

LAB ASSIGNMENT - 03

Task 1: Conceptual Understanding in Physics

1. Baseline Prompt Testing

PROMPT:

I am a data assistant developer for an EdTech company that uses
I am going to ask queries related to introductory physics.
This is a baseline prompt testing. I am going to ask simple questions
with "Explain, What, Define, Why, What".
Give the raw responses



Got it.

For this baseline prompt testing:

- You will ask simple introductory physics questions using:
 - Explain
 - What
 - Define
 - Why

1. Why

Prompt: Why do objects fall towards the Earth?

Why do objects fall towards the Earth?

Objects fall towards the Earth because of gravity. Gravity is a force of attraction between masses. The Earth has a large mass, so it pulls objects toward its center. When an object is released, the gravitational force causes it to move downward toward the Earth.

2. Explain

Prompt: Explain Newton's First Law of Motion

Explain Newton's First Law of Motion



Newton's First Law of Motion states that an object will remain at rest or continue to move in a straight line with constant speed unless acted upon by an external force. This means that if no force is applied, a stationary object will stay still, and a moving object will not change its speed or direction. This tendency of an object to resist changes in its motion is called inertia.

3. Define

Prompt: Define Velocity

Define Velocity

Velocity is the rate of change of displacement with respect to time. It tells how fast an object is moving and in which direction. Velocity is a vector quantity because it has both magnitude and direction.

4. What

Prompt: What is Entropy?

What is Entropy?

Entropy is a measure of disorder or randomness in a system. It describes how spread out or disorganized energy or particles are. In thermodynamics, entropy of an isolated system tends to increase over time.

2. Prompt Refinement

PROMPT:

- 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).

Newton's First Law of Motion

1. Context: School Level

Prompt: Define Newton's First Law. Then explain it in simple words and give one daily-life example

Context: School Level

"Define Newton's First Law. Then explain it in simple words and give one daily-life example."

Raw Response:

Newton's First Law states that an object remains at rest or in uniform motion unless acted upon by an external force. It means objects do not change their motion on their own. For example, a book on a table stays still until someone pushes it.

2. Context: Competitive Exam

Prompt: State Newton's First Law, explain inertia, and give one example.

Context: Competitive Exam

"State Newton's First Law, explain inertia, and give one example."

Raw Response:

Newton's First Law says a body remains at rest or in uniform motion unless acted upon by an unbalanced force. Inertia is the tendency to resist change in motion. Example: A moving bus passenger falls forward when the bus stops suddenly.

3. **Context:** Real-Life Application

Prompt: Explain Newton's First Law using a real-life situation

Context: Real-Life Application

"Explain Newton's First Law using a real-life situation."

Raw Response:

Newton's First Law means objects continue their state of motion unless forced to change. For example, when a car stops suddenly, passengers move forward because their bodies try to keep moving.

4. **Context:** Mathematical Focus

Prompt: State Newton's First Law and relate it to net force = 0.

Context: Mathematical Focus

"State Newton's First Law and relate it to net force = 0."

Raw Response:

Newton's First Law states that when net force on an object is zero, it remains at rest or moves with constant velocity. This means no acceleration occurs if total force is zero.

5. **Context:** Conceptual Focus

Prompt: Explain the idea of inertia using Newton's First Law.

Context: Conceptual Focus

"Explain the idea of inertia using Newton's First Law."

Raw Response:

Newton's First Law shows that objects resist changes in motion. This resistance is called inertia. Heavier objects have more inertia.

3. Evaluate Outputs

Criteria:

- **Completeness** – covers definition, explanation, example as asked
- **Accuracy** – scientifically correct
- **Relevance** – matches the prompt and context
- **Clarity** – easy to understand, simple language

| Context | Completeness | Accuracy | Relevance | Clarity |
|-----------------------|--------------|----------|-----------|---------|
| School Level | 4 | 5 | 5 | 5 |
| Competitive Exam | 4 | 5 | 5 | 4 |
| Real-Life Application | 3 | 5 | 5 | 5 |
| Mathematical Focus | 3 | 5 | 5 | 4 |
| Conceptual Focus | 3 | 5 | 5 | 4 |

4. Reflection

- Contextual prompts changed the style and focus of answers based on the learner type, such as school, exam, or real life.
- Structured prompts made responses more complete by forcing definition, explanation, and example.
- Without structure, answers were accurate but often shallow or incomplete.
- Breaking prompts into steps improved clarity and flow.
Explicit tasks reduced missing information.
Overall, better prompts produced deeper and more useful answers.

TASK 2 : Programming Fundamentals (Python)

1. Baseline Prompt Testing

PROMPT:

I am a data assistant developer for an EdTech platform that supports beginner programming students. give raw responses without any optimization or high-level for the queries, such as:
What, Explain, How, What, Difference

Baseline Prompt Testing – Raw Responses

Common Queries and Raw Response:

1) What is a variable?

A variable is a name used to store a value in a program.

2) Explain loops.

Loops are used to repeat a block of code again and again until a condition is met.

3) How to print in Python?

Use the `print()` function to show output on the screen.

4) What is a function?

A function is a block of code that does a specific task and can be used many times.

5) Difference between for and while loop.

A for loop is used when the number of times is known, and a while loop is used when it is not known.

2. Prompt Refinement

Variable:

1. Beginner Context:

prompt: Define a variable, show syntax, give one example, and one use

Define a variable, show syntax, give one example, and one use

Variable

Definition:

A variable is a name given to a memory location that stores a value which can change during program execution.

Syntax (general form):

```
java
datatype variable_name = value;
```

Copy code

Example (in Python):

```
ini
age = 20
```

Copy code

Use:

Variables are used to store data so it can be reused, updated, and processed in a program. For example, storing a user's age to calculate eligibility for voting.

2. Exam-Oriented: prompt: Define variable and give one example

Define variable and give one example

Variable – Definition:

A variable is a name given to a memory location used to store a value that can change during program execution.

Example:

```
python
marks = 85
```

Copy code

3. Real-Life: prompt: Explain variable using real life

Explain variable using real life

A variable is like a container in real life that holds something, and the thing inside can change.

For example, think of a water bottle.

The bottle is the **variable**, and the water inside is the **value**.

- In the morning, the bottle may be full.
- After drinking, it becomes half.
- Later, you can refill it.

The bottle stays the same, but the amount of water changes—just like a variable keeps the same name, but its value can change.


4. Syntax-Focused:

prompt: Write variable syntax and example

Write variable syntax and example

Variable Syntax (general form):

java

 Copy code

```
datatype variable_name = value;
```

Example:

python

 Copy code

```
age = 18
```

5. Performance-Focused:

prompt: Explain variable use in large programs

Explain variable use in large programs.

In large programs, variables are very important because they help manage and organize a lot of data.

Uses of variables in large programs:

1. Store user data:

Variables store inputs like name, age, marks, login details, etc.

2. Control program flow:

Variables decide what the program should do, such as:

- If `score > 50`, show "Pass"
- Else show "Fail"

3. Reuse values:

Instead of writing the same number or text many times, a variable stores it once and is used everywhere.

4. Make programs readable:

Names like `totalMarks`, `salary`, `isLoggedIn` make code easy to understand.

5. Handle calculations:

Variables store results of calculations, like totals, averages, and percentages.

6. Work with many modules:

In big programs, different parts share data using variables.

3. Evaluate Outputs

| Context | Completeness | Accuracy | Relevance | Clarity |
|------------------|--------------|----------|-----------|---------|
| Baseline | 4 | 5 | 5 | 5 |
| Beginner Refined | 4 | 5 | 5 | 4 |
| Exam Oriented | 3 | 5 | 5 | 5 |
| Real life | 3 | 5 | 5 | 4 |
| Syntax-Focused | 3 | 5 | 5 | 4 |

4. Reflection

- Explicit subtasks force the model to follow a clear order: definition, syntax, example, and use case.
- This reduces missing steps and improves code correctness.
Structured prompts produce more complete and student-friendly answers.
- Without subtasks, responses stay short and shallow.
Overall, clear instructions greatly improve explanation quality and code usefulness.