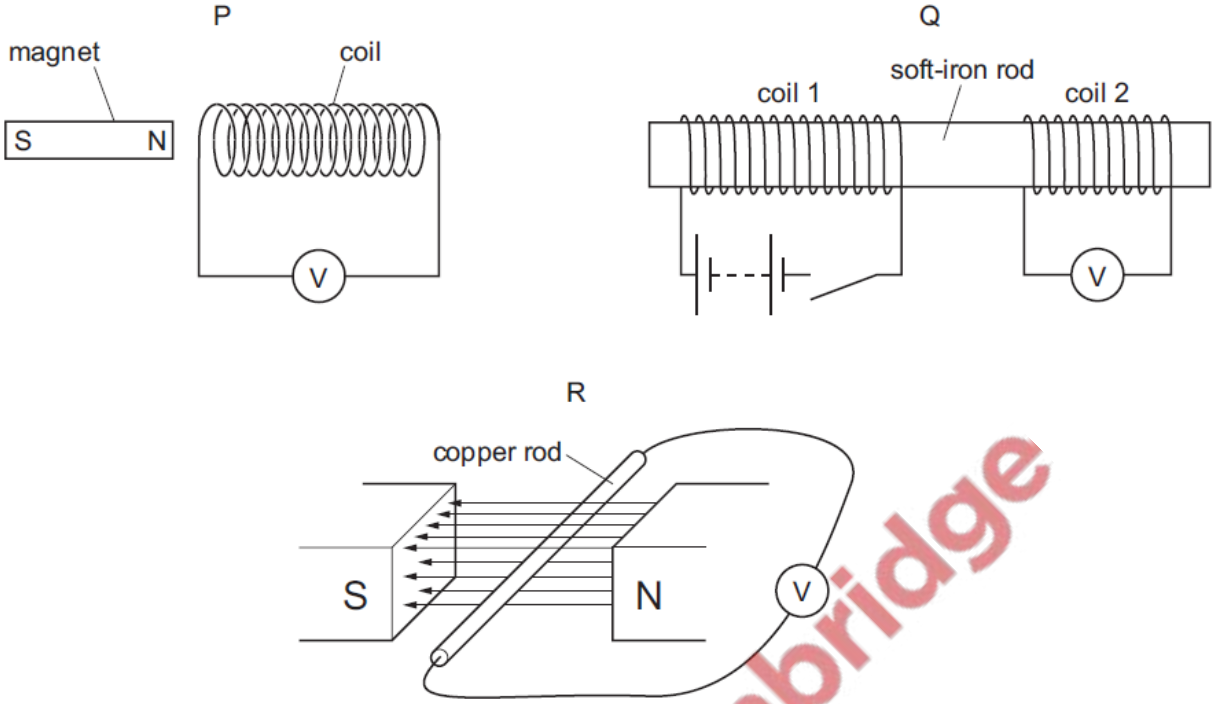
Electromagnetic Induction – 2023 IGCSE Physics 0625

1. Nov/2023/Paper_ 0625/11/No.31

A teacher sets up the equipment for three demonstrations, P, Q and R.



In demonstration P, the magnet is moved to the right.

In demonstration Q, the switch is closed.

In demonstration R, the copper rod is moved vertically upwards.

Which demonstrations can be used to demonstrate electromagnetic induction?

A P and Q only **B** P and R only **C** Q and R only **D** P, Q and R

2. Nov/2023/Paper_ 0625/11/No.33

A transformer in a computer is used to transform the mains voltage of 240 V to 12 V.

The number of turns on the secondary coil is 2000.

Which statement about the transformer is correct?

A It is a step-down transformer and has 100 turns on its primary coil.

B It is a step-down transformer and has 40 000 turns on its primary coil.

C It is a step-up transformer and has 100 turns on its primary coil.

D It is a step-up transformer and has 40 000 turns on its primary coil.

3. Nov/2023/Paper_ 0625/12/No.33

A transformer has N_p turns on its primary coil and N_s turns on its secondary coil. The voltage across the primary coil is V_p and the voltage across the secondary coil is V_s.

What is the relationship between these four quantities?

A $V_p \times V_s = N_p \times N_s$

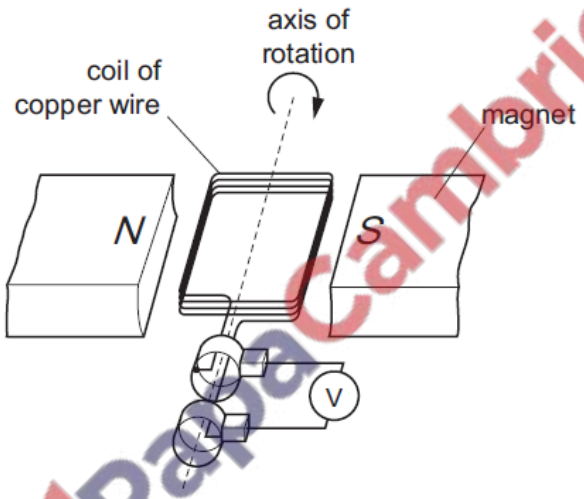
B $\frac{V_p}{V_s} = \frac{N_p}{N_s}$

C $\frac{V_p}{V_s} = \frac{N_s}{N_p}$

D $\frac{V_p}{V_s} = N_p \times N_s$

4. Nov/2023/Paper_ 0625/13/No.31

A generator uses the principle of electromagnetic induction.



Which change would increase the induced electromotive force (e.m.f.) in the coil?

A increasing the number of turns in the coil

B placing the magnets further apart

C using a coil made from steel wire

D reversing one of the magnets

5. Nov/2023/Paper_ 0625/13/No.33

What is a transformer used for?

A changing a direct current into an alternating current

B changing the magnitude of an alternating voltage

C reducing the frequency of an alternating current

D switching off the current in a circuit when there is a fault

6. Nov/2023/Paper_ 0625/21/No.31

A current in a solenoid produces a uniform magnetic field inside the solenoid. The magnetic field direction is due east.

Which changes will produce a stronger magnetic field with a direction due west?

A Use a smaller current and turn the solenoid through 180°.

B Use a smaller current and reverse the current.

C Use a larger current and turn the solenoid through 90°.

D Use a larger current and reverse the current.

7. Nov/2023/Paper_ 0625/21/No.33

A transformer in a computer is used to transform the mains voltage of 240 V to 12 V.

The number of turns on the secondary coil is 2000.

Which statement about the transformer is correct?

A It is a step-down transformer and has 100 turns on its primary coil.

B It is a step-down transformer and has 40 000 turns on its primary coil.

C It is a step-up transformer and has 100 turns on its primary coil.

D It is a step-up transformer and has 40 000 turns on its primary coil.

8. Nov/2023/Paper_ 0625/22/No.33

A transformer has N_p turns on its primary coil and N_s turns on its secondary coil. The voltage across the primary coil is V_p and the voltage across the secondary coil is V_s.

What is the relationship between these four quantities?

A $V_p \times V_s = N_p \times N_s$

B $\frac{V_p}{V_s} = \frac{N_p}{N_s}$

C $\frac{V_p}{V_s} = \frac{N_s}{N_p}$

D $\frac{V_p}{V_s} = N_p \times N_s$

9. Nov/2023/Paper_ 0625/23/No.33

What is a transformer used for?

A changing a direct current into an alternating current

B changing the magnitude of an alternating voltage

C reducing the frequency of an alternating current

D switching off the current in a circuit when there is a fault

10. Nov/2023/Paper_ 0625/33/No.8

(a) Fig. 8.1 shows an arrangement for transmitting electricity generated by a power station.

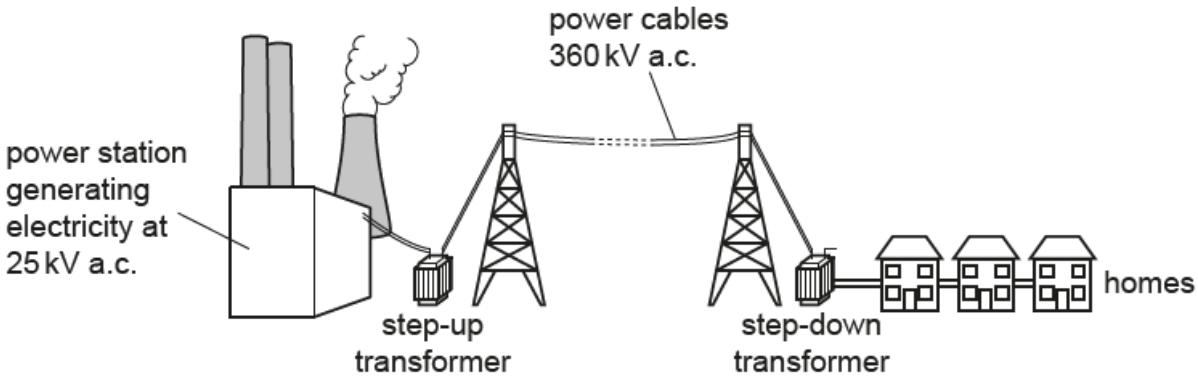


Fig. 8.1 (not to scale)

The step-up transformer has 500 turns on the primary coil.

Calculate the number of turns on the secondary coil of the step-up transformer. Use the information given in Fig. 8.1.

number of secondary turns = ... [3]

(b) State **two** benefits of using high voltages for transmitting electricity.

1 .....

2 .....

[2]

[Total: 5]

11. Nov/2023/Paper_ 0625/43/No.8(b)

(b) Fig. 8.2 is a voltage–time graph showing the output of a simple alternating current (a.c.) generator at times t_0, t_1, t_2 and t_3.

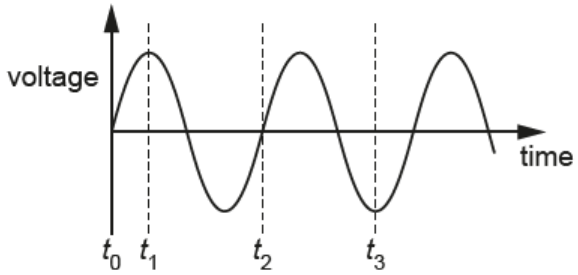


Fig. 8.2

Fig. 8.3 is an end view of the plane of the coil of the generator at time t_0. The coil is rotating clockwise.

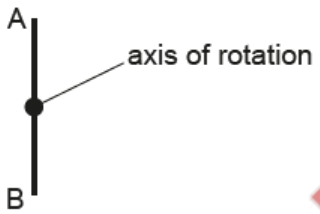


Fig. 8.3

(i) Draw an end view of the position of the plane of the coil at time t_1. Include the labels A and B.

[1]

(ii) Draw an end view of the position of the plane of the coil at time t_2. Include the labels A and B.

[1]

(iii) Draw an end view of the position of the plane of the coil at time t_3. Include the labels A and B.

[1]

12. June/2023/Paper_0625/11/No.31

A simple electric generator induces an electromotive force (e.m.f.).

Which modification would increase the induced e.m.f.?

A Increase the number of turns in the coil of the generator.

B Increase the distance between the magnetic poles.

C Reduce the strength of the magnetic field around the coil.

D Reverse the direction of the magnetic field.

13. June/2023/Paper_0625/11/No.33

What is an advantage of transmitting electricity at a high voltage?

A It is faster.

B It is safer.

C Less energy is wasted.

D Less equipment is needed.

14. June/2023/Paper_0625/12/No.32

In which device is the magnetic effect of a current **not** used?

A electromagnet

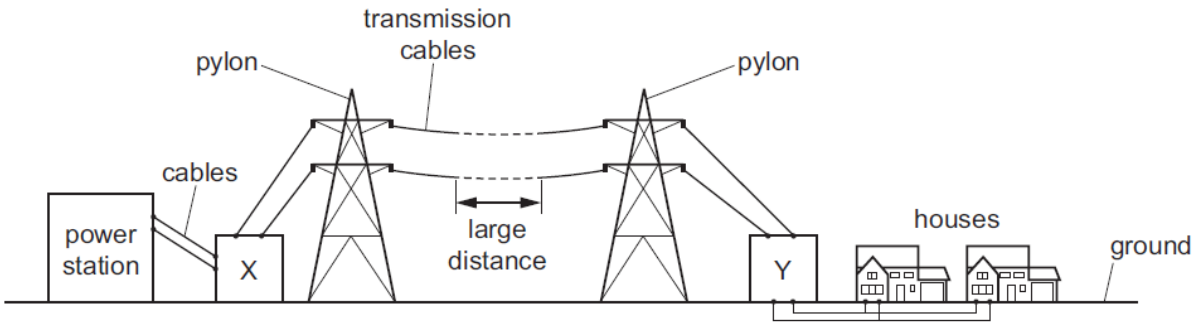
B loudspeaker

C potential divider

D relay

15. June/2023/Paper_0625/12/No.33

The diagram represents the transmission of electricity from a power station to homes that are many kilometres away. Two transformers are labelled X and Y.



What type of transformers are X and Y?

	X	Y
A	step-down transformer	step-down transformer
B	step-down transformer	step-up transformer
C	step-up transformer	step-down transformer
D	step-up transformer	step-up transformer

16. June/2023/Paper_0625/13/No.30

Which electrical device uses the turning effect produced by a current-carrying coil in a magnetic field?

A a.c. generator

B d.c. motor

C relay

D transformer

17. June/2023/Paper_0625/13/No.32

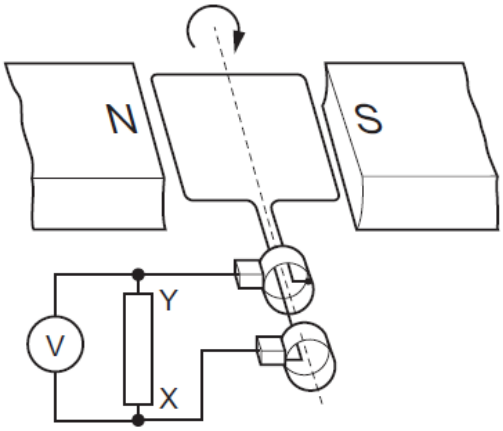
A student makes four different types of transformer. She counts the number of turns on the primary and secondary coils. She labels each transformer as either step-up or step-down.

Which row shows the correct labels?

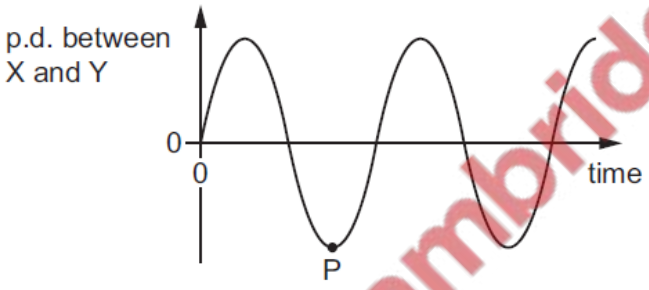
	number of turns on the primary coil	number of turns on the secondary coil	step-up or step-down transformer
A	5	5	step-up
B	10	5	step-up
C	10	20	step-down
D	20	10	step-down

18. June/2023/Paper_0625/21/No.30

The diagram shows an a.c. generator.

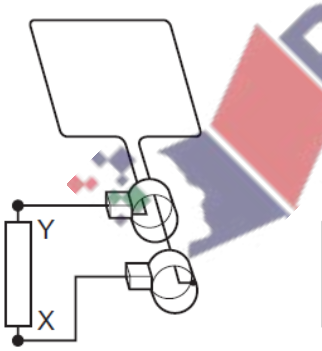


The graph shows the potential difference (p.d.) between points X and Y plotted against time. A positive value of p.d. indicates that X is more positive than Y.

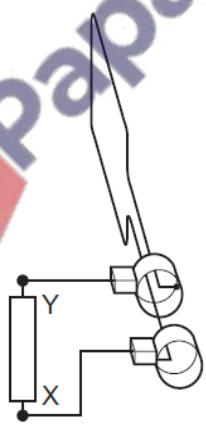


Which diagram shows the position of the coil at point P on the graph?

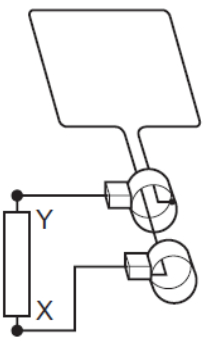
A



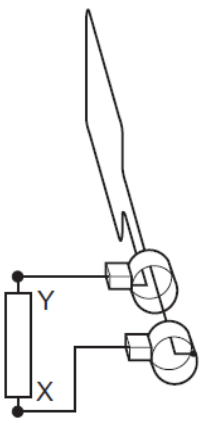
B



C



D



19. June/2023/Paper_0625/22/No.30

A step-down transformer is 100% efficient. It has an input voltage of 240 V a.c. and an output voltage of 60 V a.c.

The current in the primary coil is 0.50 A.

What is the current in the secondary coil?

A 0.13 A **B** 0.50 A **C** 2.0 A **D** 8.0 A

20. June/2023/Paper_0625/23/No.31

Which component forms part of a d.c. motor but **not** a simple moving coil a.c. generator?

A the coil

B the brushes

C the magnet

D the split-ring commutator

21. June/2023/Paper_0625/23/No.32

A transformer has 5500 turns on the primary coil and 500 turns on the secondary coil.

The output of the secondary coil is 110 V a.c. and is connected to a heater. The transformer is 100% efficient.

The heater produces a power of 132 W.

What is the current in the primary coil?

A 0.11 A **B** 0.12 A **C** 11 A **D** 12 A

22. June/2023/Paper_0625/31/No.10

(a) Fig. 10.1 shows an arrangement used to demonstrate electromagnetic induction.

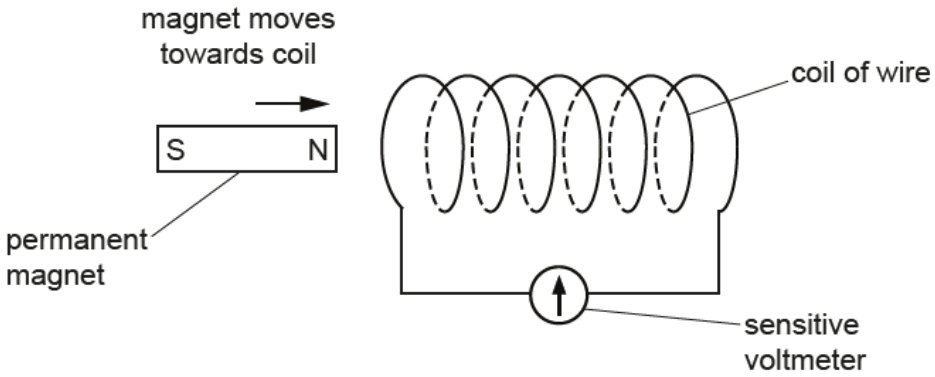


Fig. 10.1

(i) When the magnet moves towards the coil of wire, the pointer on the sensitive voltmeter deflects to the right.

Explain why the pointer deflects.

.....

..... [2]

(ii) State **two** changes that increase the deflection on the sensitive voltmeter.

1 .....

2 .....

[2]

(b) Fig. 10.2 shows the symbol for a transformer. The primary coil is connected to a voltage of 180 V a.c.

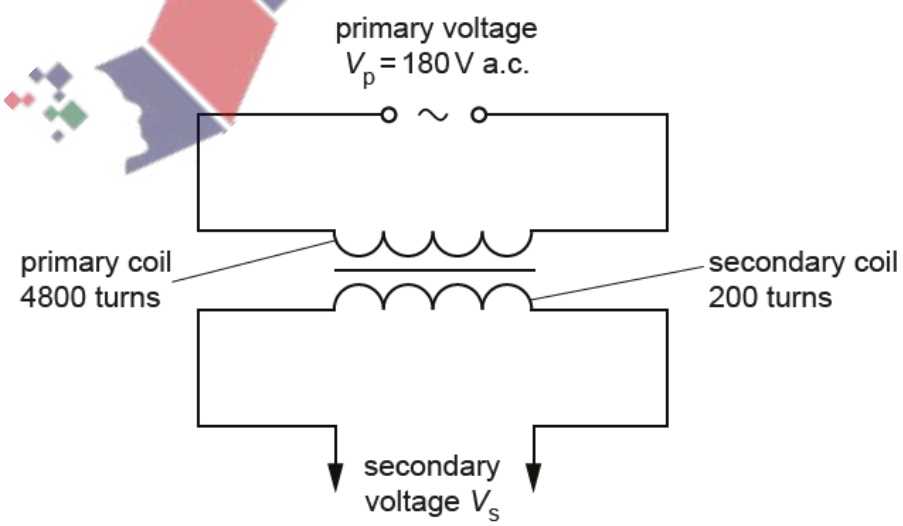


Fig. 10.2

Calculate the secondary voltage V_s for the transformer.

V_s = ... V [3]

[Total: 7]

23. June/2023/Paper_0625/31/No.7(b)

A student uses a permanent magnet to lift some unmagnetised nails. Some of the nails are made of iron and some are made of steel. Fig. 7.1 shows the magnet lifting the nails.

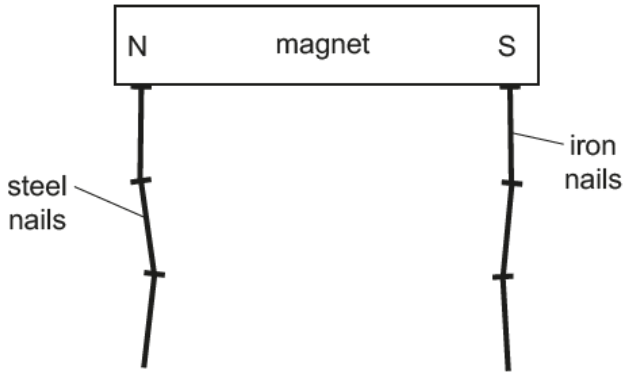


Fig. 7.1

(b) A metal wire XY is connected to a voltmeter. The wire is placed between the poles of a permanent magnet. Fig. 7.2 shows the arrangement.

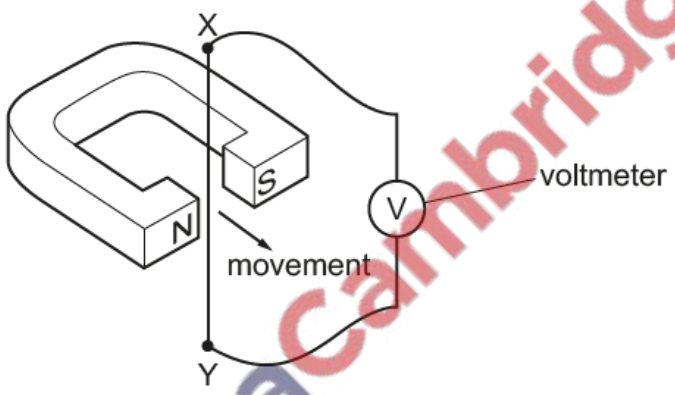


Fig. 7.2

(i) State the reading on the voltmeter when the wire is stationary between the poles.

..... [1]

(ii) Give a reason for the reading on the voltmeter when the wire is moving in the direction shown in Fig. 7.2.

.....

..... [1]

24. June/2023/Paper_0625/31/No.9(b)

A student uses the circuit in Fig. 8.1 to measure the resistance of the heater in the circuit.

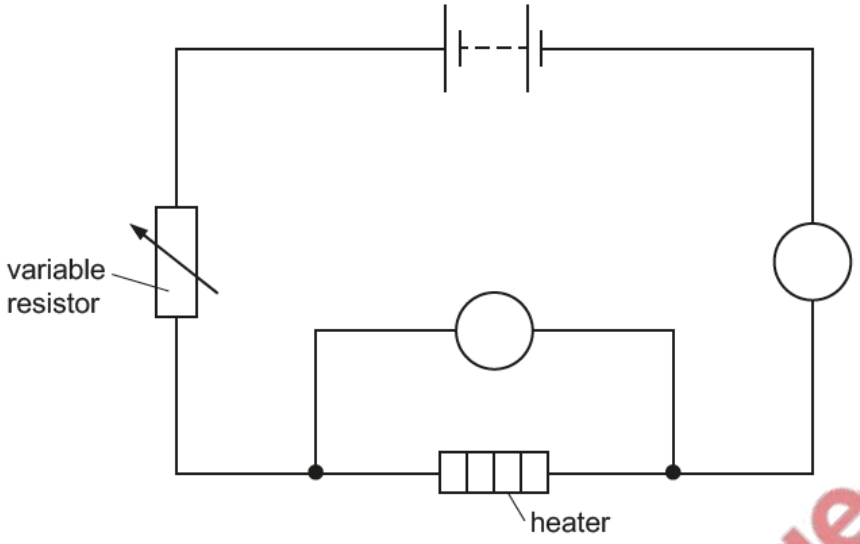


Fig. 8.1

(b) The current in the heater is 1.4A and the potential difference (p.d.) across the heater is 8.0V.

Calculate the resistance of the heater.

resistance = ... Ω [3]

25. June/2023/Paper_0625/41/No.8

(a) Fig. 8.1 shows the electrical symbols for some circuit components.

Draw a line from each electrical symbol to the name of the circuit component it represents.

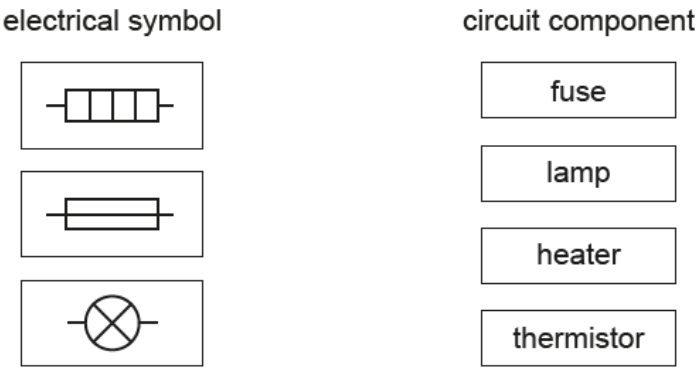


Fig. 8.1

[3]

(b) Fig. 8.2 shows a circuit including a battery, a fixed resistor R and an ammeter.

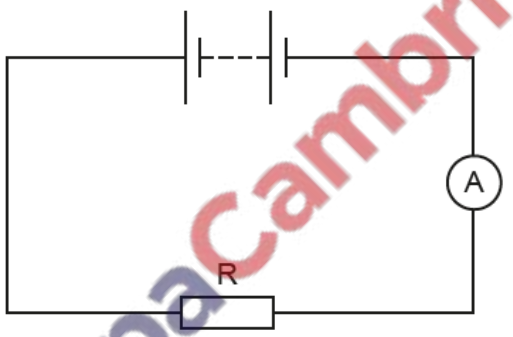


Fig. 8.2

The reading on the ammeter is 0.38A.
The potential difference across the fixed resistor R is 12V.

(i) Calculate the resistance of the fixed resistor R.

resistance = ... Ω [3]

(ii) Calculate the electrical power transferred in the fixed resistor R. Include the unit.

power transferred = ... unit ..... [4]

[Total: 10]

26. June/2023/Paper_0625/43/No.7

The voltage across the primary coil of a 100% efficient transformer is 220 V and the voltage across the secondary coil is 12 V.

(a) The current in the secondary coil is 2.5 A.

Calculate the current in the primary coil.

current = ... [3]

(b) Calculate the ratio of the number of turns on the primary coil to the number of turns on the secondary coil of the transformer.

ratio = ... [2]

[Total: 5]