Force on a current-carrying wire

Physics Paper 2 calculations | AQA Combined Science 8464 and AQA GCSE Physics 8463 | 14 questions, 38 marks

GCSE science calculations

Scan for the solutions

Equations for this topic (cover this box to practise recalling them)

- force on a conductor = magnetic flux density × current × length — on the physics equation sheet
- potential difference = current × resistance — learn this one
- weight = mass × gravitational field strength — learn this one

Name: _____ **Date:** _____ **Score:** _____ **/ 38**

1 **Higher tier**

A straight wire carries a current of 3.0 A. A 0.50 m length of the wire is at right angles to a magnetic field of flux density 0.20 T.

Calculate the force on the wire.

(2 marks)

Answer _____

2 **Higher tier**

One side of the coil in a model electric motor is 0.25 m long. It carries a current of 4.0 A at right angles to a magnetic field of flux density 0.15 T.

Calculate the force on this side of the coil.

(2 marks)

Answer _____

3 **Higher tier**

In a loudspeaker, 0.20 m of wire sits at right angles to a magnetic field of flux density 0.50 T. The current in the wire is 2.4 A.

Calculate the force on the wire.

(2 marks)

Answer _____

4 **Higher tier**

A wire carries a current of 5.0 A. A 0.40 m length of the wire is at right angles to a magnetic field of flux density 60 mT.

Calculate the force on the wire.

(2 marks)

Answer _____

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5 **Higher tier**

Rhys places a wire between the poles of a magnet. 8.0 cm of the wire is at right angles to the magnetic field. The magnetic flux density is 0.25 T and the current is 1.6 A.

Calculate the force on the wire.

(2 marks)

Answer _____

6 **Higher tier**

A wire carries a current of 750 mA. 5.0 cm of the wire is at right angles to a magnetic field of flux density 0.40 T.

Calculate the force on the wire.

(3 marks)

Answer _____

7 **Higher tier**

A force of 0.18 N acts on a wire carrying a current of 3.0 A. 0.20 m of the wire is at right angles to the magnetic field.

Calculate the magnetic flux density.

(2 marks)

Answer _____

8 **Higher tier**

0.40 m of a wire is at right angles to a magnetic field of flux density 0.12 T. The force on the wire is 0.096 N.

Calculate the current in the wire.

(3 marks)

Answer _____

9 **Higher tier**

A wire carries a current of 1.5 A at right angles to a magnetic field of flux density 90 mT. The force on the wire is 0.054 N.

Calculate the length of wire in the magnetic field. Give your answer in centimetres.

(3 marks)

Answer _____

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10 **Higher tier**

A force of 0.021 N acts on a wire carrying a current of 3.5 A. 4.0 cm of the wire is at right angles to the magnetic field.

Calculate the magnetic flux density. Give your answer in millitesla (mT). Show your working. (3 marks)

Answer _____

11 **Higher tier**

A wire with a resistance of 4.0 Ω is connected to a 6.0 V supply. 25 cm of the wire is at right angles to a magnetic field of flux density 0.080 T.

Calculate the force on the wire. Show your working. (4 marks)

Answer _____

12 **Higher tier**

In a Year 11 practical, Mei puts a magnet on a top-pan balance. A horizontal wire passes between the poles of the magnet, at right angles to the magnetic field. 5.0 cm of the wire is in the field.

When a current of 2.5 A flows in the wire, the reading on the balance increases by 1.20 g. The force on the magnet is equal in size to the force on the wire.

Gravitational field strength = 9.8 N/kg.

Calculate the magnetic flux density between the poles. Give your answer to 2 significant figures. Show your working. (5 marks)

Answer _____

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13 **Higher tier**

A wire 1.2 m long carries a current of 2.5 A. Only 0.30 m of the wire is between the poles of a magnet, at right angles to a magnetic field of flux density 0.40 T.

Calculate the force on the wire.

(2 marks)

Answer _____

14 **Higher tier**

A horizontal copper wire 30 cm long hangs between the poles of a U-shaped magnet. The poles are 5.0 cm wide, so 5.0 cm of the wire is in the magnetic field, at right angles to it.

The current in the wire is 3.2 A. The force on the wire is 4.8 mN.

Calculate the magnetic flux density between the poles. Show your working.

(3 marks)

Answer _____

End of questions | Total 38 marks

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