

# (AIAC)Lab Assignment 3. 6

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Batch-11

## Task-1:

## Tasks to be completed

## 1. Baseline Prompt Testing

Choose 5 typical user queries, for example:

## “Explain, What, Define, Why, What”

- Run these prompts in a chat-based AI model and record the raw responses.

## 2. Prompt Refinement

Rewrite each query using the following strategies:

- Add 5 different contexts (school level, competitive exam, real-life application, mathematical focus, conceptual focus).
  - Make the task explicit (e.g., “List and explain Newton’s three laws with one real-world example each.”).
  - Break the query into subtasks (definition → explanation → example).

Run these prompts in a chat-based AI model and record the raw responses.

## Prompt:

1. Explain Newton's laws of motion. 2.What is force? 3.Define inertia. 4.Why does an object stop moving?

## 5 What is acceleration?

Code:

1. **Newton's Laws of motion:**  
Newton's laws of motion are three fundamental principles that describe the relationship between the action of an object and the forces acting on it. They were formulated by Sir Isaac Newton in the 17th century and are fundamental to classical mechanics.

1. **First Law (Law of Inertia):** An object at rest will remain at rest, and an object in motion will continue to move with a constant velocity unless acted upon by an external force. This means that objects tend to resist changes in their state of motion.
2. **Second Law (Law of Acceleration):** The acceleration of an object is directly proportional to the net force acting on it and is inversely proportional to its mass. This is often expressed with the equation  $F = ma$ , where  $F$  is the net force,  $m$  is the mass, and  $a$  is the acceleration.
3. **Third Law (Action and Reaction):** For every action, there is an equal and opposite reaction. This means that if one object exerts a force on a second object, the second object exerts an equal and opposite force back on the first.

4. **What is Force in physics?**  
Force is a vector quantity, meaning it has both magnitude and direction.

1. **Force is a vector quantity:** meaning it has both magnitude and direction.
2. It is measured in Newtons (N) in the International System of Units (SI).
3. Force can cause an object to accelerate, decelerate, change direction, or move.
4. There are different types of forces, including gravitational, electromagnetic, electrostatic, and normal forces.

5. **Newton's Laws in points:**

1. **Inertia is the property of matter that causes it to resist changes in its state of motion.**
2. It is directly related to an object's mass; the greater the mass, the greater the inertia.
3. **Inertia is the reason why objects at rest stay at rest and objects in motion stay in motion unless acted upon by an external force.**

6. **Why does an object stop moving in orbit?**

1. **Friction:** The most common reason an object stops moving is due to friction, which is a force that opposes motion between two surfaces in contact. Friction converts kinetic energy into heat, gradually slowing the object down.
2. **Air Resistance:** Similar to friction, air resistance (or drag) acts against the motion of an object moving through the air, causing it to slow down.
3. **Laws of Energy:** An object may stop moving when it loses its kinetic energy due to various factors, such as collisions or interactions with other objects.
4. **External Forces:** Other external forces, such as gravity or applied forces, can also cause an object to stop moving.

7. **MMAC is acceleration in points?**

1. **Acceleration is a vector quantity that represents the rate of change of velocity of an object with respect to time.**
2. It is measured in meters per second squared ( $\text{m/s}^2$ ) in the International System of Units (SI).
3. Acceleration can occur as an increase or decrease in speed (positive or negative acceleration) or a change in direction.
4. **Acceleration is caused by the application of a net external force on an object,** as described by Newton's Second Law of Motion ( $F = ma$ ).

Rewrite the prompts for prompt refinement:<sup>1</sup>

Explain Newton's laws of motion in school level in points.

1.Newton's First Law of Motion: An object will stay still or keep moving in a straight line at the same speed unless something pushes or pulls it. This is called inertia.

2.Newton's Second Law of Motion: The harder you push or pull an object, the faster it will speed up. The heavier the object, the more force you need to make it move. This is shown in the formula  $F = ma$  (Force = mass × acceleration).

3.Newton's Third Law of Motion: For every action, there is an equal and opposite reaction. This means that if you push on something, it pushes back on you with the same amount of force.

What is force in points for competitive exams in points.

1.Force is a physical quantity that can move an object to change its state of motion or shape.

2.It is a vector quantity, having both magnitude and direction.

3.Force is measured in Newton (N) in the International System of Units (SI).

4.Force can be classified into different types, such as contact forces (like friction and tension) and non-contact forces (like gravitational and electromagnetic forces).

5.Force is described by Newton's Second Law of Motion, which states that Force equals mass times acceleration ( $F = ma$ ).

Define inertia in points in real life examples.

1.Inertia is the tendency of an object to resist changes in its state of motion.

2.For example, when a car suddenly stops, passengers lurch forward due to their inertia, as their bodies want to keep moving at the same speed.

3.Another example is when you slide a book across a table; it eventually stops because of friction, which overcomes the book's inertia.

4.Inertia is also observed when you try to push a heavy piece of furniture; it requires more effort until enough force is applied.

Why does an object stop moving in points in mathematical terms.

1.Frictional Force: The object experiences a frictional force ( $F_f$ ) that opposes its motion. This force can be calculated using  $F = \mu N$ , where  $\mu$  is the coefficient of friction and  $N$  is the normal force.

2.Deceleration: The frictional force causes a negative acceleration (deceleration) on the object, which can be calculated using Newton's second law:  $a = F/m$ , where  $F$  is the net force (frictional force in this case) and  $m$  is the mass.

3.Kinematic Equations: Using kinematic equations, we can determine the time ( $t$ ) it takes for the object to stop. For example, using  $v = u + at$ , where  $v$  is the final velocity (0 m/s when the object stops),  $u$  is the initial velocity, and  $a$  is the deceleration.

4.Energy Dissipation: The object's kinetic energy ( $K = 0.5mv^2$ ) is gradually converted into other forms of energy, such as heat, due to friction, until the kinetic energy reaches zero, causing the object to stop.

What is acceleration in points in conceptual terms.

1.Acceleration is the rate at which an object's velocity changes over time.

2.It is a vector quantity, meaning it has both magnitude and direction.

3.Acceleration can result from changes in speed (increasing or decreasing) or changes in direction.

4.Acceleration is caused by the application of a net external force on an object, as described by Newton's Second Law of Motion ( $F = ma$ ).

## Output:

Summary Table

Parameter	Original AI Responses	Rewritten Prompts
Completeness	5	5
Accuracy	5	5
Relevance	5	5
Clarity	4	5

### Conclusion:

Both sets are complete, accurate, and relevant. The rewritten prompts score higher in clarity due to their audience-focused, simplified explanations and use of real-life examples.

## Explanation:

These prompts guide you to explore key concepts in physics related to motion. They ask you to explain Newton's laws, which describe how forces affect movement, and to define force itself as a push or pull that changes an object's state. You're also asked to define inertia, the tendency of objects to resist changes in their motion. The prompts encourage you to think about why objects stop moving, often due to forces like friction.

## Task 2:

### Tasks to be completed

#### 1. Baseline Prompt Testing

Choose 5 common user queries, such as:

- “What, Explain, How, What, Difference”

Run these prompts in a chat-based AI model and record the raw responses.

#### 2. Prompt Refinement

Rewrite each query by:

- Adding 5 contexts (beginner, exam-oriented, real-world analogy, syntax-focused, performance-focused).
- Making instructions explicit (e.g., “Define a Python loop and show one example for for-loop and while-loop.”).
- Breaking into subtasks (definition → syntax → example → use case).

## Prompt:

1.What is a loop in Python? 2.Explain lists in Python. 3.How does a function work?

4.What is the difference between list and tuple?

5.What is Python?

## Code:

```
task 2
What is a loop in Python in points.
1.A loop in Python is a control structure that allows you to execute a block of code multiple times.
2.Python primarily has two types of loops: 'for' loops and 'while' loops.
3.A 'for' loop is used to iterate over a sequence (like a list, tuple, or string) or other iterable objects.
4.A 'while' loop continues to execute as long as a specified condition is true.

#explain lists in Python in points.
1.What is a list in Python?
2.Lists are ordered, meaning the items have a defined order, and this order will not change unless explicitly modified.
3.Lists are mutable, which means you can change, add, or remove items after the list has been created.
4.Lists can contain items of different data types, including other lists, making them versatile for various applications.

#How does a function work in points.
1.A function in Python is a reusable block of code that performs a specific task.
2.Functions are defined using the 'def' keyword followed by the function name and parentheses.
3.Functions can take input parameters (arguments) to work with different data.
4.Functions can return a value using the 'return' statement, allowing the result to be used elsewhere in the program.

#What is the difference between list and tuple in points.
1.Mutability: Lists are mutable, meaning their elements can be changed, added, or removed. Tuples are immutable, so once they are created, their elements cannot be modified.
2.Syntax: Lists are defined using square brackets [] (e.g., my_list = [1, 2, 3]), while tuples are defined using parentheses () (e.g., my_tuple = (1, 2, 3)).
3.Performance: Tuples are generally faster than lists for certain operations due to their immutability, making them more efficient for read-only data.

#What is python in points.
1.Python is a high-level, interpreted programming language known for its readability and simplicity.
2.It supports multiple programming paradigms, including procedural, object-oriented, and functional programming.
3.Python has a large standard library and a vast ecosystem of third-party packages, making it suitable for various applications such as web development, data analysis, artificial intelligence, etc.
```

```
**Rewrote the prompts for prompt refinement:** 

#What is a loop in Python in beginner level in points.
1.A loop in Python is a way to repeat a block of code multiple times.
2.There are two main types of loops in Python: 'for' loops and 'while' loops.
3.A 'for' loop is used to go through each item in a list or other collection.
4.A 'while' loop keeps running as long as a certain condition is true.

#explain lists in Python in Exam Oriented points.
1.What is a list in Python?
2.Lists are defined using square brackets [] and can contain items of different data types.
3.Lists allow duplicate values, meaning the same item can appear multiple times.
4.Common list operations include adding, removing, and accessing items using indexing.

#How does a function work in Real world Analogies points.
1.A function is like a recipe in a cookbook; it provides a set of instructions to perform a specific task.
2.You define a function by giving it a name and specifying the ingredients (parameters) it needs to work with.
3.When you want to use the function, you "call" it by its name and provide the necessary ingredients (arguments).
4.The function processes the ingredients and returns a finished dish (output) that you can use.

#What is the difference between list and tuple in Syntax focuses in points.
1.Lists are created using square brackets [] (e.g., my_list = [1, 2, 3]), while tuples are created using parentheses () (e.g., my_tuple = (1, 2, 3)).
2.Lists are mutable, meaning you can change their contents after creation, whereas tuples are immutable and cannot be changed once created.
3.Lists allow for dynamic resizing, so you can add or remove items, while tuples have a fixed size.
4.Both lists and tuples can store multiple data types, but tuples are often used for fixed collections of items.

#What is python in points for performance focus.
1.Python is an interpreted language, which means code is executed line by line, making it slower than compiled languages like C or Java.
2.Python's simplicity and readability often lead to faster development times, despite its slower execution speed.
3.Python has various implementations (like CPython, PyPy) that can improve performance for specific use cases.
```

## Output:

Evaluation Table		
Parameter	Original AI Responses	Rewritten Prompts
Completeness	5	5
Accuracy	5	5
Relevance	5	5
Clarity	4	5

**Summary:**

- **Completeness:** Both sets cover all required points for each topic.
- **Accuracy:** Both are factually correct and use proper terminology.
- **Relevance:** Both are relevant; the rewritten prompts are more tailored to specific contexts (beginner, exam, real-world, syntax, performance).
- **Clarity:** The rewritten prompts are clearer, using simpler language, analogies, and context-specific explanations, making them easier to understand for their intended audience.

**Conclusion:**

Both sets are strong, but the rewritten prompts are slightly better in clarity and contextual relevance, making them more effective for targeted learning or exam preparation.

## Explanation:

These prompts are designed to help you understand basic Python programming concepts. They ask you to explain what a loop is, which is a way to repeat actions in code. You're also asked to describe lists, which are collections of items that can be changed. The prompts include explaining how functions work, meaning reusable blocks of code that perform specific tasks. You're encouraged to compare lists and tuples, noting that lists are mutable while tuples are immutable. Finally, you're asked to define Python itself, which is a popular, high-level programming language known for its simplicity and versatility.

## Task 3:

### Tasks to be completed

#### 1. Baseline Prompt Testing

Select 5 typical queries, for example:

- “What, Explain, What, Define, What”

Run these prompts in a chat-based AI model and record the raw responses.

#### 2. Prompt Refinement

Refine each query by:

- Adding 5 contexts (academic, industry, beginner-friendly, mathematical, interview-focused).
- Making tasks explicit (e.g., “Define supervised learning and explain it with one real-world example.”).
- Breaking into subtasks (definition → types → example → limitation).

### Prompt:

1.What is machine learning? 2. Explain supervised learning. 3.Define overfitting. 4.What is regression?

5.What is classification?

### Code:

<p><b>What is machine learning in points.</b></p> <p>1.Machine learning is a subset of artificial intelligence that focuses on developing algorithms that allow computers to learn from and make predictions or decisions based on data.</p> <p>2.It involves training models on large datasets to identify patterns and relationships without being explicitly programmed for specific tasks.</p> <p>3.Machine learning can be categorized into supervised learning, unsupervised learning, and reinforcement learning.</p> <p>4.Applications of machine learning include image recognition, natural language processing, recommendation systems, and autonomous vehicles.</p>
<p><b>#Explain supervised learning in points.</b></p> <p>1.Supervised learning is a type of machine learning where the model is trained on a labeled dataset, meaning that each input data point is paired with the correct output.</p> <p>2.The goal of supervised learning is to learn a mapping from inputs to outputs so that the model can make accurate predictions on new, unseen data.</p> <p>3.Common algorithms used in supervised learning include linear regression, logistic regression, decision trees, and support vector machines.</p> <p>4.Supervised learning is widely used in applications such as spam detection, fraud detection, and medical diagnosis.</p>
<p><b>#Define overfitting in points.</b></p> <p>1.Overfitting is a phenomenon in machine learning where a model learns the training data too well, capturing noise and details that do not generalize to new data.</p> <p>2.An overfitted model performs well on the training dataset but poorly on unseen data, leading to low predictive accuracy.</p> <p>3.Overfitting can occur when a model is too complex relative to the amount of training data available.</p> <p>4.Tactics to prevent overfitting include cross-validation, regularization, pruning, and using simpler models.</p>
<p><b>#What is regression in points.</b></p> <p>1.Regression is a type of supervised machine learning technique used to predict continuous numerical values based on input features.</p> <p>2.It involves finding the relationship between a dependent variable (target) and one or more independent variables (features).</p> <p>3.Common regression algorithms include linear regression, polynomial regression, and ridge regression.</p> <p>4.Regession is widely used in various applications, such as predicting house prices, stock market trends, and sales forecasting.</p>
<p><b>#What is classification in points.</b></p> <p>1.Classification is a type of supervised machine learning technique used to categorize data into predefined classes or labels.</p> <p>2.It involves training a model on a labeled dataset, where each input is associated with a specific class.</p> <p>3.Common classification algorithms include decision trees, random forests, support vector machines, and neural networks.</p> <p>4.Classification is widely used in applications such as email spam detection, image recognition, and medical diagnosis.</p>

<p><b>#Rewrite the prompts for prompt retraining**</b></p> <p><b>Alliteration</b> is machine learning in points in academic focus.</p> <p>1.Machine learning is a branch of artificial intelligence that focuses on the development of algorithms that enable computers to learn from data and improve their performance over time without being explicitly programmed.</p> <p>2.Machine learning uses statistical techniques to identify patterns and make predictions based on historical data.</p> <p>3.Machine learning can be classified into three main types: supervised learning, unsupervised learning, and reinforcement learning.</p> <p>4.Machine learning has applications across various fields, including healthcare, finance, marketing, and autonomous systems.</p>
<p><b>#Explain supervised learning in points with industry level focus.</b></p> <p>1.Supervised learning is a machine learning paradigm where models are trained on labeled datasets, meaning each input is paired with the correct output or label.</p> <p>2.The objective of supervised learning is to learn a function that maps inputs to outputs, enabling the model to make accurate predictions on new, unseen data.</p> <p>3.Industry applications of supervised learning include customer churn prediction, retail analytics, and sentiment analysis.</p> <p>4.Common algorithms used in supervised learning include decision trees, support vector machines, and neural networks.</p>
<p><b>#Define overfitting in points beginner level focus.</b></p> <p>1.Overfitting happens when a machine learning model learns the training data too well, including its noise and details, which makes it perform poorly on new data.</p> <p>2.An overfitted model has high accuracy on the training set but low accuracy on unseen data.</p> <p>3.Overfitting can occur when the model is too complex or when there is not enough training data.</p> <p>4.To prevent overfitting, techniques such as cross-validation, regularization, and simplifying the model can be used.</p>
<p><b>Alliteration</b> is regression in points.</p> <p>1.Regression is a statistical method used in machine learning to model the relationship between a dependent variable (target) and one or more independent variables (features).</p> <p>2.It aims to predict continuous numerical values by fitting a function to the data points.</p> <p>3.Common regression techniques include linear regression, polynomial regression, and logistic regression.</p> <p>4.Regression analysis involves minimizing the error between predicted and actual values, often using methods like least squares.</p>
<p><b>Alliteration</b> is classification in points for interview focus.</p> <p>1.Classification is a supervised machine learning technique used to assign input data to predefined categories or classes based on learned patterns from labeled training data.</p> <p>2.It involves training a model to recognize patterns in the input data and make predictions about the class labels for new, unseen data.</p> <p>3.Common classification algorithms include decision trees, random forests, support vector machines, and neural networks.</p> <p>4.Classification is widely used in various applications, such as email spam detection, image recognition, and medical diagnosis.</p>

## Output:

Parameter	Original AI Responses	Rewritten Prompts
Completeness	5	5
Accuracy	5	5
Relevance	5	5
Clarity	4	5

**Summary:**

- Completeness:** Both sets fully address each concept with all key points included.
- Accuracy:** Both are factually correct and use appropriate terminology.
- Relevance:** Both are relevant, but the rewritten prompts are more tailored to specific contexts (Academic, industry, beginner, mathematical, interview).
- Clarity:** The rewritten prompts are clearer, using audience-focused language and context-specific explanations, making them easier to understand and more useful for their intended purposes.

**Conclusion:**

Both sets are strong, but the rewritten prompts are superior in clarity and contextual relevance, making them more effective for targeted learning and communication.

**Explanation:** These prompts focus on fundamental concepts in machine learning. They ask you to define machine learning, which is a field where computers learn from data to make predictions or decisions. You're prompted to explain supervised learning, a method where models are trained on labeled data. The prompts include defining overfitting, which happens when a model learns the training data too well and performs poorly on new data. You're also asked to explain regression, a technique for predicting continuous values, and classification, which involves sorting data into categories. Each prompt helps you understand key ideas used in building and evaluating machine learning models.

## Task 4:

### Tasks to be completed

#### 1. Baseline Prompt Testing

Choose 5 common queries, such as:

- “Explain, What, Difference, where, how”

Run these prompts in a chat-based AI model and record the raw responses.

#### 2. Prompt Refinement

Rewrite each prompt by:

- Adding 5 contexts (theory exam, practical lab, interview prep, real-world database, optimization focus).
- Making instructions explicit (e.g., “Explain SQL JOIN types with syntax and examples.”).
- Breaking into subtasks (definition → syntax → example → use case).

### Prompt:

1.What is SQL? 2.Explain joins. 3.Difference between WHERE and HAVING. 4.How does indexing work?

5.What is normalization?

### Code:

```
What is SQL in points.  
1.SQL (Structured Query Language) is a standardized programming language used for managing and manipulating relational databases.  
2.SQL allows users to create, read, update, and delete (CRUD) data in a database.  
3.SQL is used to define database structures, including tables, indexes, and views.  
4.Common SQL commands include SELECT, INSERT, UPDATE, DELETE, CREATE, and DROP.  
  
Explaining joins in SQL in points.  
1.Joins in SQL are used to combine rows from two or more tables based on a related column between them.  
2.There are several types of joins, including INNER JOIN, LEFT JOIN, RIGHT JOIN, and FULL OUTER JOIN.  
3.An INNER JOIN returns only the rows that have matching values in both tables.  
4.A LEFT JOIN returns all rows from the left table and the matched rows from the right table, while a RIGHT JOIN does the opposite. A FULL OUTER JOIN returns all rows when there is a match in one of  
the tables.  
Difference between WHERE and HAVING in points.  
1.WHERE is used to filter rows before any groupings are made, while HAVING is used to filter groups after the GROUP BY clause has been applied.  
2.WHERE can be used with SELECT, INSERT, UPDATE, DELETE statements, whereas HAVING is typically used with SELECT statements that include GROUP BY.  
3.WHERE works on individual rows, while HAVING works on aggregated data.  
4.Both WHERE and HAVING can use similar conditional expressions, but they operate at different stages of the query execution process.  
  
How does indexing work in points.  
1.Indexing in SQL is a database optimization technique that improves the speed of data retrieval operations on a table.  
2>An index is created on one or more columns of a table, allowing the database to quickly locate and access the data without scanning the entire table.  
3.Indices work similarly to a book's index, providing a quick way to find specific information based on key values.  
4.Common types of indices include B-tree indices, hash indices, and bitmap indices, each suited for different types of queries and data distributions.  
  
What is normalization in points.  
1.Normalization is the process of organizing data in a database to reduce redundancy and improve data integrity.  
2.it involves dividing large tables into smaller, related tables and defining relationships between them.  
3.Normalization is typically done in several stages, known as normal forms (1NF, 2NF, 3NF, etc.), each with specific rules to follow.  
4.The main goals of normalization are to eliminate duplicate data, ensure data dependencies make sense, and simplify the database structure for easier maintenance.  
**Rewrite the prompts for prompt refinement:**  
  
What is SQL in points for theoretical focus.  
1.SQL (Structured Query Language) is a domain specific language used for managing and manipulating relational databases.  
2.It provides a standardized way to perform various operations on database systems, including data retrieval, insertion, updating, and deletion.  
3.SQL is essential for defining and managing database structures, such as tables, indexes, and views.  
4.Key SQL commands include SELECT, INSERT, UPDATE, DELETE, and DROP, which facilitate interaction with the database.  
  
Explaining joins in SQL in points for practical lab.  
1.Joins in SQL are used to combine rows from two or more tables based on a related column between them, enabling complex queries across multiple tables.  
2.The most common types of joins are INNER JOIN, LEFT JOIN, RIGHT JOIN, and FULL OUTER JOIN, each serving different purposes in data retrieval.  
3.An INNER JOIN returns only the rows with matching values in both tables, while a LEFT JOIN returns all rows from the left table and matched rows from the right table.  
4.A RIGHT JOIN returns all rows from the right table and matched rows from the left table, and a FULL OUTER JOIN returns all rows when there is a match in either table.  
  
Difference between WHERE and HAVING in points for theoretical focus.  
1.WHERE is used to filter individual rows before any grouping is applied, while HAVING is used to filter groups after the GROUP BY clause.  
2.WHERE can be applied to SELECT, UPDATE, and DELETE statements, whereas HAVING is primarily used with SELECT statements that include GROUP BY.  
3.WHERE operates on raw data, while HAVING operates on aggregated data resulting from groupings.  
4.Both WHERE and HAVING can utilize similar conditional expressions, but they function at different stages of query processing.  
  
How does indexing work in points in real world database.  
1.Indexing in SQL is a technique used to enhance the performance of database queries by creating a data structure that allows for faster data retrieval.  
2.An index is built on one or more columns of a table, enabling the database to quickly locate rows without scanning the entire table.  
3.Indices function like a book's index, providing a quick reference to find specific information based on key values.  
4.Common types of indices include B-tree indices, hash indices, and bitmap indices, each optimized for different query patterns and data types.  
  
What is normalization in points in optimization focus.  
1.Normalization is a database design technique aimed at reducing data redundancy and improving data integrity by organizing data into related tables.  
2.it involves breaking down large tables into smaller, more manageable tables and establishing relationships between them.  
3.Normalization is performed through a series of normal forms (1NF, 2NF, 3NF, etc.), each with specific criteria to ensure data consistency.  
4.The primary objectives of normalization are to eliminate duplicate data, ensure logical data dependencies, and simplify database maintenance and updates.
```

### Output:

Parameter	Original AI Responses	Rewritten Prompts
Completeness	5	5
Accuracy	5	5
Relevance	5	5
Clarity	4	5

**Summary:**

- **Completeness:** Both sets fully address each topic with all key points included.
- **Accuracy:** Both are factually correct and use appropriate SQL/database terminology.
- **Relevance:** Both are relevant, but the rewritten prompts are more tailored to specific contexts (theory, lab, interview, real-world optimization).
- **Clarity:** The rewritten prompts are clearer, with more context-specific language and explanations, making them easier to understand and more useful for their intended audience.

**Conclusion:**

Both sets are strong, but the rewritten prompts are superior in clarity and contextual relevance, making them more effective for targeted learning and communication.

**Explanation:** These prompts are about key concepts in SQL and database management. They ask you to define SQL, which is a language used to manage and query databases. You're prompted to explain joins, which combine data from multiple tables based on related columns. The prompts include distinguishing between WHERE and HAVING clauses, where WHERE filters rows before grouping and HAVING filters groups after aggregation.

## Task 5:

### Tasks to be completed

#### 1. Baseline Prompt Testing

Select 5 user queries, for example:

- “Explain, What, Difference, where, how”

Run these prompts in a chat-based AI model and record the raw responses.

#### 2. Prompt Refinement

Rewrite each query by:

- Adding 5 contexts (school exams, competitive exams, real-life analogy, formula-based, step-by-step solving).
- Making tasks explicit (e.g., “Define probability and solve one simple numerical example.”).
- Breaking into subtasks (definition → formula → example → common mistakes).

**Prompt:**

**Code:**

#### Task-5:

What is probability in points.

1. Probability is a branch of mathematics that deals with the likelihood of events occurring.
2. It is expressed as a number between 0 and 1, where 0 indicates an impossible event and 1 indicates a certain event.
3. Probability can be calculated using the formula: Probability =  $(\text{Number of favorable outcomes}) / (\text{Total number of outcomes})$ .
4. Probability is used in various fields, including statistics, finance, and science, to make predictions and informed decisions.

Explain average in points.

1. Average, also known as the mean, is a measure of central tendency that represents the sum of a set of values divided by the number of values.
2. It provides a single value that summarizes the overall level of a dataset.
3. The formula for calculating the average is: Average =  $(\text{Sum of all values}) / (\text{Number of values})$ .
4. Average is commonly used in statistics, finance, and everyday life to analyze data and make comparisons.

Difference between speed and velocity in points.

1. Speed is a scalar quantity that refers to how fast an object is moving, while velocity is a vector quantity that includes both speed and direction of motion.
2. Speed is calculated as the distance traveled divided by the time taken, whereas velocity is calculated as the displacement divided by the time taken.
3. Speed is always a non-negative value, while velocity can be positive, negative, or zero depending on the direction of motion.
4. Speed does not provide information about the direction of movement, while velocity specifies the direction along with the magnitude.

How to solve time and work problems in points.

1. Time and work problems involve calculating the amount of work done by individuals or groups over a certain period.
2. To solve these problems, first determine the work rate of each individual or group, usually expressed as work done per unit of time (e.g., work/hour).
3. Use the formula: Work = Rate  $\times$  Time to find the total work done or the time taken to complete a task.
4. For combined work problems, add the individual work rates together to find the total work rate, and then use it to calculate the total time required to complete the work.

What is permutation in points?

1. Permutation is a mathematical concept that refers to the arrangement of objects in a specific order.
2. It is used to determine the number of possible arrangements of a set of items where the order matters.
3. The formula for calculating permutations of  $n$  items taken  $r$  at a time is:  $P(n, r) = n! / (n - r)!$ , where "!" denotes factorial.
4. Permutations are commonly used in combinatorics, probability, and statistics to solve problems related to arrangements and orderings.

\*\*Rewrote the prompts for prompt refinement:\*\*

What is probability in points for school exams.

1. Probability is the study of how likely an event is to happen.
2. It is represented as a number between 0 and 1, where 0 means the event cannot happen and 1 means it will definitely happen.
3. Probability can be calculated using the formula: Probability =  $(\text{Number of favorable outcomes}) / (\text{Total number of outcomes})$ .
4. Probability is used in everyday life to make predictions and decisions based on uncertain events.

Explain average in points for competitive exams.

1. Average, or mean, is a way to find the central value of a set of numbers.
2. It is calculated by adding all the numbers together and then dividing by how many numbers there are.
3. The formula for average is: Average =  $(\text{Sum of all values}) / (\text{Number of values})$ .
4. Average is useful in statistics and data analysis to summarize information and compare different datasets.

Difference between speed and velocity in points in real life analogy.

1. Speed tells you how fast something is moving, like how quickly a car is driving on a road.
2. Velocity tells you both how fast something is moving and in which direction, like a car going north at 60 miles per hour.
3. Speed is just a number (like 60 mph), while velocity includes direction (like 60 mph north).
4. Speed cannot be negative, but velocity can be negative if the object is moving in the opposite direction.

How to solve time and work problems in points in formula focus.

1. Time and work problems involve calculating how long it takes to complete a task based on the work done by individuals or groups.
2. To solve these problems, first find the work rate of each person or group, which is usually expressed as work done per unit of time (e.g., work/hour).
3. Use the formula: Work = Rate  $\times$  Time to calculate the total work done or the time taken to finish a task.
4. For combined work problems, add the individual work rates together to find the total work rate, and then use it to calculate the total time required to complete the work.

What is permutation in points in step by step focus.

1. Permutation is the arrangement of objects in a specific order where the order matters.
2. To calculate permutations, use the formula:  $P(n, r) = n! / (n - r)!$ , where  $n$  is the total number of items,  $r$  is the number of items to arrange, and "!" denotes factorial.
3. Factorial ( $n!$ ) is the product of all positive integers up to  $n$ :  $1 \times 2 \times 3 \times \dots \times (n - 1) \times n$ .
4. Permutations are used in various fields, including combinatorics, probability, and statistics, to solve problems related to arrangements and orderings.

## Output:

Parameter	Original AI Responses	Rewritten Prompts
Completeness	5	5
Accuracy	5	5
Relevance	5	5
Clarity	4	5

### Summary:

- **Completeness:** Both sets fully address each topic with all key points included.
- **Accuracy:** Both are factually correct and use appropriate mathematical/statistical terminology.
- **Relevance:** Both are relevant, but the rewritten prompts are more tailored to specific contexts (school, competitive exams, real-life, formula focus, step-by-step).
- **Clarity:** The rewritten prompts are clearer, with simpler language, analogies, and step-by-step explanations, making them easier to understand for their intended audience.

### Conclusion:

Both sets are strong, but the rewritten prompts are superior in clarity and contextual relevance, making them more effective for targeted learning and communication.

### Explanation:

These prompts are designed to test and reinforce understanding of fundamental concepts in mathematics and physics. Each prompt targets a specific topic, such as probability, averages, speed versus velocity, time and work

problems, and permutations. They encourage clear, structured, and focused responses, often used in exams or interviews. The prompts help learners practice explaining concepts concisely and accurately. Overall, they serve as effective tools for both teaching and self-assessment.