

9702/31

May/June 2011

CONFIDENTIAL INSTRUCTIONS

No access to the Question Paper is permitted in advance of the examination.

If you have any problems or queries regarding these Instructions, please contact CIE
by e-mail: international@cie.org.uk,
by phone: +44 1223 553554,
by fax: +44 1223 553558,
stating the Centre number, the nature of the query and the syllabus number quoted above.

This document consists of **6** printed pages and **2** blank pages.

Preparing apparatus

These instructions detail the apparatus required for the experiments in the Question Paper. It is essential that absolute confidentiality is maintained in advance of the examination: the contents of these instructions must not be revealed either directly or indirectly to candidates.

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It is assumed that the ordinary apparatus of a Physics laboratory will be available.

Number of sets of apparatus

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Organisation of the examination

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 make a deduction of marks.

Assistance should only be given:

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Faulty apparatus

In cases of faulty apparatus (not arising from a candidate's mishandling) that prevent the required measurements being taken, the Supervisor may allow extra time to give the candidate a fair opportunity to perform the experiment as if the fault had not been present. The candidate should use a spare copy of the Question Paper when the fault has been rectified or when working with a second set of apparatus.

Supervisor's Report

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Question 1

Apparatus requirements (per set of apparatus unless otherwise specified)

1 V – 2 V d.c. power supply (e.g. 1.5 V dry cell in holder) with terminals.

Three component holders with terminals, fitted with resistors as follows :

Holder labelled 'B' fitted with a $100\ \Omega$ resistor. See Note 1.

Holder labelled 'C' fitted with a $47\ \Omega$ resistor. See Note 1.

Holder labelled 'D' also fitted with a $47\ \Omega$ resistor. See Note 1.

Digital ammeter with range at least 0 – 10 mA reading to the nearest 0.01 mA or better. See Notes 2 and 3.

Digital voltmeter with range at least 0 – 1 V reading to the nearest 0.001 V or better. See Notes 2 and 3.

Switch.

Thirteen connecting wires.

Variable resistor (rheostat) with a maximum resistance of between $8\ \Omega$ and $30\ \Omega$, capable of carrying a current of at least 0.1 A. See Note 3.

Notes

- 1 All three resistors should be taped to hide their values.
The resistors should have a minimum power rating of 0.25 W and a tolerance of 5% (e.g. Rapid Electronics product codes 63-2320 and 63-2323).
- 2 A multimeter fixed to the appropriate range and precision would be suitable in each case. If a multimeter is used, the dial(s) should be taped to prevent candidates changing the settings.
- 3 Any unused terminals on the variable resistor, ammeter and voltmeter should be covered.
- 4 The apparatus should be laid out on the bench and, if it is to be used by another candidate, then it should be restored to its original state.

Information required by Examiners

Sample set of numerical results, clearly labelled "Supervisor's Results" and obtained out of sight of the candidates.

Question 2

Apparatus requirements (per set of apparatus unless otherwise specified)

Two cylinders, each with a length of at least 5 cm. See Note 1.

1.5 m length of string.

Metre rule with a millimetre scale.

Access to a vernier caliper (shared between at most two candidates).

Stopwatch reading to 0.1 s or better.

50 g of modelling clay (e.g. Plasticene).

Notes

- 1 One of the cylinders should have a diameter in the range 4 cm – 8 cm, and should be labelled 'cylinder A'. The other cylinder should have a diameter in the range 15 cm – 30 cm, and should be labelled 'cylinder B'.
The two cylinders can be solid or hollow.
Cylinder A could be an empty tin can or bottle.
Cylinder B could be a waste paper bin, large pipe or cake tin.
Each of the two cylinders should be made from a different material.
- 2 The apparatus should be laid out on the bench and, if it is to be used by another candidate, then it should be restored to its original state.

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General Certificate of Education Advanced Subsidiary Level and Advanced Level

May/June Session 2011

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Supervisor's Report



Supervisor's Report (continued)**Declaration**

(to be signed by the Supervisor)

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

Signed

Name

Centre Number

Name of Centre





UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education
Advanced Subsidiary Level and Advanced Level

PHYSICS

9702/32

Advanced Practical Skills 2

May/June 2011

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Question 1**Apparatus requirements (per set of apparatus unless otherwise specified)**

Metre rule with a millimetre scale.

Nail with diameter approximately 2.5 mm and length approximately 50 mm. The surface of the nail should be smooth.

Two stands, one with a boss and the other with a pulley wheel that can be adjusted in height.

Half-metre rule (or uniform wooden strip, with approximate dimensions 50 cm × 2.5 cm × 0.5 cm and approximate mass 50 g). See Note 1.

Protractor.

Set square.

Thin string of length 65 cm. See Note 2.

Mass hanger with a mass of 50 g, clearly labelled “mass = 50 g”.

Slotted masses (two 50 g and five 10 g) suitable for the candidate to add to the mass hanger.

Notes

- 1 Drill two 3 mm holes in the half-metre rule, as shown in Fig. 1.1.
- 2 Tie one end of the string through the hole at 15 cm, using a large loop (using 8 cm of the string), as shown in Fig. 1.1. Tie a smaller loop in the other end (for the candidate to attach the mass hanger).
- 3 The apparatus should be assembled as in Fig. 1.2, and returned to this state if it is to be used by another candidate.

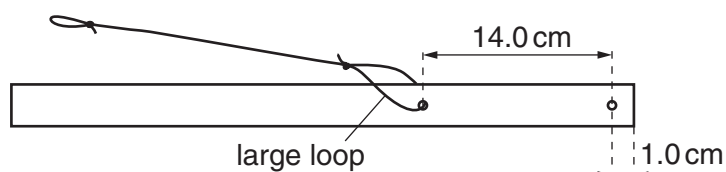


Fig. 1.1

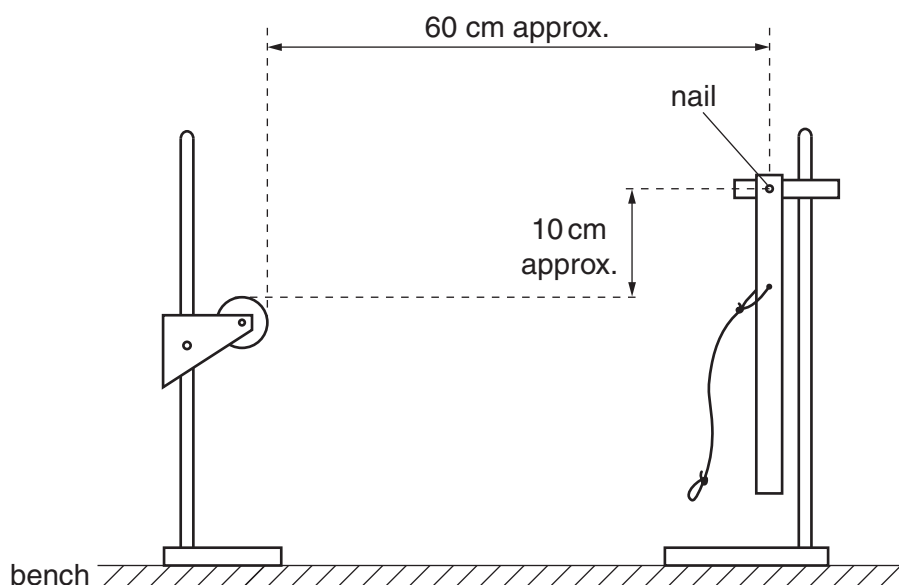


Fig. 1.2 (not to scale)

Information required by Examiners

Sample set of numerical results, clearly labelled “Supervisor’s Results” and obtained out of sight of the candidates.

Question 2**Apparatus requirements (per set of apparatus unless otherwise specified)**

Two wooden metre rules, each with a millimetre scale.

Loop of string with circumference approximately 10 cm.

Newton-meter with range 0–10 N, reading to 0.5 N or better.

Two identical triangular prisms made from any rigid material (such as wood, perspex or glass) with height in the range 4 cm to 15 cm, as shown in Fig. 2.1.

Two identical 500 g masses. Each should be made from a mass hanger and slotted masses.

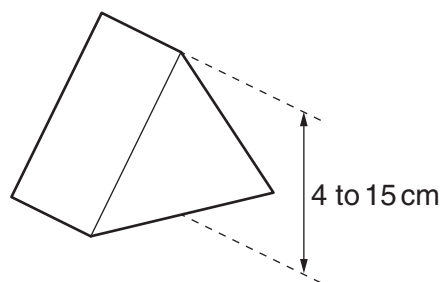


Fig. 2.1

Notes

- 1 The apparatus should be laid out on the bench, and should be returned to this state if it is to be used by another candidate.

Information required by Examiners

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May/June Session 2011

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Supervisor's Report



Supervisor's Report (continued)**Declaration**

(to be signed by the Supervisor)

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Signed

Name

Centre Number

Name of Centre





UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education
Advanced Subsidiary Level and Advanced Level

PHYSICS

9702/33

Advanced Practical Skills 1

May/June 2011

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Question 1

Apparatus requirements (per set of apparatus unless otherwise specified).

Two bulldog (binder) clips with width between 6 cm and 8 cm and with a hole in each handle, as shown in Fig. 1.1. See Note 1.

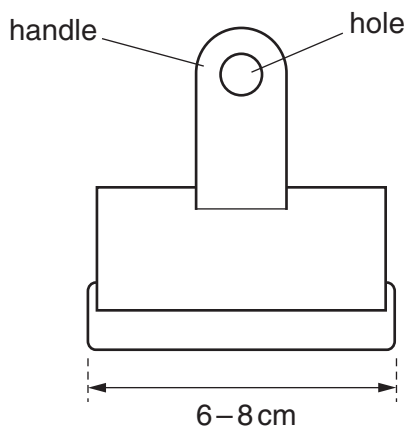


Fig. 1.1

Three sheets of graph paper or squared paper, of minimum length 29 cm (A4 is suitable).

An additional strip of graph or squared paper of width 2.0 cm and approximate length 29 cm.

Four paper clips. A mixture of lengths in the range 2 cm – 6 cm may be provided.

Stopwatch reading to 0.1 s or better.

30 cm ruler with a millimetre scale.

Retort stand with boss.

Large flat-headed nail of minimum length 8 cm and able to fit through the holes in the handle of the bulldog clips. See Note 2.

Cylindrical wooden rod of approximate length 15 cm and approximate diameter 1 cm. See Note 3.

Scissors.

Notes

- 1 If either of the bulldog clips is unable to grip a single sheet of paper, use double-sided tape or glue to attach a piece of card along the length of one of the jaws, as shown in Fig.1.2.

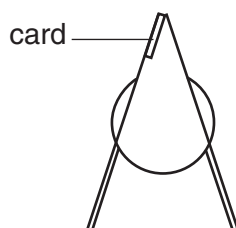


Fig. 1.2

- 2 The nail should be mounted horizontally on the retort stand, at a minimum height of 50 cm above the bench, as shown in Fig. 1.3.

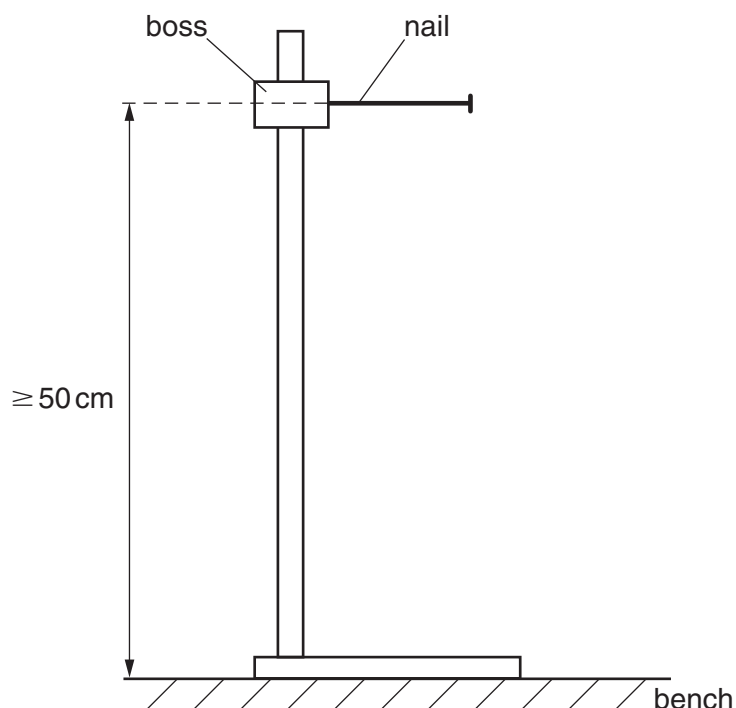


Fig. 1.3

- 3 The rod must be held inside one of the bulldog clips, but the jaws must be able to close firmly, as shown in Fig. 1.4.

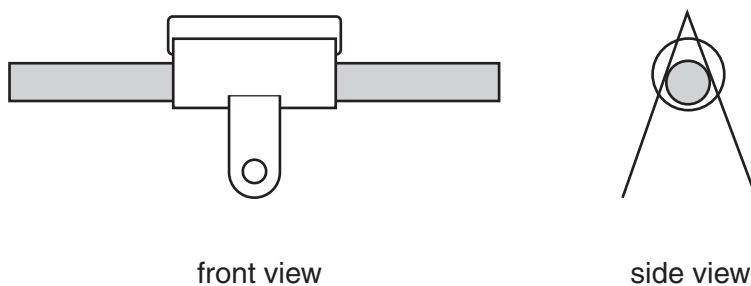


Fig. 1.4

- 4 If the apparatus is to be used by another candidate, then it should be restored to its original state.

Information required by Examiners

Sample set of numerical results, clearly labelled "Supervisor's Results" and obtained out of sight of the candidates.

Question 2

Apparatus requirements (per set of apparatus unless otherwise specified).

Two metre rules, each with a millimetre scale.

Two identical smooth cuboid blocks of approximate dimensions $20\text{ cm} \times 6\text{ cm} \times 6\text{ cm}$ (e.g. wooden blocks or sturdy boxes).

Two identical pivots with height in the range $1\text{ cm} - 6\text{ cm}$, as shown in Fig. 2.1 (e.g. small glass prisms).

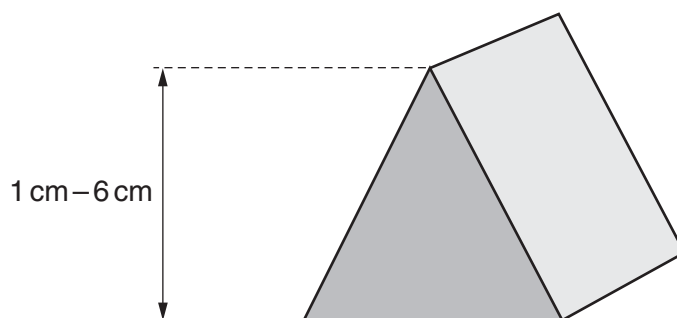


Fig. 2.1

Loop of string of approximate circumference 10 cm .

Loop of string of approximate circumference 40 cm .

A 1 kg mass with hook (e.g. appropriate masses securely taped to a mass hanger).

Notes

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Supervisor's Report



Supervisor's Report (continued)**Declaration**

(to be signed by the Supervisor)

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Signed

Name

Centre Number

Name of Centre





UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education
Advanced Subsidiary Level and Advanced Level

PHYSICS

9702/34

Advanced Practical Skills 2

May/June 2011

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Question 1**Apparatus requirements (per set of apparatus, unless otherwise specified)**

Mass hanger with a mass of 50 g, clearly labelled 'mass = 50 g'.

Slotted masses (two 50 g and three 20 g), suitable for the mass hanger and with the mass values clearly visible. See Note 1.

Two set squares.

Metre rule with a millimetre scale.

Tall 500 ml beaker (glass or rigid plastic) with parallel sides and an external diameter in the range 7 cm to 9 cm. See Note 2.

Two 100 g slotted masses. See Note 3.

Thin string of length 25 cm. See Note 4.

Paper 180° protractor with diameter slightly less than the diameter of the beaker. A clear photocopy or scanned copy of a protractor is suitable, with its size reduced to suit the beaker. See Note 5.

Two wood strips about 30 cm by 2.5 cm by 2.5 cm and two shorter strips of wood. See Note 6.

Two identical, flat-topped stable supports about 30 cm high (e.g. two piles of bricks or two box files). See Note 7.

Notes

- 1 If three 20 g masses are not available, six 10 g masses may be used. The 10 g masses should be attached in pairs with tape so that three masses of 20 g each are available to the candidate.
- 2 If a 500 ml beaker is not available, then any cylindrical, rigid container with diameter between 7 cm and 9 cm would be suitable (e.g. an empty glass bottle or metal can).
- 3 Attach the two 100 g slotted masses to the beaker using adhesive tape, as shown in Fig. 1.1.
- 4 Tie a loop in one end of the string and then attach the string to the beaker using adhesive tape, as shown in Fig. 1.1.
- 5 Stick the paper protractor to the base of the beaker using paper adhesive (e.g. Pritt Stick), as shown in Fig. 1.1. The 0° mark on the protractor should be beyond the end of the adhesive tape, as shown in Fig. 1.1, but the exact position is unimportant.
- 6 The wood strips should be fixed parallel to each other using two cross-strips, as shown in Fig. 1.2. Their spacing should be suitable for the apparatus arrangement shown in Fig. 1.3, with a gap greater than the diameter of the attached masses.
- 7 The apparatus should be arranged as shown in Fig. 1.3, and returned to this state if it is to be used by another candidate.

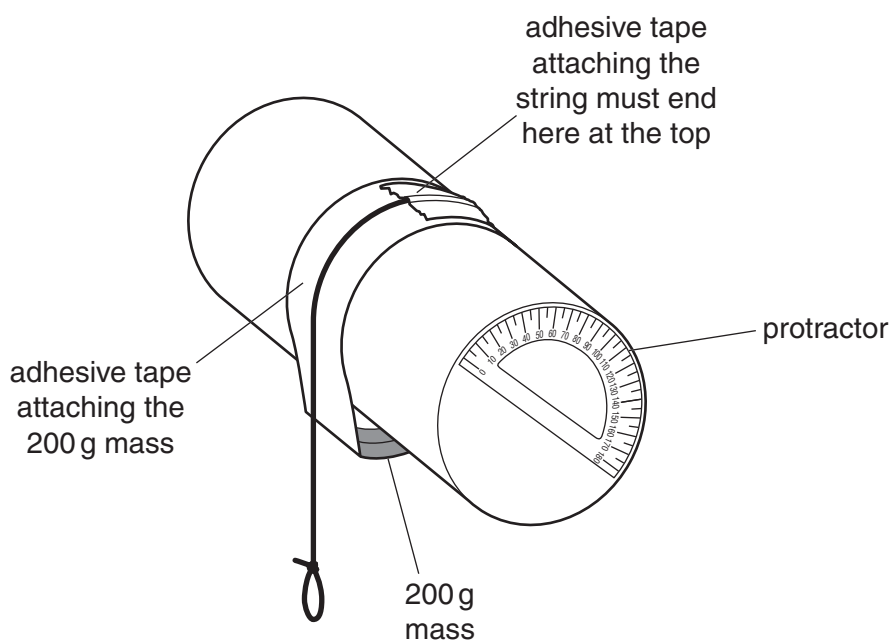


Fig. 1.1

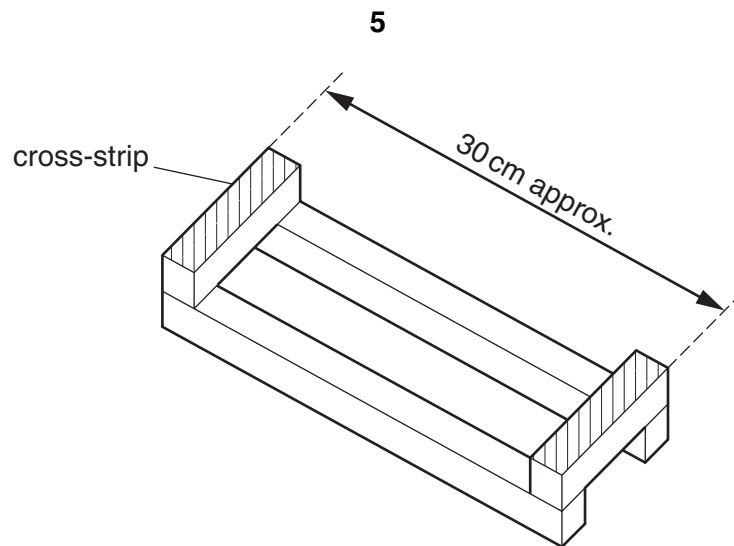


Fig. 1.2

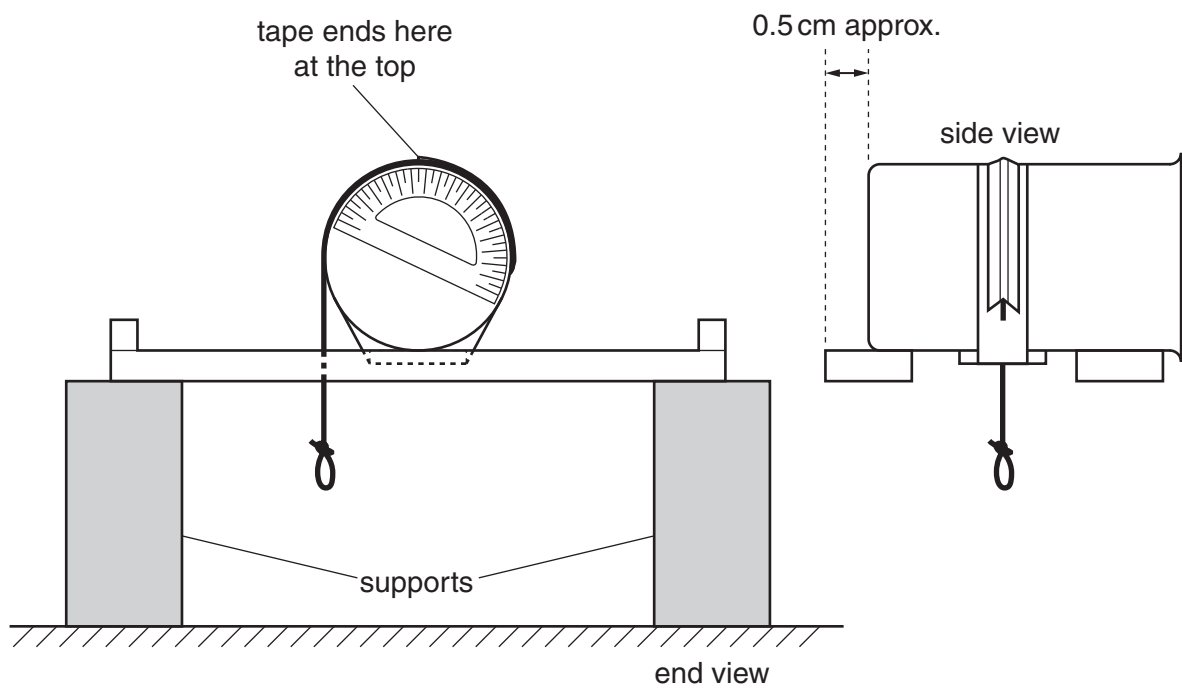


Fig. 1.3

Information required by Examiners

Sample set of numerical results, clearly labelled "Supervisor's Results" and obtained out of sight of the candidates.

Question 2**Apparatus requirements (per set of apparatus, unless otherwise specified)**

Retort stand, boss and clamp.

Mass hanger of mass 100 g, with the mass of the hanger clearly indicated.

One 100 g slotted mass suitable for the 100 g mass hanger.

Mass hanger of mass 50 g, with the mass of the hanger clearly indicated.

Rubber band of unstretched circumference approximately 20 cm, and maximum width 6 mm.

Stopwatch reading to 0.1 s or better.

30 cm rule with a millimetre scale.

Notes

- 1 The apparatus should be laid out on the bench, and returned to this state if it is to be used by another candidate.

Information required by Examiners

Diameter of the 100 g mass hanger at its widest point.

Sample set of numerical results, clearly labelled “Supervisor’s Results” and obtained out of sight of the candidates.

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This form should be completed and sent to the Examiner with the scripts.

SUPERVISOR'S REPORT FORM

General Certificate of Education Advanced Subsidiary Level and Advanced Level

May/June Session 2011

The Supervisor's Report should give full details of:

- (a)** any help given to a candidate (including the nature of the help given and the name and candidate number of the candidate);
- (b)** any cases of faulty apparatus (including the nature of the problem, the action taken to rectify it, any additional time allowed, and the name and candidate number of the candidate);
- (c)** any accidents that occurred during the examination;
- (d)** any other difficulties experienced by candidates, or any other information that is likely to assist the Examiner, especially if this information cannot be discovered in the scripts.

Cases of individual hardship, such as illness, bereavement or disability, should be reported direct to CIE on the normal Special Consideration form.

Information required by Examiners

For Question 2, diameter of the 100 g mass hanger at its widest point:

diameter = ... cm

For each question, please enclose a sample set of numerical results, obtained out of sight of the Candidates and clearly labelled "Supervisor's Results".

Supervisor's Report



Supervisor's Report (continued)**Declaration**

(to be signed by the Supervisor)

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

Signed

Name

Centre Number

Name of Centre





UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education
Advanced Subsidiary Level and Advanced Level

PHYSICS

9702/35

Advanced Practical Skills 1

May/June 2011

CONFIDENTIAL INSTRUCTIONS



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

No access to the Question Paper is permitted in advance of the examination.

If you have any problems or queries regarding these Instructions, please contact CIE
by e-mail: international@cie.org.uk,
by phone: +44 1223 553554,
by fax: +44 1223 553558,
stating the Centre number, the nature of the query and the syllabus number quoted above.

This document consists of **7** printed pages and **1** blank page.



Preparing apparatus

These instructions detail the apparatus required for the experiments in the Question Paper. It is essential that absolute confidentiality is maintained in advance of the examination: the contents of these instructions must not be revealed either directly or indirectly to candidates.

No access is permitted to the Question Paper in advance of the examination.

If you have problems or queries regarding these instructions, please contact CIE:

by e-mail: international@cie.org.uk,

or by telephone: +44 1223 553554,

or by fax: +44 1223 553558,

stating the nature of the query and quoting the syllabus and paper numbers (9702/35).

It is assumed that the ordinary apparatus of a Physics laboratory will be available.

Number of sets of apparatus

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 examination. There should, in addition, be a few spare sets of apparatus available in case problems arise during the examination.

Organisation of the examination

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 make a deduction of marks.

Assistance should only be given:

when it is asked for by a candidate,

or as directed in the Notes sections of these instructions,

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.

All assistance given to candidates must be reported on the Supervisor's Report Form.

Faulty apparatus

In cases of faulty apparatus (not arising from a candidate's mishandling) that prevent the required measurements being taken, the Supervisor may allow extra time to give the candidate a fair opportunity to perform the experiment as if the fault had not been present. The candidate should use a spare copy of the Question Paper when the fault has been rectified or when working with a second set of apparatus.

Supervisor's Report

The Supervisor should complete the Supervisor's Report Form on pages 7 and 8 and enclose it in the envelope containing the answers of the candidates. If more than one envelope is used, a copy of the report must be enclosed in each envelope.

Question 1

Apparatus requirements (per set of apparatus unless otherwise specified)

Two pendulum bobs. See Note 1.

Expendable spring with outside diameter approximately 15 mm, coiled length approximately 20 mm and spring constant approximately 25 N m^{-1} (e.g. Phillip Harris product code B8A41397). See Note 1.

Thin string. See Note 1.

Stopwatch reading to 0.1 s or better.

Two retort stands (with minimum height 60 cm), bosses and clamps.

Protractor.

Metre rule with a millimetre scale.

30 cm ruler with a millimetre scale.

Notes

- 1 The bobs, spring and string should be assembled as shown in Fig. 1.1.

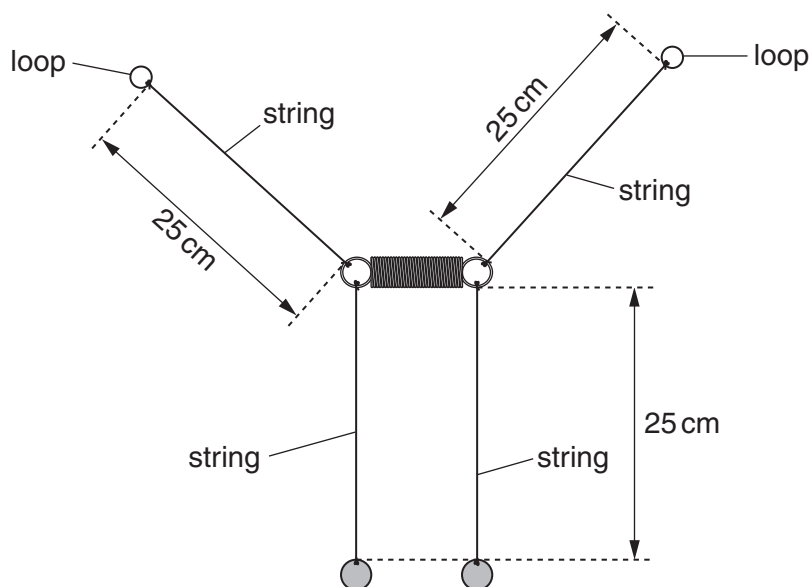


Fig. 1.1

Two small loops should be tied at the ends of the string where shown in Fig. 1.1. These loops should be large enough to fit over the rod of each clamp. The arrangement should be laid out on the bench.

- 2 If the apparatus is to be used by another candidate then it should be restored to its original state.

Information required by Examiners

Unstretched length of **coiled** part of spring.

Sample set of numerical results, clearly labelled "Supervisor's Results" and obtained out of sight of the candidates.

Question 2**Apparatus requirements (per set of apparatus unless otherwise specified)**

Open container with a base at least 10 cm × 10 cm. See Note 1.

Dry sand. See Note 1.

Wooden rod of length 10 cm and diameter approximately 5 mm. See Note 2.

Wooden rod of length 10 cm and diameter approximately 13 mm. See Note 2.

Mass hanger, with a mass of 100 g.

Masses to a total of 300 g, which the candidates can add to the mass hanger.

30 cm rule, with a millimetre scale.

Access to a manual micrometer screw gauge (not digital). See Note 3.

Small set square or straight edge suitable for flattening the surface of the sand in the container.

Notes

- 1 The container should be filled with the dry sand to a depth of at least 8 cm, as shown in Fig. 2.1.

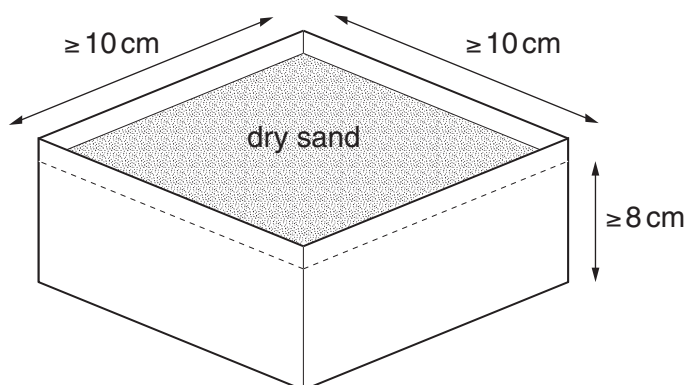


Fig. 2.1

A cylindrical container of diameter at least 10 cm would also be suitable.

- 2 The wooden rods should have a small line of length 3 mm drawn 10 mm from one end, as shown in Fig. 2.2.

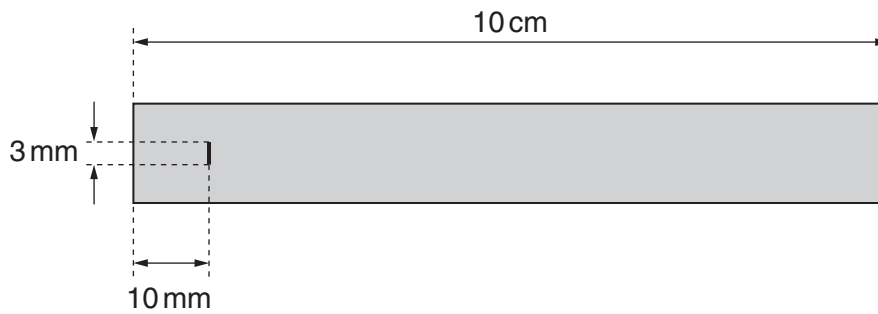


Fig. 2.2

- 3 Place the micrometer screw gauge where it can be shared. There should ideally be one micrometer screw gauge between every three or four candidates.
- 4 If the apparatus is to be used by another candidate then it should be restored to its original state.

Information required by Examiners

Sample set of numerical results, clearly labelled “Supervisor’s Results” and obtained out of sight of the candidates.

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Information required by Examiners

Unstretched length of **coiled** part of spring used in Question 1.

unstretched length = ... mm

For each question, please enclose a sample set of numerical results, obtained out of sight of the candidates and clearly labelled "Supervisor's Results".

Supervisor's Report



Supervisor's Report (continued)**Declaration**

(to be signed by the Supervisor)

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

Signed

Name

Centre Number

Name of Centre

