FREE REVISION PACK

# Force on a Current-Carrying Wire

Pearson Edexcel International Advanced Level Physics · Unit 4 (WPH14) · Specification points 105, 107

Easy | Medium | Multiple choice · past-paper questions

| 5 | 5 | ≈ 10 min |
|---|---|---|
| QUESTIONS | TOTAL MARKS | SUGGESTED TIME* |

## Contents


| Q | LEVEL | FOCUS | SOURCE | MARKS |
|---|---|---|---|---|
| 1 | Easy | Direction of the force on a wire between magnets | Edexcel IAL June 2024 · Unit 4 · Q3 | 1 mark |
| 2 | Easy | Force on a wire between magnetic poles | Edexcel IAL January 2020 · Unit 4 · Q7 | 1 mark |
| 3 | Easy | How F varies as the angle to the field increases | Edexcel IAL October 2021 · Unit 4 · Q10 | 1 mark |
| 4 | Medium | Current from the change in a balance reading | Edexcel IAL January 2021 · Unit 4 · Q8 | 1 mark |
| 5 | Medium | Force on a wire at an angle to a field | Edexcel IAL June 2022 · Unit 4 · Q5 | 1 mark |


**Key ideas to have ready**

- $F = BIl \sin\theta$, where $\theta$ is the angle between the wire and the field.
- Fleming's left-hand rule gives the direction (field, current, force at right angles).
- Field lines go from N to S between magnets.
- Use only the length of wire inside the field.

**How to use this pack**

1. The questions are grouped into levels (Easy and Medium). Work through them in order, and check your answers at the end of each level before moving on.
2. Every question is multiple choice with one correct answer. Write down your working anyway; that is how you find mistakes.
3. The separate mark scheme uses the same numbers and explains every answer.

Levels are based on how students did in Pearson's examiner reports where that information exists, plus our own difficulty rating. *About 1.5 minutes per question.

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## Easy

Definitions and one-step ideas. Most students get these right.

Questions 1–3

Choose **one** answer for each question and put a cross in the box next to it.

Edexcel IAL June 2024 · Unit 4 · Q3

**1** A current-carrying wire is placed between two bar magnets, as shown.




The current in the wire is into the page.

Which diagram shows the direction of the force on the wire due to the magnetic field?

☒ **A** 

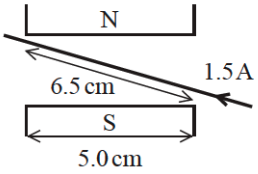
☒ **B** 

☒ **C** 

☒ **D** 

Edexcel IAL January 2020 · Unit 4 · Q7

**2** A current-carrying wire is placed between two magnetic poles as shown. The magnetic flux density in the region between the poles is 0.070 T.




Which of the following gives the magnitude of the force on the wire, in newton, and its direction?

☒ **A** $0.070 \times 1.5 \times 0.050$ into page

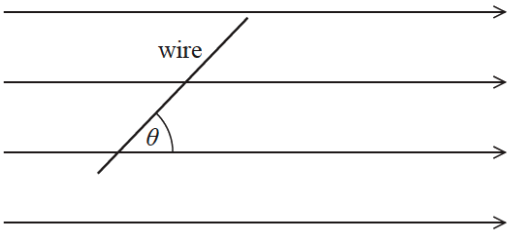
☒ **B** $0.070 \times 1.5 \times 0.065$ into page

☒ **C** $0.070 \times 1.5 \times 0.050$ out of page

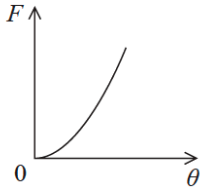
☒ **D** $0.070 \times 1.5 \times 0.065$ out of page

Edexcel IAL October 2021 · Unit 4 · Q10

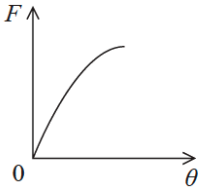
**3** The diagram shows a current-carrying wire at an angle $\theta$ to a uniform magnetic field.



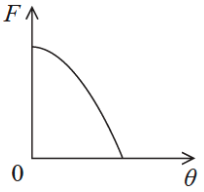

Which of the following graphs shows how the force $F$ on the wire varies as $\theta$ is increased from 0 to 90°?



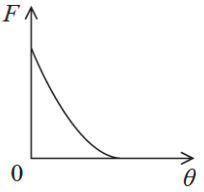

**A** ☒




**B** ☒




**C** ☒



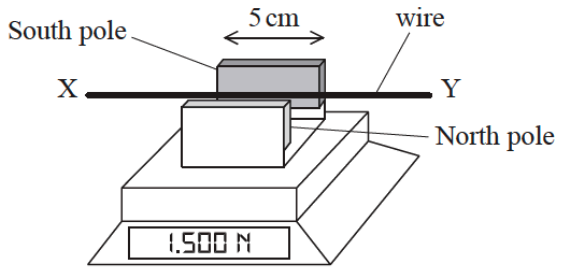

**D** ☒

**Medium** Two or three steps. Roughly a third to a half of students get these right. **Questions 4–5**

Edexcel IAL January 2021 · Unit 4 · Q8

**4** A wire is held firmly in place between two magnets mounted on top of an electric balance as shown.

The reading on the balance is 1.500 N.




The magnetic flux density between the magnets is 0.07 T.
When the wire is connected to a circuit so there is a current in the wire, the reading on the balance is 1.503 N.

Which of the following gives the current in the wire in ampere and its direction?

☒ **A** $\frac{0.003}{0.07 \times 0.05}$ from X to Y

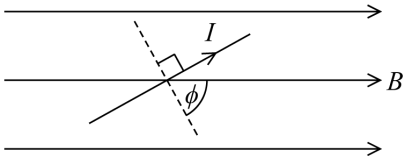
☒ **B** $\frac{0.003}{0.07 \times 0.05}$ from Y to X

☒ **C** $\frac{0.07 \times 0.05}{0.003}$ from X to Y

☒ **D** $\frac{0.07 \times 0.05}{0.003}$ from Y to X

Edexcel IAL June 2022 · Unit 4 · Q5

**5** A wire is in the same plane as a magnetic field of magnetic flux density $B$ as shown.
The wire is of length $l$ and carries a current $I$.




Which row of the table gives the magnitude and direction of the force on the wire?

| | Magnitude | Direction |
|---|---|---|
| ☒ **A** | $BIl\cos\phi$ | into page |
| ☒ **B** | $BIl\cos\phi$ | out of page |
| ☒ **C** | $BIl\sin\phi$ | into page |
| ☒ **D** | $BIl\sin\phi$ | out of page |

**End of questions.** Check your answers with the matching mark scheme. More free packs and 1-to-1 tuition:
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