GCSE PHYSICS

100 AI PROMPTS

for Smarter Revision *and* Exam Prep

Active recall, exam technique, and mark-scheme thinking — without cheating.

by James R. Martin

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The author has made use of artificial intelligence tools to assist with drafting, structuring, and generating example material. All educational guidance, explanations, and exam-related advice have been reviewed, edited, and curated by the author. Any resemblance to specific published materials is unintentional.

This book is intended to support revision and exam preparation. It does not replace formal teaching, textbooks, or official specifications. Students are responsible for ensuring that all work submitted for assessment is their own.

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How to Use This Book

For a long time, high-quality tutoring has been a major contributor to elite academic achievement. Used well, AI can now act as a powerful tutor that most students and parents could not previously afford.

This book is a **starting point**, not a rulebook. Each prompt is designed to help you revise, test your understanding, and think more clearly — not to give perfect answers. You are encouraged to **adapt, improve, and remix** these prompts.

You are learning how to think carefully about the questions you ask — a skill that will matter far beyond these exams.

Note on Exam Boards and Syllabi

This book is designed to support GCSE Physics across all major UK exam boards, including AQA, Edexcel, and OCR.

Although specifications vary slightly in structure and required practical wording, the core physics content is highly consistent across boards. All GCSE Physics courses assess fundamental principles such as forces and motion, energy transfers, electricity and circuits, waves, and atomic structure.

Students are expected to:

- Apply key equations accurately (for example, $F=ma$, $V=IR$, $E=mc\Delta T$, $v=f\lambda$)
- Use correct scientific terminology such as resultant force, potential difference, half-life, specific heat capacity, and frequency
- Interpret graphs and experimental data
- Explain cause-and-effect relationships clearly
- Demonstrate mathematical fluency in rearranging formulae and calculating with appropriate units

Assessment across exam boards places strong emphasis on:

- Structured calculation
- Clear explanation of physical processes
- Understanding required practical investigations
- Accurate use of units and significant figures
- Linking conceptual understanding with quantitative reasoning

The prompts in this book therefore focus on:

- Secure recall of core principles

- Correct application of physics equations
- Diagnostic identification of misconceptions
- Exam-style explanation and calculation practice
- Interpretation of data and evaluation of practical methods

Students should always check their own specification for precise wording, required practical details, and formula sheet expectations. This book is designed to complement official materials, not replace them.

Contents

Section 1

Core Principles and Quantitative Recall

GCSE Physics rewards students who can recall key principles quickly and apply them accurately.

Before tackling extended explanations or multi-step problems, you must be secure with the foundations:

- Newton's Laws of Motion
- Resultant force and acceleration
- Energy stores and energy transfers
- Work done and efficiency
- Current, potential difference, and resistance
- Wave properties such as frequency, wavelength, and wave speed
- Radioactive decay and half-life

You must also be confident using core equations, including:

- $F=ma$
- $E=mc\Delta T$
- $V=IR$
- $v=f\lambda$
- $p=mv$

These equations are not just formulas to memorise. They describe physical relationships between quantities. Strong students understand what each symbol represents, what the units mean, and how changing one variable affects another.

The prompts in this section are designed to:

- Strengthen rapid recall of definitions and principles
- Reinforce correct use of scientific terminology

- Build fluency in selecting and applying equations
- Identify weak areas in mechanics, energy, electricity, waves, and atomic structure
- Increase confidence in quantitative reasoning

Use this section little and often.

Answer from memory. State units clearly. Check whether your explanation matches the physics model.

If you hesitate, that is useful information. If you make mistakes, that is useful information.

Physics is cumulative. Secure foundations make complex problems manageable.

This section builds those foundations deliberately and systematically.

Prompt 1: Newton's Laws Recall

Copy this prompt into your AI tool:

Test me on Newton's First, Second, and Third Laws of Motion. Ask short recall questions about resultant force, inertia, and acceleration. Include at least one question requiring me to apply F=ma. Do not explain unless I ask.

What this helps you practise:

Rapid recall of mechanics foundations.

How to use it well:

State definitions clearly and include units (N, kg, m/s^2).

Prompt 2: Resultant Force and Free-Body Diagrams

Copy this prompt into your AI tool:

Describe a physical situation involving forces. Ask me to identify all forces acting and determine the resultant force. Include at least one example requiring a free-body diagram explanation.

What this helps you practise:

Understanding balanced and unbalanced forces.

How to use it well:

Name each force precisely (e.g., weight, normal contact force, friction).

Prompt 3: Energy Stores and Transfers

Copy this prompt into your AI tool:

Test me on energy stores and energy transfer pathways (kinetic, gravitational potential, thermal, chemical, elastic). Ask me to explain how energy is transferred in real-world scenarios.

What this helps you practise:

Using correct energy terminology.

How to use it well:
Avoid saying “energy is lost” — explain how it is transferred.

Prompt 4: Work Done, Power, and Efficiency
Copy this prompt into your AI tool:
Test me on work done, power, and efficiency. Include recall of the equations W=Fd, P=E/t, and efficiency calculations. Ask at least one calculation question.
What this helps you practise:
Linking force, energy, and time.
How to use it well:
Write the formula before substituting values.

Prompt 5: Ohm’s Law and Circuits
Copy this prompt into your AI tool:
Test me on current, potential difference, resistance, and Ohm’s Law. Include questions on series and parallel circuits and require use of V=IR.
What this helps you practise:
Core electricity principles.
How to use it well:
State units clearly (A, V, Ω).

Prompt 6: Wave Properties and Wave Speed
Copy this prompt into your AI tool:
Test me on transverse and longitudinal waves. Include questions requiring use of $v=f\lambda$ and definitions of frequency, wavelength, and amplitude.
What this helps you practise:
Wave terminology and calculation fluency.
How to use it well:
Explain what each symbol represents physically.

Prompt 7: Momentum and Collisions
Copy this prompt into your AI tool:

Test me on momentum and conservation of momentum. Include recall of p=mv and at least one collision scenario.

What this helps you practise:

Understanding momentum as a conserved quantity.

How to use it well:

State momentum with correct units (kg·m/s).

Prompt 8: Specific Heat Capacity

Copy this prompt into your AI tool:

Test me on specific heat capacity. Include conceptual questions and one calculation using $E=mc\Delta T$.

What this helps you practise:

Linking thermal energy to temperature change.

How to use it well:

Identify what each symbol represents before calculating.

Prompt 9: Radioactivity and Half-Life

Copy this prompt into your AI tool:

Test me on radioactive decay, half-life, isotopes, and activity. Include questions requiring interpretation of a decay graph.

What this helps you practise:

Understanding nuclear physics basics.

How to use it well:

Distinguish clearly between activity and half-life.

Prompt 10: Mixed Quantitative Recall

Copy this prompt into your AI tool:

Test me across mechanics, energy, electricity, waves, and atomic structure in random order. Include short calculations and definition recall.

What this helps you practise:

Switching between core physics domains.

How to use it well:
Answer from memory and check units every time.

Prompt 11: Acceleration and Motion Graphs
Copy this prompt into your AI tool:
Test me on acceleration, velocity, and motion graphs. Include interpretation of distance–time and velocity–time graphs. Ask at least one question requiring identification of gradient or area under a graph.
What this helps you practise:
Understanding motion relationships and graphical interpretation.
How to use it well:
State what the gradient or area represents physically.

Prompt 12: Mass vs Weight
Copy this prompt into your AI tool:
Test me on the difference between mass and weight. Include recall of W=mg and conceptual questions about gravitational field strength.
What this helps you practise:
Distinguishing between related but different quantities.
How to use it well:
State units clearly (kg vs N).

Prompt 13: Energy Conservation
Copy this prompt into your AI tool:
Give me scenarios involving gravitational potential energy and kinetic energy. Ask me to apply conservation of energy and use Ep=mgh and Ek=1/2mv^2.
What this helps you practise:
Energy transfer and conservation reasoning.

How to use it well:
Explain how energy is transferred between stores.

Prompt 14: Resistance and Power Dissipation
Copy this prompt into your AI tool:
Test me on resistance and electrical power. Include questions using P=IV and P=I^2R. Ask me to explain how increasing resistance affects power and thermal energy transfer.
What this helps you practise:
Linking current, resistance, and power.
How to use it well:
Connect calculations to physical consequences.

Prompt 15: Wave Behaviour
Copy this prompt into your AI tool:
Test me on reflection, refraction, and the electromagnetic spectrum. Include conceptual questions about wave speed and energy in EM waves.
What this helps you practise:
Understanding wave interactions and EM properties.
How to use it well:
Distinguish between frequency and wave speed.

Prompt 16: Radioactive Decay Graphs
Copy this prompt into your AI tool:
Provide a decay graph. Ask me to determine half-life and explain the shape of the curve using exponential decay principles.
What this helps you practise:
Interpreting nuclear decay data.
How to use it well:
Explain why activity decreases over time.

Prompt 17: Density and Pressure
Copy this prompt into your AI tool:

Test me on density and pressure. Include recall of $\rho=mV$ and $P=F/A$, and require at least one calculation.

What this helps you practise:

Understanding material properties and force distribution.

How to use it well:

Check units carefully (kg/m³, Pa).

Prompt 18: Terminal Velocity

Copy this prompt into your AI tool:

Describe a falling object scenario. Ask me to explain how forces change as the object approaches terminal velocity.

What this helps you practise:

Applying resultant force reasoning.

How to use it well:

Refer explicitly to balanced forces.

Prompt 19: Conservation of Momentum

Copy this prompt into your AI tool:

Give me a collision scenario. Ask me to apply conservation of momentum and solve using $p=mv$.

What this helps you practise:

Multi-object momentum reasoning.

How to use it well:

State the total momentum before and after.

Prompt 20: Equation Selection Challenge

Copy this prompt into your AI tool:

Give me mixed GCSE Physics problems without naming the equation required. Ask me to identify the correct equation before solving.

What this helps you practise:

Selecting appropriate formulae independently.

How to use it well:

Write the formula before calculating.

Prompt 21: Unit and Significant Figure Check

Copy this prompt into your AI tool:

Test me on short calculation questions. After I answer, check my units and significant figures carefully.

What this helps you practise:

Avoiding avoidable calculation mark losses.

How to use it well:

Always include units in your final answer.

Prompt 22: Section 1 Diagnostic Review

Copy this prompt into your AI tool:

Review my recent answers across mechanics, energy, electricity, waves, and atomic physics. Identify:

1. *Weak equation recall*
2. *Unit errors*
3. *Misconceptions about force or energy*
4. *One priority topic to revise next*

What this helps you practise:

Targeted refinement before moving on.

How to use it well:

Write down recurring weaknesses and revisit them deliberately.

Section 2

Misconceptions in Mechanics and Energy Transfer

Many marks in GCSE Physics are lost not because students fail to revise, but because they hold small but persistent misunderstandings about how physical systems behave.

Physics often appears intuitive — but many intuitive ideas are incorrect.

Common misconceptions include:

- Believing a constant force is needed to keep an object moving at constant velocity
- Confusing weight with mass
- Assuming current is “used up” in a circuit
- Thinking energy is lost rather than transferred
- Misinterpreting the relationship between potential difference and current
- Confusing speed with acceleration
- Misunderstanding half-life and radioactive decay

These errors are subtle. They feel reasonable — until tested carefully.

The prompts in this section are designed to:

- Expose incorrect mental models in mechanics
- Clarify force interactions using Newton’s Laws
- Strengthen understanding of energy conservation and efficiency
- Correct misunderstandings in series and parallel circuits
- Refine interpretation of wave behaviour and electromagnetic radiation
- Rebuild accurate models of atomic structure and nuclear processes

You will be asked to:

- Identify incorrect reasoning
- Diagnose the misconception behind an error
- Rewrite flawed explanations
- Justify corrections using physics principles
- Think like an examiner

Treat each misconception as useful feedback.

When you correct an error in your thinking about:

- Resultant force
- Acceleration
- Energy transfer pathways
- Resistance and potential difference
- Wave speed relationships
- Decay equations

you strengthen the physical model in your mind.

Physics understanding improves not by memorising more, but by correcting flawed reasoning.

This section is designed to refine your mental models so that they align with real physical behaviour.

Prompt 23: Force and Motion Misconception

Copy this prompt into your AI tool:

Present a scenario involving an object moving at constant velocity. Ask me whether a resultant force is required to keep it moving. Challenge any incorrect reasoning using Newton's First Law.

What this helps you practise:

Correcting the "force is needed to keep motion" misconception.

Prompt 24: Mass vs Weight Confusion

Copy this prompt into your AI tool:

Give statements that confuse mass and weight. Ask me to identify and correct each one using W=mg.

What this helps you practise:

Distinguishing gravitational force from mass.

Prompt 25: Heavier Objects Fall Faster?

Copy this prompt into your AI tool:

Ask whether a heavier object falls faster than a lighter object. Require explanation using gravitational field strength and air resistance.

What this helps you practise:

Correcting intuitive but incorrect reasoning.

Prompt 26: Energy "Lost" vs Transferred

Copy this prompt into your AI tool:

Provide statements claiming energy is "lost" in friction or collisions. Ask me to rewrite them using the correct idea of energy transfer pathways.

What this helps you practise:

Accurate energy store terminology.

Prompt 27: Current Is Used Up

Copy this prompt into your AI tool:

Present a series circuit scenario. Ask whether current is "used up" by components. Require explanation using charge flow and conservation of charge.

What this helps you practise:

Correct understanding of electric current.

Prompt 28: Voltage vs Current Confusion

Copy this prompt into your AI tool:

Provide incorrect explanations mixing up potential difference and current. Ask me to correct them using Ohm's Law.

What this helps you practise:

Separating electrical quantities clearly.

Prompt 29: Speed vs Acceleration

Copy this prompt into your AI tool:

Give scenarios where speed and acceleration are confused. Ask me to diagnose the error and explain using definitions.

What this helps you practise:

Clarifying rate of change vs value.

Prompt 30: Terminal Velocity Misunderstanding

Copy this prompt into your AI tool:

Describe a falling object reaching terminal velocity. Ask me to explain why acceleration becomes zero even though the object is still moving.

What this helps you practise:

Understanding balanced forces in motion.

Prompt 31: Efficiency Misconception

Copy this prompt into your AI tool:

Provide statements implying 100% efficiency is always possible. Ask me to explain why energy transfers to thermal energy reduce efficiency.

What this helps you practise:
Realistic understanding of energy systems.

Prompt 32: Wave Speed Misinterpretation
Copy this prompt into your AI tool:
Present a statement claiming frequency changes when a wave enters a new medium. Ask me to correct it using wave principles.
What this helps you practise:
Clarifying constant frequency behaviour.

Prompt 33: Half-Life Confusion
Copy this prompt into your AI tool:
Provide a decay graph and incorrect interpretations of half-life. Ask me to correct them.
What this helps you practise:
Understanding exponential decay.

Prompt 34: Power vs Energy
Copy this prompt into your AI tool:
Give incorrect statements confusing power and energy. Ask me to correct them using P=E/t.
What this helps you practise:
Distinguishing rate from total transfer.

Prompt 35: Resultant Force Errors
Copy this prompt into your AI tool:
Present a free-body diagram with incorrect resultant force reasoning. Ask me to identify the mistake and correct it.
What this helps you practise:
Diagnosing force modelling errors.

Prompt 36: Section 2 Diagnostic Reflection
Copy this prompt into your AI tool:
Ask me to summarise three misconceptions I previously held about:

1. *Forces*
2. *Energy*
3. *Circuits*

Then test whether I have corrected them.

What this helps you practise:

Rebuilding accurate physical models.

Section 3

Processes, Models, and Diagrams in Physics

Physics is built on models.

Equations describe relationships, but diagrams and structured explanations help you visualise what is happening in a system.

At GCSE level, many questions require you to interpret or construct:

- Free-body diagrams showing balanced and unbalanced forces
- Circuit diagrams using standard symbols
- Ray diagrams for reflection and refraction
- Wave diagrams showing wavelength, amplitude, and direction
- Energy transfer pathway diagrams
- Decay curves and half-life graphs
- Velocity–time and distance–time graphs

Strong students do not simply recognise these diagrams — they understand what each arrow, line, and symbol represents physically.

In this section, you will practise:

- Explaining physical processes step by step
- Translating diagrams into clear written explanations
- Identifying missing steps in a physical sequence
- Linking graphical patterns to underlying physics principles
- Describing how changing one variable affects the system

For example:

- Why does increasing resultant force change acceleration?
- How does increasing resistance affect current in a series circuit?
- Why does wave speed remain constant in a given medium?
- What does the gradient of a velocity–time graph represent physically?

Physics rewards precise cause-and-effect reasoning.

When you describe a process, you must:

- State what changes
- Explain why it changes
- Link that change to a physical principle
- Use correct terminology

Diagrams are not decorative — they are representations of physical behaviour.

This section will strengthen your ability to move confidently between:

Equation → Diagram → Explanation → Graph

That flexibility is essential for higher marks.

Prompt 37: Free-Body Diagram Interpretation

Copy this prompt into your AI tool:

Describe a physical situation involving forces (e.g., a car braking or an object on a slope). Ask me to describe the correct free-body diagram and explain the resultant force.

What this helps you practise:

Linking forces to motion models.

Prompt 38: Velocity–Time Graph Analysis

Copy this prompt into your AI tool:

Provide a velocity–time graph. Ask me to interpret acceleration, identify periods of constant velocity, and calculate distance travelled using the area under the graph.

What this helps you practise:

Graph interpretation and physical meaning.

Prompt 39: Distance–Time Graph Modelling

Copy this prompt into your AI tool:

Provide a distance–time graph and ask me to explain what is happening physically at different sections of the graph.

What this helps you practise:

Understanding gradient as speed.

Prompt 40: Energy Transfer Pathway Diagram

Copy this prompt into your AI tool:

Describe a system (e.g., a falling object or electrical appliance). Ask me to outline the energy stores involved and the transfer pathways between them.

What this helps you practise:

Structured explanation of energy systems.

Prompt 41: Circuit Diagram Reasoning

Copy this prompt into your AI tool:

Describe a series or parallel circuit using standard symbols. Ask me to explain how current and potential difference behave in the circuit.

What this helps you practise:

Applying circuit models.

Prompt 42: Current–Voltage Graph Interpretation

Copy this prompt into your AI tool:

Provide a current–voltage graph for a filament lamp or resistor. Ask me to interpret the shape of the graph and explain the underlying physical reason.

What this helps you practise:

Linking graphical shape to resistance behaviour.

Prompt 43: Wave Diagram Interpretation

Copy this prompt into your AI tool:

Describe a transverse wave diagram. Ask me to identify wavelength, amplitude, and frequency, and explain how wave speed relates to these quantities.

What this helps you practise:

Visual understanding of wave properties.

Prompt 44: Ray Diagram Explanation

Copy this prompt into your AI tool:

Describe a reflection or refraction scenario. Ask me to explain what happens to the ray using angle terminology.

What this helps you practise:

Optical modelling using correct terms.

Prompt 45: Decay Curve Interpretation

Copy this prompt into your AI tool:

Provide a radioactive decay graph. Ask me to determine half-life and explain why the curve is exponential.

What this helps you practise:
Graphical interpretation of nuclear processes.

Prompt 46: Force–Time Graph Analysis
Copy this prompt into your AI tool:
Provide a force–time graph. Ask me to interpret what the area under the graph represents and link it to change in momentum.
What this helps you practise:
Understanding impulse and momentum change.

Prompt 47: Multi-Representation Translation
Copy this prompt into your AI tool:
Give me a physics scenario and require me to:
1. *Describe it in words*
2. *Sketch the relevant diagram*
3. *Identify the equation involved*
4. *Explain the physical reasoning*

What this helps you practise:
Moving between models and equations.

Prompt 48: Section 3 Integration Check
Copy this prompt into your AI tool:
Test me on:
- *One motion graph*
- *One circuit diagram*
- *One energy transfer system*
- *One decay graph*

Require both explanation and calculation where appropriate.
What this helps you practise:
Flexible modelling across topics.

Section 4

Equations, Units, and Quantitative Application

GCSE Physics is a mathematical science.

A significant proportion of marks are awarded for correctly selecting, rearranging, and applying equations. Strong students are confident not only in calculation, but in understanding what each equation represents physically.

Success depends on more than remembering formulas. You must:

- Identify the correct equation
- Rearrange it accurately
- Substitute values carefully
- Include correct units
- Use appropriate significant figures
- Interpret the physical meaning of the result

For example:

- What does a large gradient on a velocity–time graph represent?
- Why does doubling mass affect kinetic energy differently from doubling speed?
- How does resistance influence current in different circuit arrangements?

In this section, you will practise:

- Rearranging multi-variable equations
- Checking dimensional consistency
- Applying proportional reasoning
- Avoiding common calculation traps
- Interpreting numerical answers physically

Physics calculations are not isolated mathematics exercises. They describe real behaviour in physical systems.

If your final answer is unreasonable — for example, a negative resistance or an impossible speed — that signals an error in method.

Strong students:

Write the formula first.
Substitute clearly.
Include units throughout.
Check whether the answer makes physical sense.

This section strengthens the mathematical precision required for high performance in GCSE Physics.

Prompt 49: Formula Selection Drill

Copy this prompt into your AI tool:

Give me mixed GCSE Physics problems involving forces, energy, electricity, waves, and density. Do not tell me which equation to use. Require me to identify the correct formula before calculating.

What this helps you practise:

Independent equation selection.

Prompt 50: Rearranging Multi-Variable Equations

Copy this prompt into your AI tool:

Give me equations such as $F=ma$, $V=IR$, and $E=mc\Delta T$. Ask me to rearrange each formula to make a different variable the subject.

What this helps you practise:

Algebraic fluency in physics contexts.

Prompt 51: Units and Dimensional Awareness

Copy this prompt into your AI tool:

Give me calculation questions and ask me to state the correct units at each step. Challenge me if I omit units.

What this helps you practise:

Avoiding unit-related mark loss.

Prompt 52: Significant Figures and Precision

Copy this prompt into your AI tool:

Provide calculation problems and require answers to appropriate significant figures based on the data given.

What this helps you practise:

Numerical precision under exam conditions.

Prompt 53: Proportional Reasoning

Copy this prompt into your AI tool:

Give me "what happens if…" questions involving proportional relationships, such as how doubling velocity affects kinetic energy or how increasing resistance affects current.

What this helps you practise:

Understanding relationships between variables.

Prompt 54: Multi-Step Mechanics Problem

Copy this prompt into your AI tool:

Provide a multi-step problem involving acceleration, force, and kinetic energy. Require me to calculate sequentially and justify each step.

What this helps you practise:

Structured quantitative reasoning.

Prompt 55: Electrical Power Calculations

Copy this prompt into your AI tool:

Give me calculation problems using P=IV, P=I^2R, and P=V^2/R. Ask me to explain the physical meaning of the result.

What this helps you practise:

Connecting numerical answers to physical behaviour.

Prompt 56: Wave Speed Calculations

Copy this prompt into your AI tool:

Provide wave problems requiring use of v=fλ. Include questions where one variable changes and ask me to explain the effect on the others.

What this helps you practise:

Quantitative wave modelling.

Prompt 57: Density and Pressure Calculations

Copy this prompt into your AI tool:

Give me problems involving $\rho = mV$. Include both conceptual and numerical questions.

What this helps you practise:

Applying material property equations.

Prompt 58: Specific Heat Capacity Application

Copy this prompt into your AI tool:

Provide a specific heat capacity scenario requiring use of $E = mc\Delta T$. Ask me to interpret the result physically.

What this helps you practise:

Thermal energy modelling.

Prompt 59: Momentum and Impulse

Copy this prompt into your AI tool:

Give me problems involving conservation of momentum and force–time relationships. Require calculation of change in momentum.

What this helps you practise:

Understanding impulse quantitatively.

Prompt 60: Quantitative Mixed Challenge

Copy this prompt into your AI tool:

Give me five mixed GCSE Physics calculation questions covering mechanics, energy, electricity, waves, and radioactivity. Require full working and unit checks.

What this helps you practise:

Switching between equations confidently.

Section 5

Structured Explanations and Extended Physics Responses

In GCSE Physics, extended questions often require more than recalling a definition or applying a formula. They require structured reasoning.

These 4–6 mark questions test whether you can:

- Explain cause-and-effect relationships clearly
- Link multiple physics principles together
- Use precise scientific terminology
- Apply ideas to unfamiliar contexts
- Justify conclusions logically

Common extended-response topics include:

- Explaining motion using Newton's Laws
- Describing energy transfer pathways in systems
- Analysing efficiency in real-world devices
- Explaining how current and potential difference behave in circuits
- Describing wave behaviour such as reflection, refraction, and absorption
- Explaining radioactive decay and half-life

High-level answers do not simply state facts. They:

1. Identify the relevant physical principle
2. Describe what changes
3. Explain why that change occurs
4. Link the reasoning to the question asked

For example:

- When braking distance increases, what forces are involved and how do they affect acceleration?

- When resistance increases, how does this affect current and power dissipation?
- When a wave enters a new medium, why does its speed change while frequency remains constant?

Extended answers require logical flow. Each sentence should build on the previous one.

Physics explanations are strongest when they:

- Use correct terms such as resultant force, energy transfer, potential difference, frequency, and decay constant
- Avoid vague language
- Include clear links between cause and effect
- Focus directly on what earns marks

In this section, you will practise building answers that are:

Clear.
Precise.
Logically structured.
Physically accurate.

Strong explanation is what separates solid understanding from high-grade performance.

Prompt 61: Newton's Laws Extended Response

Copy this prompt into your AI tool:

Give me a 4–6 mark question requiring explanation of motion using Newton's Laws. Require structured reasoning involving resultant force and acceleration.

What this helps you practise:

Building logical mechanics explanations.

Prompt 62: Energy Transfer Chain Explanation

Copy this prompt into your AI tool:

Provide a real-world system (e.g., a roller coaster or electrical appliance). Ask me to describe the full energy transfer pathway using correct energy store terminology.

What this helps you practise:

Avoiding vague energy explanations.

Prompt 63: Efficiency in Real Systems

Copy this prompt into your AI tool:

Give me a question about efficiency in a device. Require explanation of useful and wasted energy transfers and why 100% efficiency is unrealistic.

What this helps you practise:

Linking theory to real-world limitations.

Prompt 64: Circuit Behaviour Explanation

Copy this prompt into your AI tool:

Give me a 5–6 mark question explaining how current and potential difference behave in a series or parallel circuit.

What this helps you practise:

Structured electrical reasoning.

Prompt 65: Wave Interaction Explanation

Copy this prompt into your AI tool:

Provide a scenario involving reflection or refraction. Require explanation using correct terminology such as angle of incidence, angle of reflection, and wave speed.

What this helps you practise:

Clear optical reasoning.

Prompt 66: Electromagnetic Spectrum Application

Copy this prompt into your AI tool:

Ask me to explain how different electromagnetic waves differ in frequency, wavelength, and energy, and how this affects their uses.

What this helps you practise:

Linking properties to application.

Prompt 67: Momentum and Collision Explanation

Copy this prompt into your AI tool:

Provide a collision scenario and require explanation of conservation of momentum using clear step-by-step reasoning.

What this helps you practise:

Extended quantitative explanation.

Prompt 68: Radioactive Decay Explanation

Copy this prompt into your AI tool:

Give me a 4–6 mark question explaining half-life and why radioactive decay is random but predictable in large samples.

What this helps you practise:

Understanding nuclear modelling.

Prompt 69: Power and Energy Distinction

Copy this prompt into your AI tool:

Provide a scenario requiring explanation of the difference between energy transferred and power output.

What this helps you practise:
Clear distinction between rate and quantity.

Prompt 70: Motion Graph Explanation

Copy this prompt into your AI tool:
Provide a velocity–time graph and ask me to explain the motion in structured sentences, including reference to acceleration and distance travelled.

What this helps you practise:
Translating graphs into physics language.

Prompt 71: Required Practical Evaluation

Copy this prompt into your AI tool:
Give me a 6-mark question evaluating a required practical (e.g., specific heat capacity or resistance investigation). Require discussion of variables, accuracy, and reliability.

What this helps you practise:
Structured experimental reasoning.

Prompt 72: Extended Mixed Explanation

Copy this prompt into your AI tool:
Create a 6-mark GCSE Physics question that links two topics (e.g., energy and forces, electricity and power, waves and energy). Require a structured, logical response.

What this helps you practise:
Integrating multiple physics ideas coherently.

Section 6

Experimental Physics, Data Analysis, and Required Practicals

GCSE Physics is not only about theory — it is also about evidence.

Every exam board assesses your understanding of required practical investigations. You are expected to understand not just how experiments are carried out, but why they are designed in a particular way.

In this section, you will practise analysing data from investigations such as:

- Measuring acceleration using velocity–time graphs
- Investigating resistance and current in circuits
- Determining specific heat capacity
- Exploring wave behaviour and reflection
- Investigating radioactive decay patterns

You must be able to:

- Identify independent, dependent, and control variables
- Describe methods clearly and logically
- Interpret graphs and tables accurately
- Calculate gradients and areas where required
- Identify anomalous results
- Evaluate reliability and accuracy
- Distinguish between systematic and random error

For example:

- What does the gradient of a velocity–time graph represent?

- Why might a current–voltage graph be non-linear for a filament lamp?
- How does uncertainty in measurement affect calculated values?
- Is a conclusion fully supported by the data presented?

Physics exams reward careful interpretation.

When analysing data:

- Mention both variables clearly
- Include units
- Use numerical evidence to support conclusions
- Avoid assumptions beyond the data

When evaluating experiments:

- Suggest realistic improvements
- Explain how changes increase accuracy or reliability
- Link improvements directly to measurement quality

Physics relies on evidence.

This section strengthens your ability to interpret data logically, evaluate investigations critically, and connect experimental results to physical principles.

Prompt 73: Identifying Variables

Copy this prompt into your AI tool:

Describe a required practical (e.g., investigating resistance or specific heat capacity). Ask me to identify the independent, dependent, and control variables.

What this helps you practise:

Understanding experimental structure.

Prompt 74: Method Evaluation

Copy this prompt into your AI tool:

Provide a method for a physics practical. Ask me to identify weaknesses and suggest improvements that increase accuracy or reliability.

What this helps you practise:

Evaluating experimental design.

Prompt 75: Gradient Interpretation

Copy this prompt into your AI tool:

Provide a velocity–time or current–voltage graph. Ask me to calculate the gradient and explain what it represents physically.

What this helps you practise:

Linking mathematics to physical meaning.

Prompt 76: Area Under a Graph

Copy this prompt into your AI tool:

Provide a force–time or velocity–time graph. Ask me to calculate the area under the graph and explain its physical significance.

What this helps you practise:

Understanding impulse and distance modelling.

Prompt 77: Identifying Anomalous Results

Copy this prompt into your AI tool:

Provide a data table from a practical investigation. Ask me to identify anomalous results and explain how they affect reliability.

What this helps you practise:

Critical data interpretation.

Prompt 78: Uncertainty and Error

Copy this prompt into your AI tool:

Describe measurement tools used in an experiment (e.g., stopwatch, ammeter, ruler). Ask me to explain sources of random and systematic error.

What this helps you practise:

Understanding experimental limitations.

Prompt 79: Decay Data Analysis

Copy this prompt into your AI tool:

Provide radioactive decay data. Ask me to determine half-life and explain whether the data supports the expected decay model.

What this helps you practise:

Evaluating nuclear data critically.

Prompt 80: Comparing Experimental Results

Copy this prompt into your AI tool:

Give results from two similar experiments (e.g., two different resistors). Ask me to compare trends and justify conclusions using numerical evidence.

What this helps you practise:

Supporting conclusions with data.

Prompt 81: Linking Practical to Theory

Copy this prompt into your AI tool:

Describe a required practical and ask me to explain how the results *confirm a specific physics equation (e.g., V=IR or F=ma).*

What this helps you practise:

Connecting evidence to theory.

Prompt 82: Section 6 Experimental Challenge
Copy this prompt into your AI tool:

Create a mixed experimental question involving:

- *One graph*
- *One calculation*
- *One evaluation point*

Require clear reasoning and reference to variables.

What this helps you practise:

Handling integrated data questions.

Section 7

Linking Concepts and Applying Physics in Unfamiliar Contexts

The highest marks in GCSE Physics are often awarded in questions that combine ideas.

These questions may look unfamiliar, but they are built from principles you already know.

You may be required to connect:

- Resultant force and acceleration with kinetic energy
- Momentum conservation with impulse and force–time graphs
- Power, current, and potential difference in electrical systems
- Wave speed, frequency, and wavelength across different media
- Energy transfer pathways with efficiency calculations
- Radioactive decay with graphical interpretation of half-life

Strong students recognise that physics ideas are not isolated topics. They are connected models describing the same physical world.

For example:

- If braking force increases, how does that affect deceleration, stopping distance, and energy transfer?
- How does changing resistance in a circuit influence current, power dissipation, and thermal energy?
- Why does increasing frequency in electromagnetic waves change energy but not wave speed in a vacuum?

- How does conservation of momentum apply during collisions involving different masses?

In this section, you will practise:

- Applying principles in unfamiliar scenarios
- Combining equations and explanations
- Breaking multi-step problems into logical stages
- Justifying conclusions using more than one idea
- Thinking beyond surface features of a question

Physics application questions test understanding, not memory.

When faced with an unfamiliar scenario:

1. Identify the underlying principle.
2. Select the relevant equation or model.
3. Apply it carefully.
4. Explain the physical reasoning clearly.

Linking ideas is what moves you from secure understanding to high-level performance.

This section is designed to strengthen that flexibility and depth.

Prompt 83: Braking Distance Integration

Copy this prompt into your AI tool:

Provide a scenario involving a moving vehicle. Ask me to explain braking distance by linking force, deceleration, kinetic energy, and energy transfer to thermal energy.

What this helps you practise:

Connecting mechanics and energy principles.

Prompt 84: Power in Electrical Systems

Copy this prompt into your AI tool:

Describe an electrical appliance. Ask me to calculate current and power, then explain how resistance affects energy transfer and heating.

What this helps you practise:

Linking circuits, power, and energy transfer.

Prompt 85: Momentum and Impulse Integration

Copy this prompt into your AI tool:

Provide a collision scenario with a force–time graph. Ask me to calculate change in momentum and explain the relationship between impulse and force.

What this helps you practise:

Connecting graphical analysis to conservation of momentum.

Prompt 86: Wave Energy and Frequency

Copy this prompt into your AI tool:

Describe electromagnetic waves of different frequencies. Ask me to explain how frequency affects energy and practical applications.

What this helps you practise:

Linking wave properties to real-world context.

Prompt 87: Multi-Equation Mechanics Problem

Copy this prompt into your AI tool:

Give me a scenario requiring use of two or more equations (e.g., F=ma and Ek=1/2mv^2). Require structured reasoning.

What this helps you practise:

Sequential quantitative modelling.

Prompt 88: Energy Efficiency and Cost

Copy this prompt into your AI tool:

Provide an appliance scenario including power rating and time of use. Ask me to calculate energy consumption and discuss efficiency and cost.

What this helps you practise:

Applying energy equations to real contexts.

Prompt 89: Radioactivity and Graph Interpretation

Copy this prompt into your AI tool:

Provide decay data and ask me to calculate remaining activity after several half-lives. Require explanation of exponential decrease.

What this helps you practise:

Linking calculation with nuclear modelling.

Prompt 90: Cross-Topic Reasoning Challenge

Copy this prompt into your AI tool:

Create a GCSE Physics problem linking at least two of the following:

- *Forces*
- *Energy*
- *Electricity*
- *Waves*
- *Radioactivity*

Require calculation and structured explanation.

What this helps you practise:

Integrated higher-level application.

Section 8

Higher-Tier Reasoning and Quantitative Modelling

At higher levels of GCSE Physics, questions demand more than accurate calculation. They require structured modelling and precise reasoning.

In this section, you will encounter tasks that involve:

- Rearranging multi-variable equations
- Combining several equations within one problem
- Interpreting gradients and areas on complex graphs
- Applying proportional reasoning to physical systems
- Analysing force–time and velocity–time relationships
- Modelling energy changes mathematically
- Interpreting decay curves and half-life relationships
- Evaluating physical systems using quantitative evidence

For example:

- How does doubling velocity affect kinetic energy?
- Why does a force applied for a longer time change momentum differently from a larger force applied briefly?
- How does current respond to changes in resistance in a parallel circuit?
- What does the area under a velocity–time graph represent physically?
- How does exponential decay shape the activity–time graph?

These questions require discipline.

You must:

- Select appropriate equations carefully
- Rearrange accurately
- Keep track of units
- Interpret answers physically
- Check whether results are reasonable

Higher-tier modelling is about understanding relationships between quantities.

Physics equations are not isolated formulas — they describe how the world behaves under consistent rules.

In this section, you will practise:

- Structured multi-step reasoning
- Quantitative argumentation
- Translating graphs into physical meaning
- Justifying conclusions with numerical evidence

Take your time.
Work systematically.
Let physical principles guide every step.

This section strengthens the depth and precision required for the highest GCSE grades.

Prompt 91: Advanced Proportional Reasoning

Copy this prompt into your AI tool:

Give me "what happens if…" questions involving proportional reasoning in physics. Include scenarios such as:

- *Doubling velocity and its effect on kinetic energy*
- *Changing resistance and its effect on current and power*
- *Changing mass and its effect on acceleration*

Require explanation as well as calculation.

What this helps you practise:

Understanding non-linear relationships.

Prompt 92: Multi-Step Mechanics Modelling

Copy this prompt into your AI tool:

Provide a complex mechanics problem involving acceleration, force, and energy. Require me to:

1. *Identify relevant equations*
2. *Rearrange where necessary*
3. *Perform sequential calculations*
4. *Interpret the final result physically*

What this helps you practise:

Structured modelling under pressure.

Prompt 93: Exponential Decay Modelling

Copy this prompt into your AI tool:

Provide radioactive decay data across multiple half-lives. Ask me to:

- *Calculate remaining quantity*
- *Explain why decay is exponential*
- *Interpret the shape of the decay curve*

What this helps you practise:

Deep nuclear reasoning.

Prompt 94: Graph-Based Modelling

Copy this prompt into your AI tool:

Provide a velocity–time or force–time graph requiring:

- *Gradient interpretation*
- *Area calculation*
- *Linking results to momentum or displacement*

Require explanation of physical meaning.

What this helps you practise:

High-level graph interpretation.

Prompt 95: Circuit Modelling Under Change

Copy this prompt into your AI tool:

Describe a circuit where resistance changes dynamically (e.g., temperature change in a filament lamp). Ask me to model how current and power change using V=IR and power equations.

What this helps you practise:

Applying equations to non-linear systems.

Prompt 96: Full Higher-Tier Challenge

Copy this prompt into your AI tool:

Create a Grade 8–9 GCSE Physics problem involving:

- *At least two equations*
- *Graph interpretation*
- *Quantitative reasoning*
- *A short structured explanation*

Require full working and unit accuracy.

What this helps you practise:

Handling advanced integrated exam-style problems.

Section 9

Final Revision and Exam-Week Physics Practice

In the final days before a GCSE Physics exam, your goal is not to relearn the entire course. Your goal is to secure marks.

At this stage, success depends on clarity, precision, and confidence.

You should be secure in:

- Selecting the correct equation quickly
- Rearranging formulae accurately
- Including correct units in every calculation
- Interpreting gradients and areas on graphs
- Explaining physical processes clearly
- Avoiding common misconceptions

Typical final-stage mistakes include:

- Forgetting to write the formula before calculating
- Missing units or incorrect significant figures
- Confusing mass and weight
- Treating current as “used up” in circuits
- Misreading velocity–time or distance–time graphs
- Writing descriptive answers when explanation is required

The prompts in this section are designed to:

- Rapidly sweep across mechanics, energy, electricity, waves, and atomic physics
- Reinforce equation fluency
- Practise short, precise definitions
- Strengthen 4–6 mark structured explanations
- Review required practical evaluation
- Simulate light time pressure

When revising in the final week:

1. Practise mixed-topic questions.
2. Focus on weak areas identified earlier.
3. Check answers physically — does the result make sense?
4. Write clearly and logically.

Physics rewards structured thinking.

Before entering the exam room, you should be confident that you can:

- Interpret data carefully
- Justify conclusions with physics principles
- Apply equations without hesitation
- Avoid small but costly errors

Stay calm.
Trust the principles.
Write clearly.
Check your units.

Strong foundations, clear reasoning, and careful calculation are what earn marks in GCSE Physics.

Prompt 97: Rapid Whole-Spec Sweep

Copy this prompt into your AI tool:

Test me rapidly across GCSE Physics topics including:

- *Newton's Laws and resultant force*
- *Energy stores and transfers*
- *Ohm's Law and circuits*
- *Wave properties and EM spectrum*
- *Radioactive decay and half-life*

Ask short questions in random order. Identify hesitation or weak areas.

What this helps you practise:

Full-course recall under light time pressure.

Prompt 98: Calculation Accuracy Drill

Copy this prompt into your AI tool:

Give me five short GCSE Physics calculations covering:

- *Force or acceleration*
- *Energy or power*
- *Circuit calculation*
- *Wave speed*
- *Density or pressure*

After I answer, check:

- *Formula choice*
- *Working*
- *Units*
- *Significant figures*

What this helps you practise:

Avoiding calculation mark loss.

Prompt 99: Mini Physics Mock

Copy this prompt into your AI tool:

Create a short mixed GCSE Physics test including:

- *One mechanics problem*
- *One energy or electricity calculation*

- *One graph interpretation question*
- *One 4–6 mark explanation*

After I answer, mark it like an examiner and identify improvement areas.

What this helps you practise:

Handling exam-style integration calmly.

Prompt 100: Final Readiness Diagnostic

Copy this prompt into your AI tool:

Ask me to summarise clearly:

1. *How to apply Newton's Second Law*
2. *How to avoid unit errors in calculations*
3. *How to interpret velocity–time and decay graphs*
4. *One misconception I must avoid in circuits or energy*

Then ask one final integrated problem to confirm exam readiness.

What this helps you practise:

Consolidating understanding before the exam.

Final Closing Note

You have now worked through 100 prompts designed to help you think more clearly, revise more effectively, and prepare more confidently for your GCSE.

Remember: the goal was never to rely on AI for answers. The goal was to use it as a tool to test, challenge, and strengthen your own understanding.

The strongest students are not those who avoid difficulty, but those who engage with it deliberately. Each mistake you identified, each explanation you improved, and each gap you filled has strengthened your thinking.

As you continue your studies, aim to depend less on prompts and more on your own judgement. AI can support you — but your reasoning, clarity, and persistence are what earn marks.
Approach your exams calmly. Think carefully. Write clearly.
You are more prepared than you think.

Using AI Beyond This Book

The prompts in this book are starting points, not final forms.

As you grow more confident, begin modifying them:

- Add constraints (for example, “limit to three key points”).
- Increase difficulty gradually.
- Ask the AI to challenge your reasoning.
- Request alternative explanations.
- Ask it to critique your thinking rather than provide answers.

The most powerful use of AI is not asking it to tell you things — it is asking it to test and refine your thinking.

In the future, those who understand how to use tools intelligently will have an advantage. Treat AI as a tutor, not a shortcut. The skill of asking better questions will continue to matter long after your exams are over.

About the Author

James R. Martin holds an MSci in Physics from the University of Bristol and a PGCE with a Physics focus from the University of Oxford. He has over a decade of experience teaching and tutoring students aged 11–18 across a range of subjects, including Physics, Biology, Chemistry, Mathematics, Economics, and Electronics.

He has worked with multiple syllabi, including GCSE, A-Level, KS3, and the International Baccalaureate Diploma Programme (IBDP), supporting students of varying abilities to develop clarity, confidence, and exam success.

His work focuses on effective revision strategies, independent thinking, and the responsible use of artificial intelligence as a tool to strengthen — not replace — understanding.

Other Titles in This Series

The *100 AI Prompts for Smarter Revision* series supports students across GCSE, A-Level, and IBDP subjects.

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- Further Mathematics
- Physics
- Chemistry
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