CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

PHYSICS **5054/03**

Paper 3 Practical Test

October/November 2003

CONFIDENTIAL INSTRUCTIONS

Great care should be taken that any confidential information given does not reach the candidates either directly or indirectly.

This document consists of **8** printed pages.

Instructions for preparing apparatus

These instructions detail the apparatus required for each experiment in this paper. A summary of questions that will be presented to the candidates is included, to allow the Physics teacher to test apparatus appropriately. No access is permitted to the question paper in advance of the examination session.

Number of sets of apparatus

In addition to a few spare sets, the minimum number of sets of apparatus to be provided should be sufficient to enable candidates to spend 20 minutes with the apparatus for each of Questions 1, 2 and 3, and one hour with the apparatus for Question 4. The order in which candidates answer the questions will be determined by the Supervisor. Candidates may spend one hour circulating around Questions 1, 2 and 3, followed by an hour on Question 4, or vice versa.

Extra graph paper should be available. It is assumed that candidates will supply their own geometrical instruments, such as a set square, 0° to 180° protractor, pair of compasses and 30 cm rule. Candidates should be advised in advance that they may, if they wish, use quartz wristwatches with stopwatch facilities, providing that such wristwatches afford the required precision.

Instructions for the supervision of the examination

The Supervisor, who may be a Physics teacher, is responsible for the administration of the examination according to the procedures detailed in the Handbook for Centres. In all instances, a Physics teacher should be present. Preferably, this teacher should have been responsible for the preparation of the apparatus. Two invigilators must be present at all times: it is not acceptable for a teacher who has been responsible for preparing the candidates for this paper to be the sole Supervisor or Invigilator.

Supervisors may make the following announcement at the start of the examination.

'The Examiners do not want you to waste time when you are unable to do any experiment. Any candidate who is unable to get results with an experiment may ask for help. The extent of this help will be reported to the Examiners, who may make a deduction of marks.'

Supervisors should note that a candidate may only be given enough assistance to allow some raw readings or observations to be made. On no account should any assistance be given with the treatment or analysis of these readings and observations.

Supervisors may draw to the attention of the candidates any significant deviation between the apparatus provided and that detailed in the Question Paper, particularly where diagrams are given in the paper.

Candidates should be reminded that all their work should be written on the printed Answer Booklet. Rough paper must not be used.

The Supervisor must complete the Report at the back of these Instructions. Details should be given of any significant deviation between the apparatus used and that specified in these Instructions. A sample set of results can often help Examiners. A copy of this Report must be included in each packet of scripts.

1 Items to be supplied by the Centre (per set of apparatus, unless otherwise spe

Stiff board of minimum length 1.0 m and minimum width 20 cm, e.g. length of shelving

Block of wood

Toy car

Half-metre rule

Set square

Stopwatch

Notes

(i) The toy car should be the type that will run freely down a ramp, i.e. the car should not have any form of motor, spring, etc.

(ii) The stiff board and the block of wood are to be set up by the Supervisor as a ramp. If the ramp sags then it should be supported in the middle. The candidate should be instructed not to adjust the ramp in any way.

(iii) The Supervisor should draw two lines across the ramp that are perpendicular to the edges of the ramp. The lines should be 0.90 m apart. There should be sufficient space above the top line to enable the candidate to place the front of the car on the line before timing its motion down the ramp to the lower line.

(iv) The height of the block of wood should be chosen so that the car takes approximately 3 or 4 seconds to travel, from rest, a distance of 0.90 m down the ramp.

(v) Supervisors may wish to place some form of stop at the end of the ramp such as a pile of paper towels. This will prevent the car moving across the bench after moving down the ramp.

(vi) The mass of the toy car to the nearest 0.001 kg should be determined by the Supervisor and written on a card in the form '*m* = ...kg'.

(vii) The apparatus is to be set up as shown in Fig. 1.1.

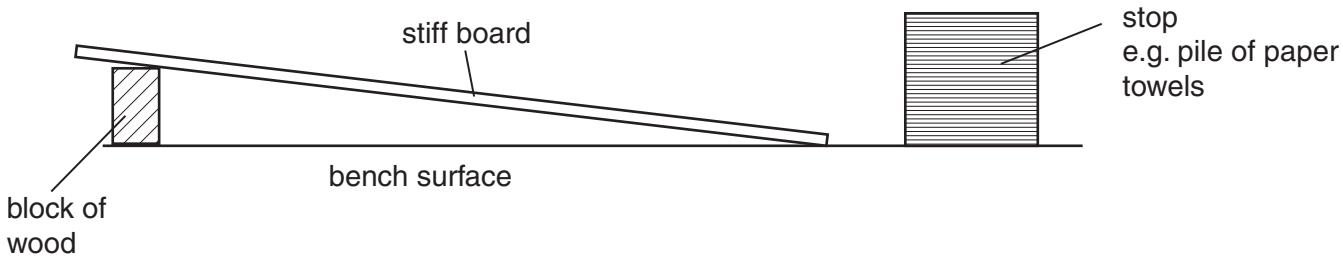

Fig. 1.1

(viii) At the changeover, Supervisors should check that the apparatus is still set up as shown.

Procedure to be followed by candidates

Candidates will be required to determine the average time taken for the car to travel a distance of 0.90 m from rest down the runway and the height through which the car moves.

Information required by examiners

2 Items to be supplied by the Centre (per set of apparatus, unless otherwise spe

Metre rule

Knife edge

100 g mass

Small rule with a mm scale e.g. 15 cm or 30 cm rule

Note

At the changeover, dismantle the apparatus.

Procedure to be followed by the candidates

Candidates will be required to determine the position of the centre of mass of the rule by balancing it on the knife edge. They will then be required to balance the rule as shown in Fig. 2.1 and to measure the dimensions of the rule.

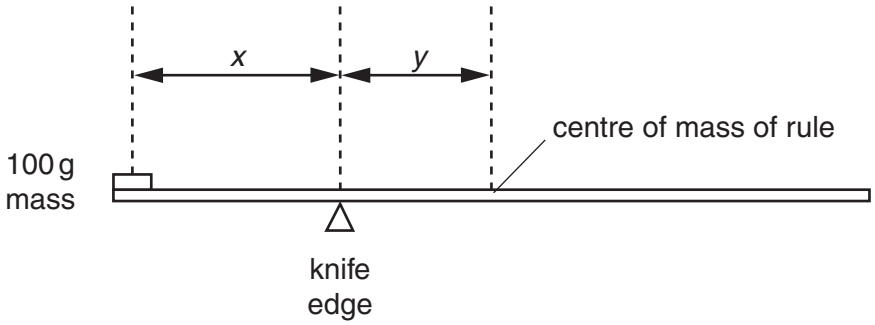

Fig. 2.1

Information required by examiners

Sample set of results.

3 Items to be supplied by the Centre (per set of apparatus, unless otherwise specified)

Block of wood of approximate size 25 mm × 50 mm × 50 mm and of mass approximately 50 grams

Small hook that should be screwed into the centre of one end of the block of wood

Card on which the Supervisor has written the total mass of the block of wood and the hook

Newton-meter with a scale reading up to 1.0 N

Three 50 g masses

Notes

(i) The candidate is to set up the apparatus as shown in Fig. 3.1.

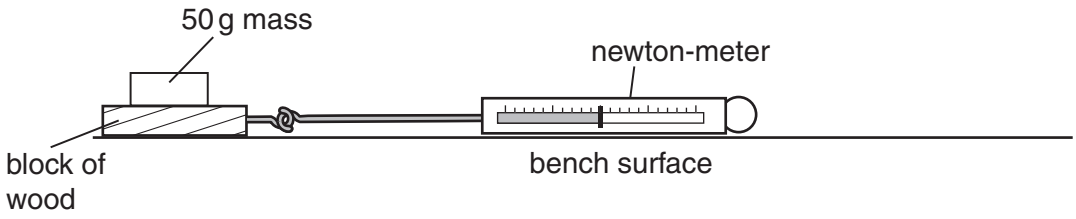

Fig. 3.1

(ii) The base of the block of wood and the bench top should be smooth so that the block slides easily across the bench. The force required to move the block with three 50 g masses on top should be less than 1.0 N.

(iii) The top of the block of wood should be labelled 'top'.

(iv) The Supervisor should measure the mass of the block and the hook and write the total value to the nearest gram on the card in the form 'M_B = ...g'.

(v) At the changeover, no action is required.

Procedure to be followed by the candidates

Candidates will measure the force required to move the block across the bench.

Information required by examiners

Sample set of results.

4 Items to be supplied by the Centre (per set of apparatus, unless otherwise specified)

Power supply, in the range 4 V to 5 V, capable of delivering a current of approximately 1.0 A

1.1 m length of resistance wire of approximate resistance 10 Ω, e.g. 28 swg nichrome wire or 32 swg constantan wire

Metre rule

Ammeter capable of measuring a current of up to 1.0 A, an analogue or digital meter is suitable

Voltmeter capable of measuring a potential difference of up to 5 V, an analogue or digital meter is suitable

Switch or plug key

Two crocodile clips

4.7 Ω resistor of minimum power rating 5 W

Heat-proof mat

Seven leads

Notes

(i) The length of resistance wire should be attached to the metre rule at each end by the of adhesive tape. The wire may need to be cleaned with an abrasive prior to use.

(ii) The components should have suitable terminations to enable them to be connected into the remainder of the circuit.

(iii) If a suitable 4.7 Ω, 5 W resistor is not available, it may be constructed from a 0.50 m length of the resistance wire. The 4.7 Ω, 5 W resistor should be labelled 'fixed resistor'.

(iv) Supervisors should place the fixed resistor on the heat-proof mat and warn candidates not to touch the fixed resistor as it may become hot.

(v) The resistance of a 1.00 m length of the resistance wire to a precision of ±0.1 Ω should be written on a piece of card in the form 'The resistance of a 1.00 m length of the resistance wire = ...Ω'.

(vi) The Supervisor should set up the circuit as shown in Fig. 4.1.

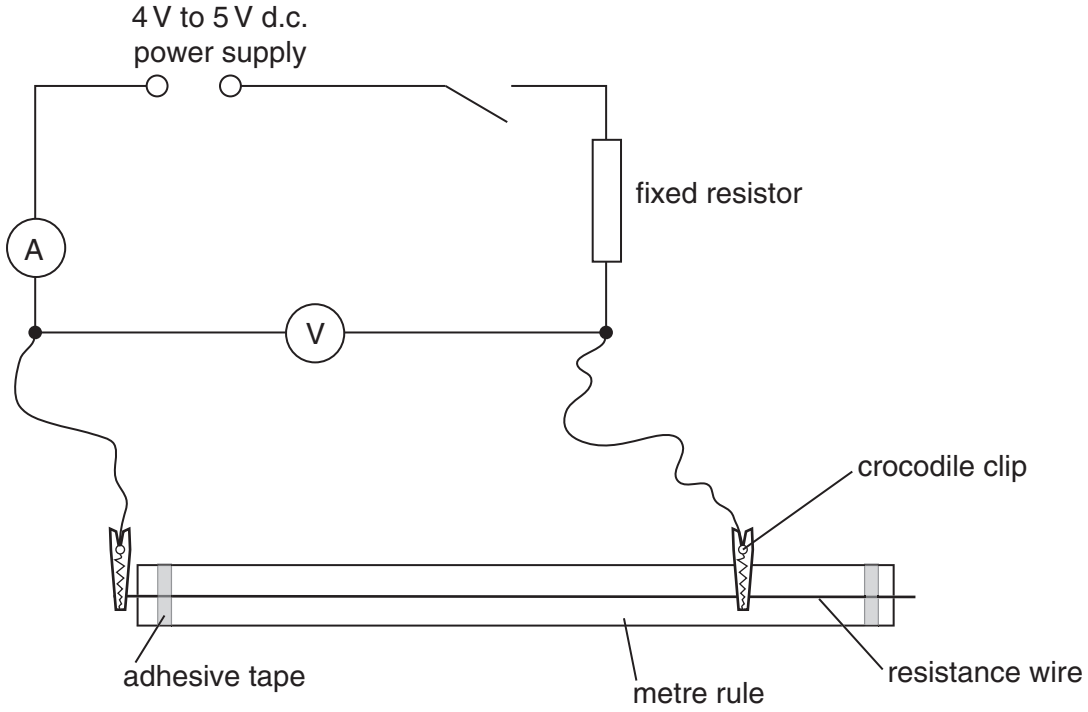

Fig. 4.1

(vii) At the changeover, the Supervisor should check that the circuit is still set up as shown in Fig. 4.1 with the switch open.

Procedure to be followed by the candidates

Candidates will draw a circuit diagram of the arrangement set up by the Supervisor. They will then measure the current in and the potential difference across various lengths of resistance wire.

Information required by examiners

Sample set of results.

This form must be completed and returned with the Answer Booklets.

REPORT ON PRACTICAL PHYSICS

The Supervisor is asked to give the following details, using the space provided on page 8.

(a) Information required at the end of the test, as indicated in the Instructions.

(b) Any help given to a candidate.

(c) Any general difficulties encountered in preparing the apparatus.

(d) Any difficulties experienced by particular candidates. These should include reference to difficulties due to faulty apparatus or materials and accidental damage to apparatus or materials. Candidates should be identified by name and index number.

Other cases of hardship, such as disability or illness, should be reported to the Syndicate in the normal way.

The Supervisor is asked to provide a plan of the work benches, giving details by index numbers of the places occupied by the candidates for each session. The plan should be enclosed with the Answer Booklets, together with the Information required by Examiners.

Declaration to be signed by the Principal

The preparation of this practical examination has been carried out so as fully to maintain the security of the examination.

Signed .....

Name (in block capitals) .....

Centre Number .....

Centre Name .....

Information required

Sample set of results for each question.

Details of difficulties and any help given to candidates