GCE A LEVEL – NEW

1420U50-1E

PHYSICS – A2 unit 5
Practical Examination

Practical Analysis Task

FRIDAY, 24 MARCH 2017 – MORNING

1 hour

ADDITIONAL MATERIALS

In addition to this examination paper, you will require a calculator and a **Data Booklet**.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Pencil may be used to draw tables and graphs.
Write your name, centre number and candidate number in the spaces at the top of the page.
Write your answers in the spaces provided in this booklet.

INFORMATION FOR CANDIDATES

The total number of marks available for this task is 25.
The number of marks is given in brackets at the end of each question or part question.
You are reminded of the necessity for good English and orderly presentation in your answers.

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*Answer **all** questions.*

1. A snooker ball has a density of $1\,700 \pm 40\,\text{kg m}^{-3}$ and diameter $52.6 \pm 0.1\,\text{mm}$. Calculate the mass of the ball along with its **absolute** uncertainty. [5]

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2. *(a)* Catrin investigates how the discharging of a capacitor through a resistor depends on the initial potential difference applied across the capacitor. Draw a circuit diagram for the investigation. [2]

(b) Catrin performs another investigation. She investigates how the energy stored in a capacitor depends on the potential difference.

The relationship between the energy stored in the capacitor, U, and the potential difference, V, can be expressed as:

$$U = kV^n$$

where k and n are constants.

(i) Explain which graph should be plotted to determine k and n. [2]

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Catrin obtained the following data from her investigation.

Potential difference, V / V	Mean energy, U / J
4.00	1.5
8.00	6.3
12.00	14.2
16.00	25.4
20.00	38.3
24.00	54.6

(ii) Use your answer to part *(b)*(i) and the above data to obtain suitable values, which will enable a graph to be plotted to determine k and n. (Space is provided for a new table of data.) [2]

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(c) Draw a suitable graph to determine k and n. [4]
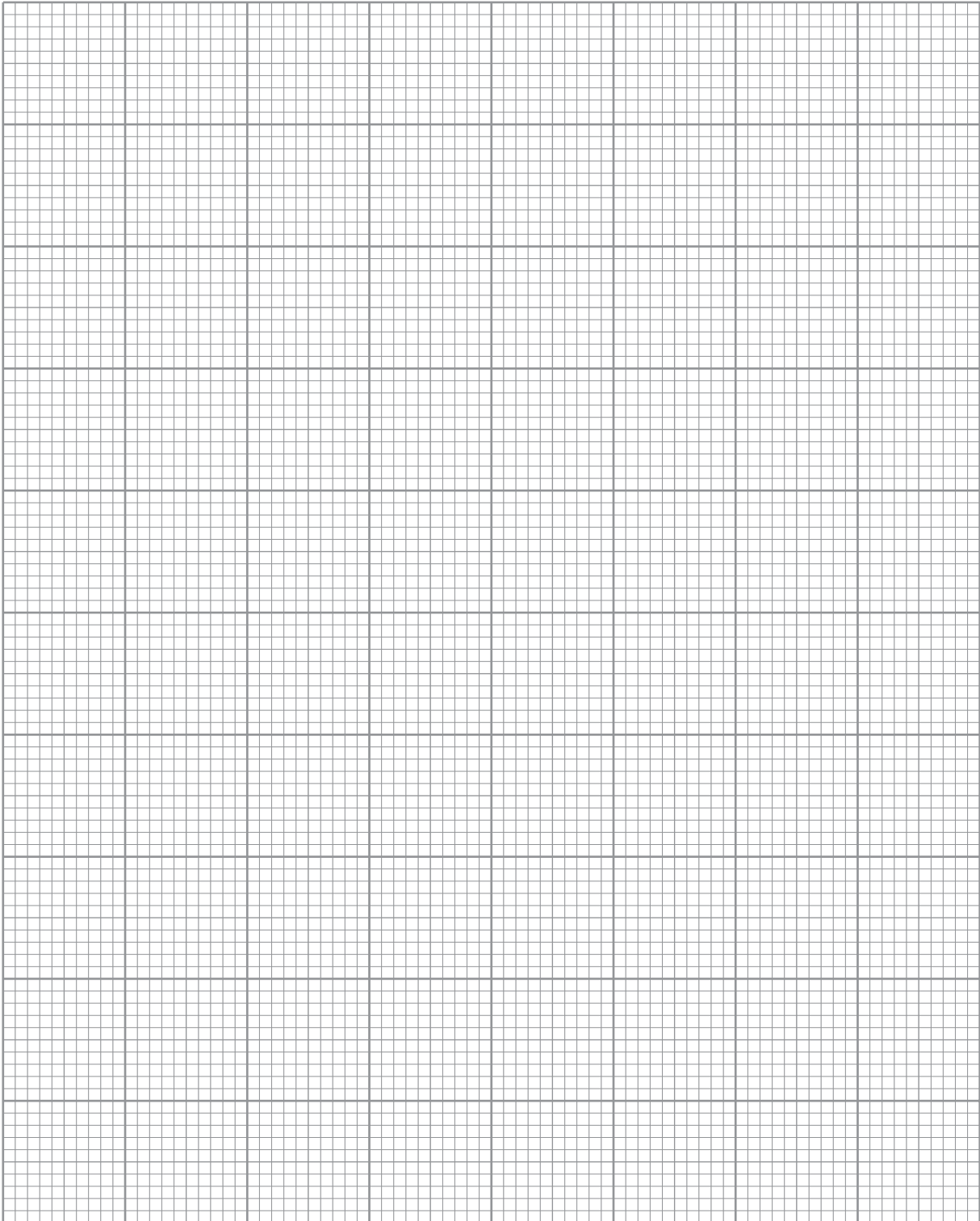
(d) Use your graph to determine n.   [3]

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(e) Theory states that the equation for the energy stored by a capacitor can be expressed as:

$$U = \tfrac{1}{2}CV^2$$

Explain whether your value for n from part *(d)* is consistent with the above equation.   [2]

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(f) Catrin used **two** 100 mF capacitors connected **in parallel** with an overall tolerance of ± 10%. Determine whether this is consistent with your graph.   [5]

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