GET BETTER AT PHYSICS · MARK SCHEME

Force on a Current-Carrying Wire: tiered multiple choice

Edexcel IAL Physics · Unit 4 (WPH14) · Specification points 105, 107 · 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
A	C	B	A	A

Easy

Questions 1–3

1 **A**

Direction of the force on a wire between magnets · Edexcel IAL June 2024 · Unit 4 · Q3

The facing poles are N (left magnet) and S (right magnet), so the field between them points from left to right. The current is into the page. Using Fleming's left-hand rule (field to the right, current into the page), the force on the wire is downwards.

How students did: 77% of students got this right in June 2024.

2 **C**

Force on a wire between magnetic poles · Edexcel IAL January 2020 · Unit 4 · Q7

F = BIl, where l is the length of wire inside the field: the 5.0 cm width of the poles. F = 0.070 × 1.5 × 0.050 N. The field points from N to S (downwards), and Fleming's left-hand rule with the current direction shown gives a force out of the page.

Watch out: Use the length of wire that is actually in the field.

How students did: 56% of students got this right in January 2020.

3 **B**

How F varies as the angle to the field increases · Edexcel IAL October 2021 · Unit 4 · Q10

F = BIl sin θ. As θ goes from 0 to 90°, sin θ rises from 0 to 1, quickly at first and then levelling off: a sine-shaped curve starting at the origin (graph B).

How students did: 54% of students got this right in October 2021.

Medium

Questions 4–5

4 **A**

Current from the change in a balance reading · Edexcel IAL January 2021 · Unit 4 · Q8

The balance reading rises by 1.503 − 1.500 = 0.003 N, so the wire pushes down on the magnets with 0.003 N; by Newton's third law the magnets push the wire up with 0.003 N. F = BIl gives I = 0.003/(0.07 × 0.05) A. Fleming's left-hand rule then gives the current direction from X to Y.

5 **A**

Force on a wire at an angle to a field · Edexcel IAL June 2022 · Unit 4 · Q5

Only the component of the current perpendicular to the field produces a force. With φ measured from the perpendicular to the field (as marked), that component is I cos φ, so F = BIl cos φ. Fleming's left-hand rule gives the direction into the page.

> **Watch out:** Check which angle is marked: here φ is not the angle between the wire and the field, so the force uses cos φ.

How students did: 39% of students got this right in June 2022.

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**

GET BETTER AT PHYSICS · WHAT NEXT?

Got some of these wrong?

Good. The questions you got wrong show you exactly what to work on next. The quickest way to fix them is to work through them with someone who marks these papers.

Book a free 15-minute call

Tell me which questions caught you out. We'll talk about what's going wrong and whether 1-to-1 or small-group tuition would help. There's no obligation.

Book your free call

calendly.com/getbetteratphysics/freechat

Scan to book

Current AQA examiner

I know what the mark schemes reward and where marks are lost.

Matched to your exam board

Sessions follow your specification and the topics you find hardest.

Pay per session

No block booking. 1-to-1 or small groups of up to 4.

More free packs

Tiered past-paper questions with full mark schemes, sorted by topic.
getbetteratphysics.co.uk/free-revision-packs

Masterclasses are coming

Want to hear first? Email **helpme@getbetteratphysics.co.uk** and I'll let you know when dates are announced.

Parents: I use these packs in my own tutoring sessions. Tuition options and prices:
getbetteratphysics.co.uk/tuitionpricing