_Orders
1	Saturday	464
2	Tuesday	456
3	Sunday	433
4	Monday	405
5	Wednesday	328
6	Friday	287
7	Thursday	126

## 13. Inactive Customers (No Orders in Last 90 Days)

```
SELECT
    Customer_ID,
    Customer_Name,
    MAX(Order_Date) AS Last_Order_Date
FROM dbo.Sales_data
GROUP BY Customer_ID, Customer_Name
HAVING MAX(Order_Date) < DATEADD(DAY, -90, GETDATE()) OR MAX(Order_Date) IS NULL;
```

Results		Messages	
	Customer_ID	Customer_Name	Last_Order_Date
1	AB-10015	Aaron Bergman	2015-02-18
2	AH-10030	Aaron Hawkins	2018-12-18
3	AS-10045	Aaron Smayling	2018-10-03
4	AB-10060	Adam Bellavance	2018-09-16
5	AH-10075	Adam Hart	2018-11-26
6	AS-10090	Adam Shillingsburg	2018-12-02
7	AB-10105	Adrian Barton	2018-08-03

## 14. Rank Products by Sales

```

SELECT
  Product_ID,
  Product_Name,
  Category,
  SUM(Sales) AS Total_Sales,
  RANK() OVER (ORDER BY SUM(Sales) DESC) AS Sales_Rank
FROM dbo.Sales_data
GROUP BY Product_ID, Product_Name, Category
ORDER BY Sales_Rank;

```

Results		Messages			
	Product_ID	Product_Name	Category	Total_Sales	Sales_Rank
1	FUR-CH-10002024	HON 5400 Series Task Chairs for Big and Tall	Furniture	12126.95	1
2	OFF-BI-10000545	GBC Ibimaster 500 Manual ProClick Binding System	Office Supplies	11871.29	2
3	TEC-CO-10004722	Canon imageCLASS 2200 Advanced Copier	Technology	10499.97	3
4	TEC-CO-10001046	Canon Imageclass D680 Copier / Fax	Technology	7559.89	4
5	TEC-MA-10001127	HP Designjet T520 Inkjet Large Format Printer - 24" ...	Technology	6999.96	5
6	TEC-PH-10002885	Apple iPhone 5	Technology	6498.3	6
7	OFF-BI-10003650	GBC DocuBind 300 Electric Binding Machine	Office Supplies	5943.57	7
8	TEC-CO-10001449	Hewlett Packard LaserJet 3310 Copier	Technology	5639.91	8
9	FUR-TA-10000198	Chromcraft Bull-Nose Wood Oval Conference Tables	Furniture	5620	9

## 15. Top 10 Cities by Revenue

```

SELECT Top 10
  City,
  SUM(Sales) AS Total_Revenue
FROM dbo.Sales_data
GROUP BY City
ORDER BY Total_Revenue DESC;

```

Results Messages		
	City	Total_Revenue
1	New York City	57283.43
2	Los Angeles	34675.48
3	Philadelphia	23998.19
4	San Francisco	23020.74
5	Seattle	22820.78
6	Chicago	18304.97
7	Detroit	17803.83
8	Newark	12683.75
9	Houston	12159.59
10	San Diego	11387.26

## 16. Evaluate Shipping Mode vs. Delivery Time

```

SELECT
  Ship_Mode,
  AVG(DATEDIFF(DAY, Order_Date, Ship_Date)) AS Avg_Delivery_Time
FROM dbo.Sales_data
GROUP BY Ship_Mode
ORDER BY Avg_Delivery_Time;

```

Results Messages		
	Ship_Mode	Avg_Delivery_Time
1	Same Day	0
2	First Class	2
3	Second Class	3
4	Standard Class	4