GET BETTER AT PHYSICS · MARK SCHEME

Electric Fields & Coulomb's Law: tiered multiple choice

Edexcel IAL Physics · Unit 4 (WPH14) · Specification points 92–95 · 5 questions · 5 marks

1 mark per correct letter

Worked reasoning for every question

How students did = from Pearson examiner reports, where available

Answer key

Q1	Q2	Q3	Q4	Q5
B	B	A	B	B

Easy

Questions 1–3

1 **B**

Field pattern for opposite charges · Edexcel IAL January 2023 · Unit 4 · Q6

Field lines start on positive charges and end on negative charges. For a + and − pair, lines run from the positive charge (right) and curve across to the negative charge (left). Diagram B has this shape with arrows pointing away from + and towards −.

> **Watch out:** Like charges give the pattern where lines push apart (C and D); opposite charges give lines that connect.

How students did: 90% of students got this right in January 2023.

2 **B**

Reading charge from a field pattern · Edexcel IAL October 2022 · Unit 4 · Q4

The field lines between X and Y bend away from each other and do not connect, so X and Y have the same sign of charge: both negative. More field lines meet Y than X, so Y has the larger charge: −2Q.

> **Watch out:** Count the lines: the number of lines is proportional to the size of the charge.

How students did: 76% of students got this right in October 2022.

3 **A**

Charge from Coulomb's law · Edexcel IAL June 2022 · Unit 4 · Q4

$F = kQ^2/r^2$ for two equal charges, with $k = 8.99 \times 10^9$ N m^2 C^{-2}. So $Q = \sqrt{(Fr^2/k)} = \sqrt{(4.0 \times 10^{-9} \times (2.4 \times 10^{-10})^2 \div 8.99 \times 10^9)}$.

> **Watch out:** Remember the square root: F depends on Q^2.

How students did: 67% of students got this right in June 2022.

Medium

Questions 4–5

4 **B**

Electric field strength between two charges · Edexcel IAL January 2021 · Unit 4 · Q7

Each positive charge produces a field pointing away from it. At X the 2 μC charge (0.4 m away) gives a field pointing right; the 3 μC charge (0.8 m away) gives a field pointing left. The fields are in opposite directions, so subtract: $E = 2 \times 10^{-6}/(4\pi\varepsilon_0(0.4)^2) - 3 \times 10^{-6}/(4\pi\varepsilon_0(0.8)^2)$.

> **Watch out:** Pair each charge with its own distance from X.

5 **B**

How E varies with distance from a point charge · Edexcel IAL October 2021 · Unit 4 · Q4

$E = Q/(4\pi\varepsilon_0 r^2)$, so $E \propto 1/r^2$. The graph falls steeply at first and then levels off towards zero, never reaching it: graph B.

How students did: 44% of students got this right in October 2021.

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

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