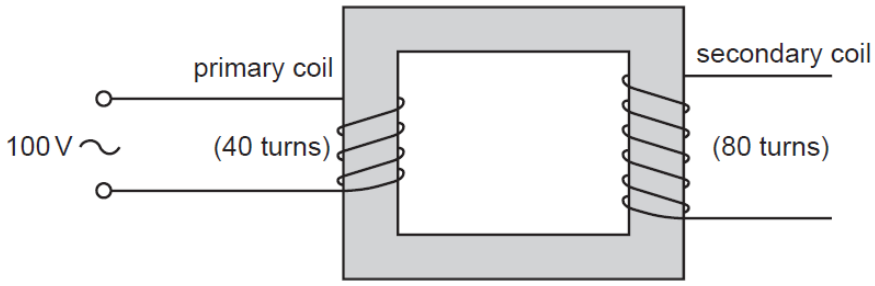
Transformers

1.

The diagram shows a transformer with an alternating voltage of 100 V applied to the primary coil.



What is the voltage produced across the secondary coil?

A 50 V **B** 100 V **C** 200 V **D** 8000 V

2.

In a country where the mains electricity supply is 240 V, the transformer in Fig. 12.1 is used to enable a 6 V lamp to be lit.

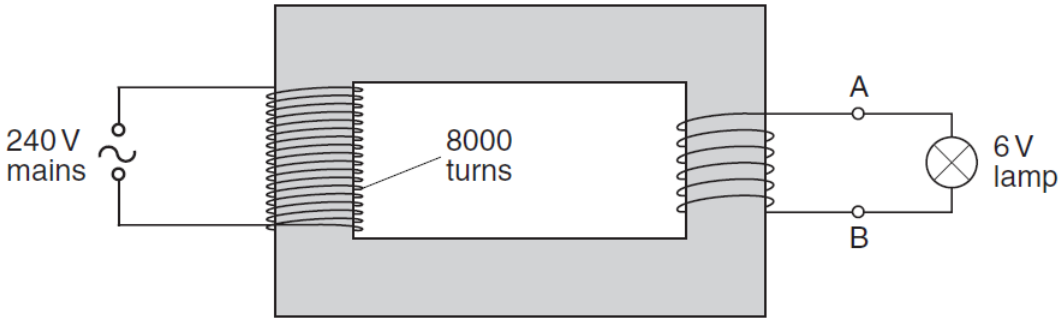


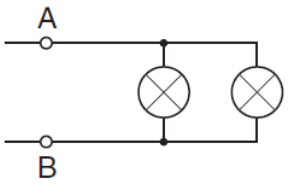
Fig. 12.1

(a) Calculate the number of turns needed on the secondary coil if the lamp is to be lit at normal brightness.

number of turns = ... [3]

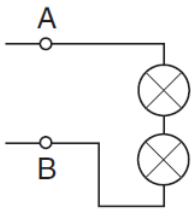
(b) Without further calculation, state the number of secondary turns needed to light, at normal brightness,

(i) two identical 6 V lamps in parallel i.e.



number of turns = ...

(ii) two identical 6 V lamps in series i.e.



number of turns = ...

[2]

3.

(a) One coil of a transformer is connected to a toy train set. The other coil is connected to a 240 V a.c. mains supply, as shown in Fig. 10.1.

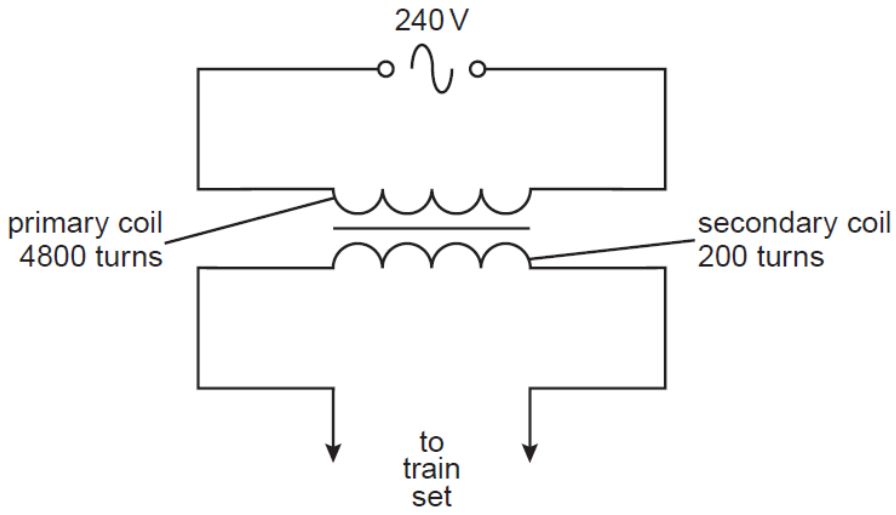


Fig. 10.1

(i) How can you tell from Fig. 10.1 that the transformer is a step-down transformer?

.....

.....[1]

(ii) Calculate the voltage at which the toy train operates.

toy train operates at ..... V [3]

(iii) **1.** The voltage of the mains supply is reduced. What happens to the voltage supplied to the train set? Tick one box.

increases	☐
decreases	☐
stays the same	☐

2. An attempt is made to use the train set in a country where the mains supply is 110 V. Suggest **one** difference that might be noticed in the way the toy train operates.

.....

.....

[2]

(b) Fig. 10.2 shows an electromagnetic relay being used to operate an electric motor.

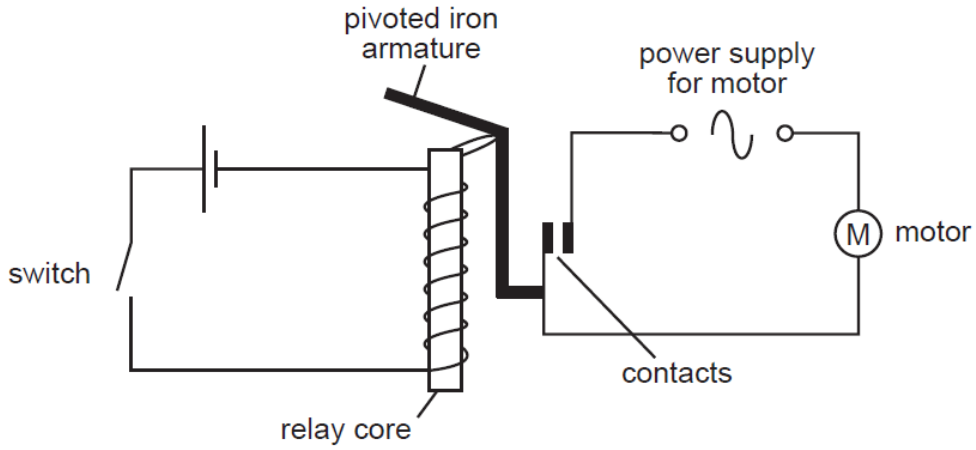


Fig. 10.2

Below are sentences that describe stages of the process by which the circuit works.

A The armature pivots and the contacts close.

B The core of the relay is magnetised.

C The switch is closed and the current flows through the coil.

D A current flows through the motor, making it work.

E The core attracts the top part of the armature.

Put the sentences so that the stages are in the correct order. Put the appropriate letters in the boxes below. One box has been filled in as an example.

Stage 1 is sentence [C]

Stage 2 is sentence [ ]

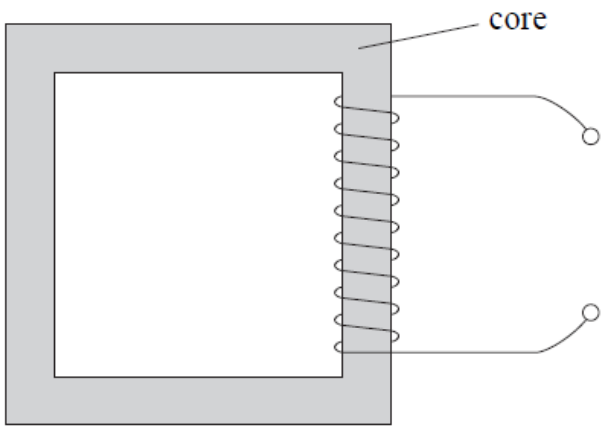
Stage 3 is sentence [ ]

Stage 4 is sentence [ ]

Stage 5 is sentence [ ] [3]

4.

The diagram shows part of a transformer. There are 10 turns of insulated wire wrapped around the right side of the core.



(a) Draw 5 turns of wire around the left side of the core.

(1)

(b) Below are the symbols for an alternating current (a.c.) supply and a 0–10 V a.c. voltmeter.

Add these to the diagram to represent a step-up transformer from which the output voltage can be measured.

(2)

(c) When a student uses the apparatus as a step-up transformer he gets the following readings.

Supply voltage (V)	Voltmeter reading (V)
2.4	4.8
3.7	7.4
6.2	

There is a gap in the table of readings. Explain why the student could not get a reading to fill this gap.

.....

.....

.....

(2)

(d) Suggest two reasons why the student did not use a 240 V a.c. supply with this equipment.

1 .....

2 .....

(2)

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5. Explain how a transformer works.

6. Explain why transformers work with A.C. voltages only.

7. Explain why transformers are used in the National Grid.