

YEAR 2 | MODULE 6 | PACK 05

Capacitance chapter test

Official past-paper questions

2017-2023 | OCR A H556 | Mixed 6.1.1-6.1.3; graphs and experimental reasoning

25 marks | 4 question entries

Suggested time: 35 minutes

Use this after the first three core topic packs. Every source question in this test has been withheld from those practice packs, including its other assigned subparts.

Conditions: 35 minutes, calculator and the official formula booklet; no notes or mark scheme. Stop at the time limit and record your first-attempt score. The timing is scaled approximately to Paper 2. All questions use the core capacitance content; no permittivity, spherical-capacitance or later electric-field calculation is required.

A chapter-test percentage is a progress measure, not an OCR grade prediction. Full-paper performance remains a separate check.

Reserved: all 2024 and 2025 papers are excluded. These files contain official examination questions only; no sample, specimen or practice papers.

Name: _____

First attempt: _____ Score: _____ / 25

[Official data, formulae and relationships booklet](#)

Question index

CP identifiers are stable across the question packs and mark schemes; Q numbers refer to this pack. All MCQs appear first.

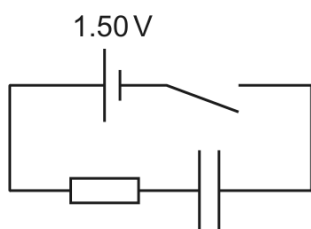
Question / source	Marks	Page
Q01 CP09	1	3
June 2019 H556/02 Q13		
Q02 CP14	1	3
November 2020 H556/02 Q8		
Q03 CP20	13	4
June 2023 H556/02 Q20		
Q04 CP15	10	6
November 2020 H556/03 Q2		

Q01 | CP09

1 mark

June 2019 | H556/02 | Q13

- 13 A capacitor is charged through a resistor.



The cell has electromotive force (e.m.f.) 1.50 V and negligible internal resistance. The time constant of the circuit is 10 s. The switch is closed at time $t = 0$. At time t , the potential difference across the resistor is 0.60 V.

Which expression is correct?

- A $0.60 = 1.50e^{-0.10t}$
- B $0.90 = 1.50e^{-0.10t}$
- C $0.60 = 1.50e^{-10t}$
- D $0.60 = 1.50(1 - e^{-10t})$

Your answer

[1]

Q02 | CP14

1 mark

November 2020 | H556/02 | Q8

- 8 A capacitor discharges through a resistor.
- At time $t = 0$ the potential difference V across the capacitor is V_0 .
- At time $t = 2.0$ s, $V = 0.90 V_0$.

Which statement is **not** correct?

- A At $t = 4.0$ s, $V = 0.81 V_0$.
- B The capacitor is fully discharged after $t = 10$ s.
- C The potential difference across the resistor is the same as that for the capacitor.
- D The potential difference V decreases exponentially with time t .

Your answer

[1]

Q03 | CP20

13 marks

June 2023 | H556/02 | Q20

- 20** In an experiment a circuit is set up so that a capacitor with a resistor in series can be charged and at some later time discharged through the same resistor without changing the positions of the components. This process can be repeated.

The supply has a potential difference (p.d.) 6.0 V d.c.

The capacitor has capacitance $1.0 \mu\text{F}$.

The resistor has resistance $10 \text{ k}\Omega$.

A voltmeter is used to measure the p.d. across the capacitor.

- (a)** Draw a circuit diagram for this experiment.

[2]

- (b)** Calculate the charge Q stored on the capacitor when it is fully charged.

$Q = \dots\dots\dots \text{ C}$ [1]

- (c)** Use a calculation to explain why it will not be possible to measure the variation of p.d. across the capacitor with time, using a stop watch.

.....
..... [4]

Q03 | CP20 - continued

13 marks

June 2023 | H556/02 | Q20

- (d) State how this experiment can be modified to measure the variation of p.d. across the capacitor with time as the capacitor charges.

.....
..... [1]

- (e) The capacitor was completely charged and then discharged to 4.12 V.

- (i) Calculate the time t required for the p.d. across the capacitor to reach 4.12 V when discharging.

$t =$ s [2]

- (ii) Calculate the average rate at which energy is lost by the capacitor as it discharges from 6.0 V to 4.12 V.

average rate at which energy is lost = ... J s^{-1} [3]

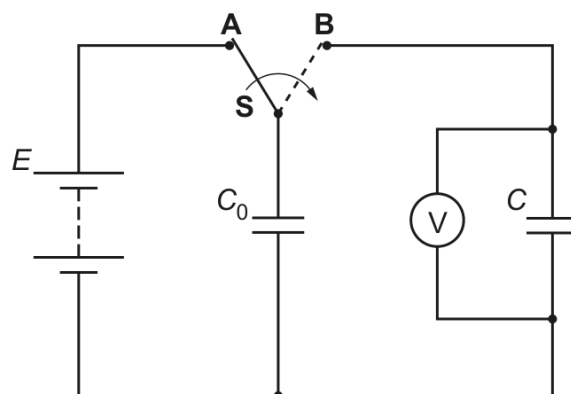
Q04 | CP15

10 marks

November 2020 | H556/03 | Q2

- 2 The diagram below shows a circuit containing two capacitors which are both initially uncharged. The battery has e.m.f. E and negligible internal resistance.

The switch **S** is first moved to position **A** until the capacitor of capacitance C_0 is fully charged.



The switch **S** is then moved to position **B**. The initial charge stored by the capacitor of capacitance C_0 is shared between the two capacitors. The final reading on the voltmeter is V .

- (a) Show that $V = \frac{C_0}{C + C_0} E$.

[2]

- (b) A student wants to determine the values of E and C_0 by repeating the experiment above and measuring the potential difference (p.d.) V for a selection of capacitors of capacitance C .

The student decides to plot a graph of $\frac{1}{V}$ against C .

- (i) Use the expression in (a) to show that the graph should be a straight line of gradient $\frac{1}{C_0 E}$ and y-intercept $\frac{1}{E}$.

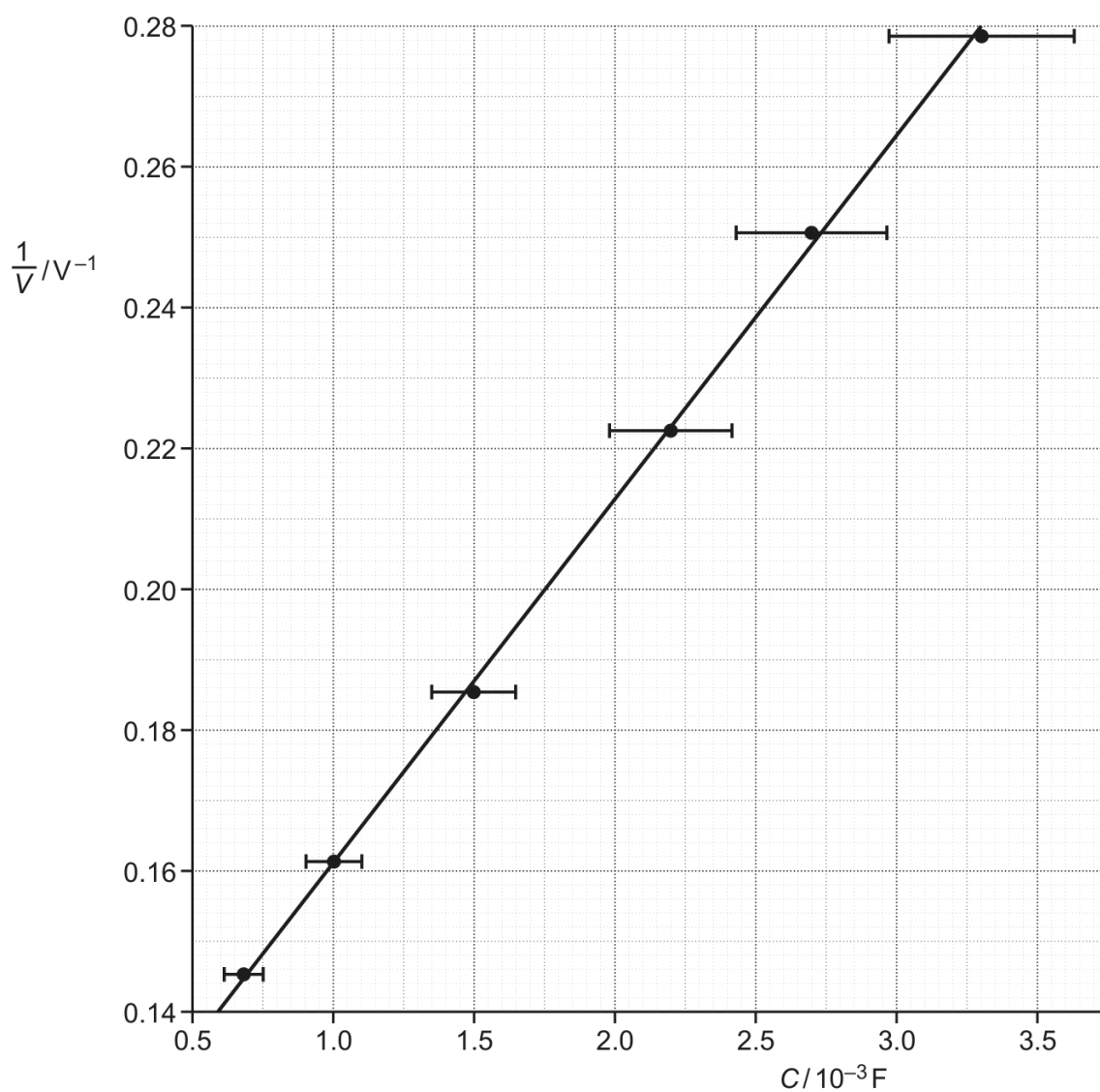
[1]

Q04 | CP15 - continued

10 marks

November 2020 | H556/03 | Q2

- (ii) The data points, error bars and the line of best fit drawn by the student are shown in the graph below.



The gradient of the line of best fit is $51 \text{ V}^{-1} \text{ F}^{-1}$. The value of E is 9.1 V .

Determine the value of C_0 in millifarads (mF). Write your answer to 2 significant figures.

$C_0 = \dots\dots\dots \text{ mF}$ [2]

Q04 | CP15 - continued

10 marks

November 2020 | H556/03 | Q2

- (iii) Draw on the graph a straight line of worst fit.

Use this line to determine the absolute uncertainty in your value of C_0 . Write your answer to an appropriate number of significant figures.

absolute uncertainty = ... mF [4]

- (c) The experiment is repeated with a resistor of resistance $10\text{ k}\Omega$ placed in series between **S** and the capacitor of capacitance C_0 .

State with a reason what effect, if any, this would have on the experiment.

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..... [1]