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

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

8042323168

PHYSICS **9702/34**

Advanced Practical Skills 2 **October/November 2011**

2 hours

Candidates answer on the Question Paper.

Additional Materials: As listed in the Confidential Instructions.

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use a soft pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **both** questions.
You will be allowed to work with the apparatus for a maximum of one hour for each question.
You are expected to record all your observations as soon as these observations are made, and to plan the presentation of the records so that it is not necessary to make a fair copy of them.
You may lose marks if you do not show your working or if you do not use appropriate units.

Additional answer paper and graph paper should be submitted only if it becomes necessary to do so.
You are reminded of the need for good English and clear presentation in your answers.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] after each question or part question.

For Examiner's Use	
1	
2	
Total	

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1 In this experiment, you will investigate the variation of a potential difference in a resistor network.

(a) Set up the circuit of Fig. 1.1. The resistor R should have a resistance R where $R = 2.2\text{k}\Omega$.

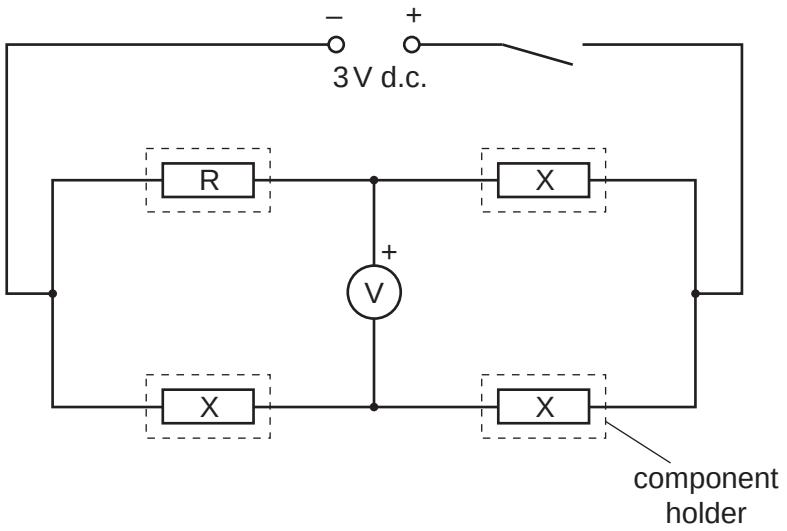


Fig. 1.1

(b) Close the switch and record the voltmeter reading V, which should be in the range +0.10 V to +0.90 V.
Open the switch.

V = ...[1]

(c) **(i)** Change resistor R for one of another value. Close the switch and record the new resistance R and the voltmeter reading V.
Open the switch.

R = ... kΩ

V = ...

(ii) Repeat **(c)(i)** until you have six sets of readings for R (in kΩ) and V. Include in your table of results values for $\left(\frac{R}{R+1}\right)$, where R is in kΩ.

Some resistors may give negative values for V.

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[11]

(d) (i) Plot a graph of V on the y-axis against $\left(\frac{R}{R+1}\right)$ on the x-axis. [3]

(ii) Draw the straight line of best fit. [1]

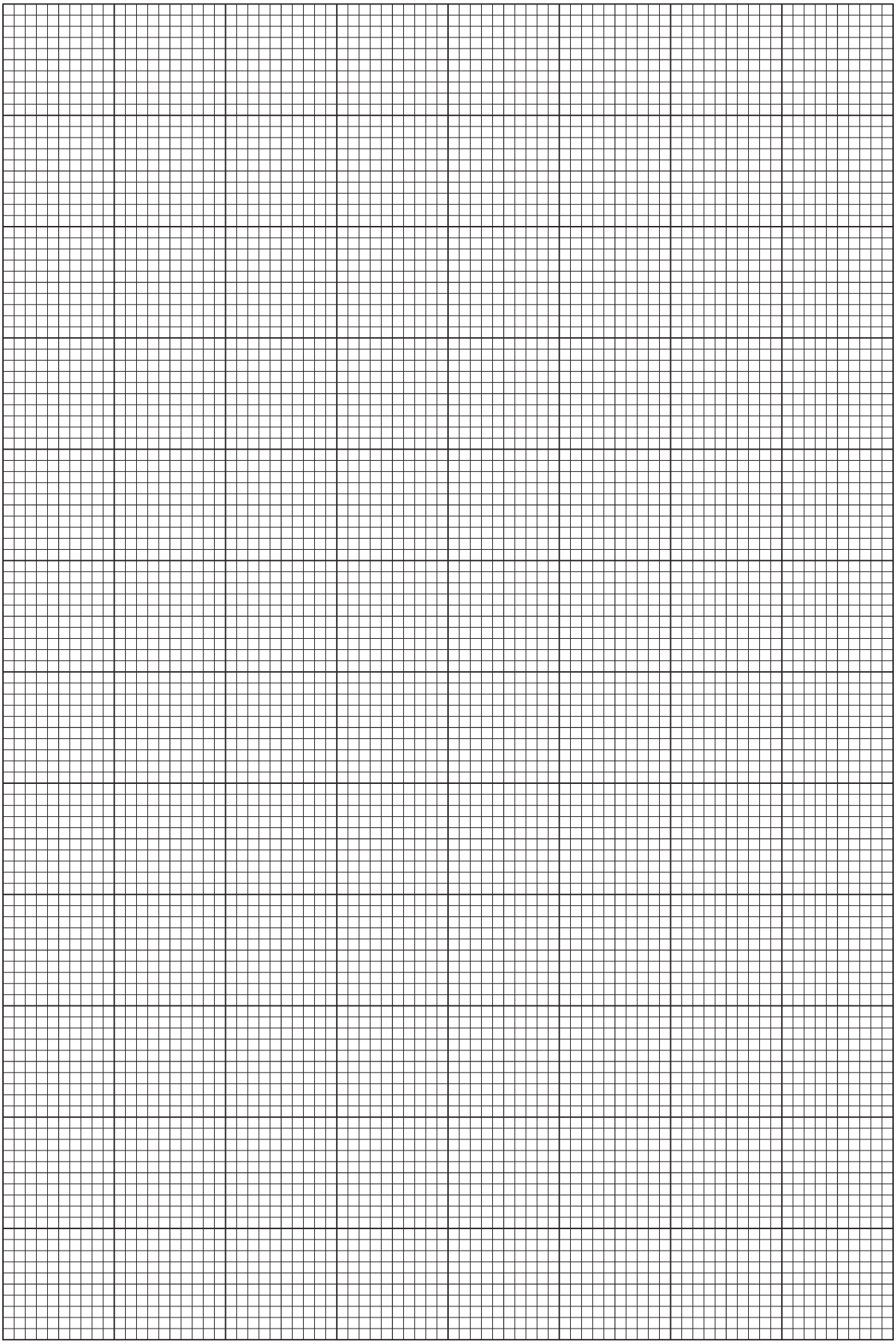
(iii) Determine the gradient and y-intercept of this line.

gradient = ...

y-intercept = ...

[2]

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(e) The relationship between V and R is

$$V = a\left(\frac{R}{R+1}\right) - b$$

where a and b are constants, and R is in kΩ.

Using your answers from **(d)(iii)**, determine the values of a and b.
Give an appropriate unit for b.

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a = ...

b = ...

[2]

You may not need to use all of the materials provided.

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2 In this experiment you will investigate the effect of cross-sectional area on the breaking force of polythene.

(a) You are provided with eight strips of polythene, each with a hole at one end. Four of the strips are marked P and four are marked Q.
For one of the strips, measure and record the thickness *t* of the polythene (measure near the end without the hole).

t = ... [1]

(b) Each strip has two cuts in it, as shown in Fig. 2.1.

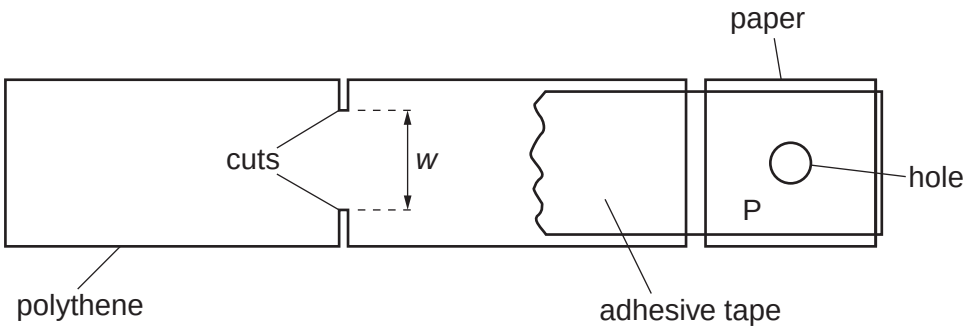


Fig. 2.1

For the strips marked P,

(i) measure the distance *w* between the cuts,

w = ... mm [2]

(ii) estimate the percentage uncertainty in *w.*

percentage uncertainty = ... [1]

(c) The cross-sectional area *A* of the strip between the cuts is shown in Fig. 2.2.

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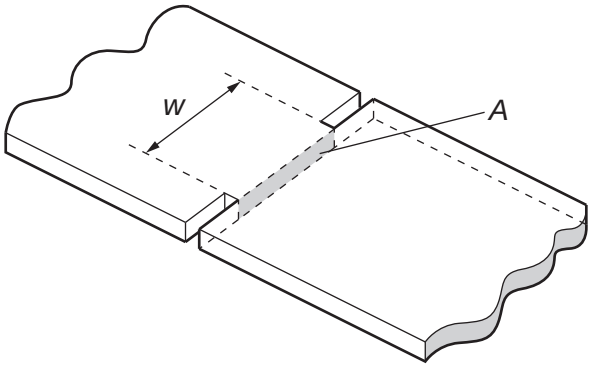


Fig. 2.2

Calculate *A* using the relationship $A = wt$.

$A =$ ..... mm^2 [1]

(d) (i) Lay a strip marked P on the bench and hook the newton-meter through the hole. Use a piece of adhesive tape to fix the other end of the strip to the bench, as shown in Fig. 2.3.

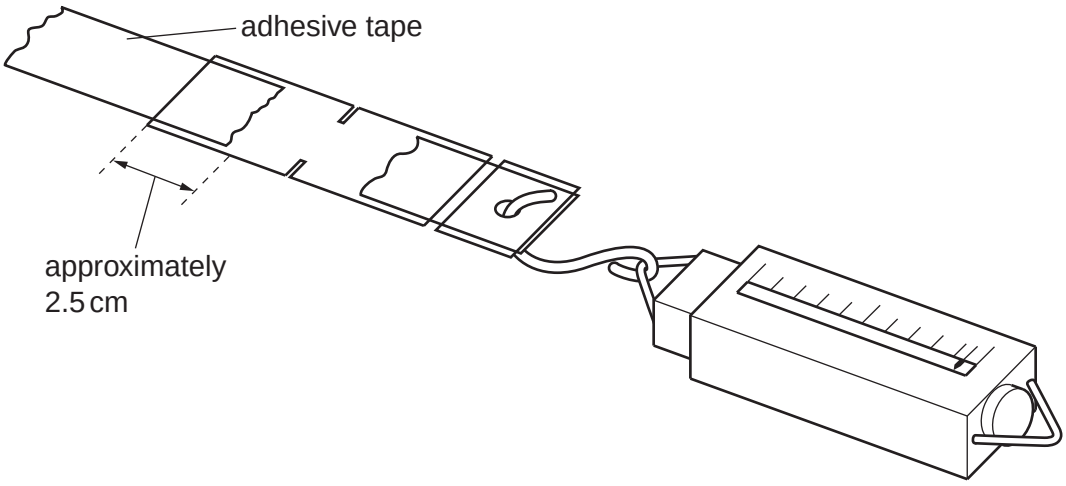


Fig. 2.3

(ii) Slowly pull the newton-meter until the strip breaks.

(iii) Repeat **(d)(i)** and **(d)(ii)** for the other strips marked P. Record the average breaking force *F*.

$F =$ ..... [2]

(e) Repeat **(b)(i)**, **(c)** and **(d)**, but this time using the strips marked Q.

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w = ... mm

A = ... mm^2

F = ...
[3]

(f) **(i)** It is suggested that the relationship between F and A is

$$F = kA$$

where k is a constant.
Using your data, calculate two values of k.

first value of k = ...

second value of k = ...
[1]

(ii) Explain whether your results support the suggested relationship.

.....

.....

.....

.....[1]

(g) (i) Describe four sources of uncertainty or limitations of the procedure for this experiment.

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1. .....

.....

2. .....

.....

3. .....

.....

4. .....

.....

[4]

(ii) Describe four improvements that could be made to this experiment. You may suggest the use of other apparatus or different procedures.

1. .....

.....

2. .....

.....

3. .....

.....

4. .....

.....

[4]

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