

UNIVERSITY OF LONDON

General Certificate of Education Examination

SUMMER 1972

ORDINARY LEVEL

Physics with Chemistry 1

Syllabus A

PHYSICS

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One and a half hours

Answer **FOUR** questions. All questions carry equal marks.

*Diagrams of apparatus should be given wherever they clarify an answer.*

*Candidates are reminded of the necessity for good English and orderly presentation in their answers.*

*Graph paper is provided.*

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1. A piece of iron of mass 500 grammes has a thin wire attached to it. What tension in the wire is necessary (a) to move the iron vertically upwards with an acceleration of 0.1 metre per second<sup>2</sup>, (b) to allow the iron to fall downwards with an acceleration of 0.1 metre per second<sup>2</sup>, (c) to support the iron when completely immersed in water? In each case explain your calculation.

(Density of iron = 8 grammes per centimetre<sup>3</sup>; acceleration due to gravity = 10.0 metres per second<sup>2</sup>)

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2. State *Boyle's law*. Describe an experiment by which it could be tested for pressures below and above atmospheric pressure.

A bubble of air escapes from a container when it is 380 millimetres below the surface of mercury on a day when the atmospheric pressure is 760 millimetres of mercury. What will be the fractional change in volume when it reaches the surface if there is no change in temperature?

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3. Define *latent heat of evaporation* of a liquid. Describe an experiment to find its value for water, including an explanation of the calculation to get the final result.

What would be the most important inaccuracies in the experiment and what precautions should be taken to minimise them?

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4. Answer both (a) and (b).

(a) What is meant by *humidity* and *dew-point*? Explain the connection between these two quantities, and describe how one of them is measured in the laboratory.

(b) Describe in detail how to find the refractive index of a solid or a liquid by the apparent depth method.

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5. A converging lens of focal length 10 centimetres has an object 2 centimetres high placed on the principal axis and at right angles to it. Its distance from the pole of the lens is 30 centimetres. By drawing a diagram to scale find the position and size of the image.

Describe a quick method by which the focal length of such a lens can be roughly determined.

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6. In determinations of the velocity of sound in free air, sometimes two observers work at a distance from one another and sometimes one observer uses echoes. Give details of one of these methods. Which method is more likely to give an accurate result and why?
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7. Answer (a) or (b) but not both.

(a) What is meant by (i) a *magnetic field*, (ii) a *line of force* in a magnetic field?

Describe in detail how to map the magnetic field due to a bar magnet (iii) using a small plotting compass, (iv) using iron filings. Which of these methods is the more suitable to explore a weak magnetic field and why?

(b) Electrostatic charges can be produced by the friction between two different materials. Give three examples where this occurs in everyday life rather than under laboratory conditions. Explain how one becomes aware that electrification has been produced in each case.

Describe a simple experiment to find whether an electric charge produced by friction is the same as or opposite to that on a given charged rod.

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8. Name and define the unit of (a) electrical power, (b) electrical energy, as commonly used in electricity.

How could the total energy used by a large electric bulb in two hours be measured, without using the normal electric meter such as is connected to the domestic supply?

If the cost of running ten 60-watt lamps continuously for a month of 30 days is £8.64, what is the cost of electrical energy per unit?

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9. Describe, and explain the action of, an ammeter. State, with reasons, whether or not it is suitable for measuring alternating current.

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