

Magnets, motors, generators and transformers

Physics grades 9-10 (GCSE · IGCSE · O Level · Class 9-10) · Test

Name: _____ Date: _____ Class: _____ Mark: ____ / 20

This test has 8 questions worth 20 marks. Show your working for every calculation and give units. Explanations should use the correct scientific words such as field, induced and current. You have 45 minutes.

Level: Physics grades 9-10 (GCSE · IGCSE · O Level · Class 9-10) · **Curriculum:** HS-PS2-5, GCSE P7

Time: 45 minutes · 8 questions · Total: 20 marks · Calculator allowed

Question 1 Field lines (2 marks)

State **two** properties of magnetic field lines around a bar magnet.

Question 2 Force on a wire (3 marks)

A wire of length 0.080 m carries a current of 3.0 A at right angles to a magnetic field of 0.25 T.

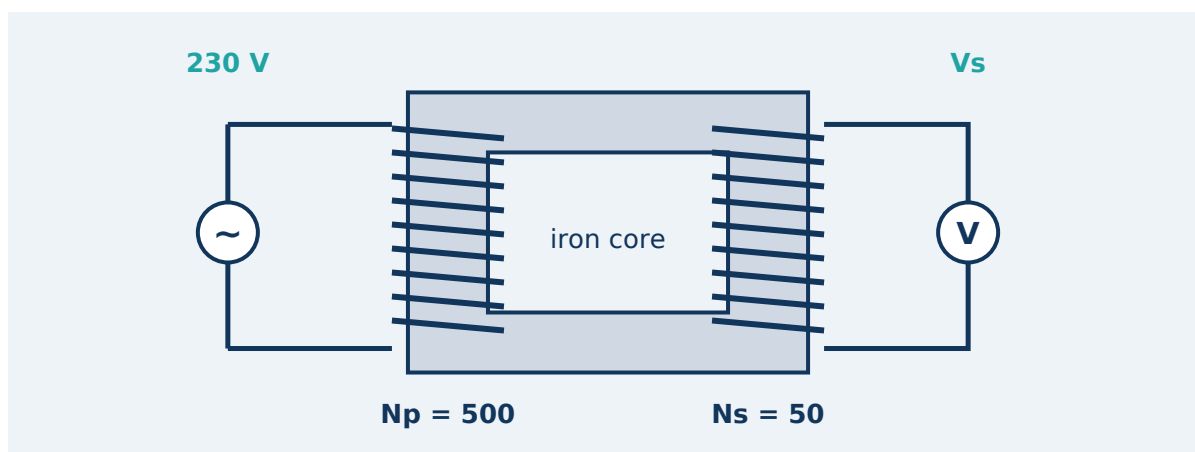
Write down the equation, substitute the values and calculate the force on the wire.

Question 3 Increasing the force (2 marks)

State two ways to increase the force on a current-carrying wire in a magnetic field.

Question 4 Transformer voltage (3 marks)

The transformer in the figure has 500 turns on the primary coil and 50 turns on the secondary coil. The primary voltage is 230 V.



Transformer: two coils on a laminated iron core. The primary coil is on the left, the secondary on the right.

- Calculate the secondary voltage. (2 marks)
- State whether it is a step-up or a step-down transformer. (1 mark)

Question 5 Transformer power (3 marks)

The secondary of the transformer in the previous question supplies a current of 2.0 A at 23 V. Assume the transformer is 100 % efficient.

Calculate the output power and the current in the primary coil.

Question 6 How a generator works (3 marks)

Explain how a simple generator produces an alternating voltage when its coil is spun in a magnetic field.

Question 7 Direct current (2 marks)

Explain why a transformer does not work when it is connected to a battery.

Question 8 Electromagnet core (2 marks)

A coil of wire carrying a current is wound round a soft iron rod. Explain why this is a stronger magnet than the coil on its own.