```sql
--1.SELECT, WHERE, ORDER BY, GROUP BY
Select * From RetailData
```

150 % — No issues found — Ln: 3 Ch: 25 TABS CRLF

Results | Messages

	Transaction_ID	Customer_ID	Name	Email	Phone	Address	City	State	Zipcode	Country	Age	Gender	Income	Customer_Segment	Date	Year	Month	Time	Total_Purchases	Amount	Total_
1	8691788	37249	Michelle Harrington	Ebony39@gmail.com	1414786801	3959 Amanda Burgs	Dortmund	Berlin	77985	Germany	21	Male	Low	Regular	2023-09-18	2023	September	22:03:55	3	108.0287567	324.0
2	2174773	69749	Kelsey Hill	Mark36@gmail.com	6852899987	82072 Dawn Centers	Nottingham	England	99071	UK	19	Female	Low	Premium	2023-12-31	2023	December	8:42:04	2	403.3539073	806.7
3	6679610	30192	Scott Jensen	Shane85@gmail.com	8362160449	4133 Young Canyon	Geelong	New South Wales	75929	Australia	48	Male	Low	Regular	2023-04-26	2023	April	4:06:29	3	354.4775997	1063.4
4	7232460	62101	Joseph Miller	Mary34@gmail.com	2776751724	8148 Thomas Creek Suite 100	Edmonton	Ontario	88420	Canada	56	Male	High	Premium	2023-05-08	2023	May	14:55:17	7	352.4077173	2466.8
5	4983775	27901	Debra Coleman	Charles30@gmail.com	9098267635	5813 Lori Ports Suite 269	Bristol	England	48704	UK	22	Male	Low	Premium	2024-01-10	2024	January	16:54:07	2	124.2765245	248.5
6	6095326	41289	Ryan Johnson	Haley12@gmail.com	3292677006	532 Ashley Crest Suite 014	Brisbane	New South Wales	74430	Australia	58	Female	Medium	Premium	2023-09-21	2023	September	23:24:27	4	296.2918059	1185.1
7	5434096	97285	Erin Lewis	Arthur76@gmail.com	1578355423	600 Brian Prairie Suite 497	Kitchener	Ontario	47545	Canada	29	Female	Low	New	2023-06-26	2023	June	13:35:51	2	315.0576476	630.1
8	2344675	26603	Angela Fields	Tanya94@gmail.com	3668096144	237 Young Curve	Munich	Berlin	86862	Germany	29	Male	Medium	Premium	2023-03-24	2023	March	10:12:56	1	46.58807038	46.58
9	4155845	80175	Diane Clark	Martin39@gmail.com	6219779557	8823 Mariah Heights Apt. 263	Wollongong	New South Wales	39820	Australia	46	Male	Medium	New	2024-01-06	2024	January	14:38:26	8	328.8393017	2630.7
10	4926148	31878	Lori Bell	Jessica33@gmail.com	6004895059	6225 William Lodge	Cologne	Berlin	64317	Germany	25	Male	Medium	New	2023-10-04	2023	October	22:27:40	10	397.6112295	3976.1
11	8493213	19136	Jonathan Eaton	Mark38@gmail.com	2996714102	9772 Sosa Coves	Portsmouth	England	59280	UK	64	Female	Low	Regular	2023-07-20	2023	July	23:06:51	4	90.98186975	363.9
12	1609659	66883	Brianna Oconnor	David47@gmail.com	9398168800	95471 Jerry Hollow Suite 034	Portsmouth	England	91253	UK	31	Female	Medium	Regular	2023-06-21	2023	June	13:09:58	1	364.8305669	364.8
13	2846832	31930	Kristine Williams	Charles29@gmail.com	1822767586	60629 Jones Villages	Portsmouth	England	38173	UK	56	Female	Medium	Regular	2024-01-02	2024	January	0:00:47	10	161.879361	1618.7
14	3217461	74671	Felicia Brown	Laura72@gmail.com	8869644441	381 Richard Plaza	Portsmouth	England	32061	UK	53	Female	Medium	Regular	2023-05-07	2023	May	18:49:35	9	350.8170158	3157.3
15	2401331	98300	Andrew Guzman	Eric76@gmail.com	2923044936	470 Rodriguez Estate Suite 564	Portsmouth	England	5259	UK	32	Female	High	Regular	2023-11-18	2023	November	23:41:05	6	297.7260391	1786.3
16	4969987	64995	Justin Lara	Jacob26@gmail.com	2683281702	3577 Cole Stream Apt. 351	Portsmouth	England	9845	UK	43	Male	Medium	Regular	2023-06-15	2023	June	23:24:22	3	23.72390122	71.17
17	6681000	69939	Jessica Harrison	Anne45@gmail.com	2540232555	93806 Murphy Avenue Apt. 919	Portsmouth	England	84007	UK	69	Male	Low	Regular	2023-07-01	2023	July	11:12:02	10	14.72716425	147.2
18	2430572	71803	Alicia Knight	Jennifer1@gmail.com	6262218202	9856 Meyers Road Apt. 698	Portsmouth	England	91967	UK	19	Female	High	Regular	2023-04-14	2023	April	5:50:55	3	139.786855	419.3
19	7728099	78376	Ronald Chen	Nicole72@gmail.com	1796133281	6048 Charles Lake	Portsmouth	England	82975	UK	49	Male	Low	Regular	2024-02-07	2024	February	18:29:59	1	210.1379188	210.1
20	3489336	40654	Sara Rogers	Jeff99@gmail.com	2687947826	6048 Charles Knoll Suite 755	Portsmouth	England	3035	UK	69	Male	Low	Regular	2023-10-24	2023	October	13:01:04	2	469.6596392	939.3
21	6925572	42165	Daniel Hutchinson	Oscar54@gmail.com	9604443902	37402 Williams Stream Apt. 7...	Portsmouth	England	29119	UK	46	Male	Low	Regular	2023-03-21	2023	March	11:51:41	6	420.8750298	2525.2
22	8871554	63914	Joshua Noble	Diana25@gmail.com	5383491869	7467 Henry Port	Portsmouth	England	16385	UK	61	Male	High	Regular	2023-08-06	2023	August	5:13:31	4	200.2871282	801.1
23	9476855	42410	Anthony Rodriguez	Paula49@gmail.com	3745118170	585 Malik Lodge Suite 186	Portsmouth	England	83903	UK	21	Female	Low	Regular	2024-02-03	2024	February	6:22:00	6	34.12426631	204.7
24	9338306	48869	Ashley Watson	Christine23@gmail.c...	3296155904	6088 Sandra Streets Suite 952	Portsmouth	England	38435	UK	41	Female	Low	Regular	2023-05-31	2023	May	9:15:44	8	436.6079091	3492.6
25	9070447	99870	Timothy Benton	Thomas4@gmail.com	4754833123	424 Patton Parkways Apt. 545	Portsmouth	England	2916	UK	38	Male	Medium	Regular	2024-02-27	2024	February	13:51:11	2	285.2983297	570.5
26	9082305	47037	Mike Christensen	Olivia95@gmail.com	3605880512	753 Rachel Lodge Apt. 514	Portsmouth	England	92862	UK	59	Male	High	Regular	2023-04-20	2023	April	4:45:57	6	75.20993501	451.2
27	4725198	28381	Kimberly Evans	Claire78@gmail.com	8215497648	2445 Clayton Spur	Portsmouth	England	30007	UK	20	Male	High	Regular	2023-06-03	2023	June	4:57:04	1	173.5707379	173.5
28	5230876	23097	Michael Cole	Rachel75@gmail.com	6487484685	0777 Rebecca Junctions Apt. ...	Portsmouth	England	14668	UK	67	Male	Low	Regular	2024-01-07	2024	January	17:33:45	5	471.482132	2357.4
29	2459574	42540	Robin Jackson	James3@gmail.com	4258351481	8306 Daniel Parkways Suite 7...	Portsmouth	England	62300	UK	43	Male	Medium	Regular	2023-04-22	2023	April	9:17:29	8	333.8596639	2670.9
30	2873384	55388	Yolanda Martin	Emily94@gmail.com	2450716315	62142 Karen Motorway Apt. 324	Portsmouth	England	63093	UK	50	Male	Medium	Regular	2023-06-21	2023	June	16:42:37	6	240.2281886	1441.3

```sql
-- Select customers from UK, order by Amount
SELECT Transaction_ID, Customer_ID, Country, Amount
FROM dbo.RetailData
WHERE Country = 'UK'
ORDER BY Amount DESC;
```

150 % — No issues found

Results | Messages

	Transaction_ID	Customer_ID	Country	Amount
1	4902860	54624	UK	499.9970238
2	8975907	36149	UK	499.9893306
3	3862075	11183	UK	499.9883822
4	9910796	67547	UK	499.9661769
5	8691541	49053	UK	499.9650712
6	3955465	16696	UK	499.9625796
7	4549255	77375	UK	499.954725
8	7221238	67088	UK	499.9489932
9	4066769	86454	UK	499.9466072
10	4762512	32231	UK	499.9369002
11	8629980	48908	UK	499.9321846
12	3689635	75459	UK	499.8721901
13	3285800	83820	UK	499.8685569
14	3434811	11952	UK	499.8621754
15	4489747	51102	UK	499.8574699
16	7254662	30488	UK	499.8397444
17	5843130	39259	UK	499.8363656
18	2683767	68270	UK	499.8073913
19	6806512	39846	UK	499.8065914
20	9495794	97609	UK	499.8031394
21	9016730	73827	UK	499.7988437
22	4762718	10139	UK	499.7986042
23	7760949	52129	UK	499.7933548
24	6018080	25255	UK	499.7859252
25	4538929	52457	UK	499.7669226
26	9489760	39415	UK	499.7648728
27	3046003	18813	UK	499.7609199

Query executed successfully.

```sql
-- Group by Country with revenue
SELECT Country, SUM(Amount) AS TotalRevenue
FROM dbo.RetailData
GROUP BY Country
ORDER BY TotalRevenue DESC;
```

150 % — No issues found

Results | Messages

	Country	TotalRevenue
1	USA	24267923.8716299
2	UK	16107091.7970224
3	Germany	13452165.3135864
4	Australia	11542454.241415
5	Canada	11534062.6980077
6	NULL	67185.29545754

```sql
--2.JOINS (INNER, LEFT, RIGHT)
-- INNER JOIN: match transactions with product info
SELECT r.Transaction_ID, r.Customer_ID, p.Product_Brand, r.Amount
FROM dbo.RetailData r
INNER JOIN dbo.Products p
    ON r.Product_Category = p.Product_Category;
```

150 % 3 0

Results Messages

	Transaction_ID	Customer_ID	Product_Brand	Amount
1	8691788	37249	NULL	108.0287567
2	8691788	37249	NULL	108.0287567
3	8691788	37249	NULL	108.0287567
4	8691788	37249	Adidas	108.0287567
5	8691788	37249	Adidas	108.0287567
6	8691788	37249	Adidas	108.0287567
7	8691788	37249	Nike	108.0287567
8	8691788	37249	NULL	108.0287567
9	8691788	37249	Zara	108.0287567
10	8691788	37249	Nike	108.0287567
11	8691788	37249	Zara	108.0287567
12	8691788	37249	Nike	108.0287567
13	8691788	37249	NULL	108.0287567
14	8691788	37249	Zara	108.0287567
15	8691788	37249	NULL	108.0287567
16	2174773	69749	Sony	403.3539073
17	2174773	69749	NULL	403.3539073
18	2174773	69749	Sony	403.3539073
19	2174773	69749	Whirepool	403.3539073
20	2174773	69749	Samsung	403.3539073
21	2174773	69749	Samsung	403.3539073
22	2174773	69749	BlueStar	403.3539073
23	2174773	69749	Mitsubhisi	403.3539073
24	2174773	69749	NULL	403.3539073
25	2174773	69749	Samsung	403.3539073
26	2174773	69749	NULL	403.3539073

```sql
-- RIGHT JOIN: keep all products, even if no sales
SELECT r.Transaction_ID, r.Customer_ID, p.Product_Brand, r.Amount
FROM dbo.RetailData r
RIGHT JOIN dbo.Products p
    ON r.Product_Category = p.Product_Category;
```

150 % 6 0

Results Messages

	Transaction_ID	Customer_ID	Product_Brand	Amount
1	8691788	37249	NULL	108.0287567
2	8691788	37249	NULL	108.0287567
3	8691788	37249	NULL	108.0287567
4	8691788	37249	Adidas	108.0287567
5	8691788	37249	Adidas	108.0287567
6	8691788	37249	Adidas	108.0287567
7	8691788	37249	Nike	108.0287567
8	8691788	37249	NULL	108.0287567
9	8691788	37249	Zara	108.0287567
10	8691788	37249	Nike	108.0287567
11	8691788	37249	Zara	108.0287567
12	8691788	37249	Nike	108.0287567
13	8691788	37249	NULL	108.0287567
14	8691788	37249	Zara	108.0287567
15	8691788	37249	NULL	108.0287567
16	2174773	69749	Sony	403.3539073
17	2174773	69749	NULL	403.3539073
18	2174773	69749	Sony	403.3539073
19	2174773	69749	Whirepool	403.3539073
20	2174773	69749	Samsung	403.3539073
21	2174773	69749	Samsung	403.3539073
22	2174773	69749	BlueStar	403.3539073
23	2174773	69749	Mitsubhisi	403.3539073
24	2174773	69749	NULL	403.3539073
25	2174773	69749	Samsung	403.3539073

```sql
 -- LEFT JOIN: keep all transactions, even if no product match
SELECT r.Transaction_ID, r.Customer_ID, p.Product_Brand, r.Amount
FROM dbo.RetailData r
LEFT JOIN dbo.Products p
    ON r.Product_Category = p.Product_Category;
```

150 % 6 0

Results Messages

	Transaction_ID	Customer_ID	Product_Brand	Amount
1	8691788	37249	NULL	108.0287567
2	8691788	37249	NULL	108.0287567
3	8691788	37249	NULL	108.0287567
4	8691788	37249	Adidas	108.0287567
5	8691788	37249	Adidas	108.0287567
6	8691788	37249	Adidas	108.0287567
7	8691788	37249	Nike	108.0287567
8	8691788	37249	NULL	108.0287567
9	8691788	37249	Zara	108.0287567
10	8691788	37249	Nike	108.0287567
11	8691788	37249	Zara	108.0287567
12	8691788	37249	Nike	108.0287567
13	8691788	37249	NULL	108.0287567
14	8691788	37249	Zara	108.0287567
15	8691788	37249	NULL	108.0287567
16	2174773	69749	Sony	403.3539073
17	2174773	69749	NULL	403.3539073
18	2174773	69749	Sony	403.3539073
19	2174773	69749	Whirepool	403.3539073
20	2174773	69749	Samsung	403.3539073
21	2174773	69749	Samsung	403.3539073
22	2174773	69749	BlueStar	403.3539073
23	2174773	69749	Mitsubhisi	403.3539073
24	2174773	69749	NULL	403.3539073
25	2174773	69749	Samsung	403.3539073
26	2174773	69749	NULL	403.3539073
27	2174773	69749	NULL	403.3539073

```sql
--3.Subqueries
-- Customers who spent more than the average customer
SELECT Customer_ID, SUM(Amount) AS TotalSpent
FROM dbo.RetailData
GROUP BY Customer_ID
HAVING SUM(Amount) > (
    SELECT AVG(TotalSpent)
    FROM (
        SELECT SUM(Amount) AS TotalSpent
        FROM dbo.RetailData
        GROUP BY Customer_ID
    ) t
);
```

150 % 9 0

Results Messages

	Customer_ID	TotalSpent
1	36915	2047.89857786
2	74281	1044.8667887
3	50442	1104.53673892
4	65697	945.2517847
5	12053	1829.03323334
6	18840	1368.54879795
7	10494	1762.294811
8	34494	1306.83762216
9	44489	1156.4423346
10	80878	2210.8262963
11	21016	915.97900144
12	20472	1728.000508
13	16184	965.0783193

```sql
--4.Aggregate functions
-- Total revenue (SUM)
SELECT SUM(Amount) AS TotalRevenue
FROM dbo.RetailData;

-- Average spend per transaction (AVG)
SELECT AVG(Amount) AS AvgTransactionValue
FROM dbo.RetailData;
```

150 % 9 0

Results Messages

	TotalRevenue
1	76970883.217119

	AvgTransactionValue
1	255.163658962845

```sql
--5.Create Views
-- View: Monthly Revenue
CREATE VIEW dbo.vw_MonthlyRevenue
AS
SELECT [Year] AS SalesYear, [Month] AS SalesMonth,
       SUM(Amount) AS Revenue
FROM dbo.RetailData
GROUP BY [Year], [Month];
-- Query the view
SELECT * FROM dbo.vw_MonthlyRevenue ORDER BY SalesYear, SalesMonth;
```

150 % 10 0

Results Messages

	SalesYear	SalesMonth	Revenue
1	NULL	April	12358.42386088
2	NULL	August	9015.78178832
3	NULL	December	5765.88869123
4	NULL	February	4925.06566472
5	NULL	January	11072.39454186
6	NULL	July	10265.93261142
7	NULL	June	4906.85944248
8	NULL	March	5252.73660324
9	NULL	May	8098.01924832
10	NULL	November	7356.08151802
11	NULL	October	5255.66295919
12	NULL	September	6914.3978919
13	2023	NULL	58373.85485374
14	2023	April	9550661.260083
15	2023	August	7826406.75457873
16	2023	December	4808641.33927518
17	2023	February	72325.24411965
18	2023	January	3917289.71358561
19	2023	July	7339547.08676307
20	2023	June	4648689.1046558

```sql
--6.Optimize with Indexes
-- Index on Customer_ID for faster customer analysis
CREATE NONCLUSTERED INDEX IX_Retail_CustomerID
ON dbo.RetailData(Customer_ID);
-- Index on Date for faster time-series queries
CREATE NONCLUSTERED INDEX IX_Retail_Date
ON dbo.RetailData(Date);
-- Index on Product_Category for product joins
CREATE NONCLUSTERED INDEX IX_Retail_ProductCategory
ON dbo.RetailData(Product_Category);
-- Show all indexes on RetailData table
EXEC sp_helpindex 'dbo.RetailData';
```

150 % 10 0

Results Messages

	index_name	index_description	index_keys
1	IX_Retail_CustomerID	nonclustered located on PRIMARY	Customer_ID
2	IX_Retail_Date	nonclustered located on PRIMARY	Date
3	IX_Retail_ProductCategory	nonclustered located on PRIMARY	Product_Category