

# GEMINI 4 ARGON PROMPTING GUIDE

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A Complete Guide to Prompting, Long-Horizon  
Workflows, Strategies, Optimization, Strengths,  
Weaknesses and Practical Applications



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# Gemini 4 Argon Prompting Guide

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Steve Publications

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# **A Complete Guide to Prompting, Long-Horizon Workflows, Strategies, Optimization, Strengths, Weaknesses and Practical Applications**

This book is a practical, evidence-based handbook for designing prompts and building workflows with Gemini 4 Argon, Google DeepMind's frontier model announced on September 30, 2026. It is written for software engineers, knowledge workers, researchers, technical leaders and AI practitioners who need to get reliable results from this model on real work. You will find a systematic taxonomy of prompting approaches, worked examples for every major technique, long-horizon workflow patterns for tasks that stretch into hundreds of thousands of tokens, domain-specific strategies for coding, legal, financial and research work, cost and efficiency optimization methods and a complete framework for evaluating prompts. All date-sensitive claims are marked with the date of verification. The book assumes basic familiarity with large language models but requires no prior experience with Gemini 4 Argon.

# Introduction

On September 30, 2026, Google DeepMind announced Gemini 4 Argon as its “next era of frontier intelligence” [1]. The announcement made one change that stands out above all others: the model can now generate up to one million tokens in a single response, a sixteenfold increase from the sixty-four thousand token limit that constrained its predecessor [2]. That is not a marketing flourish. One million tokens of output is the difference between receiving a summary and receiving a complete codebase, an entire legal memo, a full research synthesis, or a multi-hundred-page technical document from a single prompt.

Most existing prompting advice was written for models capped at a few thousand tokens of output and optimized for conversational turn-taking. That advice does not transfer directly to Gemini 4 Argon. You cannot prompt this model the same way you prompt a chatbot. Doing so wastes tokens, invites hallucinations and leaves most of the model’s capability on the table.

This book is built on a single conviction: to get the best out of Gemini 4 Argon, you need to treat prompting as engineering, not as conversation. You need explicit structure, decomposed tasks, verification built into the prompt itself, careful management of context and cost-aware design. When those disciplines are applied systematically, the results justify the complexity.

Here is what you will know after reading this book:

- Exactly what Gemini 4 Argon can and cannot do based on official claims and independent evidence, with full transparency about where the evidence is thin or conflicting.
- The fundamental differences between casual chatbot prompting and prompt design for long-context, high-capability models like Argon.
- A complete taxonomy of prompting approaches, from direct queries to agentic workflows, with the mechanics, advantages, limitations and appropriate use cases for each.
- How to design prompts for long-horizon tasks that may require hundreds of thousands of tokens, including checkpoints, resumability, intermediate validation and failure recovery.

- Domain-specific prompting strategies for software engineering, legal analysis, financial research, literature synthesis, multimodal tasks and more.
- Practical cost and efficiency techniques, including caching, prompt compression, context reuse and deciding when deeper reasoning is actually worth the latency and expense.
- A systematic method for diagnosing poor responses and improving prompts rather than blindly retrying.
- A complete framework for prompt evaluation, including test case construction, quality metrics, cost tracking, versioning and regression testing.
- A growing library of reusable prompt templates and frameworks that you can adapt directly to your own work.

Every major technique in this book is illustrated with complete worked examples, not exercises or abstract descriptions. You will see exactly how to structure a prompt, line by line and understand why each component is there. Where Google's official claims diverge from independent evaluations, I will present both and explain the evidence. Where data is missing, I will say so instead of filling the gap with speculation.

The model's capabilities and availability are evolving quickly. All pricing, limits and access information in this book is verified as of October 3, 2026. I have dated every claim that is likely to change so you know when to recheck. The prompting principles themselves are more stable and will remain relevant even as the model evolves.

Let us start with what Gemini 4 Argon actually is.

# Chapter 1: What Is Gemini 4 Argon

Before we discuss how to prompt this model, we need to establish a shared understanding of what it is, what it can do and what evidence supports those claims. This chapter lays the factual groundwork for everything that follows.

## The Gemini Family and the Argon Release

Gemini is Google DeepMind’s family of large multimodal models, designed from the ground up to process text, images, audio, video and code. The family has evolved through multiple iterations, with different tiers optimized for different tradeoffs between capability, speed and cost [3].

Gemini 4 Argon sits at the top of this hierarchy as the flagship frontier model. It was announced on September 30, 2026, by Koray Kavukcuoglu, Google’s chief AI architect and co-founder of DeepMind [4]. The release followed a long period of anticipation and uncertainty: Google had been expected to launch Gemini 3.5 Pro throughout 2026, but that model was never released, with development focus shifting to Gemini 3.8 Flash as the public-facing workhorse while Argon was built separately [5].

The naming itself tells a story. “Argon” is not part of a numbered sequence. Google chose it as a codename that stuck, signaling a qualitative step rather than a minor increment. Argon was built specifically for what Google calls “deep reasoning across complex, long-horizon workflows” [6], targeting professional workloads in software engineering, legal and financial analysis, scientific research and cybersecurity defense.

The most striking technical feature is the output token limit. Prior Gemini models capped responses at sixty-four thousand tokens. Argon raises that ceiling to one million tokens, a change that fundamentally alters what the model can accomplish in a single turn [7]. This is not a context window increase; it is a generation limit increase. The distinction matters because most of the AI industry has spent the past year expanding how much models can read while leaving how much they can write relatively constrained.

## Official Capability Claims vs Independent Evidence

Google’s official announcement presents Argon as the company’s most capable model to date, with frontier performance across coding, reasoning, multimodal understanding and long-context tasks [8]. The claims are ambitious and need careful scrutiny.

Google published benchmark results comparing Argon against GPT-6 Astra from OpenAI and Claude Opus 5.5 from Anthropic across nineteen rows covering software engineering, knowledge work, cybersecurity, science, long-context and multimodal understanding [9]. According to this table:

- Argon leads outright in thirteen benchmarks
- It ties for first in one (CWE-bench v1, shared with GPT-6 Astra at sixty-eight percent)
- It trails in five benchmarks, notably FrontierSWE v2 and Terminal-bench 4.0, where GPT-6 Astra and Claude Opus 5.5 lead respectively

This scoreline is impressive but comes with important caveats that we should note from the start.

First, the benchmarks are self-reported by Google using their own evaluation methodology. Their published methodology page states that “all results are run with the Gemini API with the highest thinking settings unless indicated otherwise” [10]. This means Argon was running with extended reasoning computation, which improves accuracy but increases latency and token use. It is legitimate to run with the best settings available, but it means the reported scores represent the model’s peak capability under resource-intensive conditions, not the baseline experience a typical user would get without enabling deep reasoning.

Second, some benchmarks use non-standard evaluation protocols. The OSWorld-2.0 score, for example, is the maximum across three runs rather than a single-attempt result, which reduces variance but inflates the reported capability [11].

Third, independent evaluations of Argon are still scarce because the model is not widely available. As of October 3, 2026, Argon is accessible only through Google’s Fairwind Program, a restricted-access initiative for trusted cybersecurity defenders and government partners [12]. Without broader access, third-

party researchers and competitive analysts have not had the opportunity to run independent test suites under transparent conditions.

Where independent data does exist, the picture is generally positive but more nuanced than Google's marketing suggests. Vals AI, which runs enterprise-focused benchmarks across finance, law, coding and tax work, confirms Argon's first-place ranking on its Vals Index at sixty-eight point nine percent [13]. BenchLM lists Argon at rank ten of two hundred twelve models with an estimated score of seventy-seven point two two out of one hundred, though its evidence status is marked as "Estimated" rather than independently verified [14]. Artificial Analysis places Argon at fifty-three on its Intelligence Index, ranking it eighth of two hundred twenty-four models [15].

The consistent gap between Google's self-reported leadership claims and third-party composite rankings is instructive. It does not necessarily indicate dishonesty on Google's part: different benchmarks emphasize different capabilities and Argon may genuinely excel on the specific tasks Google chose to highlight. But it does mean we should treat Google's comparative claims as evidence of capability in specific domains rather than as proof of universal superiority.

## Context Window, Output Limits and Technical Specifications

Let us clarify the technical specifications because confusion here has already caused misunderstanding in the AI community.

**Output limit:** One million tokens. This is confirmed and is the headline feature. It means a single prompt can cause Argon to generate a response of up to one million tokens. For perspective, that is roughly seven hundred fifty thousand words, equivalent to a full-length novel or a several-hundred-page technical document. This is a generative capacity, not a memory capacity [16].

**Input context window:** Not officially disclosed. Google has not published a specific context window size for Gemini 4 Argon. The company has run long-context benchmarks like GraphWalks that test performance across two hundred fifty-six thousand tokens up to one million tokens of input and Argon scores eighty-four point two percent on those tasks [17]. This strongly suggests the model can handle inputs in the million-token range, but until Google explicitly states the limit, we should treat the exact number as uncertain. Some

third-party sources have speculated about two million tokens based on leaked information from earlier development stages, but that should be treated as rumor, not fact [18].

**Reasoning mode:** Argon uses an explicit reasoning mode that Google describes as “test-time compute” built into the model’s forward pass [19]. This is Google’s implementation of extended reasoning: the model performs additional computation internally before generating its response, trading latency and token use for improved accuracy on complex tasks. The “highest thinking settings” used in benchmark evaluations likely refer to the maximum level of this reasoning computation. Users should expect that enabling deeper reasoning will substantially increase both the time to receive a response and the token cost.

**Multimodal capabilities:** Argon accepts text and image inputs and produces text output. It is trained to handle video understanding, as evidenced by its ninety-one point seven percent score on LVBench, a long-video comprehension benchmark [20]. The model can analyze diagrams, screenshots, charts and other visual content as part of multimodal prompts. Video understanding appears to work through image sampling rather than direct video input, a detail we will explore in the multimodal prompting chapter.

**Tool use and function calling:** The Gemini API supports function calling with JSON Schema definitions and Argon inherits this capability. The model can make parallel and compositional tool calls, allowing it to orchestrate multiple external tools in a single turn. Best practice guidance from Google recommends limiting active tools to ten to twenty to avoid decision noise [21]. Argon also supports Remote MCP integration via Streamable HTTP, though not via Server-Sent Events [22].

**Parameter count and architecture:** Undisclosed. Google has not published the number of parameters in Argon or detailed architectural specifications beyond general descriptions of its reasoning architecture. This is consistent with Google’s approach to frontier models: the capability is exposed through the API, but the internals remain proprietary.

## Availability, Access and Pricing Landscape

Understanding how to access and pay for Argon is not just a logistical detail; it affects which prompting strategies are economically feasible.

Access status as of October 3, 2026:

1. Fairwind Program participants: Vetted cybersecurity defenders, government agencies and select Google Cloud customers have early access through Google's Fairwind Program, which launched in September 2026 with over six hundred fifty partners [23]. This is currently the only route to production access. Some Fairwind partners receive a "guardrail-free" version optimized for vulnerability research, meaning safety filters that might block security-related queries are relaxed [24].
2. Google AI Ultra subscribers: Broader rollout to paying subscribers of Google AI's Ultra tier is planned but has no confirmed date. Google stated rollout would happen "as soon as possible" after the initial Fairwind phase [25].
3. Paid API customers: API access for general commercial use is announced but not yet available. The model has not been added to the public Gemini API model list as of this writing [26].
4. Free tier: Argon is not available on any free tier. This is a frontier model priced accordingly.

Pricing (verified as of October 3, 2026):

Google announced introductory pricing at two dollars per million input tokens and ten dollars per million output tokens [27]. Cached input tokens receive a ninety-five percent discount, pricing at ten cents per million tokens [28].

This introductory pricing is explicitly temporary. Google has stated that standard pricing will be four dollars per million input tokens and twenty dollars per million output tokens, though no end date for the introductory period has been announced [29]. For long-term budgeting, you should plan around the four-twenty rate, not the two-ten rate.

The pricing structure reveals something important about how to think about using Argon. Output tokens cost five times more than input tokens. A million-token response at introductory pricing costs ten dollars. At standard pricing, it costs twenty dollars. A long-horizon workflow that generates several hundred thousand tokens can easily run to several dollars per execution. This makes cost-aware prompt design not optional but essential.

Let me put that in perspective with a concrete example. Suppose you ask Argon to analyze a fifty thousand token legal contract and produce a detailed

review. The input costs ten cents at introductory pricing or twenty cents at standard pricing. A thorough review that examines each clause might generate ten thousand tokens of output, costing ten cents at introductory pricing or twenty cents at standard pricing. Total cost for the full task: fifteen cents to forty cents. Now suppose you ask it to generate an entire software module from scratch, including documentation, tests and integration code. That could easily generate one hundred thousand tokens of output, costing one dollar at introductory pricing or two dollars at standard pricing. The output cost dominates.

This is why the one million token output limit is both an opportunity and a responsibility. It opens up workflows that were previously impossible, but using it indiscriminately will burn money.

## How to Interpret Early Reports and Benchmarks

Before moving on to how to prompt this model, let us establish some principles for interpreting the flood of claims, benchmarks and early user reports that surround any new frontier model launch.

Benchmarks measure specific things. When Google reports Argon scoring seventy-seven point nine percent on DeepSWE v1.1, that means Argon successfully completed seventy-seven point nine percent of the tasks in that specific benchmark suite under the specific conditions Google configured. It does not mean Argon will succeed on seventy-seven point nine percent of your software engineering tasks. It does not even guarantee success on seventy-seven point nine percent of future DeepSWE tasks, since individual task difficulty varies and model performance can degrade on out-of-distribution problems [30].

Self-reported benchmarks are optimization targets. There is nothing wrong with companies reporting results on benchmarks where their model performs well. But it is naive to assume that the benchmarks a company chooses to highlight tell the whole story. Google's nineteen-row table shows leadership in most categories while omitting benchmarks where Argon performs less strongly. The five benchmarks where Argon trails its competitors are still reported, which is good practice, but the fact that only nineteen benchmarks are shown out of potentially dozens is a curation choice, not a comprehensive survey.

Early user access is biased. The Fairwind Program participants are not a

random sample of users. They are vetted cybersecurity professionals and government partners who have passed Google's trust criteria. Their use cases are concentrated in security-related workloads. Their feedback will reflect that concentration. A model that performs excellently for vulnerability research might have quirks or limitations in other domains that Fairwind participants do not encounter.

The practical takeaway is straightforward: trust specific benchmark results as evidence of capability in specific domains, treat comparative claims with calibrated skepticism and when possible, run your own evaluations on tasks that resemble your actual work. The prompting strategies in this book are designed to help you get reliable results regardless of where Argon sits in the abstract rankings.

# Chapter 2: The Prompting Paradigm Shift

Most people who have used AI assistants approach prompting as conversation. You ask a question, the model answers, you refine, you iterate. This works fine for simple tasks and casual queries. It works poorly for complex professional workloads with Gemini 4 Argon.

The one million token output limit and deep reasoning capability demand a fundamentally different approach. In this chapter, I will explain why the old approach fails at scale and what to do instead.

## From Conversational Chats to Structured Workflows

Conversational prompting has three implicit assumptions:

1. The task fits in a single turn or a few exchanges.
2. The model can hold all relevant context in its attention.
3. You can inspect the output quickly and correct course if it goes wrong.

With Argon's capabilities, all three assumptions can break.

Consider a task like “analyze this two-hundred-page technical specification and produce a requirements document, design review and risk assessment.” Under a conversational approach, you might paste the spec, ask for an analysis and hope the result is coherent. The model might generate a partial response that cuts off at sixty-four thousand tokens, or it might drift between tasks, mixing requirements with risks, or it might hallucinate details that sound plausible but are not in the source.

A structured workflow approach treats the prompt as a specification. You define the role, the objective, the input, the output format, the constraints and the verification criteria before the model generates a single token. You might decompose the task into phases: first extract requirements, then review design

implications, then assess risks, with explicit transitions and validation steps. The prompt becomes an executable document, not a casual request.

This shift matters because Argon is capable of following complex instructions and maintaining coherence over very long outputs. If you give it vague instructions, it will confidently generate a long, well-written response to the wrong question. The model's verbosity is not a bug; it is a feature. But a feature that amplifies your instructions also amplifies your mistakes.

## What Changes When You Have Long Context and Deep Reasoning

Long context and deep reasoning change the economics and mechanics of prompting in ways that are not immediately obvious.

With short-context models, you had to be extremely selective about what information to include. You summarized, you extracted, you prioritized the essentials. With Argon's million-token context capability, the temptation is to dump everything: entire codebases, full document libraries, every email and meeting note. This is the "context dump" anti-pattern and it fails not because the model cannot handle the volume, but because relevance and priority become harder to maintain.

Research on LLM position bias shows that information in the middle of a long prompt is less likely to be used than information at the beginning or end, with accuracy drops exceeding thirty percent for mid-context instructions [31]. This "lost in the middle" effect means that simply providing more context does not linearly improve performance. You still need to organize information carefully, placing critical instructions at the start and end, using clear section headers and explicitly marking what is essential versus supplementary.

Deep reasoning compounds this effect. When Argon is running with extended reasoning enabled, it is doing additional internal computation before generating each token. This improves accuracy on hard problems but makes the model more sensitive to instruction quality. A vague or contradictory prompt will not produce a better result with more reasoning; it will produce a more elaborate bad result.

The practical implication: with more capability, prompt engineering becomes more important, not less. The margin for sloppy prompts shrinks.

## Token Budgeting as a First-Class Design Constraint

Let us be explicit about something that many practitioners treat as an afterthought: token consumption is a design constraint and you need to budget for it.

Every token you send as input costs money. Every token the model generates as output costs more money. Deep reasoning consumes additional tokens internally, further increasing cost and latency. If you design prompts without considering these costs, you will find that technically feasible workflows are economically impractical.

Here is a simple token budgeting framework:

1. Estimate input tokens: How many tokens of context, instructions and examples will you provide? Include system instructions, document content, code and any multimodal inputs converted to tokens.
2. Estimate output tokens: Based on the task, how many tokens of output do you expect? A brief summary might be five hundred tokens. A detailed analysis might be ten thousand. A full codebase generation might be one hundred thousand or more.
3. Calculate cost: At current pricing, multiply input tokens by two dollars per million (or four dollars for long-term planning) and output tokens by ten dollars per million (or twenty dollars). Add a buffer for reasoning tokens.
4. Decide if it is worth it: Does the value of the output justify the cost? If not, can you reduce input tokens through better organization, reduce output tokens through tighter constraints, or use a cheaper model for simpler phases of the work?

This framework is not about penny-pinching. It is about making explicit tradeoffs. Sometimes the right answer is to spend fifty dollars on a single prompt that would have taken a consultant two weeks. Sometimes the right answer is to use a cheaper model or a more constrained prompt.

## Latency, Cost and Quality Tradeoffs

Three dimensions matter for every prompt:

1. Latency: How long does it take to get a response?
2. Cost: How much does the prompt execution cost?
3. Quality: How good is the output?

You cannot maximize all three simultaneously. Deeper reasoning improves quality but increases latency and cost. Longer outputs cost more and take longer. More context improves accuracy on some tasks but increases cost and may dilute instruction clarity.

The trick is to understand which dimension matters most for your specific use case and optimize for that.

For interactive tasks where a user is waiting, latency matters most. You might accept slightly lower quality to get a response in ten seconds instead of two minutes. For batch processing overnight, latency matters less and you can afford deeper reasoning and longer outputs. For production-critical decisions, quality matters most and you should spend whatever it takes, including multiple verification passes.

A practical heuristic: use the minimum level of reasoning and context needed to get acceptable quality, then iterate upward only if quality is insufficient. Do not start at maximum reasoning for every task. That is wasteful and slow.

## The Prompt as a Spec, Not a Conversation

This is the core principle of this chapter and it will guide everything that follows:

Treat every prompt to Gemini 4 Argon as a specification document, not as a conversational turn.

A specification document has clear objectives, explicit constraints, defined inputs and outputs, success criteria and edge case handling. A conversational turn assumes context, tolerates ambiguity and relies on clarification. When you give Argon a conversational prompt for a complex task, you are asking it to fill in all the blanks itself. It will, but not necessarily in the way you want.

The rest of this book will show you, in concrete detail, how to write prompts that function as specifications. We will cover every component: role definition, objective statements, context organization, constraints, output formatting,

verification requirements, error handling and more. Each chapter builds on this principle.

In the next chapter, we will examine the technical model of how Argon processes prompts, including system instructions, tool definitions and multimodal inputs. Understanding the plumbing is essential before we build sophisticated architectures on top of it.

# Chapter 3: The Gemini 4 Argon Prompting Model

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## System Instructions and Role Framing

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## User Message Structure and Content Types

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## Tool Definitions and Function Calling

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## Context Caching Mechanics

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# Chapter 4: Prompt Architecture

## Fundamentals

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### Role Definition and Persona Specification

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### Objective Statements and Success Criteria

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### Context Organization and Prioritization

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### Constraints, Rules and Priorities

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### Output Specifications and Formatting Requirements

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## Putting It All Together: A Complete Prompt Architecture

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# Chapter 5: Task Decomposition and Planning-First Prompting

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## When to Decompose vs When to Go Direct

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## Planning-First Prompt Patterns

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## Multi-Step Execution with Validation Gates

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## Handling Dependencies Between Steps

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## Milestone Definition and Intermediate Checkpoints

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# Chapter 6: Long-Horizon Prompting and Extended Workflows

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## Defining Long-Horizon Tasks and Success Criteria

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## Working-State Checkpoints and Resumability

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## Context Management for Extended Work

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## Intermediate Validation and Quality Gates

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## Failure Recovery and Interruption Handling

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# Chapter 7: Iterative Refinement and Critique-and-Revise Workflows

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## One-Shot vs Iterative: When Each Wins

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## Structured Critique Prompts

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## Revision Loops with Escalating Precision

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## Accumulating Feedback Across Turns

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# Chapter 8: Verification-Driven and Self-Checking Prompts

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## Self-Verification and Self-Critique Patterns

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## Source Citation and Attribution Requirements

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## Fact-Checking Within Prompts

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## Handling Conflicting Information

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## Uncertainty Expression and Escalation

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# Chapter 9: Document Synthesis and Large-Context Workflows

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## Structuring Large Document Inputs

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## Context Overload Prevention

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## Reference and Citation in Outputs

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## Cross-Document Synthesis Prompts

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## Working with Heterogeneous Document Types

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## Code Review Prompt Patterns

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# Chapter 11: Research and Literature Synthesis

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## Combined Text-Image Reasoning

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## Limitations and Reliability in Multimodal Work

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# Chapter 14: Agentic Workflow Prompting

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## Defining Agent Roles and Boundaries

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## Tool Use Instructions and Fallback Behaviors

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## Safety Guardrails for Autonomous Agents

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## Input Token Economics and Prompt Compression

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## Output Limit Management and Chunking

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# Chapter 16: Prompt Engineering

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### Vague Objectives and Missing Success Criteria

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### Excessive Instructions and Contradictory Requirements

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## Poorly Defined Roles

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## Weak Source Requirements

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## Failure to Distinguish Facts from Inference

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## Excessive Dependence on Chain-of-Thought-Style Requests

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## Token Waste and Latency Bloat

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# Chapter 17: Diagnosing and Fixing Poor Responses

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## Root-Cause Analysis of Prompt Failures

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## Iterative Improvement Methodology

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## Ablation Testing for Prompt Components

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## Building a Feedback Loop Around Prompts

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# Chapter 18: Prompt Evaluation and Benchmarking

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## Defining Task Success Criteria

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## Controlled Comparison and Versioning

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# Chapter 19: Reliability Engineering for Prompts

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## Adversarial Inputs and Prompt Injection Defense

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## Instruction Hierarchy and Priority Enforcement

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## Monitoring and Alerting for Prompt Degradation

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# Chapter 20: Building a Prompt Library and Knowledge Base

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## Prompt Library Architecture

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## Version Control and Change Management

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# Chapter 21: Strengths, Weaknesses and Honest Assessment

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# Conclusion: The Path Forward

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