

Magnetism Electromagnetism

KS3 Physics · Follows the national curriculum

Name _____ Class _____ Date _____

1. Worked example

What is an electromagnet?

Step 1 · Parts

A coil of insulated wire, usually wrapped round an iron core, connected to a supply.

Step 2 · How it works

A current in a wire makes a magnetic field. Coiling the wire adds the fields together; the iron core makes it much stronger.

Answer: A coil carrying a current, usually with an iron core

Check: Switch off the current and the magnetism disappears.

2. Now try one with the steps

Give three ways to make an electromagnet stronger.

Step 1 · Current

Step 2 · Coil

Step 3 · Core

Answer:

3. Practice

Show your working. The marks tell you how much is expected.

1. What is an electromagnet? [1]

2. What is the main advantage of an electromagnet over a permanent magnet? [1]

3. State three ways to make an electromagnet stronger. [3]

4. What happens to the poles of an electromagnet if the current is reversed? [1]
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5. Describe the shape of the magnetic field around a straight wire carrying a current. [1]
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6. What is the shape of the field around a coil carrying a current? [1]
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7. With 10 turns an electromagnet lifts 5 paperclips; with 20 turns it lifts 10. Predict how many it lifts with 30 turns. [1]
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8. An electromagnet lifts 8 paperclips at 1 A. If the number lifted is proportional to current, how many will it lift at 2 A? [1]
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9. In an investigation of how the number of turns affects electromagnet strength, name the independent and dependent variables. [2]
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10. Name two control variables for the investigation in the last question. [2]
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11. Why is the core made of iron rather than steel? [2]
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12. Explain why a scrapyard crane uses an electromagnet. [2]
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13. Why shouldn't you keep increasing the current to make an electromagnet stronger? [2]
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14. Describe how an electric bell uses an electromagnet to ring continuously.

[3]

4. Before you hand it in

"An electromagnet works without a current if it has an iron core."

No current → (almost) no magnetism.

"A bigger coil is stronger."

More turns of wire on the same core gives a stronger electromagnet.

Changing two variables at once in the investigation.

Change one variable (e.g. turns) and keep current and core the same.