GET BETTER AT PHYSICS · MARK SCHEME

Electric Fields & Coulomb's Law: tiered multiple choice

AQA A-level Physics · 7408 · Specification 3.7.3.1–3.7.3.2 · 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
D	B	D	C	A	D

Easy

Questions 1–3

1 **D**

Force after adding charge to both · AQA November 2020 · A-level Paper 2 · Q14

Adding −2Q to each gives −Q and +Q. The product of the charges changes from $3Q^2$ to $-Q^2$, so the force is a third as big and is now attractive: F/3, attractive.

How students did: In November 2020 this question was answered better than most of the paper.

2 **B**

Field lines for two unequal opposite charges · AQA June 2025 · A-level Paper 2 · Q11

Field lines leave +Q and end on −q. Because +Q is the bigger charge, more lines leave it than end on −q, so some of its lines go off to infinity. The lines never cross: diagram B.

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

3 **D**

Changing the charges and the separation · AQA November 2021 · A-level Paper 2 · Q14

Adding +2Q gives +3Q and +Q, which repel. $F \propto Q_1Q_2 / r^2$: the product goes from Q^2 to $3Q^2$ (× 3) and r doubles (÷ 4). New force = (3/4)F, repulsive.

How students did: In November 2021 this question was answered better than most of the paper.

Medium

Questions 4–6

4 **C**

Field lines for a charged sphere inside another · AQA June 2018 · A-level Paper 2 · Q20

The +10 μC sphere induces −10 μC on the inner surface of the outer sphere and leaves +10 μC on its outer surface. Field lines run radially from the inner sphere to the outer sphere, there is no field inside the metal of the outer sphere, and lines continue radially outwards beyond it: diagram C.

Watch out: Field lines are always at right angles to the surface of a conductor and never pass through the metal.

How students did: 49.2% of students got this right in June 2018.

5 **A**

Inverse-square force over a larger distance · AQA June 2023 · A-level Paper 2 · Q15

The new separation is 200 + 400 = 600 mm, three times the original. $F \propto 1/r^2$, so the force becomes 180 ÷ 9 = 20 μN.

Watch out: The distance is increased **by** 400 mm, not **to** 400 mm.

How students did: Fewer than 35% of students got this right in June 2023.

6 **D**

Where the field between unequal charges is zero · AQA June 2025 · A-level Paper 2 · Q15

Between Q and q the two fields point the same way (towards the negative charge), so they cannot cancel. Outside the pair they point in opposite directions, and they can only be equal in size close to the smaller charge q, on the far side from Q: point D.

> **Watch out:** With charges of opposite sign the zero-field point is never between them.

How students did: Around a third of students got this right in June 2025.

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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