

PHYSICS (SPECIFICATION A)

PHA3/P/TN

Instructions to Supervisors for the Unit 3 Practical Examination

CONFIDENTIAL

OPEN ON RECEIPT

The examination will be held on Wednesday 17 January 2007 1.30 pm to 3.15 pm

- These *Instructions* are provided to enable centres to make appropriate arrangements for the examination. Copies of the *Instructions* are to be kept at the centre under lock and key when not in use; they are not to be removed from the centre. The question paper packets must not be opened prior to the examination.
- These Instructions explain how to set up the equipment for Question 2.
- Relevant sections of Question 2 are printed on page 5 of this Instruction Booklet.
- Centres are at liberty to make any reasonable minor modifications to the apparatus which may be required for the successful working of the experiment but a note of all such modifications must be forwarded to the Examiner with the scripts. However, any such modifications must permit the experiment to be carried out in the specified manner.

INSTRUCTIONS TO THE SUPERVISOR OF THE PRACTICAL EXERCISES

Preparing for the Practical Examination

- 1 The instructions and details of materials contained in this document are for the use of the Supervisor and are strictly confidential. After use, these Instructions must be kept in safe custody by the Examinations Officer until after the issue of results (in March or August as appropriate).
- 2 The Supervisor has been granted access to some of the content of Question 2 to aid the practical set up as part of these instructions. This is printed to enable the Supervisor to carry out the experimental parts of the Exercises in order to ensure that the apparatus and materials obtained are satisfactory and to seek advice from AQA if there are any problems. The Instructions must be returned to safe custody at the earliest possible moment after the Supervisor has ensured that all is in order.

The Practical Examination

- 1 If a candidate is **unable to perform** any experiment, or is performing an experiment **incorrectly**, the Supervisor is expected to give the **minimum** help required to enable the candidate to proceed. In this instance, a note bearing the candidate's name and number must be attached to the candidate's script reporting to the Examiner the extent of the help given. Any failure in the apparatus should also be reported to the Examiner. No help should be given with the analysis of the experimental data.

The Supervisor should not intervene in situations where the candidate is performing some aspect of the work badly or in a manner likely to obtain less than full credit.

It is not the wish of the Examiner that a candidate should waste time because of, for example, an incorrect electrical connection. The Examiner wishes to test the candidate's ability to perform an experiment and carry out the subsequent analysis.

- 2 Details should be given to the Examiner if the apparatus or materials provided differ from that detailed in this document. Where specific information or data about apparatus or materials is requested in these Instructions, it is important that it is given accurately. In some cases it may represent the only means available to the Examiner of assessing the accuracy of a candidate's work.

In case of difficulty the Supervisor should telephone the Senior Subject Officer for A Level Physics, David Baker, at AQA (Manchester Office), telephone number 0161 953 1180, or email dbaker@aqa.org.uk

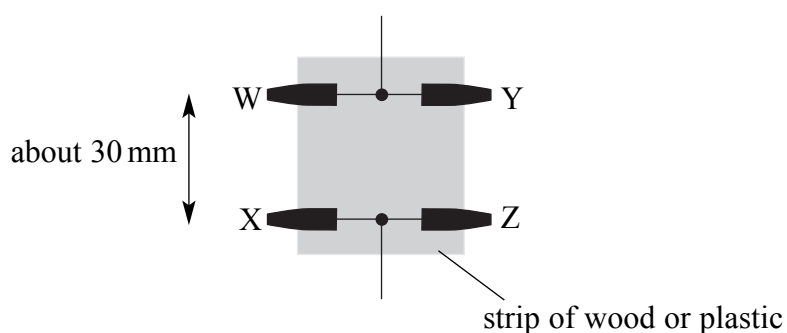
Candidates will investigate the characteristics of a potential divider circuit.

Apparatus required for each candidate:

- dc supply in range 4.5 V to 6.0 V at the convenience of the centre; this may be 3 or 4 D-type cells in a suitable holder, connected in series, a 5 V regulated supply or a variable voltage supply set at a suitable output voltage with the control knob taped over
- digital voltmeter, to read up to emf of the supply, to 0.01 V: the lead connected to the positive terminal should terminate at a 4 mm plug
- insulated wire and connecting leads as required
- four crocodile clips, labelled W, X, Y and Z, mounted on a strip of wood or plastic, to provide the means of connecting two resistors in parallel with one another, as described below (or suitable alternative)
- 4 mm round socket to be labelled 'A' and 4 mm round socket to be labelled 'B'
- one each of the following eight 0.5 W or 0.6 W, carbon or metal film resistors: 4700 Ω , 1000 Ω , 820 Ω , 470 Ω , 330 Ω , 220 Ω , 150 Ω , 100 Ω
- A4 card, onto which is photocopied the table (see page 7): place each of the eight resistors listed directly above in the indicated position then secure these in place using a strip of masking tape
- one 220 Ω resistor, 0.5 W or 0.6 W, carbon or metal film, value to be concealed from the candidate; candidates **should not be able to remove this** from the circuit, nor should they be able to short this resistor out, e.g. by using any additional lead to connect between sockets A and B

Construct the circuit shown in the question, **Figure 2**.

The component holder consists of four crocodile clips, mounted as shown below.



The separation of each pair of clips, W and X, and Y and Z, should be about 30 mm, such that a resistor can be conveniently mounted between.

W is joined directly to Y with about 50 mm of bare copper wire. Likewise X is connected to Z. These clips can be fixed to the wood/plastic base using hot glue or contact adhesive. The connection blobs shown on the diagram above are points at which connections to the rest of the circuit should be made.

Examiners require no information for this question.

Electronic components may be obtained from

Rapid Electronics Ltd.,
Severalls Lane,
Colchester,
Essex,
C04 5JS

No.	Component	Rapid Code
2	220 Ω resistor, 0.5 W or 0.6 W metal or carbon film	62-0542*
1	100 Ω resistor, similar to above	62-0536*
1	150 Ω resistor, similar to above	62-0538*
1	330 Ω resistor, similar to above	62-0546*
1	470 Ω resistor, similar to above	62-0548*
1	820 Ω resistor, similar to above	62-0554*
1	1000 Ω resistor, similar to above	62-0556*
1	4700 Ω resistor, similar to above	62-0572*
2	4 mm round sockets	17-1920

* per pack of 100

Similar components can be obtained from

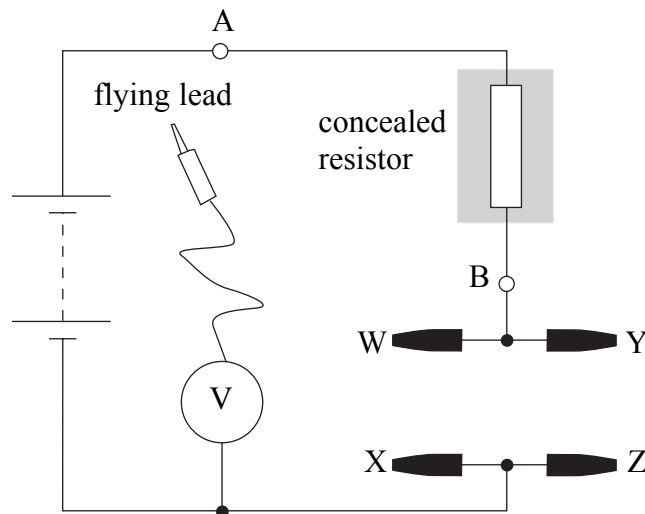
Maplin Electronics,
Freepost NEA 9437
Barnsley,
S73 0BR

Farnell Electronic Components Ltd.,
Canal Road,
Leeds,
LS12 2TU

- 2 You are to investigate the characteristics of a potential divider circuit. The potential divider consists of a concealed resistor and combinations of other known resistors that can be connected into the circuit using the clips W, X, Y and Z.
No description of the experiment is required.

You are provided with the circuit shown in **Figure 2**.

Figure 2



- (a) (i) Connect the $1000\ \Omega$ resistor between clip W and clip X.
 Connect the flying lead to socket A.
 Read and record the voltmeter reading, V_0 .
- (ii) Connect the flying lead to socket B.
Do not remove this lead for the remainder of the experiment.
 Read and record the new voltmeter reading V_1 .
- (b) You are also provided with seven additional resistors with resistances, R , between $4700\ \Omega$ and $100\ \Omega$. Connect the $4700\ \Omega$ resistor between clip Y and clip Z so that it is **in parallel** with the $1000\ \Omega$ resistor.
 Read the voltmeter reading, V , recording the reading corresponding to this value of R in the table below.
 Repeat the procedure, replacing the $4700\ \Omega$ resistor with each of the additional resistors in turn, until you have readings of V for each value of R .
When you have completed your readings, remove any resistors still connected between clips W and X or between clips Y and Z.
- (c) Plot a graph with $\frac{1}{V}$ on the vertical axis and $\frac{(1000 + R)}{R}$ on the horizontal axis.

The remaining questions for this examination are not provided in the Instructions to Supervisors. It is not necessary for the Supervisor to be aware of the questions as they have no bearing on the setting up of the experiment.

Centres are advised that the graph should be a straight line of positive gradient and positive intercept.

There are no instructions printed on this page

resistance/ Ω	fix resistors below
4700	
1000	
820	
470	
330	
220	
150	
100	

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