

EduLens: Uncovering Patterns Behind Student Performance

-A Data-Driven Exploration of Academic Trends,
Risks & Opportunities



Overview

❑ **Objective:**

To uncover key patterns and insights that influence student academic performance using structured SQL analysis.

❑ **Approach:**

Leveraged MySQL to extract, filter, and analyze student score data across multiple dimensions — gender, parental education, lunch type, test prep, and more.

❑ **Why It Matters:**

Understanding these trends helps educators and policymakers identify at-risk groups, enhance learning strategies, and drive data-informed decisions that improve student outcomes.

Data & Tools Used

❑ Dataset:

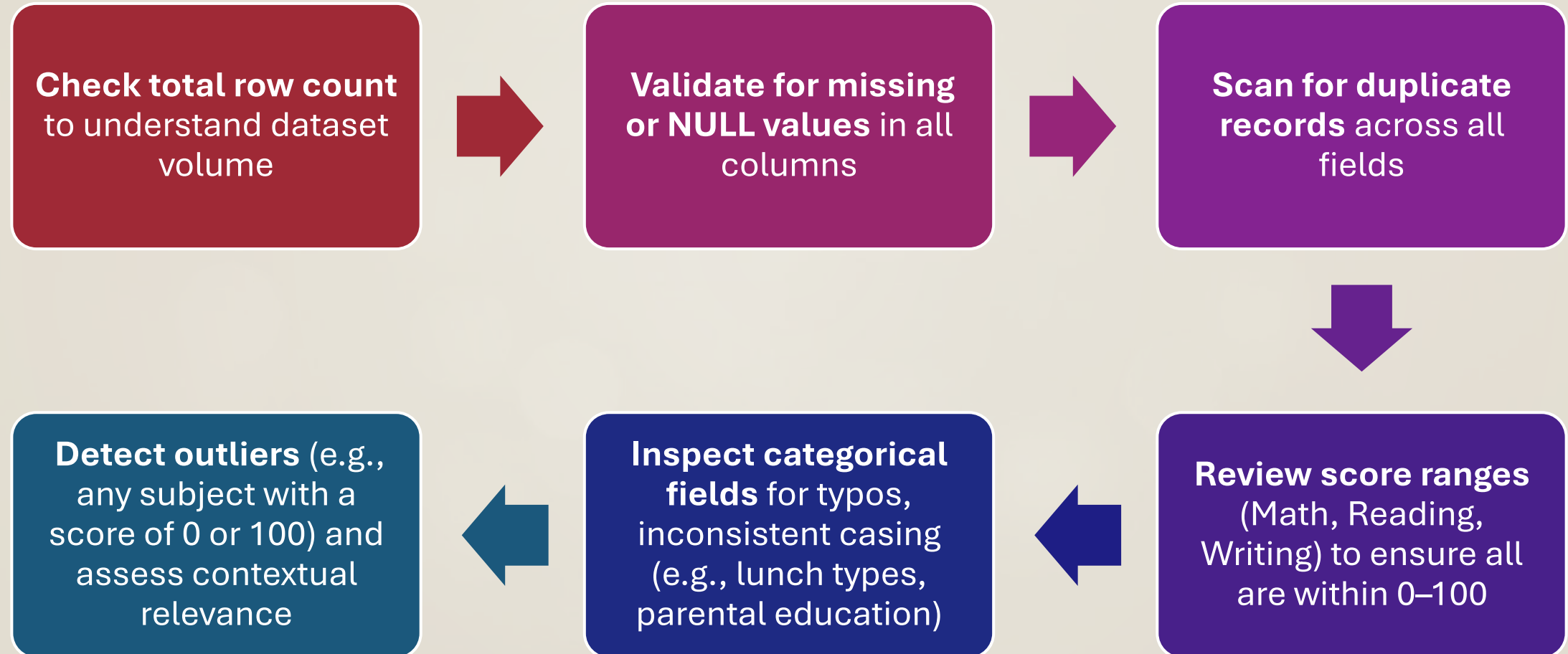
Student performance dataset containing scores in math, reading, and writing, along with demographic and socioeconomic factors such as gender, lunch type, test preparation status, and parental education level.

❑ Tools Used:

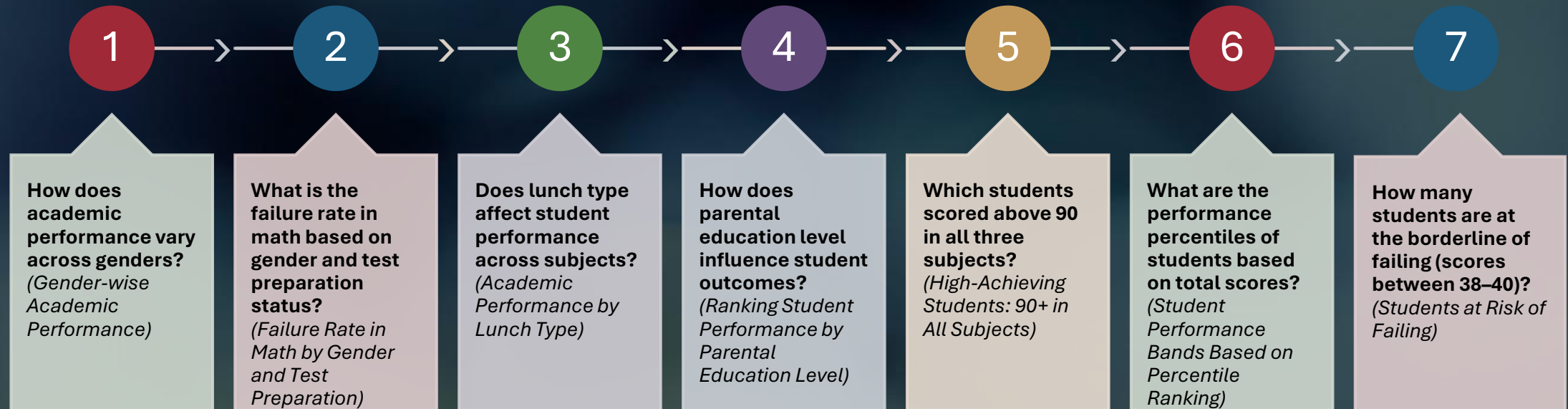
- **MySQL:** For querying and analyzing student performance trends through structured queries.
- **Excel:** For calculating metrics, creating visualizations, and formatting insights into presentation-ready visuals.
- **PowerPoint:** For compiling insights into a professional and engaging report.



DATA AUDIT & CLEANING

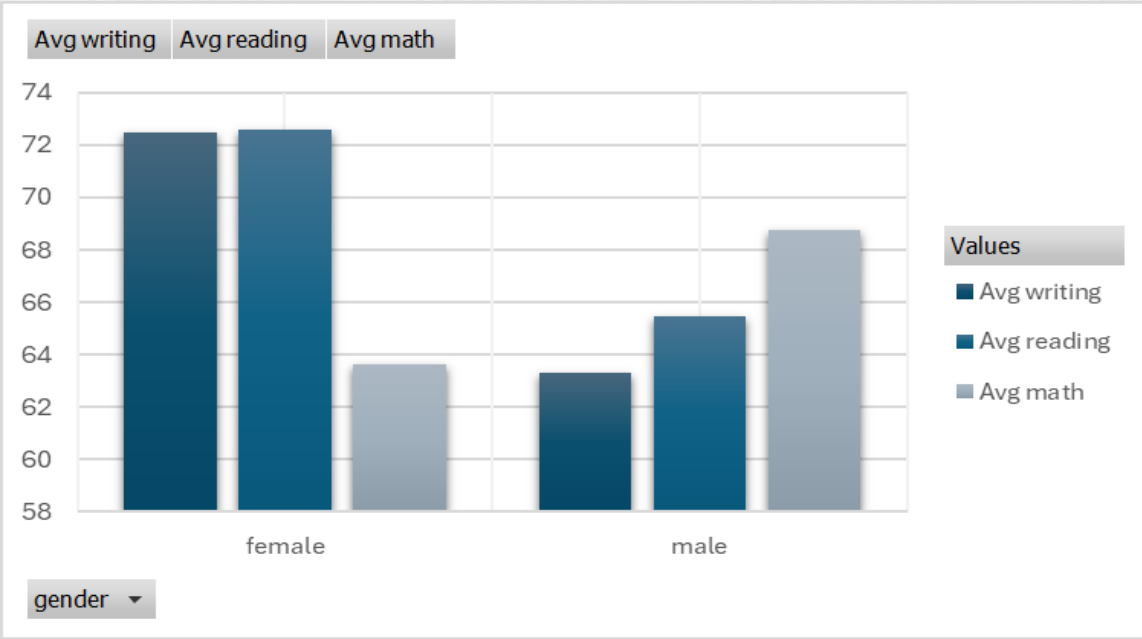


Key Business Questions Explored



1.What is the average score in math, reading, and writing for each gender?

```
1  -- Gender-wise Academic Performance
2  •  SELECT
3      gender,
4      ROUND(AVG(math_score), 2) AS avg_math_score,
5      ROUND(AVG(reading_score), 2) AS avg_reading_score,
6      ROUND(AVG(writing_score), 2) AS avg_writing_score
7  FROM
8      student_performance
9  GROUP BY
10     gender;
```

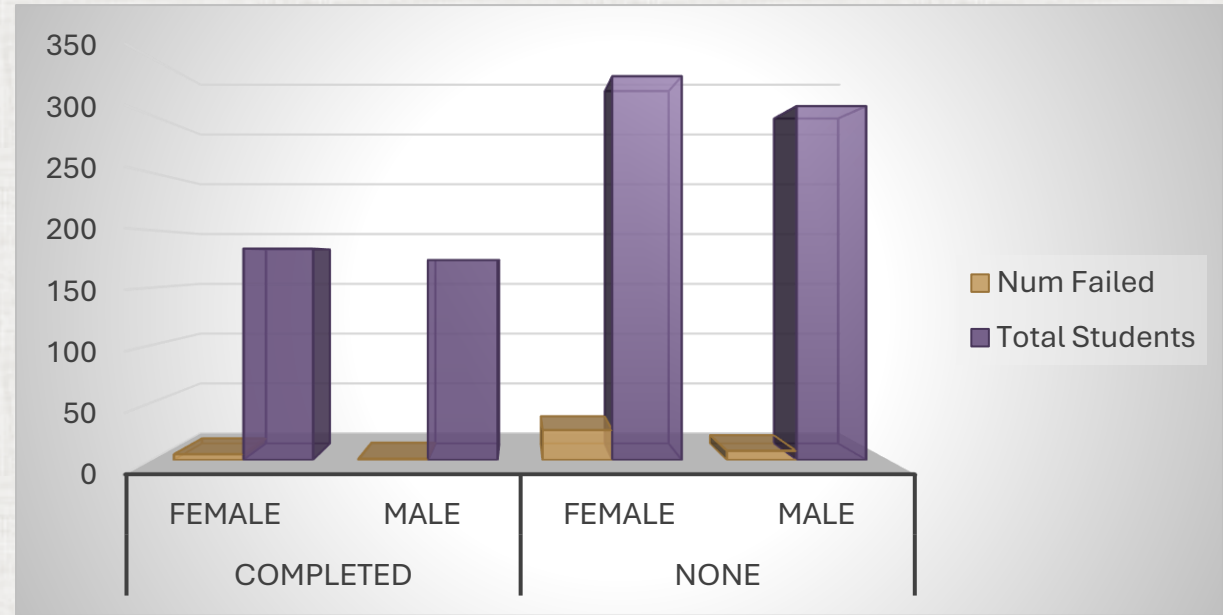


Gender	Avg writing	Avg reading	Avg math
female	72.46718147	72.60810811	63.63320463
male	63.31120332	65.47302905	68.72821577
Grand Total	68.054	69.169	66.089

💡 **Insight:**Female students scored higher in reading and writing, while male students led in math. This highlights subject-wise strengths by gender — valuable for designing focused academic support. Such analysis helps educators tailor learning strategies that promote equity and performance growth.

2. Which group has the highest proportion of students failing in math (score < 40)?

```
1  -- Failure Rate in Math by Gender and Test Preparation
2
3  • SELECT
4      gender,
5      test_preparation_course,
6      COUNT(*) AS total_students,
7      SUM(CASE WHEN math_score < 40 THEN 1 ELSE 0 END) AS num_failed,
8      ROUND(
9          SUM(CASE WHEN math_score < 40 THEN 1 ELSE 0 END) * 100.0 / COUNT(*), 2
10     ) AS failure_percentage
11 FROM
12     student_performance
13 GROUP BY
14     gender, test_preparation_course
15 ORDER BY
16     failure_percentage DESC;
```

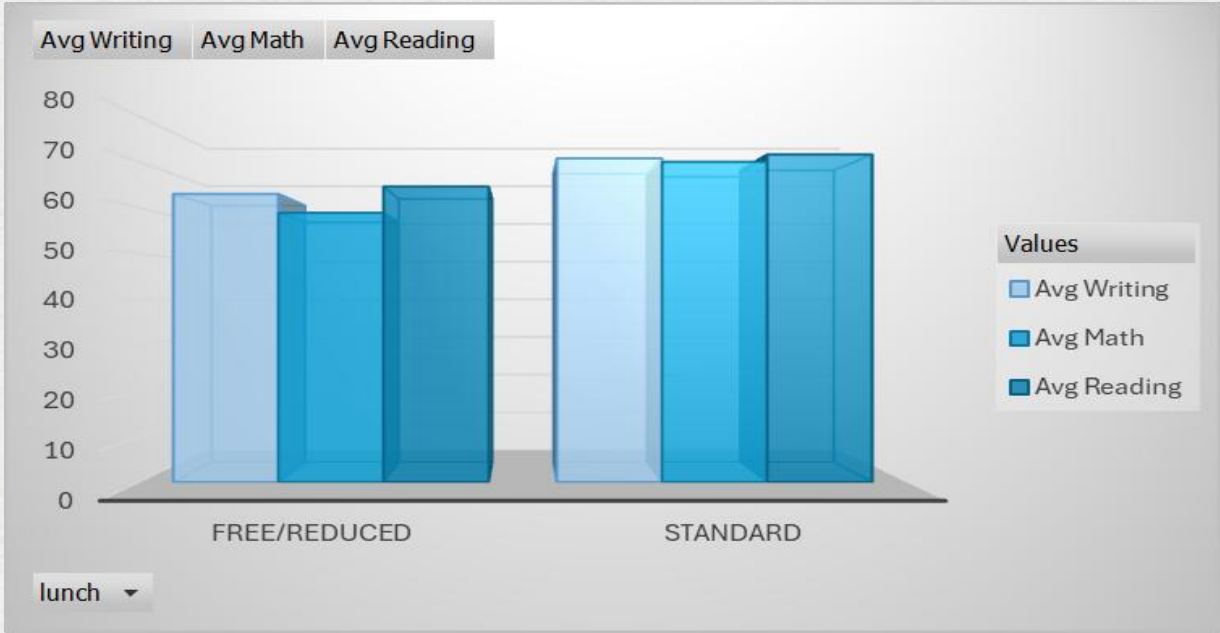


Gender		Num Failed	Total Students	Failure %
completed		6	358	1.68%
	female	5	184	2.72%
	male	1	174	0.57%
none		34	642	5.30%
	female	26	334	7.78%
	male	8	308	2.60%
Grand Total		40	1000	4.00%

💡 **Insight :** Students with no test preparation show a higher failure rate in math, especially females at 7.78%. Completion of test prep lowers failure rates drastically across both genders. This analysis is vital for identifying at-risk groups and justifying targeted intervention programs.

3.Is there a performance difference between students with standard lunch vs. free/reduced lunch?

```
1  -- Academic Performance by Lunch Type
2
3  •  SELECT
4      lunch,
5      COUNT(*) AS total_students,
6      ROUND(AVG(math_score), 2) AS avg_math,
7      ROUND(AVG(reading_score), 2) AS avg_reading,
8      ROUND(AVG(writing_score), 2) AS avg_writing
9  FROM
10     student_performance
11  GROUP BY
12     lunch
13  ORDER BY
14     lunch;
```

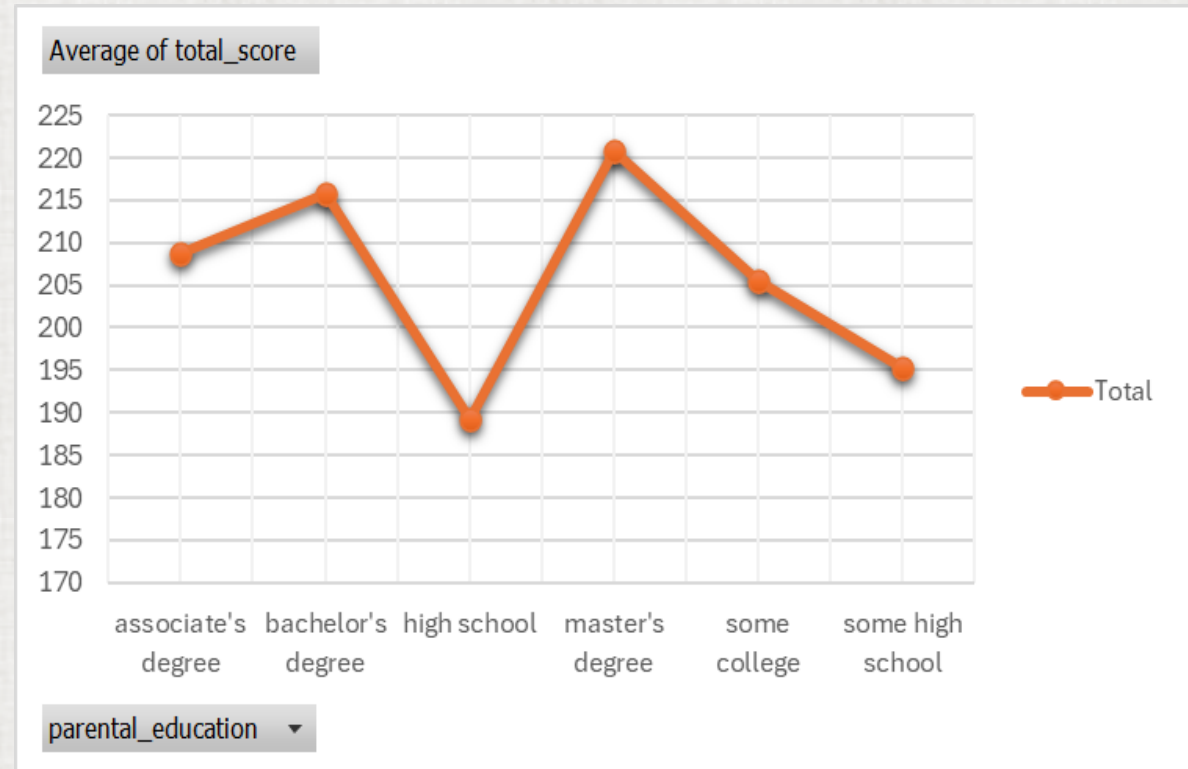


Lunch	Avg Writing	Avg Math	Avg Reading
free/reduced	63.02253521	58.92112676	64.65352113
standard	70.82325581	70.03410853	71.65426357
Grand Total	68.054	66.089	69.169

💡 **Insight :** Students with standard lunch scored significantly higher across all subjects.This highlights the impact of nutrition access on academic performance, making it essential to support under-resourced students through targeted programs.

4. Rank parental education levels by overall student performance?

```
1  -- Ranking Student Performance by Parental Education Level
2
3  SELECT
4      parental_education,
5      ROUND(AVG(math_score + reading_score + writing_score), 2) AS avg_total_score,
6      RANK() OVER (
7          ORDER BY AVG(math_score + reading_score + writing_score) DESC
8      ) AS education_rank
9  FROM
10     student_performance
11  GROUP BY
12     parental_education
13  ORDER BY
14     education rank;
```

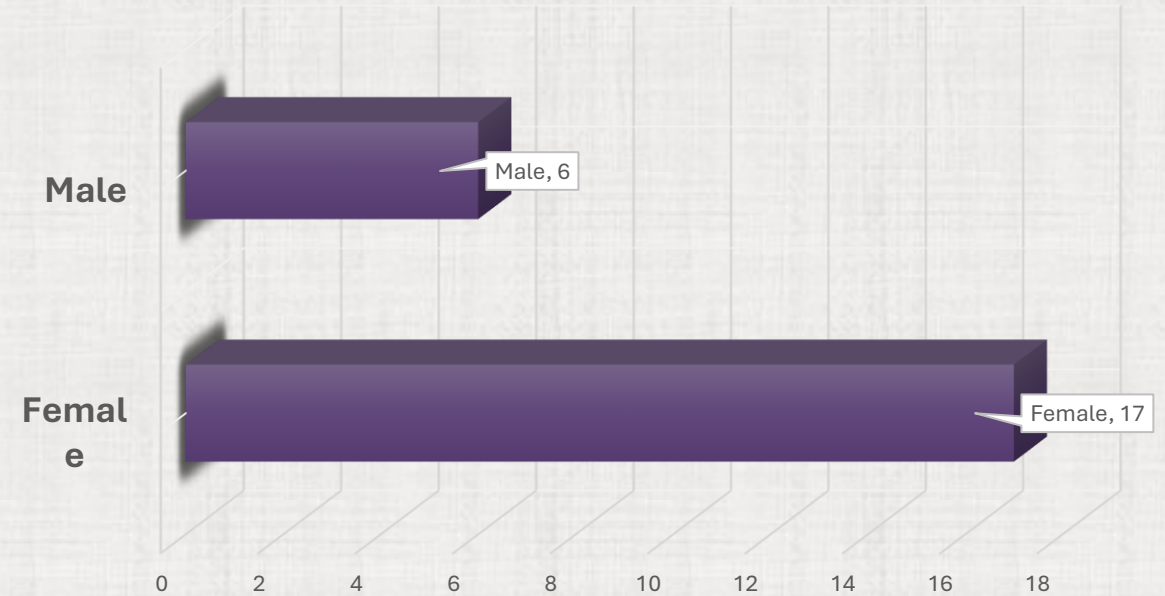


Insight : Students with parents holding a master's degree achieved the highest overall scores. The trend shows performance rises with parental education, highlighting the need for extra support systems for students from lower-education backgrounds.

Row Labels	Average of total_score	Rank
associate's degree	208.7072072	3
bachelor's degree	215.7711864	2
high school	189.2908163	6
master's degree	220.7966102	1
some college	205.4292035	4
some high school	195.3240223	5
Grand Total	203.312	

5.How many students scored above 90 in all three subjects: math, reading, and writing?

```
1  -- High-Achieving Students: 90+ in All Subjects
2
3  •  SELECT
4      gender,
5      COUNT(*) AS top_performers
6  FROM
7      student_performance
8  WHERE
9      math_score > 90
10     AND reading_score > 90
11     AND writing_score > 90
12  GROUP BY gender;
```



Gender	Top Performer
Female	17
Male	6

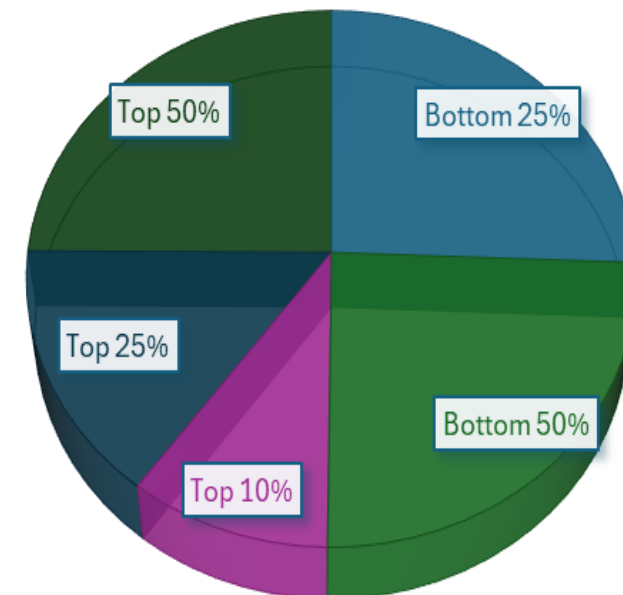
💡 **Insight :** A total of 23 students scored above 90 in all subjects, with female students significantly outperforming males . This highlights the importance of recognizing high achievers early, especially in academic planning and scholarship programs.

6.What is the performance percentile of each student based on total score?

```
1  -- Student Performance Bands Based on Percentile Ranking
2
3  WITH scored_students AS (
4      SELECT gender,parental_education,(math_score + reading_score + writing_score) AS total_score,
5             PERCENT_RANK() OVER (ORDER BY (math_score + reading_score + writing_score)) AS percentile_rank
6      FROM student_performance
7  )
8  SELECT
9      CASE
10         WHEN percentile_rank >= 0.9 THEN 'Top 10%'
11         WHEN percentile_rank >= 0.75 THEN 'Top 25%'
12         WHEN percentile_rank >= 0.5 THEN 'Top 50%'
13         WHEN percentile_rank >= 0.25 THEN 'Bottom 50%'
14         ELSE 'Bottom 25%'
15     END AS performance_band,
16     COUNT(*) AS num_students
17 FROM scored_students GROUP BY performance_band ORDER BY
18 FIELD(performance_band, 'Top 10%', 'Top 25%', 'Top 50%', 'Bottom 50%', 'Bottom 25%');
```

💡 **Insight :** A significant portion of students (over 50%) fall into the bottom two performance bands, while only 9.8% rank in the top 10%. This highlights a performance gap that can inform targeted academic support programs.

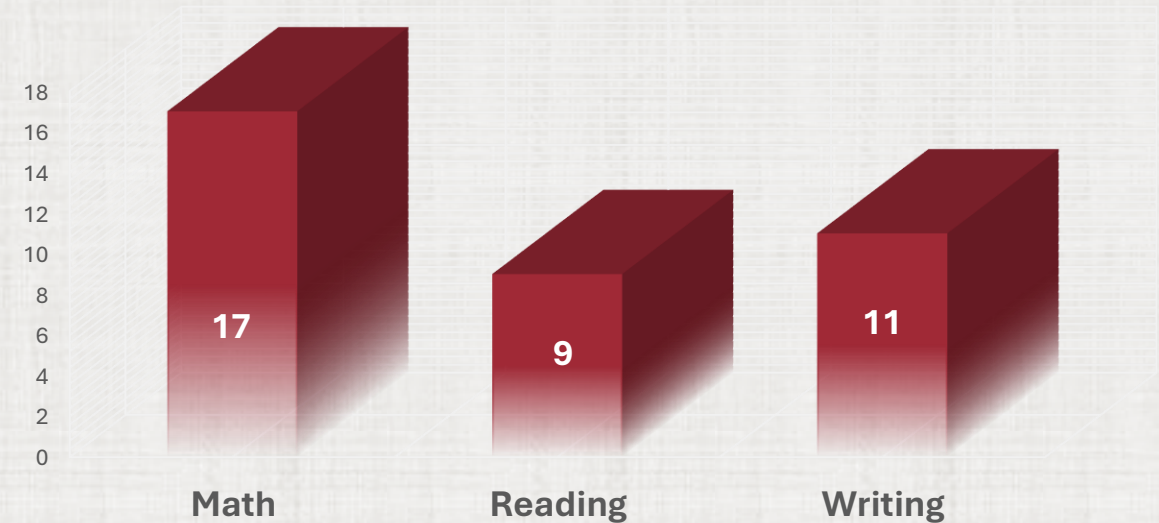
Count of students



Performance Band	Count of students
Bottom 25%	256
Bottom 50%	246
Top 10%	98
Top 25%	151
Top 50%	249
Grand Total	1000

7.How many students are borderline failing in each subject?

```
1  -- Students at Risk of Failing (Score: 38-40)
2
3  •  SELECT
4      'Math' AS subject,
5      COUNT(*) AS borderline_students
6  FROM student_performance
7  WHERE math_score BETWEEN 38 AND 40
8  UNION ALL
9  SELECT
10     'Reading',
11     COUNT(*)
12  FROM student_performance
13  WHERE reading_score BETWEEN 38 AND 40
14  UNION ALL
15  SELECT
16     'Writing',
17     COUNT(*)
18  FROM student_performance
19  WHERE writing_score BETWEEN 38 AND 40;
```



Subject	Borderline Students(Scores 38-40)
Math	17
Reading	9
Writing	11

💡 **Insight :** Math has the highest number of borderline students (scores between 38–40), highlighting a critical area for early intervention. Identifying these students helps educators provide timely support before failure occurs.





Key Takeaways from Analysis




- ✓ **Gender-based trends** show females excel in reading/writing, while males perform better in math.
- ✓ **Test preparation programs** significantly reduce math failure rates, especially among female students.
- ✓ **Nutrition access**, reflected through lunch type, has a direct impact on academic performance.
- ✓ **Parental education level** strongly influences student achievement, especially at higher degrees.
- ✓ **Top-performing students** (scoring above 90 in all subjects) are predominantly female, indicating academic excellence trends.
- ✓ **More than half** of students fall into lower performance percentiles, emphasizing the need for focused academic interventions.
- ✓ **Math requires urgent attention**, with the highest number of students at risk of failure.

Conclusion

 Our analysis uncovered actionable insights around student performance across gender, parental background, preparation, and nutrition.

 These findings can guide targeted academic interventions, resource allocation, and personalized learning strategies to bridge performance gaps and promote equity.

 By identifying risk zones and excellence pockets, institutions can make data-driven decisions that directly improve educational outcomes.

Recommendations



LAUNCH EARLY SUPPORT
PROGRAMS IN MATH,
ESPECIALLY FOR
BORDERLINE AND FAILING
STUDENTS.



PROMOTE TEST
PREPARATION PROGRAMS,
PARTICULARLY FOR
UNDERPERFORMING
GROUPS.



OFFER NUTRITIONAL
SUPPORT FOR STUDENTS
ON FREE/REDUCED LUNCH.



DESIGN LEARNING
INTERVENTIONS FOR
STUDENTS FROM LOWER
PARENTAL EDUCATION
BACKGROUNDS.



RECOGNIZE TOP
PERFORMERS TO SUPPORT
SCHOLARSHIP AND
ADVANCED LEARNING
PATHS.

THANK YOU

