T12 Magnetism and the Motor Effect FOUNDATION and T13 Electromagnetism FOUNDATION

combined sciences text book pages 401-412

Section A

1) Which of the following is **NOT** magnetic?
- ☐ **A:** aluminium
- ☐ **B:** iron
- ☐ **C:** cobalt
- ☐ **D:** nickel

2) Which of these will *always* produce a magnetic field regardless of its surroundings?
- ☐ **A:** a steel bar
- ☐ **B:** a permanent magnet
- ☐ **C:** a temporary magnet
- ☐ **D:** an induced magnet

3) Which word describes a magnetic field where the field lines are evenly spaced and all point in the same direction?
- ☐ **A:** solenoid
- ☐ **B:** magnetosphere
- ☐ **C:** uniform
- ☐ **D:** bar magnet

4) Which word describes a coil of wire with a current flowing through it (making it a type of electromagnet)
- ☐ **A:** solenoid
- ☐ **B:** uniform magnet
- ☐ **C:** magnetron
- ☐ **D:** parallel circuit

5) Which ***one*** of these affects the strength of the magnetic field around a long, straight conductor?
- ☐ **A:** the length of the conductor
- ☐ **B:** the strength of the Earth's magnetic field
- ☐ **C:** the resistance the conductor
- ☐ **D:** distance from the conductor

6) Which of the following could be used to detect the magnetic field around a bar magnet?
- ☐ **A:** plotting compasses
- ☐ **B:** lead shavings
- ☐ **C:** a 9V battery

Describe what will happen in each of these situations using the words ***attract, repel*** or ***no movement.***

Section B

Figure 1 shows the uniform magnetic field between the opposite ends of two bar magnets.
*Add field lines to figure 2 to show how the magnetic field changed when the magnets were **closer** together ↓*

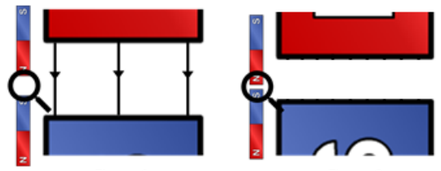
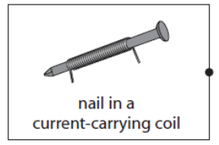
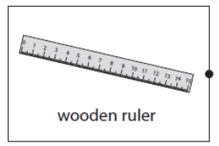


Figure 1 *Figure 2*

Draw one line from each object to its description





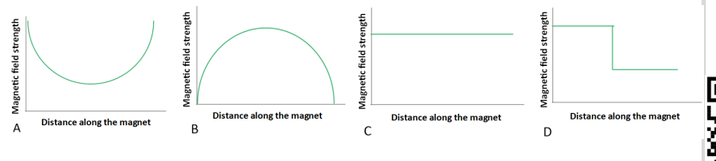
non-magnetic

permanent magnet

temporary magnet

*Draw the shape of the magnetic field around the bar magnet below and add an **X** to show where the field is strongest.*

If we measured the strength of the magnetic field as we moved a sensor along a bar magnet from the north pole to the south pole which of these graphs would we get? →



Draw the shape of the magnetic field where the ends of the bar magnets meet.

Draw the shape of the magnetic field where the ends of the bar magnets meet.

Link to BBC Bitesize

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Section C

Figure 3 shows the magnetic field around a long, straight conductor.

*Add field lines to figure 4 to show how the magnetic field changed when the **current** flowing through the conductor was **reduced***

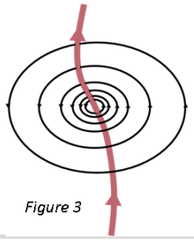
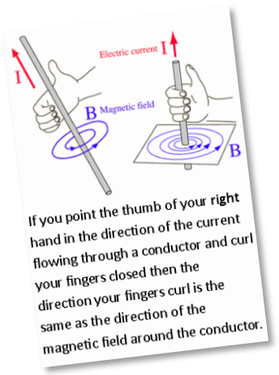


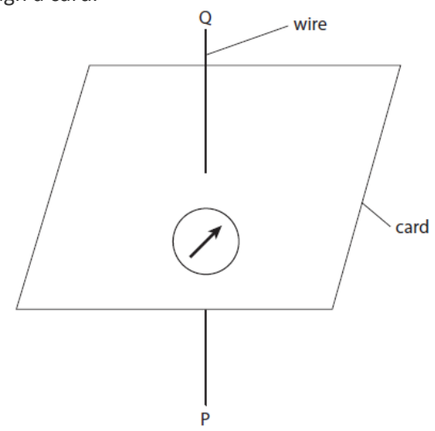
Figure 3

Figure 4



A student uses a plotting compass to investigate the magnetic field around a wire.

The image below shows the wire going straight through a card.



Which direction will the plotting compass face when current is passed through the wire from point P to point Q?

☐ A ☐ B ☐ C ☐ D

Figure 5 shows a solenoid. A solenoid is a series of coils of a wire stacked next to each other with an electrical current flowing through them.

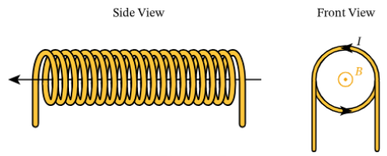


Figure 5

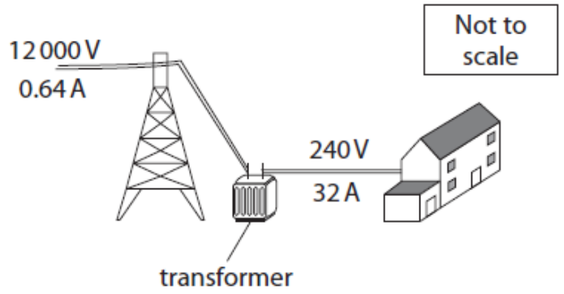
State whether each of the following statement about solenoids is true or false.

	True or False?
A solenoid must be made from magnetic material.	
The magnetic field around a solenoid is similar to that of a bar magnet,	
The strength of the magnetic field around a solenoid depends on the current flowing through the wire.	
The magnetic field around a solenoid gets stronger the further away you are.	
There is a uniform magnetic field inside the centre of a solenoid.	
The magnetic field is weakest in the centre of the solenoid	
Inside the solenoid each small magnetic field created by each coil add together to make a stronger overall field.	
Outside the solenoid each small magnetic field created by each coil cancel each other out to make a weaker overall field.	
The overall strength of the magnetic field will increase if an iron core is added inside the solenoid	

Describe how to use a plotting compass to show the shape and direction of the magnetic field around a bar magnet. You may use diagrams.

Section D

1) The image below shows part of the UK National Grid system for the supply of electricity to homes.



a) State and explain whether the transformer is a step-up transformer or a step-down transformer.

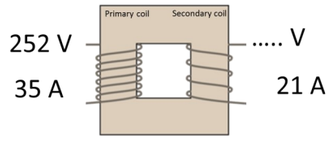
b) Calculate the power flowing into the house.

Power = ... Watts

2) Explain why the national grid uses high voltages to transfer electrical energy over long distances.

3) The image below shows a transformer with an input current of 35 A and an output current of 21 A.

Calculate the output voltage when the input voltage is 252 V.

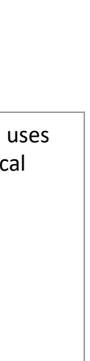


4) Why is it not possible to use a transformer to change the voltage of the electricity from a car battery?

5) Use lines to link the labels to the parts of the diagram:

Induced magnet •

Permanent magnet •



6) A teacher wants to use the equipment to the right to pick up some iron filings when the switch is closed

a) Suggest a suitable metal for the rod.

b) Suggest a change to the equipment that would allow it to pick up more iron filings.