



MOJZA

9702

A2 Level

PHYSICS

PAPER 5 GUIDE



UPDATED TO THE
2025-27 SYLLABUS

1st
Edition

MOJZA

A Level

PHYSICS P5 GUIDE

9702



BY TEAM MOJZA

CONTENTS

Question 1 ----- **Pg 02**

Question 2 ----- **Pg 05**



Question 1

Planning

- Defining the problem

- Independent variable is quantity we change
- Dependent variable is quantity we measure
- Constant/controlled variable is quantity we keep constant to ensure fair testing
- Example: investigating the relationship between the length of a wire and its resistance
 - ◆ Independent: length of wire
 - ◆ Dependent: resistance
 - ◆ Constant: material of wire, temperature, cross-sectional area

- Methods of data collection

- Methods to measure constants include:
 - ◆ Distance in cm/m: meter rule/vernier calliper
 - ◆ Angle: protractor, trigonometry by measuring distance
 - ◆ Diameter/thickness: micrometer
 - ◆ Time: stopwatch, light gate attached to a timer/data-logger
 - ◆ Velocity at a point: light gates
 - ◆ Mass: balance
 - ◆ Sound: microphone, sound meter, sound detector
 - ◆ Pressure: bourdon gauge/manometer or pressure gauge
 - ◆ Temperature: thermometer
 - ◆ Wavelength (light): diffraction grating ($n\lambda = d\sin\theta$)/Young's slit
 - ◆ Light intensity: light meter/detector, LDR
 - ◆ Power: $P=VI$; use ammeter, voltmeter
 - ◆ Force: newton-meter, extension of stretched elastic/spring
 - ◆ Magnetic field strength: Hall probe

- Experiment involving oscillator:
 - ◆ Voltmeter/c.r.o connected in parallel with vibrator in a workable circuit
 - ◆ a.c supply connected to vibrator

- Experiment that involves sound:
 - ◆ Perform experiment in quiet room
 - ◆ Method of ensuring that output from speaker is constant
 - Keep the frequency constant
 - ◆ Method of reducing sound reflections from e.g. foam/speaker & microphone close to glass
 - ◆ Window perpendicular to sound source
 - ◆ Intensity is proportional to the amplitude²

- Experiment that involves measuring resistivity:
 - ◆ Method of determining resistance

- ◆ Good contact between circuit and glass e.g. metal plates, foil, conducting putty
 - ◆ Metal plates/foil/conducting putty to cover all of the cross-sectional area in use
 - ◆ Method of securing good contact between circuit and glass, e.g clamps, weights
- Experiment that involves measuring light:
- ◆ Use high intensity lamp or collimated beam or laser
 - ◆ View with the same eye
 - ◆ Perform experiment in a dark room/tube
 - ◆ Method to check output of lamp is constant e.g. measure p.d across lamp
 - ◆ Method of producing monochromatic light → filter/coloured LED
- Experiments that involves falling objects:
- ◆ Keep starting point constant/ drop object from the same position/ use of electromagnet to drop object/ ensure mass is dropped from fixed point/ check object falls vertically
- Experiment that involves inducing e.m.f in coil Y:
- ◆ Two independent coils labelled X and Y
 - ◆ Alternating current in coil X
 - ◆ Voltmeter in coil Y
 - ◆ Use c.r.o to determine period/frequency or read off signal generator
 - ◆ Keep coil Y and coil X in the same relative positions
 - ◆ Keep frequency of power supply constant
 - ◆ Avoid other alternating magnetic fields

- Method of analysis

- Always the same for every experiment
- There will be some equation for you to prove the relationship between the dependent and independent variable, rearrange them into the form $y = mx + c$ (sometimes using \ln):
- ◆ Use $y = mx + c$
 - ◆ Dependent variable as y
 - ◆ Independent variable as x
- Plot y against x
- ◆ The relationship will be valid if it is a straight line through c (if $c = 0$ then through origin)

| Relationship | Graph | Gradient | y-intercept |
|---------------|---------------------------|----------|-------------|
| $y = mx + c$ | y against x | m | c |
| $y = ax^n$ | $\log y$ against $\log x$ | n | $\log a$ |
| $y = ae^{kx}$ | $\ln y$ against x | k | $\ln a$ |

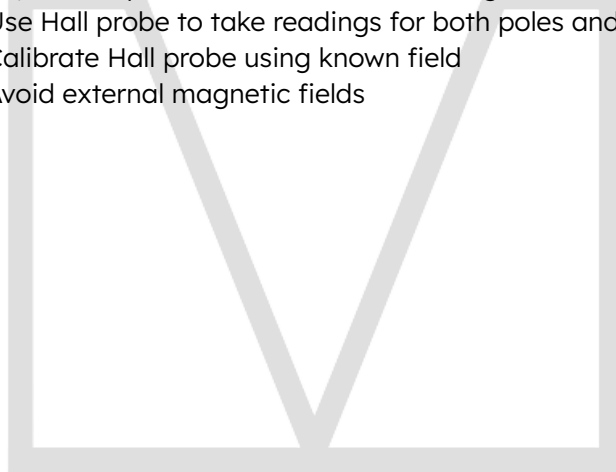
- Additional details

- Do repeats for each measurement (at different parts) and find an average
- Use large measurements to reduce the percentage uncertainty (including the method)

- ◆ Large protractor to measure angle
- ◆ Large temperature change
- ◆ Large distances
- ◆ Large current
- ◆ Large number of coils → large magnetic field

→ Other points depending on the type of experiment:

- ◆ Correct trigonometry relationship to determine $\sin\theta$ or θ using marked lengths
- ◆ Method of securing load to rule e.g. with tape/glue
- ◆ Involve inclined plane and acceleration:
 - Clean surfaces of blocks/inclined plane
 - Ensure surface of the plane is smooth to reduce friction
- ◆ Method of using c.r.o (c.r.o is connected in parallel)
 - Method to determine period of oscillation from c.r.o., i.e. one time period x time-base
 - Method to determine V from c.r.o., i.e. amplitude (height) x y-gain
- ◆ Experiment involving Hall probe:
 - Adjust Hall probe until maximum reading obtained/perpendicular to field
 - Use Hall probe to take readings for both poles and average
 - Calibrate Hall probe using known field
 - Avoid external magnetic fields



Question 2

Analysis, conclusions and evaluation

- Rearranging the equation

- If the equation is in the form of straight line, $y = mx + c$, then gradient = m and y-intercept = c
- If the equation is in the form of $y = ax^n$, take logs to base 10 of both sides

$$\lg y = \lg a + n \lg x$$
 - ◆ If a graph is plotted of $\lg y$ on y-axis and $\lg x$ on x-axis, then gradient = n and y-intercept = $\lg a$
- If the equation is in the form of $y = ae^{kx}$, take natural logs of both sides
 - ◆ If a graph is plotted of $\lg y$ on y-axis and x on x-axis, then gradient = k and y-intercept = $\ln a$

- Uncertainties

- Absolute uncertainty in $x = \Delta x$
- Fractional uncertainty in $x = \frac{\Delta x}{x}$
- Percentage uncertainty in $x = \frac{\Delta x}{x} \times 100$
- If quantities are added or subtracted, then add absolute uncertainties
- If quantities are multiplied or divided, then add percentage uncertainties or fractional uncertainties
- Uncertainty in logarithm:

$$\Delta \lg x = \frac{(\lg x_{\max} - \lg x_{\min})}{2}$$

- Absolute uncertainty in gradient:

$$\Delta \text{gradient} = \text{difference between gradient of line of best fit and gradient of worst acceptable line}$$
- Absolute uncertainty in y-intercept:

$$\Delta \text{y-intercept} = \text{difference between y-intercept of line of best fit and y-intercept of worst acceptable line}$$

- Graph

- Firstly, plot the best value of each variable on the graph
- Next, add and subtract the error and plot this above and below the best value
- Join the three points together to form the error bar
- Line of best fit should pass through most 'best' values and must be passing through each error bar
- Worst acceptable line is the shallowest or steepest possible line that passes through or close to every error bar
 - ◆ Join the top of the topmost point's error bar and the bottom of the bottom-most point's error bar, and the line should touch every error bar

A Note from Mojza

These notes for Physics(9702) have been prepared by Team Mojza, covering the content for A Level 2025-27 syllabus. The content of these notes has been prepared with utmost care. We apologise for any issues overlooked; factual, grammatical or otherwise. We hope that you benefit from these and find them useful towards achieving your goals for your Cambridge examinations.

If you find any issues within these notes or have any feedback, please contact us at support@mojza.org.

Acknowledgements

Authors:

Aliya Sarfaraz
Azka Masood
Zainab Fatima

Proofreaders:

Miraal Omer

Designers:

Fasiha Raza

© 2025 Mojza. All rights reserved.

The content of these notes may not be republished or redistributed without permission from Mojza. All diagrams have been designed by Team Mojza except where cited.



MOJZA

9702

A2 Level

PHYSICS

PAPER 5 GUIDE

These notes are made to encompass the complete syllabus for 9702 from 2025 to 2027, with great attention and care for every topic. All information is curated in a simple, clear, and concise manner. The aim is to aid students and make learning easier in preparation for their exams. Team Mojza makes every effort to error-check all the content; if you find any discrepancies, please reach out to us at support@mojza.org.