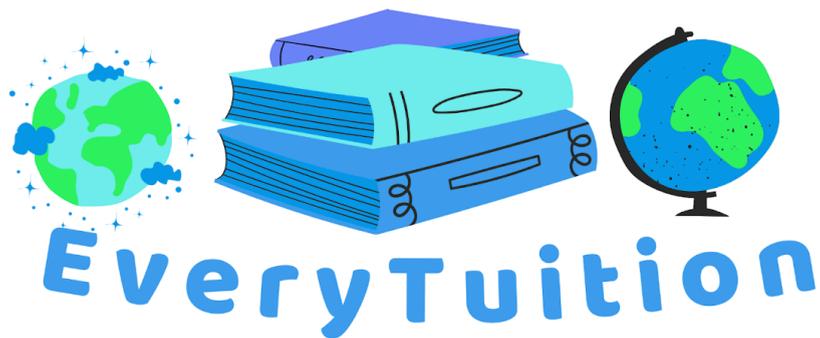


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GCSE Physics Topic 7 AQA: Magnetism and Electromagnetism

Exam Questions/Mock Exam Questions



Questions For Foundation, Higher, and Triple Science ([scroll down for questions for higher and triple science only](#)):

(It would still be recommended to answer the foundation tier questions for triple science and higher tier to ensure you have good understanding).

Q1.

Ben plays with a bar magnet and a paperclip.

(a) State whether the paperclip is a permanent or induced magnet.

[1]

(b) Explain your answer.

[2]

[Total: 3 marks]

Q2.

Tom places two bar magnets close together.

(a) What happens when two north poles are placed near each other?

[1]

(b) What happens when a north pole and a south pole are placed near each other?

[1]

[Total: 2 marks]

Q3.

Harry sprinkles iron filings around a bar magnet.

(a) Describe what the iron filings show.

[2]

[Total: 2 marks]

Q4.

Jack uses a plotting compass near a magnet.

(a) State what the needle of the compass represents.

[1]

(b) Explain why the compass needle moves when placed near a bar magnet.

[2]

[Total: 3 marks]

Q5.

Ethan is revising permanent and induced magnets.

(a) Define a permanent magnet.

[1]

(b) Define an induced magnet.

[1]

[Total: 2 marks]

Q6.

Oliver builds an electromagnet using a wire, a battery and an iron nail.

(a) Explain why the nail becomes magnetic.

[2]

(b) State one way Oliver could make the electromagnet stronger.

[1]

[Total: 3 marks]

Q7.

Sam uses Fleming's left-hand rule in class.

(a) State what Fleming's left-hand rule is used for.

[1]

(b) Name the quantities represented by each finger in the rule.

[3]

[Total: 4 marks]

Q8.

Daniel moves a wire through a magnetic field.

(a) State the effect produced when a wire cuts through a magnetic field.

[1]

(b) State one factor that would increase the size of this effect.

[1]

[Total: 2 marks]

Q9.

Jacob is studying the motor effect.

(a) State two factors that affect the size of the force on a wire carrying a current in a magnetic field.

[2]

(b) What happens to the force if the current is reversed?

[1]

[Total: 3 marks]

Q10.

Noah looks at electric motors.

(a) State one use of an electric motor.

[1]

(b) Explain how the coil in a motor is made to keep turning.

[2]

[Total: 3 marks]

Q11.

Alex looks at magnetic fields around a wire.

(a) State the shape of the magnetic field around a straight current-carrying wire.

[1]

(b) Explain how the strength of the magnetic field changes with distance from the wire.

[2]

[Total: 3 marks]

Q12.

Luke investigates solenoids.

(a) Explain how the magnetic field inside a solenoid compares to the field around a bar magnet.

[2]

(b) State one way to increase the strength of the field in a solenoid.

[1]

[Total: 3 marks]

Q13.

William looks at transformers.

(a) State the purpose of a transformer.

[1]

(b) Why must transformers use alternating current (a.c.)?

[2]

[Total: 3 marks]

Q14.

Charlie studies the National Grid.

(a) Explain why step-up transformers are used in the National Grid.

[2]

(b) Explain why step-down transformers are needed before electricity enters homes.

[2]

[Total: 4 marks]

Q15.

James looks at induced potential difference.

(a) State what is meant by electromagnetic induction.

[1]

(b) Describe how to produce an alternating potential difference using a coil of wire and a magnet.

[2]

[Total: 3 marks]

Higher Tier

Q16.

Ben investigates magnetic fields.

(a) Draw the magnetic field pattern around a bar magnet, including field lines and arrows.

[2]

(b) State how the strength of the field changes with distance from the magnet.

[2]

[Total: 4 marks]

Q17.

Tom places a magnetic compass near a wire carrying current.

(a) Explain why the compass needle deflects.

[2]

(b) State how the size of the deflection changes if the current is increased.

[1]

[Total: 3 marks]

Q18.

Harry makes an electromagnet with a coil of wire around an iron nail.

(a) Explain why the nail becomes magnetised when current flows.

[2]

(b) State two ways Harry could increase the strength of the electromagnet.

[2]

[Total: 4 marks]

Q19.

Jack is revising the motor effect.

(a) Write the equation that links force, magnetic flux density, current, and length.

[1]

(b) A wire of length 0.2 m carries a current of 4 A. It is in a magnetic field of 0.5 T at right angles.

Calculate the force on the wire.

[2]

[Total: 3 marks]

Q20.

Ethan wants to explain Fleming's left-hand rule.

(a) State what quantity each of the three fingers represent.

[3]

(b) Explain how this rule can predict the direction of motion in a motor.

[2]

[Total: 5 marks]

Q21.

Oliver builds a simple d.c. motor.

(a) State the purpose of the split-ring commutator.

[1]

(b) Explain why the coil continues to rotate in the same direction.

[2]

[Total: 3 marks]

Q22.

Sam is investigating electromagnetic induction.

(a) State what happens when a wire is moved through a magnetic field.

[1]

(b) Describe two factors that affect the size of the induced potential difference.

[2]

[Total: 3 marks]

Q23.

Daniel uses a magnet and a coil.

(a) State what happens if the magnet is pushed into the coil quickly.

[1]

(b) State what happens if the magnet is held still inside the coil.

[1]

(c) Explain why.

[2]

[Total: 4 marks]

Q24.

Jacob studies transformers.

(a) State the equation that links potential difference and number of turns for a transformer.

[1]

(b) A transformer has 50 turns on the primary coil and 200 turns on the secondary coil. The input p.d. is 12 V.

Calculate the output p.d.

[2]

[Total: 3 marks]

Q25.

Noah investigates alternating current.

(a) Explain why a transformer cannot work with d.c.

[2]

(b) Describe how the alternating magnetic field in the core induces a potential difference in the secondary coil.

[2]

[Total: 4 marks]

Q26.

Alex is revising the National Grid.

(a) Explain why step-up transformers are used before long-distance transmission.

[2]

(b) Explain why step-down transformers are used before the electricity enters homes.

[2]

[Total: 4 marks]

Q27.

Luke uses the motor effect in an experiment.

(a) State what happens if the current in the wire is parallel to the magnetic field.

[1]

(b) Explain why no force is produced in this case.

[2]

[Total: 3 marks]

Q28.

William is looking at loudspeakers.

(a) Explain how the motor effect is used in a loudspeaker.

[3]

(b) State one factor that affects the pitch of the sound produced.

[1]

[Total: 4 marks]

Q29.

Charlie is building a relay.

(a) Explain how an electromagnet can be used to switch another circuit on.

[2]

(b) Give one use of a relay.

[1]

[Total: 3 marks]

Q30.

James is investigating generators.

(a) State the difference between a d.c. generator and an a.c. generator.

[1]

(b) Explain how an a.c. generator produces alternating current.

[2]

[Total: 3 marks]

Q31.

Ben uses the transformer equation.

The input potential difference is 230 V, with 2000 turns on the primary and 100 turns on the secondary.

Calculate the output potential difference.

[3]

[Total: 3 marks]

Q32.

Tom is asked to explain efficiency in transformers.

(a) State why transformers are designed with a soft iron core.

[2]

(b) Suggest one way energy is wasted in transformers.

[1]

[Total: 3 marks]

Q33.

Harry measures currents in a transformer.

The primary coil has a potential difference of 230 V and a current of 0.2 A.

The secondary coil has a potential difference of 46 V. The transformer is assumed to be 100% efficient.

Calculate the current in the secondary coil.

[3]

[Total: 3 marks]

Q34.

Jack looks at induced current.

(a) State one way to reverse the direction of induced current in a coil.

[1]

(b) State another way.

[1]

[Total: 2 marks]

Q35.

Ethan investigates Earth's magnetic field.

(a) Explain how a compass needle aligns in the Earth's magnetic field.

[2]

(b) Give one piece of evidence that the Earth's magnetic field has changed in the past.

[1]

[Total: 3 marks]

Q36.

Oliver wants to design a powerful electromagnet.

(a) Give three design changes that would increase its strength.

[3]

[Total: 3 marks]

Q37.

Sam reads about magnetic flux density.

(a) Define magnetic flux density.

[1]

(b) Explain why it is useful to describe the field in terms of flux density.

[2]

[Total: 3 marks]

Q38.

Daniel is learning about alternating current.

(a) Sketch a graph of current against time for a.c.

[1]

(b) Sketch a graph of current against time for d.c.

[1]

[Total: 2 marks]

Q39.

Jacob is studying dynamos.

(a) Describe how a bicycle dynamo generates electricity.

[2]

(b) Explain why the lamp connected to the dynamo flickers.

[2]

[Total: 4 marks]

Q40.

Noah is revising electromagnetic induction.

(a) State two practical applications of electromagnetic induction.

[2]

(b) Explain why the induced current opposes the change that produced it.

[2]

[Total: 4 marks]

Triple Science

Q41.

Alex is learning about transformers.

(a) Derive the transformer equation using conservation of energy.

[3]

[Total: 3 marks]

Q42.

Luke investigates eddy currents.

(a) Explain what eddy currents are.

[2]

(b) State how transformer design reduces energy loss from eddy currents.

[2]

[Total: 4 marks]

Q43.

William studies flux linkage.

(a) State the equation linking induced e.m.f. to change in magnetic flux linkage.

[1]

(b) Explain why a faster change in flux linkage produces a larger e.m.f.

[2]

[Total: 3 marks]

Q44.

Charlie uses Faraday's law in a calculation.

A coil has 200 turns. The magnetic flux changes by 0.05 Wb in 0.1 seconds.

Calculate the induced e.m.f.

[3]

[Total: 3 marks]

Q45.

James investigates Lenz's law.

(a) State Lenz's law.

[1]

(b) Explain how Lenz's law is consistent with conservation of energy.

[2]

[Total: 3 marks]

Q46.

Ben designs a.c. generators.

(a) Explain how the slip rings in an a.c. generator work.

[2]

(b) Compare the current output of an a.c. generator with that of a d.c. generator.

[2]

[Total: 4 marks]

Q47.

Tom investigates alternating current.

(a) State the frequency of mains electricity in the UK.

[1]

(b) State the potential difference of UK mains electricity.

[1]

[Total: 2 marks]

Q48.

Harry is revising step-up and step-down transformers.

(a) Explain why the ratio of turns affects the output potential difference.

[2]

(b) Calculate the secondary potential difference if a transformer with 500 turns primary, 50 turns secondary, and 230 V input is used.

[2]

[Total: 4 marks]

Q49.

Jack is looking at power transmission.

(a) State the equation for power in terms of potential difference and current.

[1]

(b) Explain why high voltage transmission reduces energy losses.

[2]

[Total: 3 marks]

Q50.

Ethan is calculating energy losses.

The current in a transmission line is 200 A, and the resistance of the line is 0.5Ω .

Calculate the power wasted as heat in the line.

[3]

[Total: 3 marks]

Q51.

Oliver is investigating flux density.

(a) State the unit of magnetic flux density.

[1]

(b) A wire of length 0.3 m carries a current of 5 A at right angles in a magnetic field of 0.4 T. Calculate the force on the wire.

[2]

[Total: 3 marks]

Q52.

Sam studies oscilloscopes.

(a) Explain how an oscilloscope trace can be used to measure the frequency of an a.c. supply.

[2]

(b) State how the amplitude of the trace relates to potential difference.

[1]

[Total: 3 marks]

Q53.

Daniel looks at magnetic field strength.

(a) Write the equation that links force, flux density, current, and length.

[1]

(b) State two conditions needed for this equation to apply.

[2]

[Total: 3 marks]

Q54.

Jacob is investigating rotating coils.

(a) Explain why the induced current varies sinusoidally in an a.c. generator.

[3]

[Total: 3 marks]

Q55.

Noah investigates transformer efficiency.

(a) Write the equation for efficiency of a transformer.

[1]

(b) A transformer has an input of 200 W and an output of 180 W.
Calculate its efficiency as a percentage.

[2]

[Total: 3 marks]