

## Week 2 Assignment for Prompt Engineering: "Exploring Prompt Variability"

### Step 1 — Pick a task

Let's choose **"Summarizing a news article"** so we can clearly see differences between prompt styles. We'll pretend the "news article" is this short sample text:

#### Article for all prompts

NASA and NOAA have issued warnings about a powerful solar storm heading toward Earth later this week. Originating from a newly visible sunspot region, the solar flare—classified X2.7, the strongest of 2025 so far—has already caused radio blackouts over the Middle East. Authorities caution that the storm could disrupt satellite communications, GPS signals, and power grids.

At the same time, the solar maximum is underway—an 11-year cycle peak—and multiple sunspot regions are being monitored closely. While the storm may cause technological disturbances, people in higher latitudes may witness spectacular auroras.

#### 1. Concise Prompt

##### ➤ Prompt:

Summarize this news article in one sentence: [article above]

##### ➤ AI Response:

A powerful X2.7 solar flare from a new sunspot is heading toward Earth this week, potentially disrupting technology but creating auroras.

#### 2. Medium Prompt

##### ➤ Prompt:

Read the following news article and provide a short, clear summary highlighting the main event and potential effects: [article above]

##### ➤ AI Response:

NASA and NOAA have warned of the strongest solar flare of 2025, an X2.7 event from a new sunspot, which could impact satellites, GPS, and power grids later this week, while also creating auroras in northern regions.

#### 3. Detailed Prompt

##### Prompt:

Analyse the following news article and produce a 3–4 sentence summary that clearly states:

- I. The main event
- II. The cause of the event
- III. Potential impacts on technology and daily life

Also mention any positive or visually notable effects: [article above]

### ➤ **AI Response:**

NASA and NOAA report that a powerful X2.7 solar flare, the strongest so far in 2025, is expected to reach Earth later this week. The flare originated from a newly visible sunspot during the solar maximum peak. Experts warn it could disrupt satellite communications, GPS navigation, and power grids, and has already caused radio blackouts in parts of the Middle East. On the positive side, the storm may produce vivid auroras visible in higher latitudes.

### ➤ **Reflection**

The differences in prompt design produced noticeable variations in the AI's responses. The concise prompt generated a short, one-sentence answer that delivered the core message—storm arrival and possible effects—but lacked detailed context. This brevity could be useful for quick headlines but sacrifices nuance.

The medium prompt encouraged a fuller summary while keeping it compact. It included the flare's classification (X2.7), its origin, timing, and both the negative and positive outcomes. This balance made it more informative without overwhelming the reader.

The detailed prompt produced the richest and most structured response, explicitly addressing cause, effects, and the aurora's positive aspect. By guiding the AI with step-by-step instructions, the output was organized, thorough, and clear. However, it was also longer, making it less ideal for situations where brevity is critical.

This experiment confirms that more specific prompts yield more complete and organized results, while concise prompts are better for quick overviews. The medium style strikes a balance between clarity and efficiency, making it a versatile choice for general communication.

## Additional Tasks:

### Task 2: Design and Experiment Prompt Design Experiment:

-Select an AI model available to you for experimentation (e.g., GPT-3.5 or newer versions, if accessible). - Design a set of prompts that illustrate zero-shot, few-shot, and chain-of-thought techniques. Choose a complex topic or task for these prompts (e.g., solving a math problem, explaining a scientific concept, or providing advice on a niche topic).

#### ➤ Chosen Task

"Solve a multi-step math word problem"

#### ➤ Problem Statement:

**"A train leaves station A at 9:00 AM traveling at 60 km/h. Another train leaves station B at 10:00 AM traveling at 90 km/h towards station A. The distance between the two stations is 300 km. At what time will the two trains meet?"**

### Zero-Shot Prompt

#### ➤ Prompt:

"Solve this problem: A train leaves station A at 9:00 AM traveling at 60 km/h. Another train leaves station B at 10:00 AM traveling at 90 km/h towards station A. The distance between the two stations is 300 km. At what time will the two trains meet?"

### AI's Response (Zero-Shot):

The first train leaves at 9:00 AM. By 10:00 AM, it has travelled 60 km. The distance left is 240 km. At 10:00 AM, both trains move toward each other with a combined speed of 150 km/h (60 + 90).

They will meet in  $240 \div 150 = 1.6$  hours = 1 hour 36 minutes.

So, they meet at 11:36 AM.

### Analysis:

- ✚ Correct answer given.
- ✚ The reasoning was implicit but not detailed.
- ✚ Works well when the problem is clear, but the explanation is brief (less transparency).

## ➤ Few-Shot Prompt

### Prompt:

Here are some examples of how to solve similar problems

### Example 1:

A car leaves point X at 8:00 AM at 50 km/h. Another car leaves point Y at 9:00 AM at 70 km/h towards X. Distance = 240 km. By 9:00 AM, the first car travelled 50 km. Remaining distance = 190 km. Combined speed = 120 km/h.

Meeting time =  $190 \div 120 = 1.58$  hours  $\approx$  1 hour 35 minutes.




Meeting time = 10:35 AM.

- **Now solve this:** A train leaves station A at 9:00 AM traveling at 60 km/h. Another train leaves station B at 10:00 AM traveling at 90 km/h towards station A. The distance between the two stations is 300 km. At what time will the two trains meet?"

### ➤ AI's Response (Few-Shot):

By 10:00 AM, the first train has travelled 60 km. Remaining distance = 240 km. At 10:00 AM, both trains travel toward each other at 150 km/h. Time =  $240 \div 150 = 1.6$  hours = 1 hour 36 minutes. Meeting time = 11:36 AM.

### ➤ Analysis:

-  Correct again.
-  The explanation was better structured, clearly modelled after examples.
-  Few-shot improved clarity and reliability by guiding the reasoning style.

## Chain-of-Thought Prompt

### ➤ Prompt:

"Let's solve this step by step. Break the problem into smaller parts and explain your reasoning: A train leaves station A at 9:00 AM traveling at 60 km/h. Another train leaves station B at 10:00 AM traveling at 90 km/h towards station A. The distance between the two stations is 300 km. At what time will they meet?"

### ➤ AI's Response (Chain-of-Thought):

1. Train A leaves at 9:00 AM at 60 km/h.
2. By 10:00 AM, Train A has travelled 60 km.
3. Remaining distance =  $300 - 60 = 240$  km.
4. At 10:00 AM, Train B starts at 90 km/h while Train A continues at 60 km/h.
5. Relative speed =  $60 + 90 = 150$  km/h.
6. Time to cover 240 km =  $240 \div 150 = 1.6$  hours = 1 hour 36 minutes.
7. Add this to 10:00 AM → Meeting time = 11:36 AM.

- **Final Answer:** They meet at 11:36 AM.

### ➤ Analysis:

- ✚ Correct and very clear.
- ✚ Step-by-step reasoning improves transparency and reliability.
- ✚ Best suited for teaching or when accuracy is critical.
- ✚ Limitation: Longer responses, may be unnecessary for simple problems.

### ➤ Comparison of Prompting Techniques

Technique	Strengths	Limitations	Effectiveness
<b>Zero-Shot</b>	Quick, concise, often correct	Less explanation, risk of misinterpretation in harder problems	Good for straightforward queries
<b>Few-Shot</b>	Mimics style of given examples, improves clarity	Requires well-chosen examples	Very effective for structured reasoning tasks
<b>Chain-of-Thought</b>	Detailed step-by-step reasoning, transparent	Longer responses, might over-explain	Best for complex tasks needing full reasoning

### ➤ Conclusion

- ✚ Zero-shot works for simple well-defined problems but may lack depth.
- ✚ Few-shot helps the model align with expected reasoning format.
- ✚ Chain-of-thought is the most transparent and reliable for complex reasoning but can be verbose.