Practical Electricity

Question Paper

Level	O Level
Subject	Physics
Exam Board	Cambridge International Examinations
Unit	Electricity and Magnetism
Topic	Practical Electricity
Booklet	Question Paper

Time Allowed: **61 minutes**

Score: **/51**

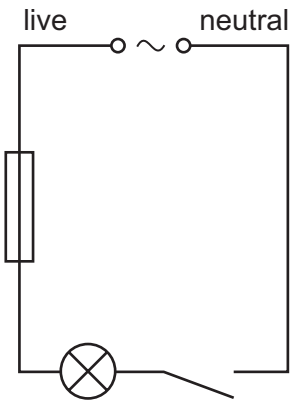
Percentage: **/100**

Grade Boundaries:

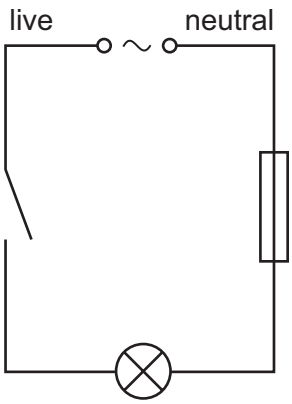
1 A lamp is connected to the a.c. mains supply in series with a switch and a fuse.

Which circuit shows these components wired correctly?

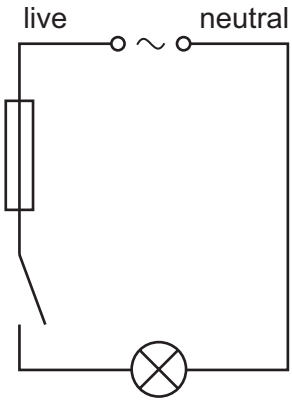
A



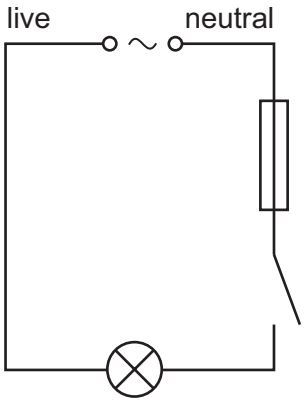
B



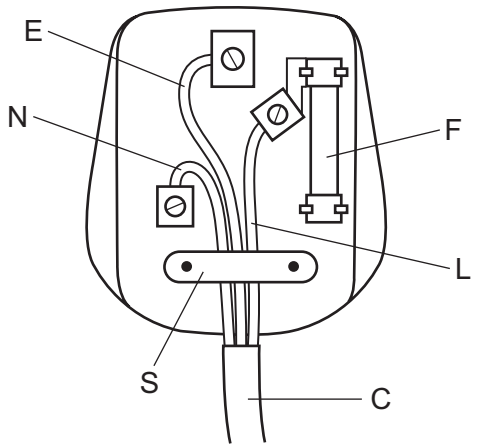
C



D



2 The diagram shows the wiring of a three-pin mains plug. There is an error in the diagram.



What is the error?

A The cable cover C is not under the clip S.

B The earth wire E is connected to the wrong terminal.

C The fuse F is connected to the live wire L.

D The live wire L is connected to the wrong end of the fuse F.

3 A 100 W lamp is switched on for five hours each day for three weeks.

The cost of one unit of electricity is $0.24.

How much does it cost to run the lamp for this time?

A $0.36 **B** $0.84 **C** $2.52 **D** $25.20

4 The diagram shows the information found on an electric kettle.

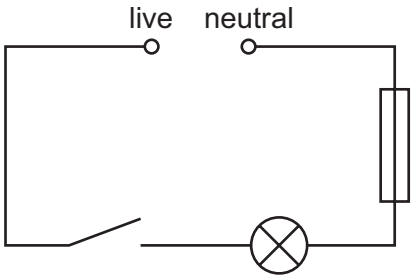
240 V	50 Hz
600 W	700 cm^3

What is the frequency of the electrical supply used to power the kettle?

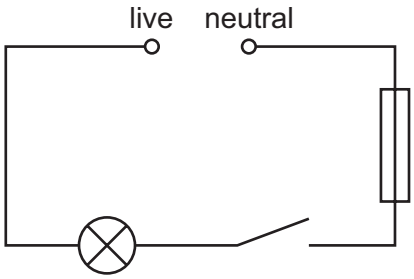
A 50 Hz **B** 240 V **C** 600 W **D** 700 cm^3

5 Which diagram shows a lamp wired correctly to the mains supply in a house?

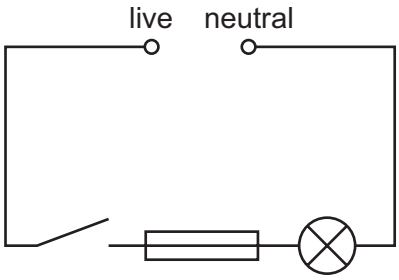
A



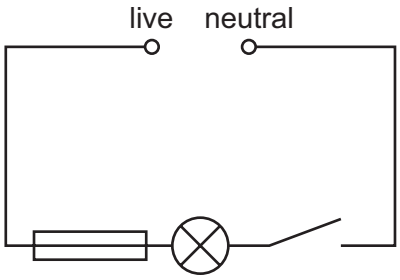
B



C



D

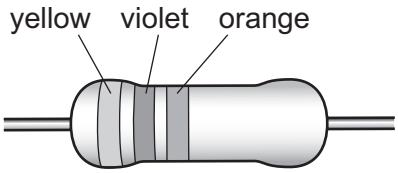


6 One kilowatt-hour of energy costs $0.24.

How much does it cost to run a 2 kW heater for three hours?

A $0.24 **B** $0.48 **C** $0.72 **D** $1.44

7 A resistor is marked with three coloured bands.



black	brown	red	orange	yellow	green	blue	violet
0	1	2	3	4	5	6	7

Using the key provided, what is the resistance of the resistor?

A $374\,\Omega$ **B** $473\,\Omega$ **C** $47 \times 10^3\,\Omega$ **D** $37 \times 10^4\,\Omega$

8 An appliance uses a current of 3 A.

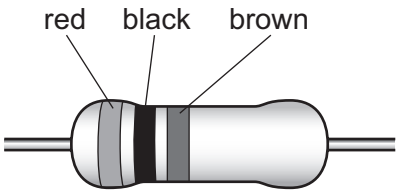
Which row is correct for the fuse in this appliance?

	most suitable fuse rating / A	fuse connected in
A	5	earth wire
B	5	live wire
C	13	earth wire
D	13	live wire

9 The table contains part of the colour code for resistors.

black	brown	red
0	1	2

What is the resistance of the resistor with the colour bands shown?



A 102 Ω **B** 200 Ω **C** 201 Ω **D** 1000 Ω

10 Which unit measures the energy input to an electrical appliance?

A ampere

B kilowatt-hour

C volt

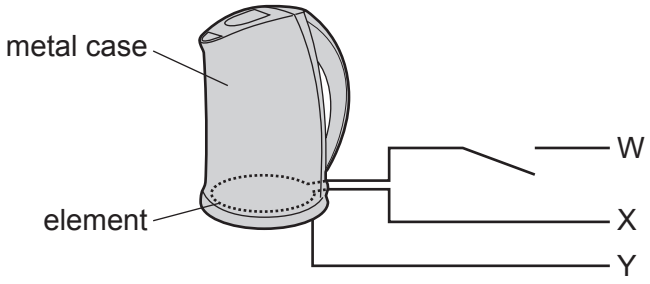
D watt

11 An electric lamp is marked 0.5 A. It is connected to a socket marked '30 A maximum'.

Which fuse is best to use in the lamp?

A 0.5 A **B** 3 A **C** 30 A **D** 40 A

12 The diagram represents part of a household circuit containing an electric kettle.



Which row correctly identifies the wires W, X and Y?

	W	X	Y
A	earth	live	neutral
B	live	neutral	earth
C	live	earth	neutral
D	neutral	live	earth

13 Five electrical appliances are connected to the same socket and there is a very large current.

Why is this dangerous?

A The fuses blow in the appliances.

B There is a greater risk of an electrical shock.

C There is overheating in each appliance.

D There is overheating in the socket.

14 What causes the fuse to blow in a mains electrical circuit?

A a person touches the live wire

B a person touches the neutral wire

C the live wire touches the earth wire

D the neutral wire touches the earth wire

15 A water heater uses 6 kW of electric power when connected to a 240 V circuit.

Which fuse is **most** suitable for use in this circuit?

A 5 A **B** 13 A **C** 30 A **D** 50 A

16 A lamp connected to a 12 V supply converts energy at a rate of 36 W.

How much energy will be converted in 10 s?

A 30 J **B** 36 J **C** 120 J **D** 360 J

17 An immersion heater is labelled 12 V, 60 W.

What is the current in the heater when connected to a 12 V supply?

A 0.20 A **B** 5.0 A **C** 12 A **D** 60 A

18 A lamp is rated at 60 W on a 240 V supply.

What is the current in the lamp when used normally?

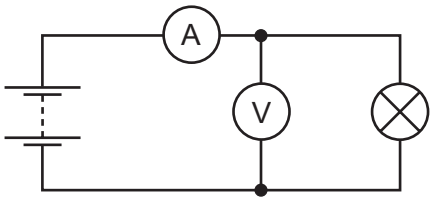
A 0.25 A **B** 4.0 A **C** 60 A **D** 180 A

19 The cost of electricity is 16 c per kW h.

What is the cost of using a 3 kW heater for 4 hours?

A $\frac{3 \times 4}{16}$ c **B** $\frac{3 \times 16}{4}$ c **C** $4 \times 3 \times 16$ c **D** $4 \times 3 \times 60 \times 16$ c

20 The diagram shows a circuit.



The lamp is a 12 W lamp and is working at normal brightness.

What are the readings on the meters?

	voltmeter reading / V	ammeter reading / A
A	6	0.5
B	12	0.5
C	12	1
D	24	2

21 A lamp rated 6 V, 2 A is switched on for 60 s.

How much energy is used?

A 0.2 J **B** 20 J **C** 180 J **D** 720 J

22 The current in a filament lamp is 0.25 A when working normally. The lamp is connected to a plug and the mains a.c. supply.

When the lamp is switched on, it does not light.

What is a possible cause for this?

A The earth wire in the plug is not connected.

B The fuse in the plug is 3 A.

C The lamp only works on a d.c. power supply.

D The live wire in the plug is not connected.

23 Which appliance used on a 240 V supply is **most** likely to burn out its fuse?

	appliance	fuse
A	100 W lamp	1 A
B	1 kW vacuum cleaner	5 A
C	2 kW fan heater	3 A
D	3 kW electric fire	13 A

24 Which quantity is measured in kilowatt-hours?

A charge

B current

C energy

D power

25 The metal case of an electric heater is earthed. The plug to the heater contains a 5 A fuse. There is a current of 4 A when the heater works normally.

The cable to the heater becomes so worn that the live wire makes electrical contact with the case.

What happens?

A The current flows to earth and the fuse is not affected.

B The fuse melts and switches off the circuit.

C The metal case becomes live and dangerous.

D The metal case becomes very hot.

26 Many electrical appliances have metal cases.

To prevent the case from becoming 'live', with the possibility of an electric shock, the earth wire of the electric cable is attached to the case.

How does the earth wire prevent an electric shock?

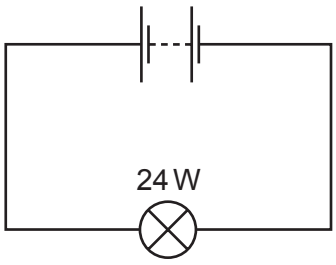
A It allows a current to flow to earth, so that the appliance continues working.

B It allows a large current to flow to earth, blowing the fuse.

C It prevents the fuse from blowing.

D It reduces the current to a safe level.

27 A battery is used to light a 24 W electric lamp. The battery provides a charge of 120 C in 60 s.



What is the potential difference across the lamp?

A 5 V **B** 12 V **C** 24 V **D** 120 V

28 A student has a chain of 20 lamps. These are wired in series and connected to the mains.

One lamp blows and all the others go out.

The student wants to find the faulty lamp and replace it.

Where should the student begin?

A anywhere, because the current was the same in each lamp

B at the live end of the chain, because the current was greatest there

C at the middle of the chain, because the current was greatest there

D at the neutral end of the chain, because the current was least there

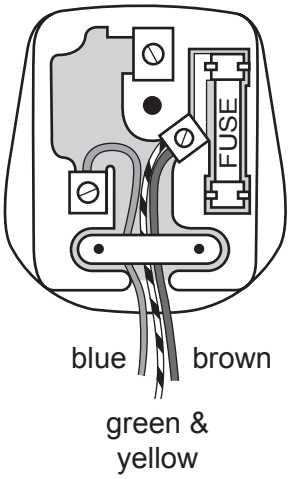
29 An electric iron is marked 240 V, 2500 W.

Four fuses are available with values of 5 A, 10 A, 13 A and 30 A.

Which fuse should be used?

A 5 A **B** 10 A **C** 13 A **D** 30 A

30 A plug is wrongly wired as shown. It is connected to an old vacuum cleaner, which has a metal case.



What is the effect of using the plug wired in this way?

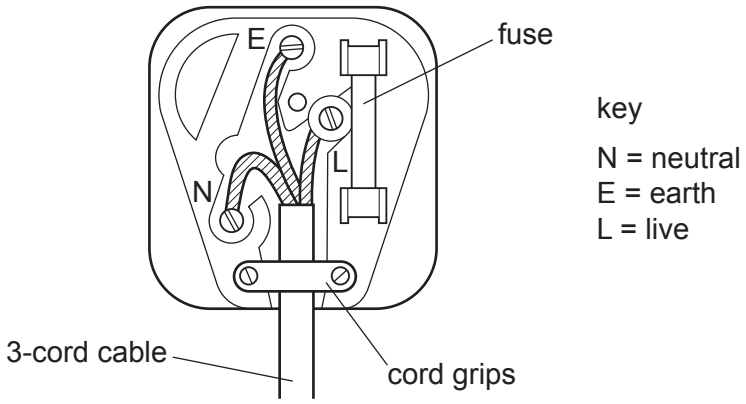
A The fuse in the plug blows.

B The metal case is live.

C The neutral wire melts.

D The vacuum cleaner catches fire.

31 The diagram shows a standard mains plug.



What are the correct colours for the wires?

	N	E	L
A	blue	br	green and yellow
B	blue	gr and yellow	brown
C	brown	g and yellow	blue
D	green and yellow	brown	blue

32 Which costs the **most** if operated from the same mains supply?

A a 5000 W electric cooker used for 1 minute

B a 1000 W electric fire used for 10 minutes

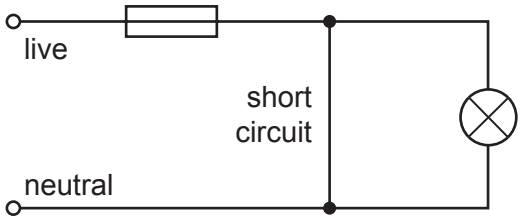
C a 500 W electric iron used for 1 hour

D a 100 W lamp used for 1 day

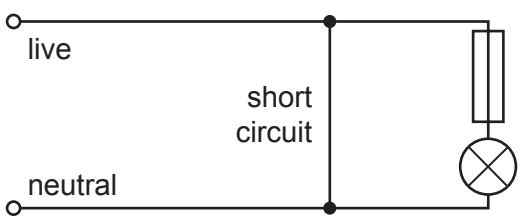
33 In each of the circuits below there is a short circuit.

In which circuit does the fuse blow and make the circuit safe to repair?

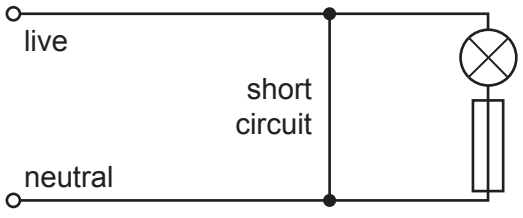
A



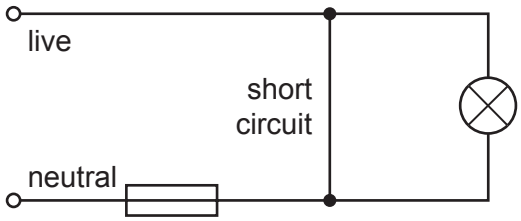
B



C



D



34 What is the purpose of a circuit breaker in an electric circuit?

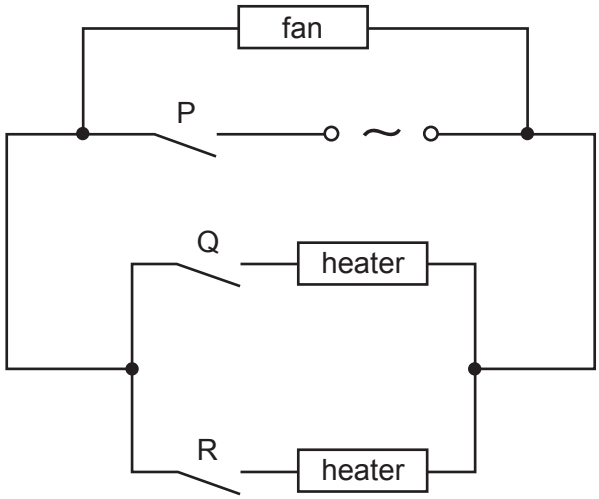
A to change alternating current into direct current

B to keep the current constant

C to prevent the current from becoming too large

D to reduce the current to a safe value

35 The diagram shows the circuit for a hair-dryer.



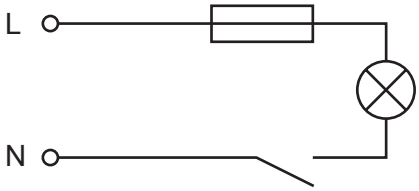
The fan has a power rating of 0.1 kW and the heaters each have a rating of 0.4 kW. The cost of electricity is 8 cents/kW h.

What is the cost of running the dryer for two hours with switches P and Q closed and switch R open?

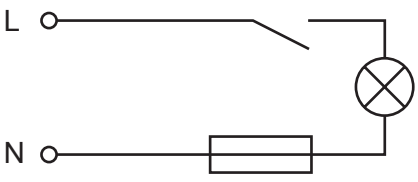
A 1.6 cents **B** 3.2 cents **C** 6.4 cents **D** 8.0 cents

36 Which circuit shows the correct positions for the fuse and the switch in the lighting circuit of a house?

A



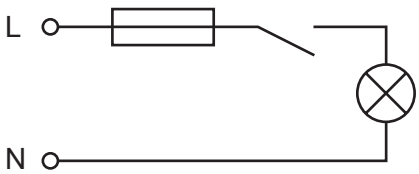
B



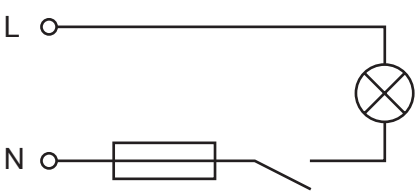
key

L = live wire
N = neutral wire

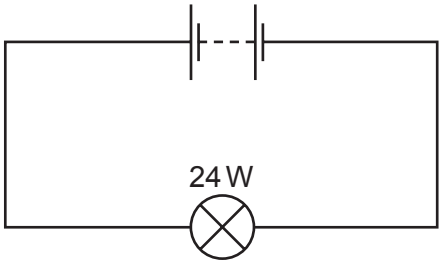
C



D



37 A battery is used to light a 24 W electric lamp. The battery provides a charge of 120 C in 60 s.



What is the potential difference across the bulb?

A 5 V **B** 12 V **C** 24 V **D** 120 V

38 Energy is represented by the letter *E*, current by *I*, power by *P*, charge by *Q*, p.d. by *V* and time by *t*.

Which pair of equations is correct?

A $E = It$ and $P = VIt$

B $E = VQ/t$ and $P = VI$

C $E = VIt$ and $P = VI$

D $E = VQ$ and $P = VI/t$

39 The case of an electric fan is earthed. The plug to the fan contains a 5 A fuse. There is a current of 4 A when the fan works normally.

The cable to the fan becomes so worn that the live wire makes electrical contact with the metal case.

What happens?

A The current flows to earth and the fuse is not affected.

B The fuse melts and switches off the circuit.

C The metal case becomes live and dangerous.

D The metal case becomes very hot.

40 How much energy is converted in a resistor of 5.0 Ω carrying a current of 2.0 A for 10 seconds?

A 4.0 J **B** 25 J **C** 100 J **D** 200 J

41 Which of the following would cost the **least** if operated from the same voltage supply?

A a 5000 W electric cooker used for 1 minute

B a 1000 W electric fire used for 10 minutes

C a 500 W electric iron used for 1 hour

D a 100 W lamp used for 1 day

42 A house-owner replaces a failed fuse for the lights of the house. When the lights are switched on, the second fuse also fails. The house-owner then uses a third fuse with a higher rating than the previous two.

Why is this **not** a sensible thing to do?

A Fuses only allow the circuit to work if the rating is exactly right.

B The third fuse will melt because the rating is too high.

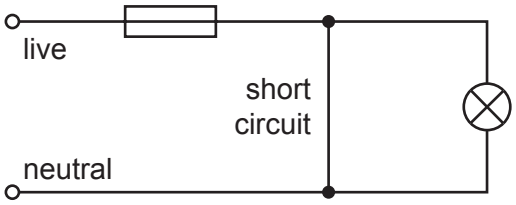
C Using a fuse with too high a rating causes electric shocks.

D The circuit may work, but the fault is not corrected.

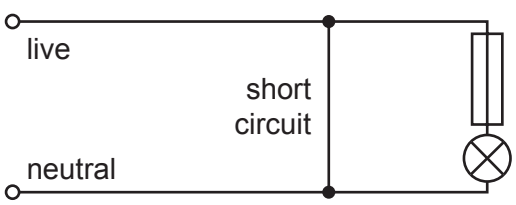
43 In each of the circuits below, a short circuit occurs.

In which circuit would the fuse blow and make the circuit safe to repair?

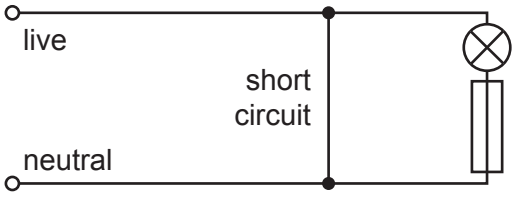
A



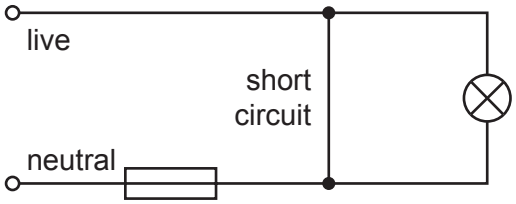
B



C



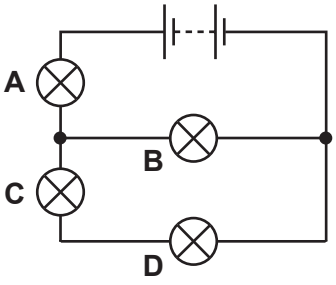
D



44 In the circuit shown, the battery lights up all four lamps.

When one of the lamp filaments melts, the other three lamps stay on.

Which lamp filament melts?



45 A combined bathroom unit of a heater and a lamp is controlled by one switch. The unit contains a 2 kW heater and a 100 W lamp. In one week, the lamp uses 1 kW h of electrical energy.

How much electrical energy is used by the heater alone?

A 2 kW h **B** 4 kW h **C** 10 kW h **D** 20 kW h

46 An electric kettle is plugged in and switched on. The fuse in the plug blows immediately.

Which single fault could cause this?

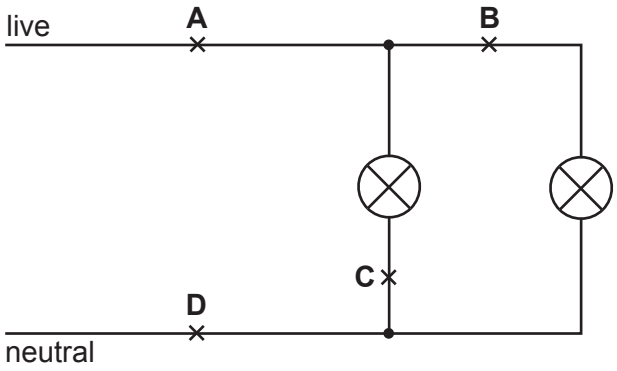
A The earth wire is not connected to the kettle.

B The live wire and neutral wire connections in the plug are swapped around.

C The live wire touches the metal case of the kettle.

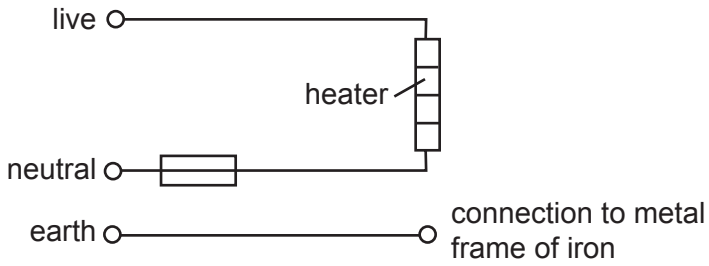
D The wires connected to the plug are too thin.

47 In order to turn off both lamps, which is the safest switch position?

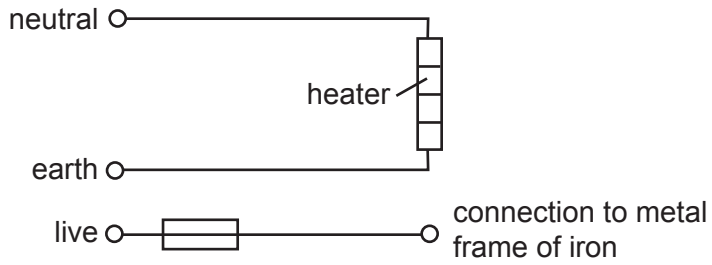


48 Which circuit shows how the heater in an electric iron and a fuse should be connected to a mains electricity supply?

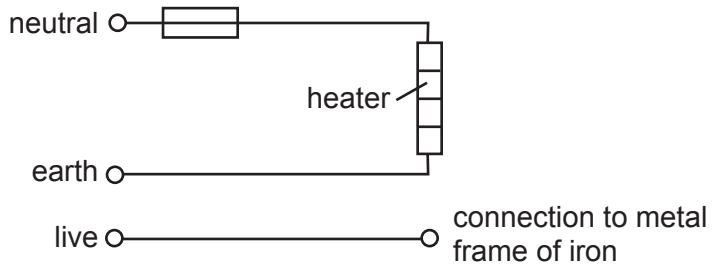
A



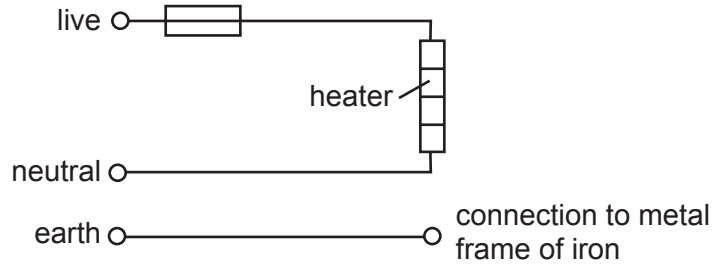
B



C



D



49 An electric heater consists of a heating element mounted on a metal reflector. The reflector is connected to earth.

Where should the switch for the heating element be connected?

A between the earth wire and the reflector

B between the live wire and the heating element

C between the live wire and the neutral wire

D between the neutral wire and the heating element

50 The cable to an electric fan becomes so worn that the live wire makes electrical contact with the metal case. The case is earthed. The plug to the fan contains a 5 A fuse. There is a current of 4 A when the fan works normally.

What will happen?

A The current will run to earth and the fuse will not be affected.

B The fuse will melt and switch off the circuit.

C The metal case will become live and dangerous.

D The metal case will become very hot.

51 A small heater operates at 12 V, 2 A.

How much energy will it use when it is run for 5 minutes?

A 30 J

B 120 J

C 1800 J

D 7200 J