GET BETTER AT PHYSICS · MARK SCHEME

Parallel-Plate Capacitors & Dielectrics: tiered multiple choice

AQA A-level Physics · 7408 · Specification 3.7.4.2 · 7 questions · 7 marks

1 mark per correct letter | Worked reasoning for every question | **How students did** = from AQA examiner reports, where available

Answer key

Q1	Q2	Q3	Q4	Q5	Q6	Q7
A	C	C	D	D	C	B

Easy

Questions 1–3

1 **A**

How a polar molecule lines up in a field · AQA June 2023 · A-level Paper 2 · Q18

The field points down the page. The force on the positive end of the molecule is along the field (down) and the force on the negative end is the other way (up), so the molecule turns until its positive end points down: diagram A.

How students did: At least 70% of students got this right in June 2023.

2 **C**

Capacitance of a bigger capacitor with a dielectric · AQA June 2025 · A-level Paper 2 · Q17

$C \propto \varepsilon_r A / d$. Y has twice the plate area (double height, same width), the same separation, and $\varepsilon_r = 3.0$. $C = 100 \times 2 \times 3.0 = 600$ μF.

How students did: Over two-thirds of students got this right in June 2025.

3 **C**

Relative permittivity from equal capacitances · AQA June 2018 · A-level Paper 2 · Q24

First capacitor: $\varepsilon_0 \varepsilon_r l^2 / d$. Second: $\varepsilon_0 (2l)^2 / 2d = 2\varepsilon_0 l^2 / d$. These are equal, so $\varepsilon_r = 2$.

Watch out: The plates are square: doubling the side length makes the area four times bigger.

How students did: 52.4% of students got this right in June 2018.

Medium

Questions 4–6

4 **D**

Inserting a dielectric into an isolated capacitor · AQA June 2017 · A-level Paper 2 · Q18

The capacitor is disconnected, so no charge can flow on or off: the charge stays the same. The dielectric increases C, so $V = Q / C$ falls, and the field $E = V / d$ decreases: row D.

Watch out: Check first whether the battery is still connected: that decides whether Q or V is fixed.

5 **D**

Bigger plates, closer together · AQA June 2017 · A-level Paper 2 · Q20

$C \propto A / d$. Doubling the side doubles each dimension, so the area is 4 times bigger; halving d doubles C again. New capacitance = $4 \times 2 \times C = 8C$.

Watch out: 4C (C) forgets that the area goes up by the square of the side length.

6 **C**

Halving the separation with the battery connected · AQA June 2022 · A-level Paper 2 · Q20

The battery keeps V fixed. Halving d doubles C. Energy = $\frac{1}{2}CV^2$, so it doubles: 2E.

Watch out: With V fixed, use $\frac{1}{2}CV^2$; $Q^2/2C$ would wrongly assume Q is fixed (0.5E, A).

Hard

Question 7

7 **B**

Field after pulling isolated plates apart · AQA June 2018 · A-level Paper 2 · Q23

The plates are isolated, so Q stays the same. Doubling d halves C, so V = Q / C doubles. E = V / d = 2V / 2d, which is the same as before: E.

> **Watch out:** 2E (A) only doubles V and forgets that d has doubled too.

How students did: Only 13.3% of students got this right in June 2018.

End of mark scheme. Answers from AQA's published keys; explanations written for this pack. AQA material is © AQA. More free packs and 1-to-1 tuition: **www.getbetteratphysics.co.uk**

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