Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use

Examiner's Initials

Question	Mark
1	
TOTAL	

AQA

General Certificate of Education
Advanced Level Examination
June 2012

Physics   PHA6/B6/XPM2
(Specifications A and B)

Unit 6   **Investigative and Practical Skills in A2 Physics**
           Route X Externally Marked Practical Assignment (EMPA)

Section A   Part 2

For this paper you must have:
- a calculator
- a pencil
- a ruler.

Instructions
- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Show all your working.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information
- The marks for questions are shown in brackets.
- The maximum mark for Section A Part 2 is 16.

                           PHA6/B6/XPM2

Section A   Part 2

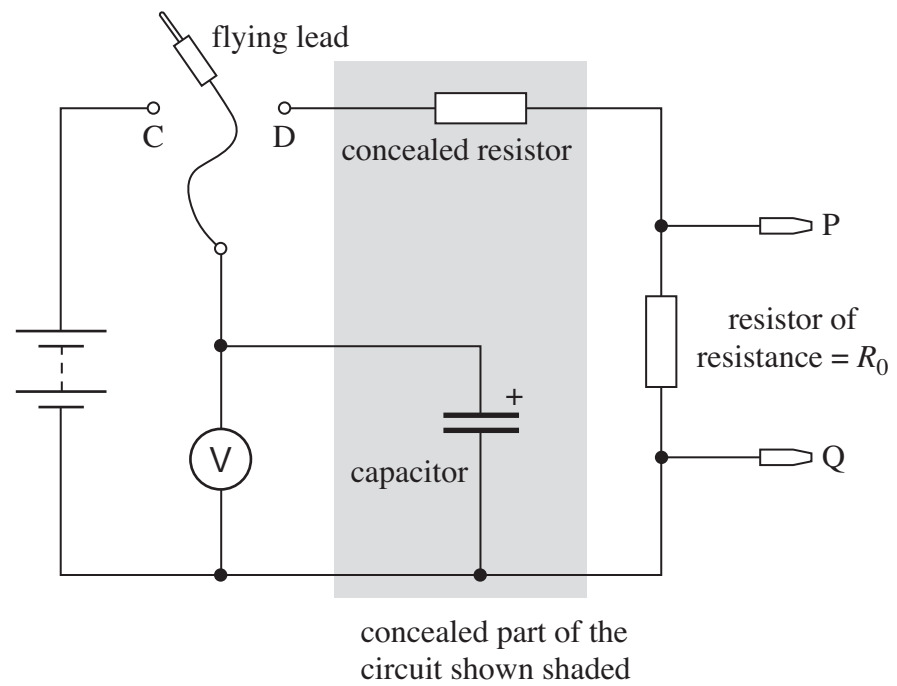Follow the instructions given below.

Answer **all** the questions in the spaces provided.

No description of the experiment is required.

1   In this experiment you are to investigate the discharge of a capacitor through different combinations of resistors.

You are provided with the circuit shown in **Figure 4**, part of which is concealed, as shown by the shaded region on the diagram.

Figure 4

flying lead

C

D

concealed resistor

P

resistor of
resistance = R_0

+

V

capacitor

Q

concealed part of the
circuit shown shaded

1 (a)   Charge the capacitor by connecting the flying lead to terminal C.
The voltmeter will show a steady reading.

Connect the flying lead to terminal D so that the capacitor discharges through the concealed resistor and the resistance R_0.
The voltmeter reading will be seen to fall exponentially.

Make suitable measurements to determine T_0, the time for the voltmeter reading to decrease by 50%.
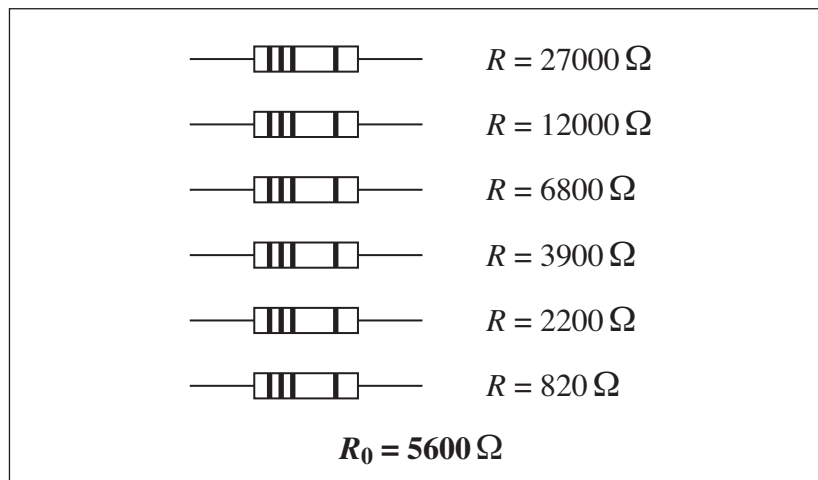
....

....

T_0 = ...

(1 mark)

1 (b)   You are provided with a postcard to which six resistors have been attached; the resistance, R, of each of these is printed on the card, as shown in **Figure 5**.

Figure 5

$R = 27000\,\Omega$

$R = 12000\,\Omega$

$R = 6800\,\Omega$

$R = 3900\,\Omega$

$R = 2200\,\Omega$

$R = 820\,\Omega$

$R_0 = 5600\,\Omega$

Connect the resistor with $R = 27000\,\Omega$ between clip P and clip Q so that it is in parallel with resistor R_0.

Using the same procedure for charging and then discharging the capacitor as before, make suitable measurements to obtain T, the time for the voltmeter reading to decrease by 50%.

Repeat the procedure using each resistor, in turn, between P and Q, until you have obtained values of T for all six resistors.

Record your measurements and observations below.

(4 marks)

Turn over ▶

1 (c) Use the value of R_0 printed on the postcard to calculate values of $\dfrac{R}{R + R_0}$ that correspond to each of your values for T.
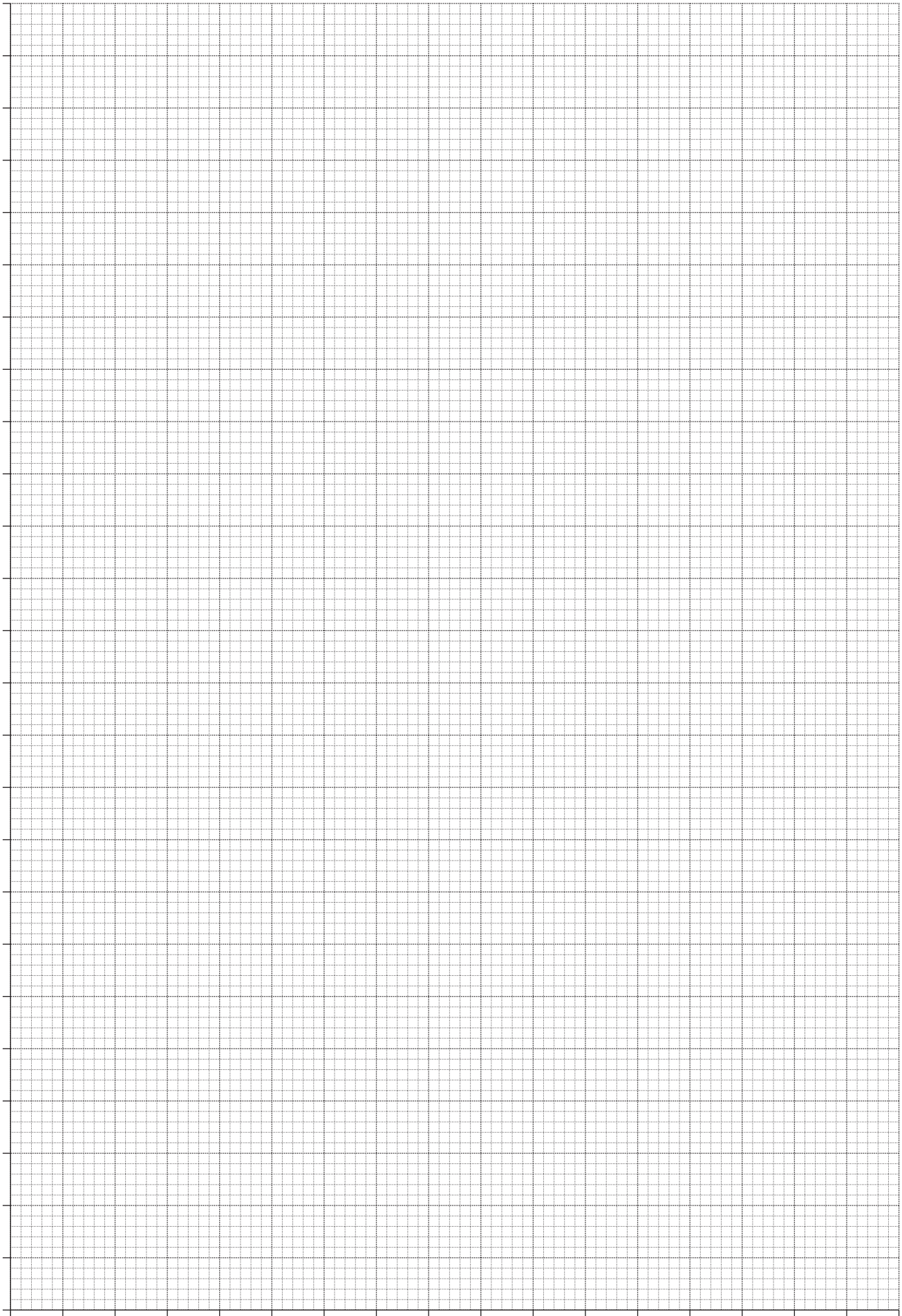
Record these data below.

(2 marks)

1 (d) Plot, on the grid opposite, a graph with $\dfrac{R}{R + R_0}$ on the vertical axis and T on the horizontal axis.

(9 marks)

16

END OF QUESTIONS

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ANSWER IN THE SPACES PROVIDED

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