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Cambridge Assessment International Education

Cambridge International AS & A Level

PHYSICS **9702/33**

Paper 3 Advanced Practical Skills 1 **February/March 2023**

CONFIDENTIAL INSTRUCTIONS

7133631648

This document gives details of how to prepare for and administer the practical exam.

The information in this document and the identity of any materials supplied by Cambridge International are confidential and must NOT reach candidates either directly or indirectly.

The supervisor must complete the report at the end of this document and return it with the scripts.

INSTRUCTIONS

- If you have any queries regarding these confidential instructions, contact Cambridge International stating the centre number, the syllabus and component number and the nature of the query.
  email info@cambridgeinternational.org
  phone +44 1223 553554

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General information about practical exams

Centres must follow the guidance on science practical exams given in the *Cambridge Handbook*.

Safety

Supervisors must follow national and local regulations relating to safety and first aid.

Only those procedures described in the question paper should be attempted.

Supervisors must inform candidates that materials and apparatus used in the exam should be treated with caution. Suitable eye protection should be used where necessary.

Before the exam

- The packets containing the question papers must **not** be opened before the exam.
- It is assumed that standard school laboratory facilities, as indicated in the *Guide to Planning Practical Science*, will be available.
- Spare materials and apparatus for the tasks set must be available for candidates, if required.

During the exam

- It must be made clear to candidates at the start of the exam that they may request spare materials and apparatus for the tasks set.
- Where specified, the supervisor **must** perform the experiments and record the results as instructed. This must be done **out of sight** of the candidates, using the same materials and apparatus as the candidates.
- Any assistance provided to candidates must be recorded in the supervisor's report.
- If any materials or apparatus need to be replaced, for example, in the event of breakage or loss, this must be recorded in the supervisor's report.

After the exam

- The supervisor must complete a report for each practical session held and each laboratory used.
- Each packet of scripts returned to Cambridge International must contain the following items:
  - the scripts of the candidates specified on the bar code label provided
  - the supervisor's results relevant to these candidates
  - the supervisor's reports relevant to these candidates
  - seating plans for each practical session, referring to each candidate by candidate number
  - the attendance register.

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Specific information for this practical exam

The supervisor must be a teacher of Physics or other competent physicist who is familiar with the requirements of this syllabus. During the exam, the supervisor (**not** the invigilator) should obtain a sample set of numerical results by following the relevant steps in the question paper. The results should be clearly labelled 'Supervisor's results' and recorded on the supervisor's report or on a spare copy of the question paper.

Organisation of the exam

- The number of sets of apparatus provided for each experiment should be $\frac{1}{2}N$, where N is the number of candidates taking the exam.
- Candidates should not be provided with any additional apparatus beyond that specified in these instructions.
- Candidates should be allowed access to the apparatus for each experiment for one hour only.
- After spending one hour on one experiment, candidates should change over to the other experiment.
- The order in which a candidate attempts the two experiments is immaterial.

Assistance to candidates

- Candidates should be informed that, if they find themselves in real difficulty, they may ask the supervisor for practical assistance, but that the extent of this assistance will be reported to the Examiner, who may not award full credit for the relevant skills.
- Assistance should only be given when it is asked for by a candidate or where apparatus is seen to have developed a fault.
- Assistance should be restricted to enabling candidates to make observations and measurements. Observations and measurements must **not** be made for candidates, and no help should be given with data analysis or evaluation.
- In cases of faulty apparatus that prevent the required measurements being taken, the supervisor should allow extra time to give the candidate a fair opportunity to perform the experiment as if the fault had not been present.
- Any assistance or extra time given to candidates must be recorded in the supervisor's report.

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Specific information for this practical exam

Materials and apparatus for Question 1 (per set of apparatus unless otherwise specified)

- Wooden strip of length 48.0 cm and approximate cross-section 0.5 cm × 2 cm. See Note 1.
- Two 50 g slotted masses. See Note 1.
- One 100 g slotted mass. See Note 2.
- String. See Note 2.
- Two stands, each of height at least 60 cm.
- Pulley wheel attached to one of the stands. It must be possible to adjust the height of the pulley.
- Boss and clamp.
- Nail of approximate diameter 3 mm and approximate length 6 cm.
- Split cork for holding the nail securely in the clamp.
- Plumb line of approximate length 40 cm with a small loop at the free end.
- 180° protractor with 1° divisions.
- Metre rule with a millimetre scale.

Notes

1 Two holes of approximate diameter 4 mm should be drilled through the wooden strip at the positions shown in Fig. 1.1.
Nine shallow grooves should be made along one edge of the strip at the positions shown in Fig. 1.1. Each groove can be made by drawing a saw across the edge of the strip.

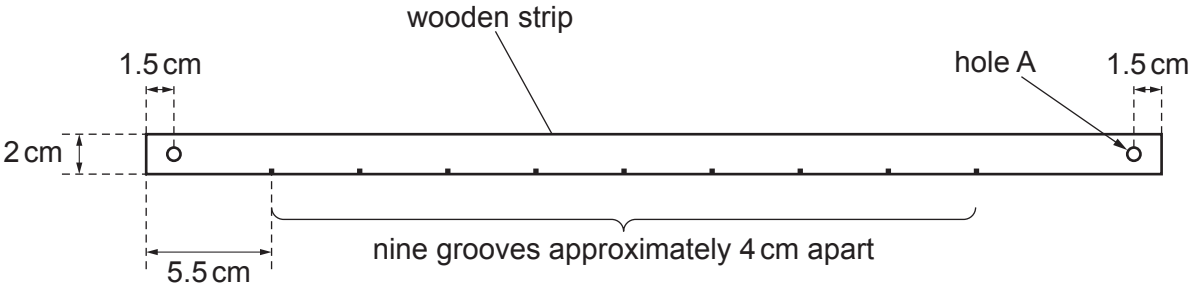


Fig. 1.1

Fix the two 50 g masses, one either side of the strip using a suitable nut and bolt through hole A, as shown in Fig. 1.2.

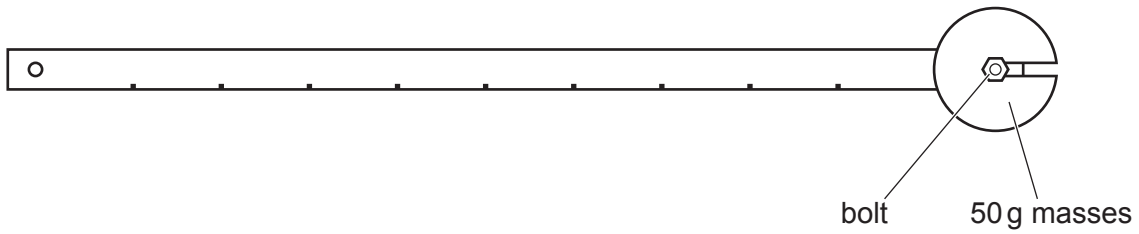


Fig. 1.2

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2 The 100 g mass should be tied to one end of the string and a loop of approximate circumference 12 cm should be tied in the other end of the string, as shown in Fig. 1.3.

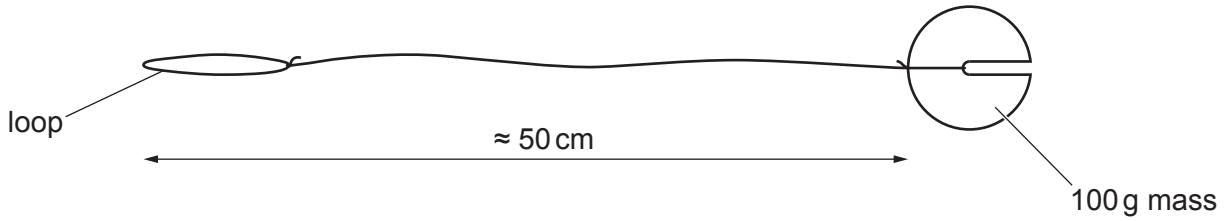


Fig. 1.3

3 The apparatus should be laid out on the bench. If the apparatus is to be used by another candidate, then it should be restored to its original state.

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Materials and apparatus for Question 2 (per set of apparatus unless otherwise specified)

- Bi-convex glass lens of focal length 5 cm and approximate diameter 5 cm.
- Transparent container with a flat base. It should be large enough for the lens to stand on its edge in the container, as shown in Fig. 2.1, (e.g. ukge.com item SR0150). See Note 1.
- Two 250 cm^3 beakers. See Note 2.
- Small torch with at least three bright LEDs as its light source.
- White cardboard screen of A4 size fixed with its plane vertical.
- 30 g of modelling clay (e.g. Plasticine).
- Metre rule with a millimetre scale.
- Paper towels to mop up any spillages.
- Tray for beakers.

Notes

1 Example of a suitable transparent container.

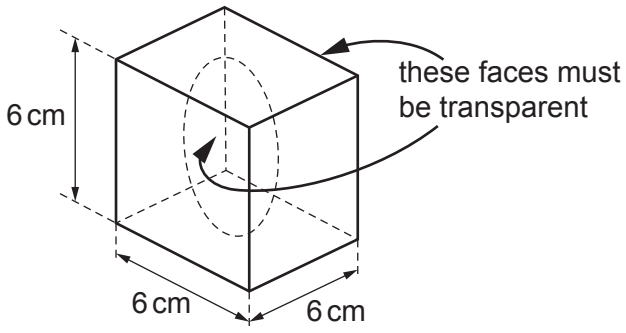


Fig. 2.1

2 One of the beakers should contain a solution made with 200 g of water and 100 g of white sugar. This beaker should be labelled **0.33 SUGAR CONCENTRATION**.

The second beaker should contain a solution made with 200 g of water and 44 g of white sugar. This beaker should be labelled **0.18 SUGAR CONCENTRATION**.

3 The apparatus should be laid out on the bench. If the apparatus is to be used by another candidate, then it should be restored to its original state. New solutions and dry equipment should be provided.

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Supervisor's report

Syllabus and component number | | | | | / | | |

Centre number | | | | | |

Centre name .....

Time of the practical session .....

Laboratory name/number .....

Give details of any difficulties experienced by the centre or by candidates (include the relevant candidate names and candidate numbers).

You must include:
- any difficulties experienced by the centre in the preparation of materials
- any difficulties experienced by candidates, e.g. due to faulty materials or apparatus
- any specific assistance given to candidates.

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Space for supervisor to record results, if relevant, e.g. temperature of the laboratory; results for Questions.

Declaration

1 Each packet that I am returning to Cambridge International contains all of the following items:
- the scripts of the candidates specified on the bar code label provided
- the supervisor's results relevant to these candidates
- the supervisor's reports relevant to these candidates
- seating plans for each practical session, referring to each candidate by candidate number
- the attendance register.

2 Where the practical exam has taken place in more than one practical session, I have clearly labelled the supervisor's results, supervisor's reports and seating plans with the time and laboratory name/number for each practical session.

3 I have included details of difficulties relating to each practical session experienced by the centre or by candidates.

4 I have reported any other adverse circumstances affecting candidates, e.g. illness, bereavement or temporary injury, directly to Cambridge International on a *special consideration form*.

Signed ..... (supervisor)

Name (in block capitals) .....

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