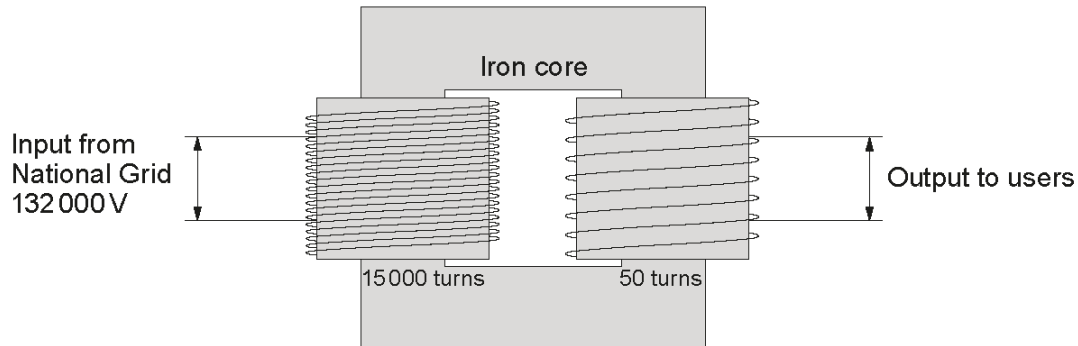


**WJEC Physics GCSE**  
**Topic 1.9: Electromagnetism**  
Questions by topic

1.

The diagram shows a transformer that is used to change the voltage in the National Grid.



(a) **Underline** the correct statement in each bracket of the following sentences.

(i) This transformer (**steps-down** / steps-up / increases the power of) the voltage supplied to it. [1]

(ii) The voltage supplied to the users by the secondary coil is (**440** / 132 000 / 440 000) volts. [1]

(iii) The current through the input coil must alternate so that the iron core (**doesn't get hot** / has a constant magnetic field / has a changing magnetic field). [1]

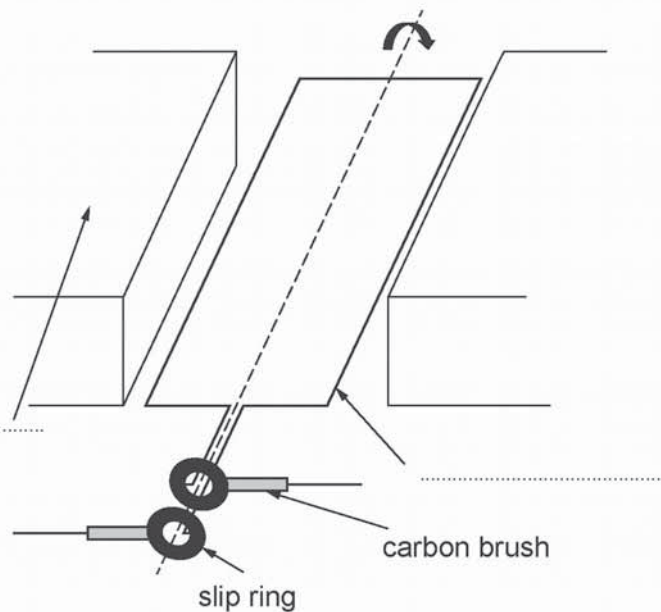
(b) Explain how the magnetic field produces a current in the secondary coil of the transformer. [2]

.....  
.....  
.....

2.

The diagram shows a simple a.c. generator in which the coil is made to spin in the direction shown.

- (a) (i) **Complete the labelling of the diagram.** [2]



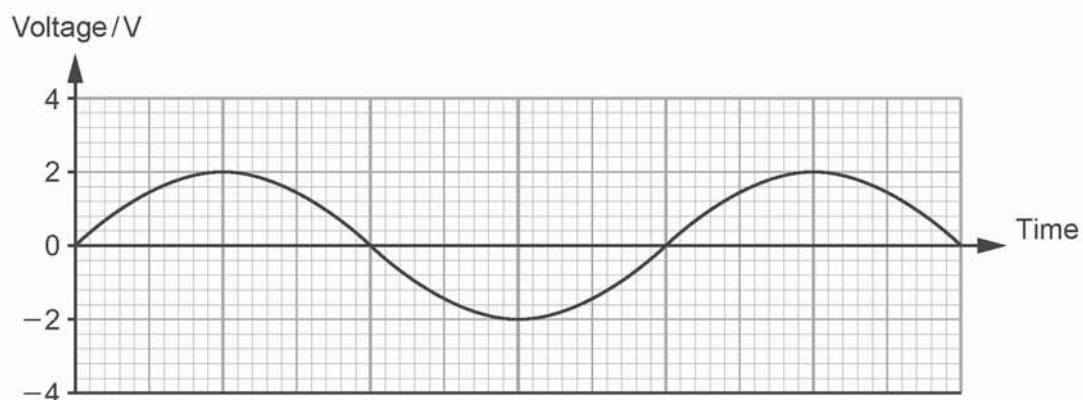
- (ii) **State why a voltage is produced when the coil spins.** [1]

.....

.....

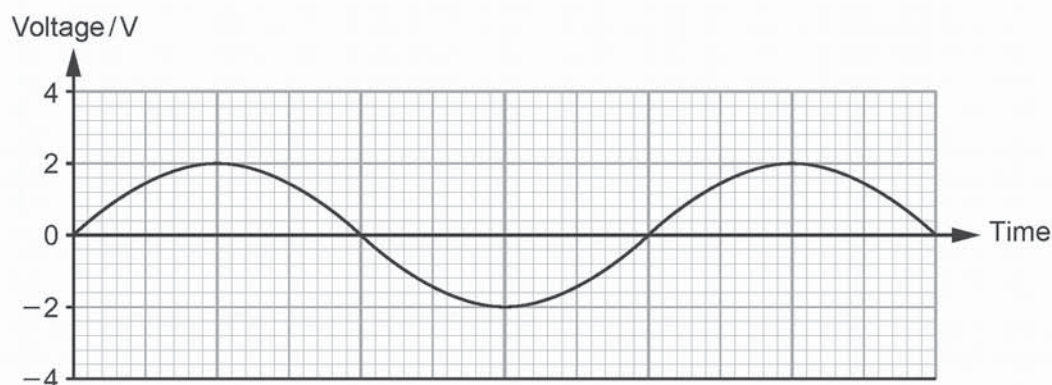
- (b) The original output from the generator is shown in each of the following graphs. **On each of the graphs**, draw the new voltage curve for the stated change.

- (i) The magnetic field is made twice as strong. [1]



(ii) The coil is spun twice as fast.

[2]



(c) The table below shows how the output voltage changes with the input voltage for five different transformers A to E.

Input voltage to transformer (V)	Output voltage from transformer (V)				
	A	B	C	D	E
10	20	30	150	2	10
20	40	60	300	4	20
30	60	90	450	6	30
40	80	120	600	8	40

(i) I. Identify the step-down transformer. .... [1]

II. Identify the transformer that steps up the current. .... [1]

III. Identify the transformer with the same number of turns on the input and output coils.  
..... [1]

IV. An input voltage of 2 V a.c. is supplied to transformer B. Calculate its output voltage. [1]

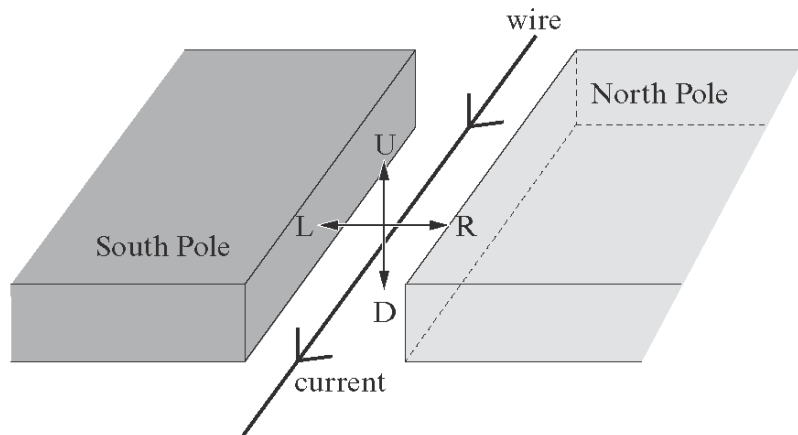
output voltage = .....V

(ii) Use an equation from page 2 to calculate the number of turns on the output coil of transformer C given that its input coil has 500 turns. [2]

number of turns = .....

3.

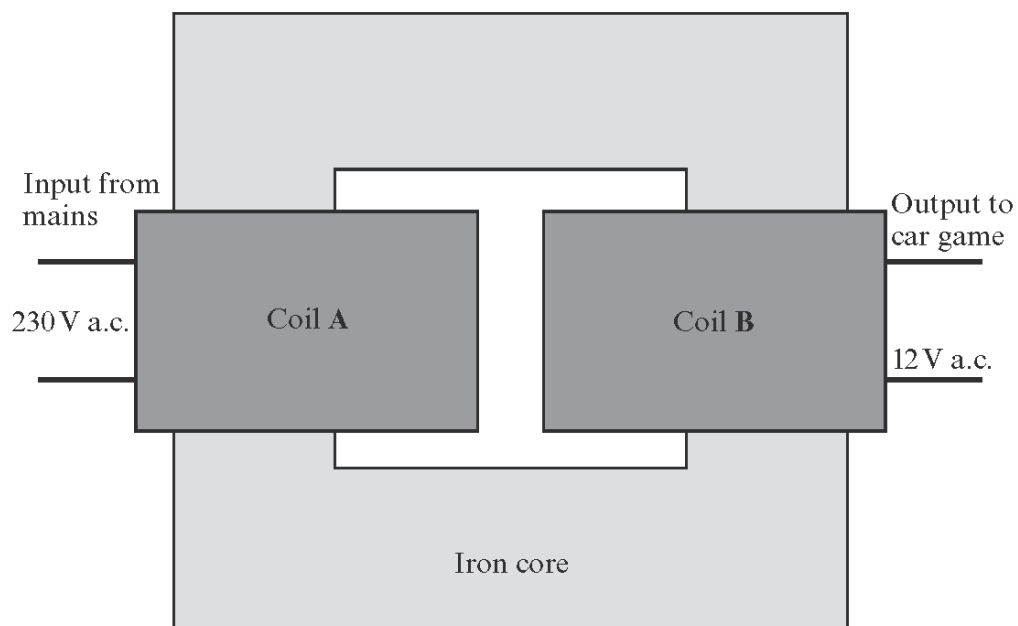
The diagram shows a wire being moved in a magnetic field between two permanent magnets.



- (a) By using one of the letters on the diagram, state the direction in which the wire needs to move so that the current is induced in it in the direction shown. [1]

.....

- (b) A model racing car game uses a transformer. It changes a 230 V input to a 12 V output by using two coils A and B.



- (i) Which coil, A or B should have the bigger number of turns? Give a reason for your answer. [1]

.....

.....

(ii) State why the input voltage has to be alternating for the transformer to work. [1]

.....

.....

(iii) One function of the iron core is to increase the strength of the magnetic field inside the primary coil. State **one** other function that it has. [1]

.....

.....

(iv) Briefly state why an output voltage is produced by the transformer. [1]

.....

.....

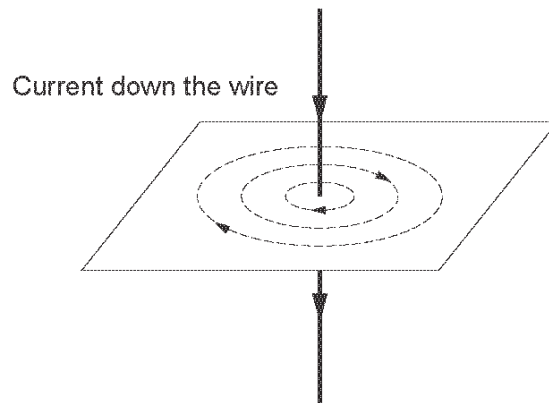
(v) Coil **A** has 18400 turns. Use an equation from page 2 to calculate the number of turns in coil **B**. [2]

Number of turns = .....

7

4.

The diagram shows the shape of the magnetic field (as dashed lines) around a long straight wire. A current flows down the wire.



(a) Describe the shape of the magnetic field lines. [1]

.....

(b) The current is then reversed. It flows up the wire. State how the magnetic field changes. [1]

.....

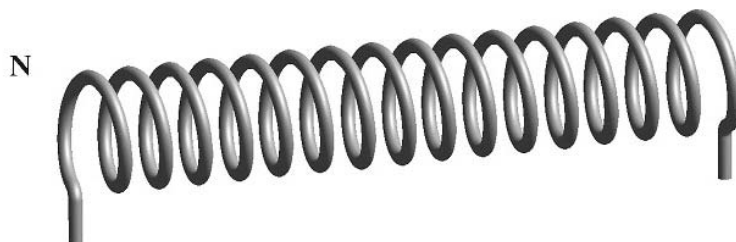
(c) State what happens to the magnetic field when the current is turned off. [1]

.....

3

5.

The diagram shows a solenoid carrying a current. The solenoid acts like a magnet. The N pole on the solenoid is labelled.



(a) **Draw** the magnetic field around the solenoid. [2]

(b) (i) State the effect on the magnetic field of increasing the current. [1]

.....  
(ii) State the effect on the magnetic field of increasing the number of turns on the solenoid. [1]

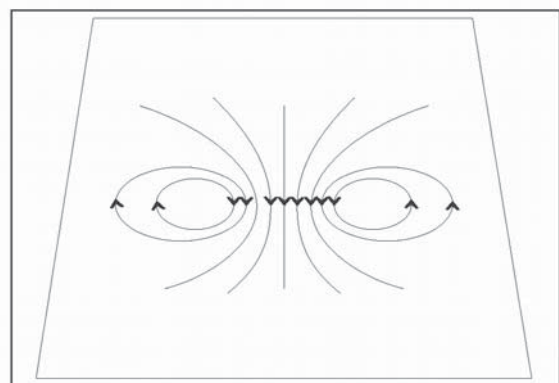
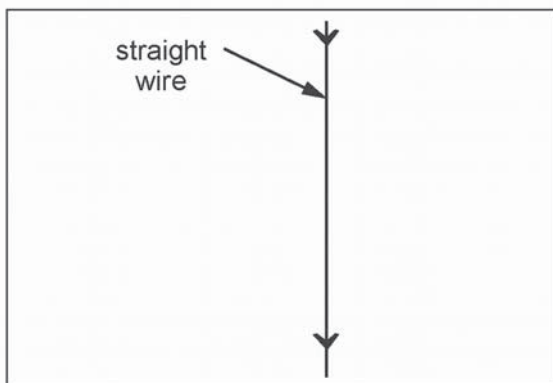
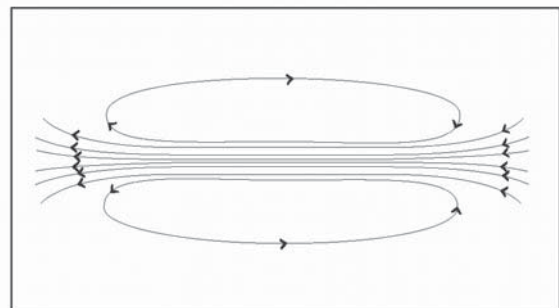
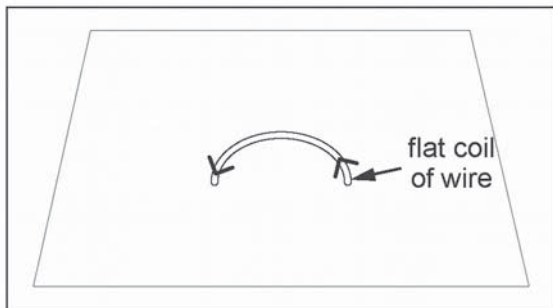
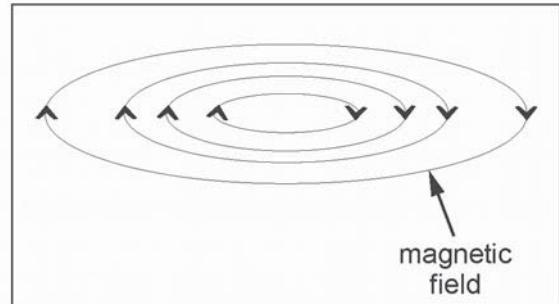
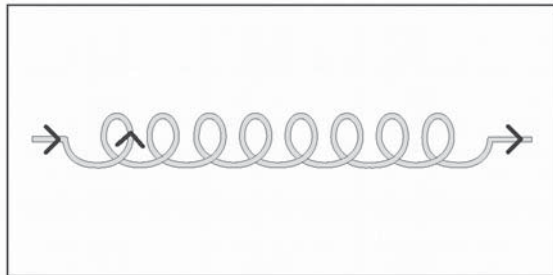
.....  
(iii) State the effect on the magnetic field of reversing the current through the solenoid. [1]

.....



6.

- (a) The diagrams on the left below show currents flowing in wires of different shapes. The diagrams on the right show the shapes of the magnetic fields produced by currents in wires. **Draw lines** from the diagrams on the left to the correct field shapes on the right. [2]



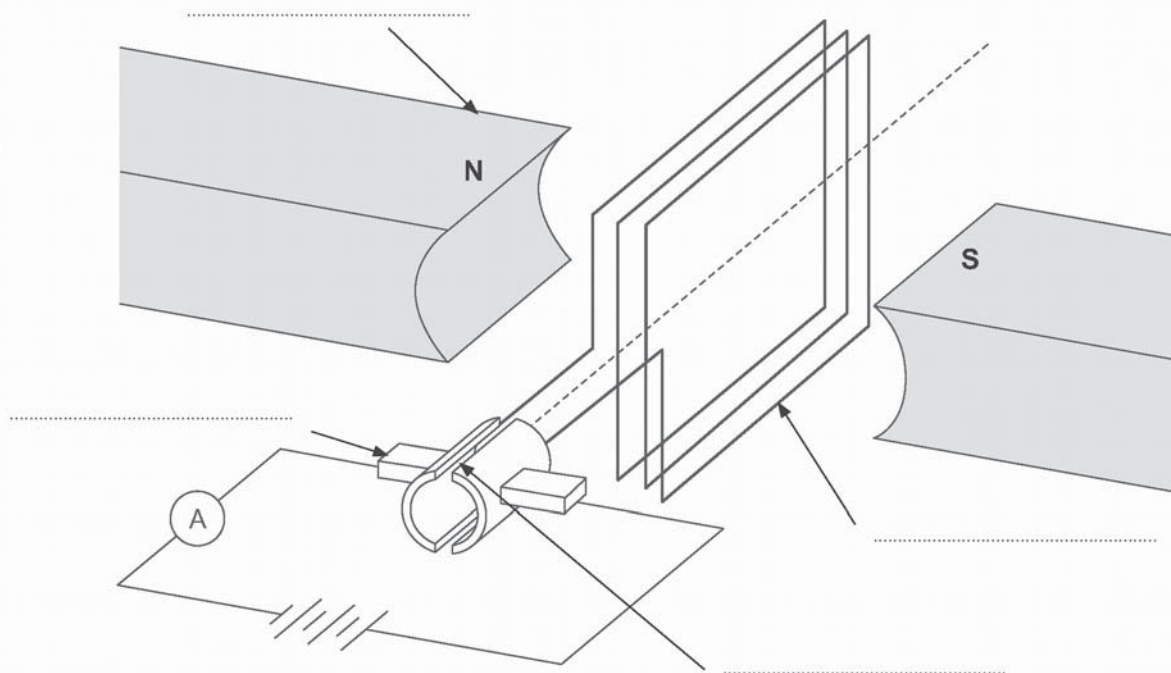
(b) Use the words from the box below to **label this diagram** of a simple d.c. motor. [3]

carbon brush

magnet

split ring

coil of wire



(c) Draw an arrow on the diagram to show the direction of the magnetic field (label this arrow as D). [1]

(d) State **two** ways of making the coil move more slowly. [2]

1. ....

2. ....

(e) State **one** way of reversing the direction the coil rotates. [1]

.....