THE STRIVING

MUSLIM ACADEMY

Islamic and Academic Education

YEARS 7 TO 9 · SCIENCE

Electricity and magnetism

Current, voltage and resistance, series against parallel, and what every magnet has.

WHAT IS INSIDE

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The Striving Muslim Academy

1 sets · a hint on every question

Written for a parent teaching at home. No training assumed, and nothing else to buy.

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Series and parallel, and why it matters

Read this, then answer the questions on it.



SERIES AND PARALLEL, AND WHY IT MATTERS

In a series circuit everything sits in one loop, so the same current passes through all of it and the components share the voltage. Add a second bulb in series and both are dimmer.

In parallel each branch gets the full voltage, so a branch draws the current it would if it were alone, provided the supply is not overloaded, and each branch can be switched separately. That is why a house is wired in parallel and why one failed lamp does not darken the room. It is not perfect: the source notes a motor starting can make a light dim for a moment, through the resistance of the wiring.

OpenStax notes that if wire resistance is relatively large, as in a worn or a very long extension cord, the loss can be significant, and less current reaches the device. The wiring has a resistance of its own.

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Magnets, and what they always have

Read this, then answer the questions on it.



MAGNETS, AND WHAT THEY ALWAYS HAVE

Every magnet has two poles. OpenStax states it plainly: all have both a north pole and a south pole, and if freely suspended one pole will point toward the north.

Unlike poles attract and like poles repel. Breaking a magnet in half does not give you a north piece and a south piece; it gives two smaller magnets each with both poles.

A current in a wire produces a magnetic field. Compasses placed near a long straight current-carrying wire indicate that the field lines form circular loops centred on the wire, and the right hand rule emerges from that observation: point the thumb in the direction of the current, and the fingers curl in the direction of the field loops.

For a single current-carrying loop, both the direction and the magnitude of the field are complex.

A solenoid is a long coil of wire. Because of its shape the field inside it can be very uniform, and also very strong, and only near the ends does it begin to weaken and change direction. Its strength is B = mu0 n I, so it depends on the current and on how tightly the coil is wound. The field is similar to that of a bar magnet. Oersted discovered in 1820 that a current in a wire affected a compass needle.

The S

How each one is answered

Mark it together. Where a question asks for a list, the order does not matter.



CIRCUITS AND MAGNETS

1. Give what current, voltage and resistance each measure, and the unit of each.

1. Current is the rate of flow of charge, in amperes.
2. Voltage is the push driving it, in volts.
3. Resistance is how much the circuit opposes it, in ohms.

Answer: **current is flow of charge in amperes, voltage is the push in volts, resistance is opposition in ohms**

2. For a fixed voltage, what happens to the current if the resistance increases?

1. For a given voltage, more resistance means less current.
2. That is the relationship V = IR rearranged.

Answer: **there is less current**

3. Explain why a house is wired in parallel rather than in series.

1. In series the same current passes through everything and they share the voltage, so each added device dims the others and one break stops everything.
2. In parallel each branch gets the full voltage and can be switched on its own.
3. So one failed lamp does not darken the room.

Answer: **so each device gets the full voltage, can be switched separately, and one failure does not stop the rest**

4. What does the source say long or worn wire does, and why does that matter?

1. Long or worn wire with high resistance reduces the current reaching a device.
2. So the connecting wire is part of the circuit rather than a neutral link, and it can be the reason a device underperforms.

Answer: **it reduces the current reaching the device, so the wiring is part of the circuit and not a neutral connection**

5. What does every magnet have, and what happens if one is freely suspended?

1. All magnets have both a north pole and a south pole.
2. If freely suspended, one pole will point toward the north.

Answer: **both a north and a south pole, and suspended freely one pole points north**

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SAMPLE PAGES

You have read a few pages. The pack is longer.

What you are holding is a short sample, taken from different parts of the pack so that you can see how a week is planned and what a child is actually asked to do, before you decide.

The complete pack, and the rest of the academic materials, are on our website: schemes of work for a parent teaching at home, and practice packs for the skills children get stuck on.

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Our Islamic Education classes are free. These packs are part of what pays the teachers who teach them.