OCR
RECOGNISING ACHIEVEMENT

SPECIMEN

Advanced Subsidiary GCE

PHYSICS A

Unit G483: Practical Skills in Physics 1:
Quantitative Task

Specimen Task

For use from September 2008 to June 2009.

G483

All items required by teachers and candidates for this task are included in this pack.

INFORMATION FOR CANDIDATES

- Quantitative Task: Determining the resistivity of a metal wire.

INFORMATION FOR TEACHERS

- Mark scheme.
- Instructions for Teachers and Technicians.

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SPECIMEN

Advanced Subsidiary GCE

PHYSICS A

Unit G483: Practical Skills in Physics 1:
Quantitative Task

Specimen Task

G483

For use from September 2008 to June 2009.
Candidates answer on this task sheet.

INSTRUCTIONS TO CANDIDATES

- Answer **all** parts of the task.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [ ] at the end of each part.
- The total number of marks for this task is **20.**

ADVICE TO CANDIDATES

- Read each part carefully and make sure you know what you have to do before starting your answer.

FOR TEACHER'S USE		
Part	**Max.**	**Mark**
TOTAL	**20**	

This task consists of **9** printed pages and **1** blank page.

Introduction

Resistivity is a property which can be used when comparing different materials.

In this experiment, you will investigate how the current in a circuit depends on the length of a piece of resistance wire included in the circuit. You will then determine the resistivity of the material of the wire.

What you have to do

You are expected to answer on the question paper in the spaces provided on pages 5-8, with the following headings:

- Planning and carrying out the experiment (1,2,3 below)
- Results (4,5 below)
- Analysing data (6,7 below)
- Interpreting the data (8 below)
- Conclusions (9 below)

Equipment Provided

Switch

5 V or 6 V power supply (or 6 V battery pack)

Ammeter (digital or analogue)

105 cm of nichrome wire (e.g. 32 swg)

Protective resistor labelled R

1 crocodile clip.

1 jockey as movable contact or small flathead screwdriver and additional crocodile clip.

Metre rule

Adhesive tape

Connecting leads

You will also have access to a micrometer.

Procedure

1 Using the equipment provided, measure the potential difference, *V* across the terminals of the power supply. Draw a circuit diagram to show how you carried out this measurement.

2 Using the equipment provided, measure the diameter of the wire. Determine the cross-sectional area of the wire. Show all the steps in your working.

3 Using the equipment provided, set up the circuit shown in Fig 1.1.

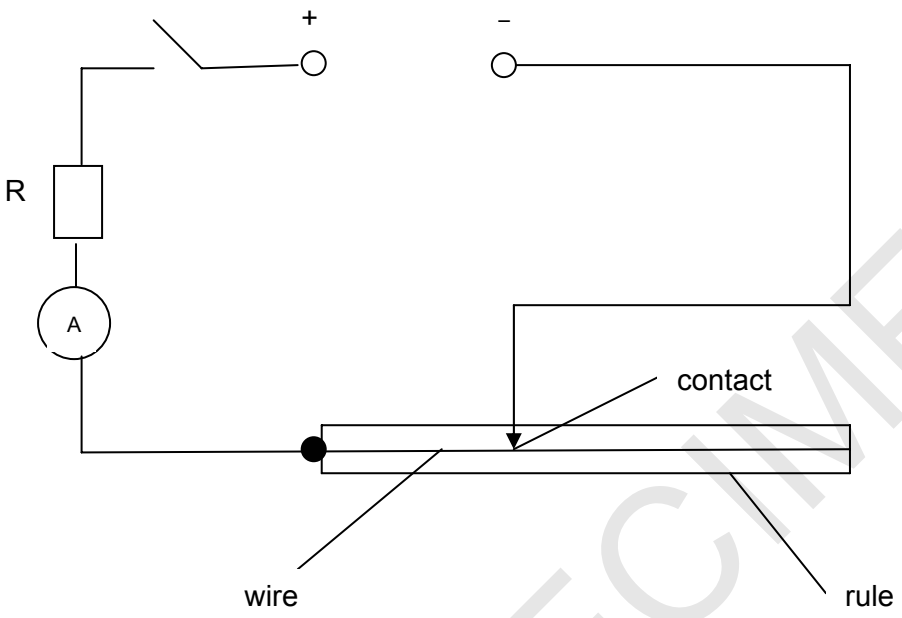


Fig 1.1

4 Close switch **S**. Place the movable contact on the wire. Measure and record the current, *I* and the length, *x*. Change the value of *x* and repeat the experiment until you have an appropriate number of readings for *x* and *I*

5 Record your results precisely and accurately in a table. Include in your table values for $\frac{1}{I}$.

6 Plot a graph of $\frac{1}{I}$ (*y*-axis) against *x* (*x*-axis) and draw the best straight line through the points.

7 Determine the gradient of the line.

8 It is suggested that the relationship between $\frac{1}{I}$ and x is

$$\frac{1}{I} = \left(\frac{\rho}{AV}\right)x + k$$

where ρ is the resistivity of the wire, A is the cross-sectional area of the wire, V is the potential difference of the power supply and k is a constant for the circuit..

Using the value for the gradient and your other results determine a value for the resistivity ρ with an appropriate unit.

9 Justify the number of significant figures for ρ.

Total [20]

Planning and carrying out the experiment

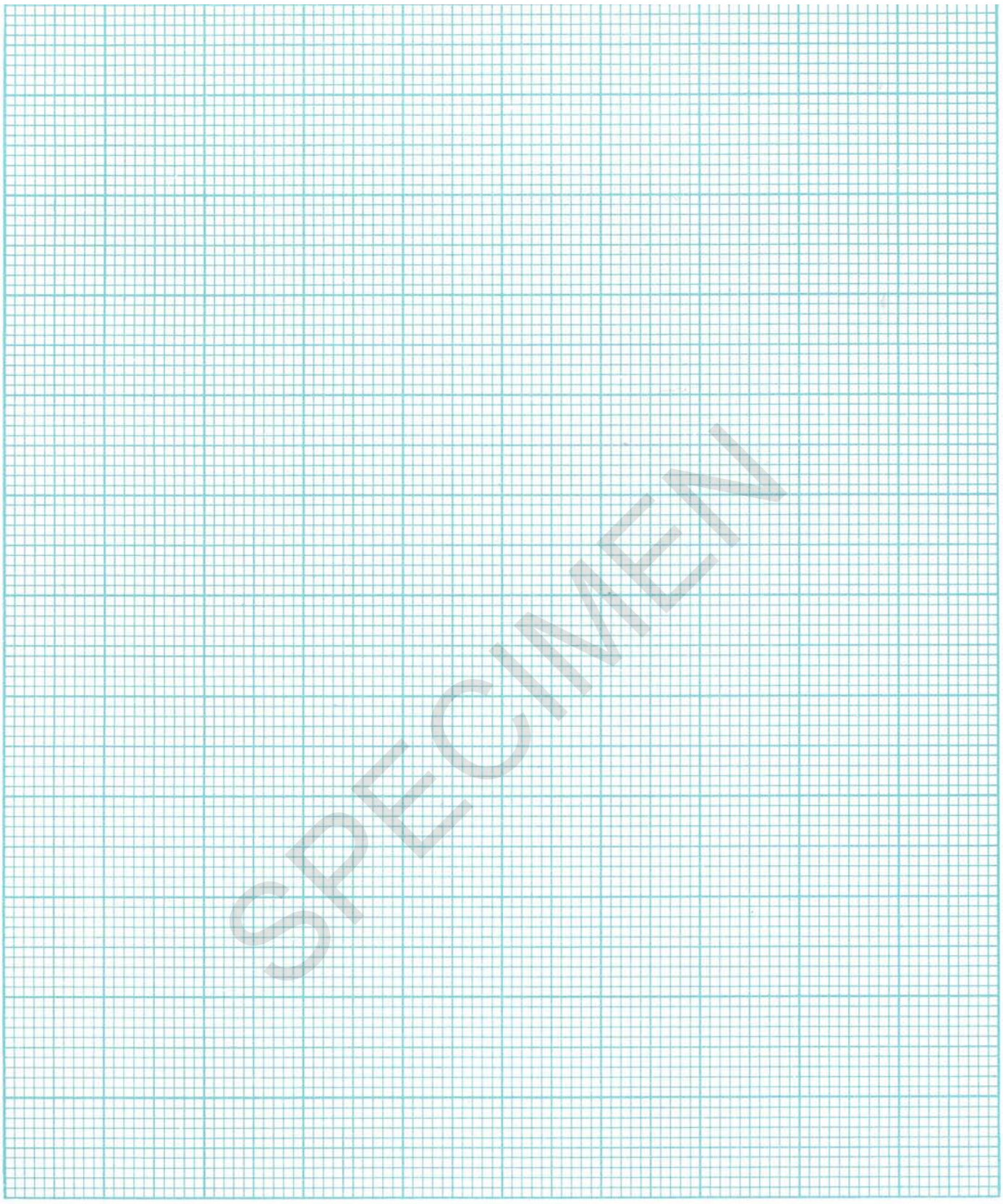
[5]

Results

[5]

Analysing data

[5]



Interpreting the data

[4]

Conclusions

[1]

[Total: 20]

END OF TASK

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OXFORD CAMBRIDGE AND RSA EXAMINATIONS

Advanced Subsidiary GCE

PHYSICS A G483

Unit G483: Practical Skills in Physics 1: Quantitative Task

Specimen Mark Scheme

The maximum mark for this task is **20**.

For use from September 2008 to June 2009.

	Answer	Max Mark
A2	**Strand A: Quality 2**	
1	Sets up circuits in Fig 1.1 and draws appropriate circuit diagram to measure the potential difference *V* and measures *V* without help.	**[2]**
2	Measures the diameter of the wire using a micrometer without help, repeating the measurements, and determines the average diameter	**[2]**
3	Chooses appropriate scales on the meters and uses a large range of values for *x*.	**[1]**
B2	**Strand B: Quality 2**	
1	Makes and records at least six sets of observations, and records results for *I* and *x* consistently. *x* must be to the nearest mm *I* must be to the same number of decimal places.	**[2]**
2	Records the diameter to the nearest 0.01 mm and determines the cross-sectional area *A* correctly and to an appropriate number of significant figures. The cross-sectional area should be given to 2 or 3 SF.	**[2]**
3	$\frac{1}{I}$ is recorded to an appropriate number of significant figures.	**[1]**
C1	**Strand C: Quality 1**	
1	Plots graph of $\frac{1}{I}$ (*y*-axis) against *x* (*x*-axis). Labels axes, uses sensible scales and points occupy more than half the graph paper in each direction.	**[2]**
2	Points plotted correctly. Best fit line drawn.	**[2]**
3	The gradient is correctly determined. Where appropriate, ICT is used to find to analyse the data (e.g: finding the gradient of the line graph).	**[1]**
C2	**Strand C: Quality 2**	
1	Recognises that the gradient of the line being equal ρ/AV and determines a suitable value for ρ.	**[2]**
2	ρ is given to an appropriate number of significant figures and with correct unit	**[2]**
3	Justifies the use of significant figures.	**[1]**
	Total	**[20]**

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OXFORD CAMBRIDGE AND RSA EXAMINATIONS

Advanced Subsidiary GCE

PHYSICS A G483

Unit G483: Practical Skills in Physics 1: Quantitative Task

Instructions for Teachers and Technicians

For use from September 2008 to June 2009.

There is no time limit for this task, but it is expected that it can be completed within one timetabled lesson.

It is assumed that you will have completed the teaching of the above module before setting your students this task. This module has links to other modules which contain related learning experiences – please refer to your specification.

Candidates may attempt more than one quantitative task with the best mark from this type of task being used to make up the overall mark for Unit G483.

Preparing for the assessment

It is expected that before candidates attempt Practical Skills in Physics 1 (Unit G483) they will have had some general preparation in their lessons. They will be assessed on a number of qualities such as demonstration of skilful and safe practical techniques using suitable quantitative methods, the ability to make and record valid observations, and the ability to organise results suitably. It is therefore essential that they should have some advance practice in these areas so that they can maximise their attainment.

Preparing candidates

At the start of the task the candidates should be given the task sheet.

Candidates must work on the task individually under controlled conditions with the completed task being submitted to the teacher at the end of the lesson. Completed tasks should be kept under secure conditions until results are issued by OCR.

Candidates should not be given the opportunity to redraft their work, as this is likely to require an input of specific advice. If a teacher feels that a candidate has under-performed, the candidate may be given an alternative task. In such cases it is essential that the candidate be given detailed feedback on the completed assessment before undertaking another Quantitative Task. Candidates are permitted to take each task **once** only.

Assessing the candidate's work

The mark scheme supplied with this pack should be used to determine a candidate's mark out of a total of 20 marks. The cover sheet for the task contains a grid for ease of recording marks. To aid moderators it is preferable that teachers mark work using red ink, including any appropriate annotations to support the award of marks.

Notes to assist teachers with this task

Teachers must trial the task before candidates are given it, to ensure that the apparatus, materials, chemicals etc provided by the centre are appropriate. The teacher carrying out the trial must complete a candidate's task sheet showing the results attained, and retain this, clearly labelled, so that it can be provided to the moderator when requested.

Health and Safety

Attention is drawn to Appendix E of the specification.

NOTES FOR TEACHERS

Introduction

This task assumes that pupils are able to:

- Set up circuits
- Use a voltmeter and an ammeter
- Use a micrometer

Pupils will be required to perform an experiment to investigate how the current in an electrical circuit changes with the length of a piece of resistance wire.

Apparatus requirements (per pupil):

Switch

5 V or 6 V power supply (or 6 V battery pack)

Ammeter (digital or analogue)

105 cm of nichrome wire (e.g. 32 swg)

Protective resistor labelled R

1 crocodile clip.

1 jockey as movable contact or small flathead screwdriver and additional crocodile clip.

Metre rule

Adhesive tape

Connecting leads

Apparatus requirements (to be available):

Micrometer or electronic vernier calipers reading to 0.01 mm.

Notes

In trials with some with some circuits large currents occurred. Centres should use ensure that a sufficiently high value protective resistor is used.

The equipment should be laid out on the bench ready for the candidates to use and should **not** be assembled prior to use by the candidates.

Teachers should be vigilant to ensure that the diameter of the wire, the potential difference of the power supply and the circuit are set up correctly. Any help given should be recorded.

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