GET BETTER AT PHYSICS · MARK SCHEME

Uniform Electric Fields: tiered multiple choice

AQA A-level Physics · 7408 · Specification 3.7.3.2 · 6 questions · 6 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
A	B	A	D	B	B

Easy

Questions 1–3

1 **A**

Field strength between parallel plates · AQA June 2017 · A-level Paper 2 · Q15

Between parallel plates the field is uniform, E = V / d, so E is the same at every point between them: graph A.

Watch out: The field only falls off near the edges of the plates, which this graph doesn't include.

2 **B**

pd needed to hold a charge still · AQA June 2019 · A-level Paper 2 · Q14

The electric force balances the weight: QE = mg, with E = V / d. So QV / d = mg and V = mgd / Q.

Watch out: Check the units: mgd / Q is (N × m) / C = J C^{-1} = V.

3 **A**

Field direction from an electron's path · AQA June 2023 · A-level Paper 2 · Q16

The electron's path curves upwards, so the force on it is upwards. An electron is negative, so the force on it is opposite to the field: the field points vertically down.

Watch out: For a negative charge, the force and the field are in opposite directions.

Medium

Questions 4–6

4 **D**

Force on an electron in a field · AQA June 2019 · A-level Paper 2 · Q16

F = QE, and an electron has a negative charge, so the force on it acts opposite to the direction of the field, whichever way the electron is moving.

Watch out: An electric force does not depend on the direction of motion (unlike a magnetic force).

How students did: In June 2019 this was answered much less well than most of Section B.

5 **B**

Field that holds a negative ion still · AQA June 2024 · A-level Paper 2 · Q27

QE = mg, so E = g ÷ (Q/m) = 9.81 ÷ 7.1 × 10^{7} = 1.38 × 10^{-7} V m^{-1}. The electric force must act upwards; the ion is negative, so the field points downwards.

Watch out: 7.24 × 10^{6} V m^{-1} (C, D) comes from dividing the specific charge by g, the wrong way round.

6 **B**

Final velocity after acceleration through a pd · AQA June 2022 · A-level Paper 2 · Q15

½mu^{2} = QV, so u = √(2QV / m). Second particle: √(2 × 2Q × 2V ÷ (m/2)) = √(16QV / m) = √8 × √(2QV / m) = 2√2 u.

Watch out: Multiply the factors inside the square root first: 2 × 2 × 2 = 8, then take the root.

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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