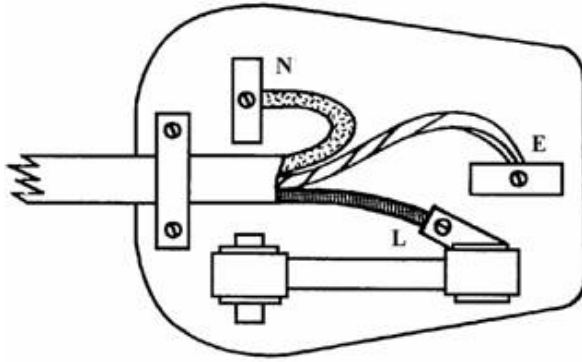


Q1. The diagram shows the inside of a 3-pin plug.



(a) What colour wire should be connected to each terminal?

Terminal **E**

Terminal **N**

Terminal **L**

(3)

(b) Name **two** parts inside the 3-pin plug which help to make it safe.

1

.....

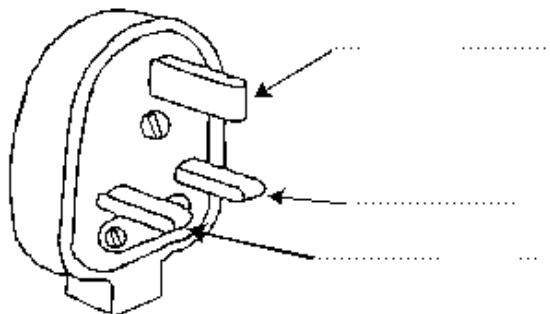
2

.....

(2)

(Total 5 marks)

Q2. (a) The diagram below shows the three pins in a mains plug. The pins connect with the live, neutral and earth terminals in a socket.



On the diagram, label each pin to show which is:

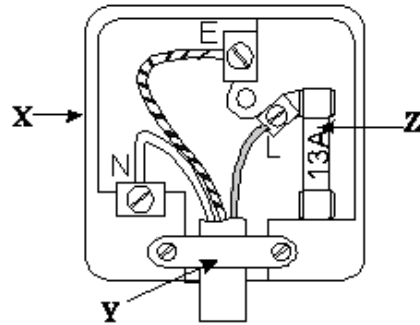
the live pin,

the neutral pin,

the earth pin.

(3)

(b) The diagram below shows the inside of a mains plug.



(i) Name **one** material which could be used for the part labelled **X**.

.....

(ii) Complete the sentences below.

The part labelled **Y** is called the

This is used to hold the firmly in place.

The component labelled **Z** is the

(iii) The plug is used with an electric fire.

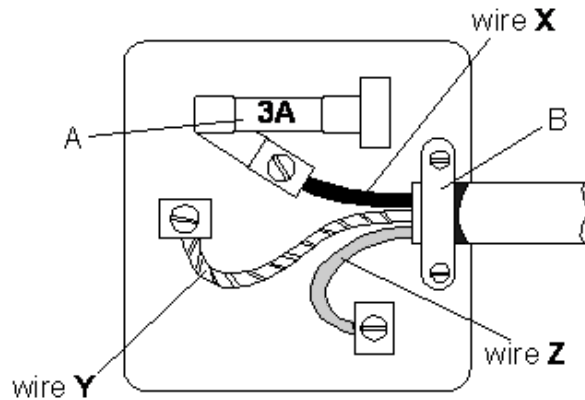
Which part of the electric fire is connected to the earth pin?

.....

(5)

(Total 8 marks)

Q3. The diagram below shows an electric mains plug.



(a) Name the parts of the plug labelled **A** and **B**.

A

B

(2)

(b) Name the colour of each of the wires **X**, **Y** and **Z**.

X

Y

Z

(3)

(c) Name a suitable material for the case of the plug.

.....

(1)

(d) Electric fires have three wires connected in the plug. One is the live wire to feed electric current in, another is the neutral (return) wire.

(i) What is the third wire called?

.....

(1)

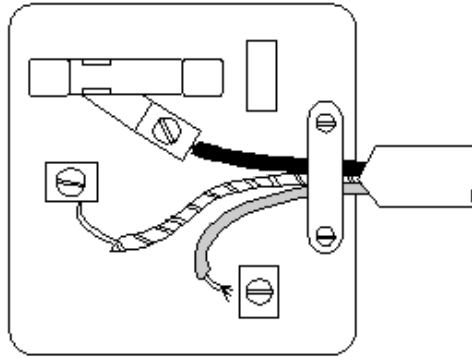
(ii) Why is it important that the third wire is also connected?

.....

.....

(1)

- (e) The diagram below shows a badly wired mains plug.

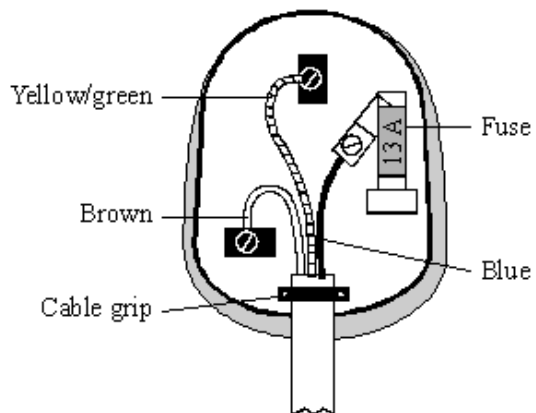


Look at the plug carefully. What **four** changes should be made to make the plug safe?

1.
2.
3.
4.

(4)
(Total 12 marks)

- Q4.** (a) The diagram shows a 13 amp plug.



- (i) What is wrong with the way this plug has been wired?

.....

.....

(1)

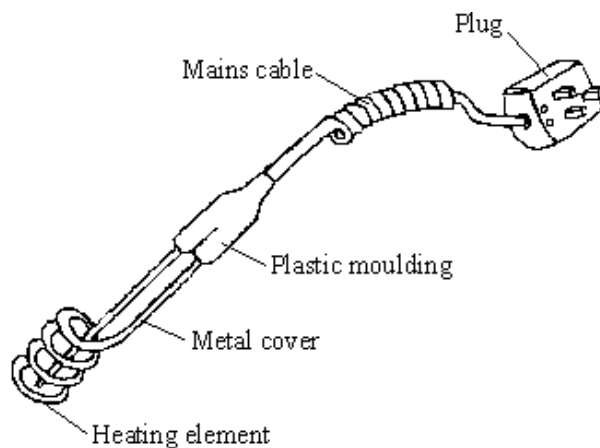
(ii) Why do plugs have a fuse?

.....

.....

(1)

(b) The diagram shows an immersion heater which can be used to boil water in a mug.



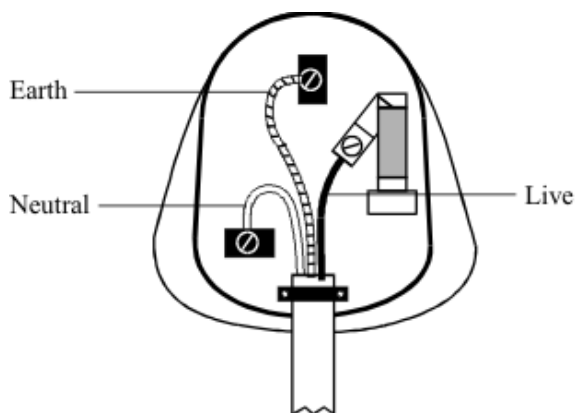
(i) Which part of the immersion heater should be connected to the earth pin of the plug?

.....

(1)

(Total 3 marks)

Q5. The diagram shows the inside of a mains plug.

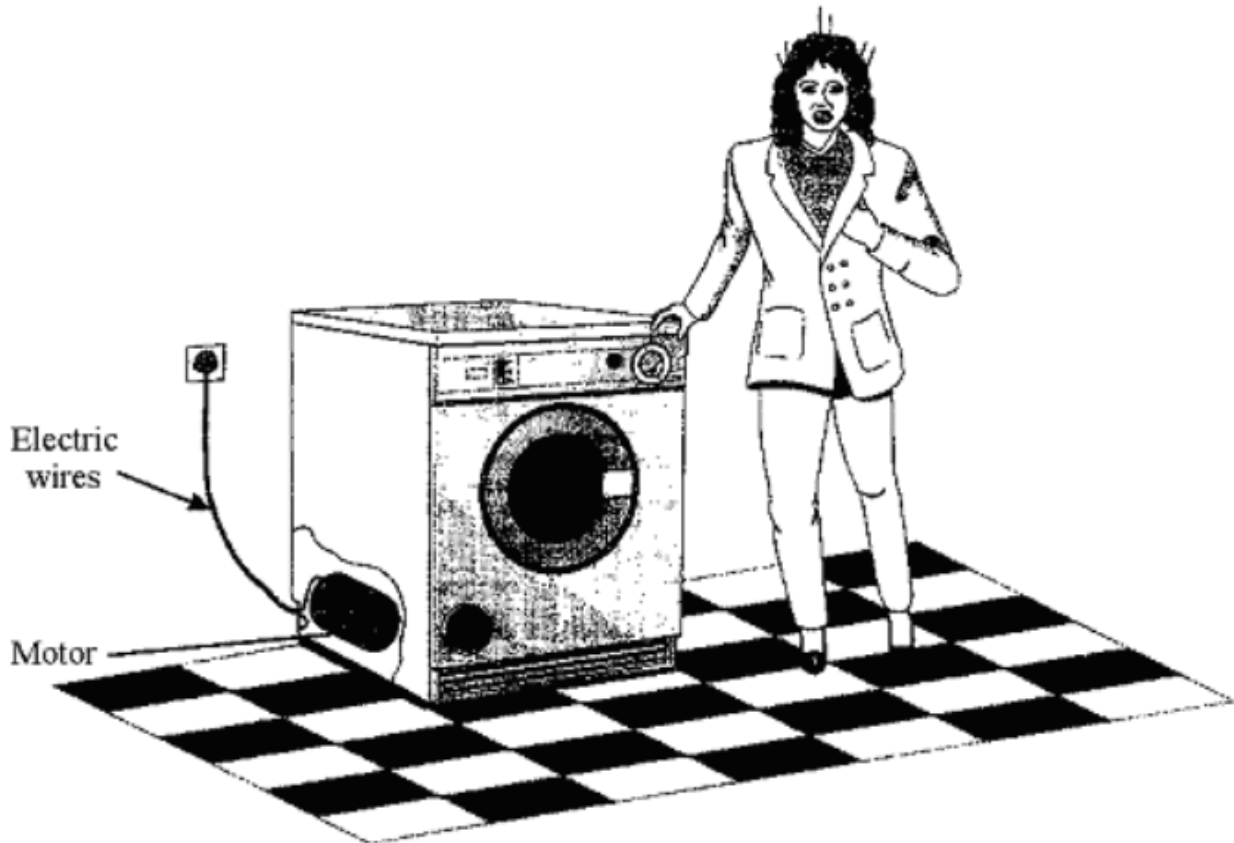


(a) Complete the table.

Wire	Colour of insulation
Earth	
Live	
Neutral	

(3)

- (b) The diagram shows a washing machine without an earth connection. The live wire has become loose and is touching the metal case of the washing machine.



- (i) Draw on the diagram the path taken by the electricity when the person touches the metal case of the machine.

(1)

- (ii) Describe how the path of the electricity would change if the washing machine had an earth connection.

.....

.....

.....

(2)

- (c) Some electrical appliances use a cable which does not have an earth wire. Which **one** of the following appliances can safely use this type of cable?

hairdrier iron refrigerator

.....

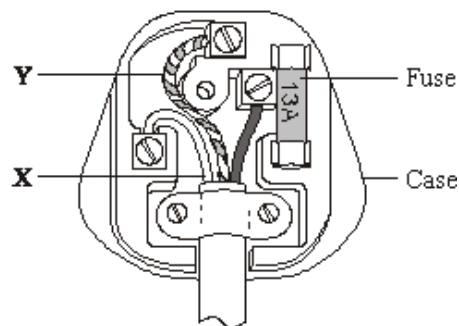
Give a reason for your answer.

.....

.....

(2)
(Total 8 marks)

- Q6.** (a) The diagram shows the inside of a correctly wired three-pin plug.



- (i) What colour is the insulation on the wire labelled **X**?

Draw a ring around your answer.

blue brown green/yellow

(1)

- (ii) What name is given to the wire labelled **Y**?

Draw a ring around your answer.

earth live neutral

(1)

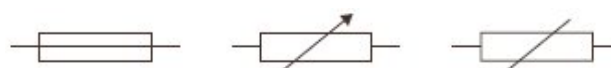
- (iii) What material would be suitable for the case of the plug?

.....

(1)

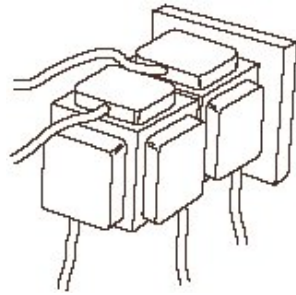
- (iv) Which **one** of the following is the correct circuit symbol for a fuse?

Draw a ring around your answer.



(1)

- (b) A householder does not have enough electric sockets in the kitchen. To overcome the problem, the householder uses two adaptors to plug five appliances into a single electric socket.



Explain why this is dangerous.

.....

.....

.....

.....


(2)
(Total 6 marks)

- Q7.** (a) Look at this electrical safety information poster.

Get it right!
Choose the right fuse.

Most fuses are 3 A or 13 A.

To choose the right fuse
you must know the
power of the appliance.



Power is marked on the information plate.

<p>Power over 700 W use a 13 A fuse.</p> <ul style="list-style-type: none">• Fan heaters• Kettles• Dishwashers• Washing machines	<p>Power under 700 W use a 3 A fuse.</p> <ul style="list-style-type: none">• Radios• Table lamps• Portable TVs• Electric blankets
---	--

- (i) Complete the table to show which size fuse, 3 A or 13 A, should be fitted to each of the appliances.

Appliance	Power rating	Fuse
Hairdryer	1600 W	
Electric saw	350 W	
Food mixer	1200 W	

(2)

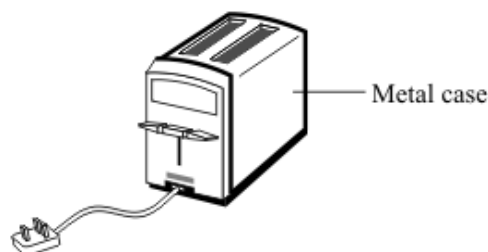
- (ii) The plug of an electric kettle has been wrongly fitted with a 3 A fuse.

What will happen to the fuse when the kettle is switched on?

.....

(1)

- (b) The drawing shows a toaster, which takes a current of 4 A from the 230 V mains electricity supply.



- (i) Use the equation in the box to calculate the power of the toaster.

Power (watt, W)	=	current (ampere, A)	×	potential difference (volt, V)
--------------------	---	------------------------	---	--------------------------------------

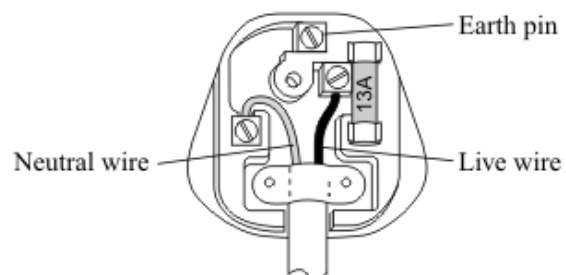
Show clearly how you work out your answer.

.....

Power = W

(2)

- (ii) A householder rewires the toaster with a new cable and plug. The diagram shows how the new cable has been connected to the plug.



Explain why the toaster may **not** be safe to use.

.....

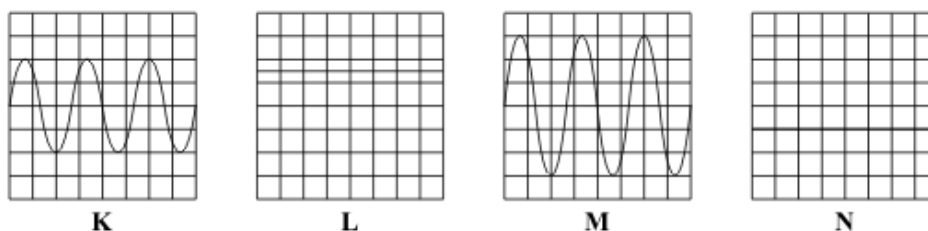
.....

.....

.....

(2)

- (c) The diagram shows the oscilloscope traces produced by four different electricity supplies. The settings on the oscilloscope are the same for each electricity supply.



- (i) Which **two** supplies give a direct current (d.c.)?

..... and

(1)

- (ii) Supply **K** provides a peak potential difference of 6 V.

What is the peak potential difference provided by supply **M**?

.....

(1)

(Total 9 marks)

##

- (a) Use numbers given in the box to complete the following sentences.

12	50	110	230
----	----	-----	-----

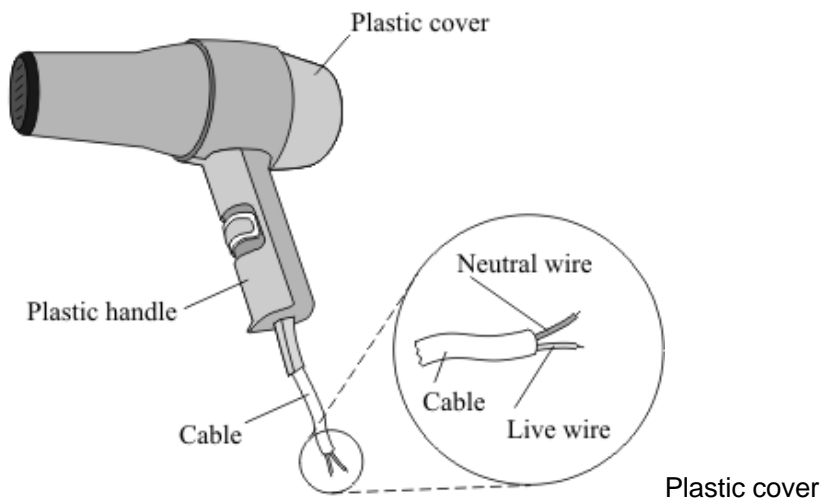
In the UK, the mains electricity supply is volts.

The frequency of the UK mains electricity supply is hertz.

(2)

- (b) The diagram shows a hairdryer designed to be used with the UK mains supply.

The cable connecting the hairdryer to the plug does not have an earth wire.



- (i) Why does the hairdryer **not** need a cable with an earth wire?

.....
.....

(1)

- (ii) Which **one** of the following materials are the two wires inside the cable made from?

Draw a ring around your answer.

aluminium

copper

steel


(1)

(Total 4 marks)

- Q9.** (a) Look at the electrical safety information poster.

**Get it right!
Choose the right fuse.**

Most fuses are 3A or 13A.
To choose the right fuse you must know the power of the appliance.



230 V 4A
920 W

Power is marked on the information plate.

<p>Power over 700 W use a 13A fuse.</p> <ul style="list-style-type: none"> Fan heaters Dishwashers Washing machines 	<p>Power under 700 W use a 3A fuse.</p> <ul style="list-style-type: none"> Radios Portable TVs Electric blankets
--	---

- (i) Complete the table to show which size fuse, 3 A or 13 A, should be fitted to each of the appliances.

Appliance	Power	Fuse
Kettle	2200 W	
Hair straighteners	75 W	
Coffee maker	1260 W	

(2)

- (ii) The plug of a washing machine has been wrongly fitted with a 3 A fuse.
Explain why the washing machine stops working shortly after it is switched on.

.....

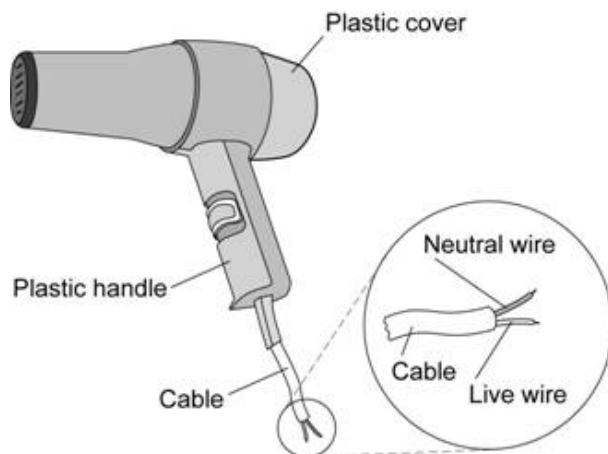
.....

.....

.....

(2)

- (b) The diagram shows a hairdryer. The cable connecting the hairdryer to the plug does not have an earth wire.



- (i) Why does the hairdryer **not** need a cable with an earth wire?

.....

.....

.....

(1)

- (ii) The hairdryer takes a current of 5 A from the 230 V mains electricity supply.

Calculate the power of the hairdryer.

Write down the equation you use, and then show clearly how you work out your answer.

.....

.....

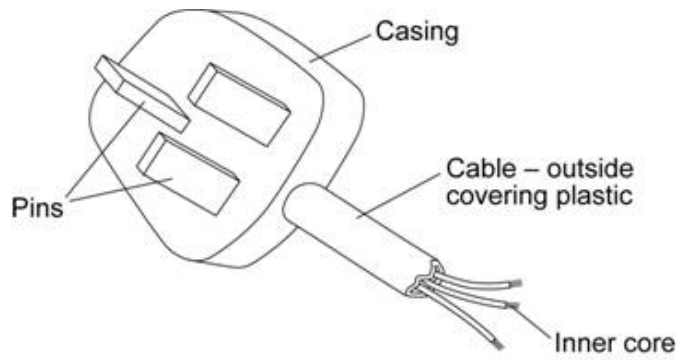
.....

Power = W

(2)

(Total 7 marks)

Q10. (a) The diagram shows a three-pin plug and electrical cable.



Name a suitable material to make:

the plug casing

the inner cores of the cable.

Give the reason for your choice of each material.

plug casing

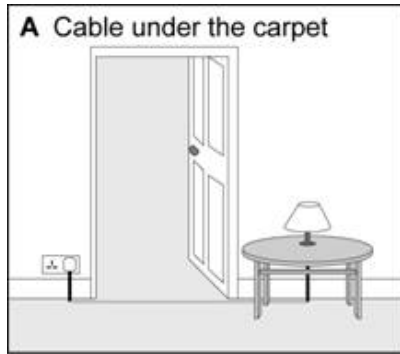
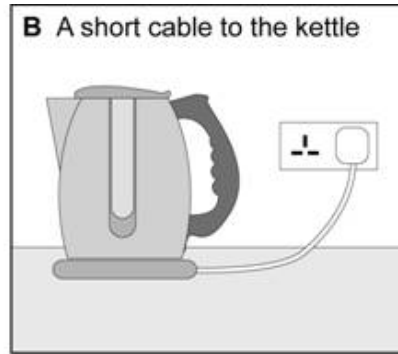
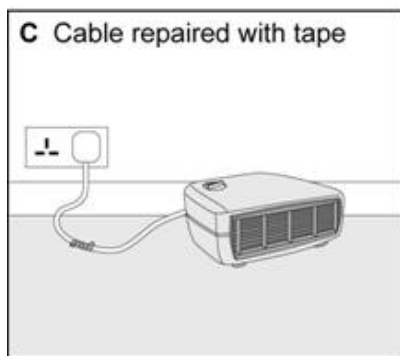
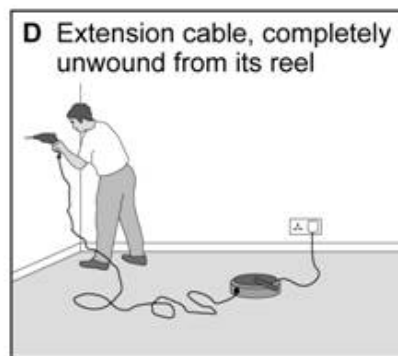
.....

inner core of the cable

.....

(4)

- (b) The pictures show mains electricity being used to operate various devices. Some of the pictures show the electricity being used in a dangerous way.

☐☐☐☐

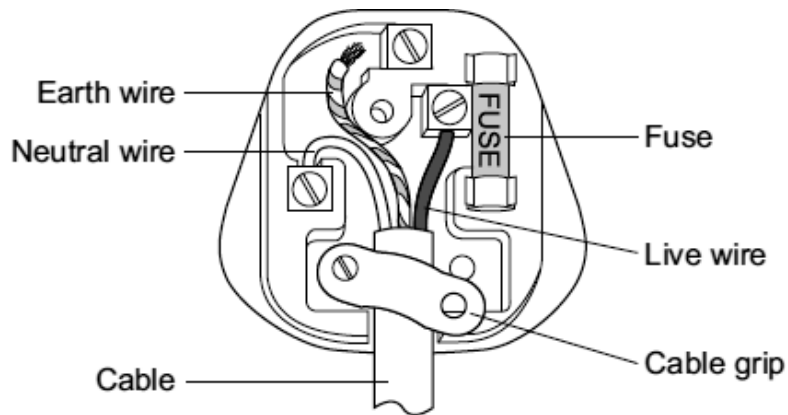
In the box underneath each picture put:

a tick (✓) if the electricity is being used safely

a cross (✗) if the electricity is being used dangerously.

(2)
(Total 6 marks)

- Q11.** (a) The diagram shows the inside of an incorrectly wired three-pin plug.



- (i) What **two** changes need to be made so that the plug is wired correctly?

1

.....

2

.....

(2)

- (ii) Which one of the wires inside a plug is there to make an appliance with a metal case safer to use?

.....

(1)

- (iii) The fuse inside a plug is a safety device.

Explain what happens when too much current passes through a fuse.

.....

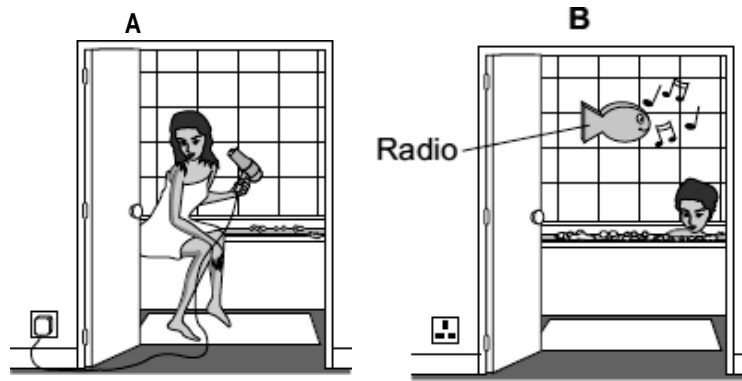
.....

.....

.....

(2)

- (b) Each of these pictures shows an electrical appliance being used in a bathroom.



Using the hairdryer in picture **A** is dangerous. However, it is safe to use the battery-operated radio in picture **B**.

Explain why.

.....

.....

.....

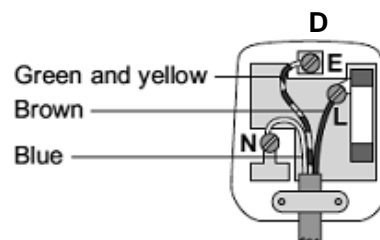
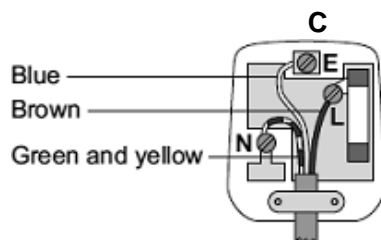
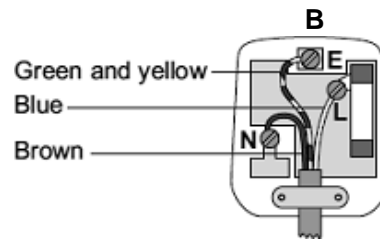
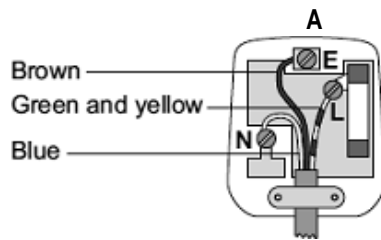
.....

(2)
(Total 7 marks)

Q12. The diagrams show the inside of a 13 amp plug.

- (a) (i) Which **one** of the plugs, **A**, **B**, **C** or **D**, is correctly wired?

Write your answer, **A**, **B**, **C** or **D**, in the box.



The plug that is correctly wired is

(1)

- (ii) What material is the outside casing of a plug made from?

.....

(1)

- (b) An electric drill draws a current of 2 amps from the 230 volt mains electricity supply.

Use the equation in the box to calculate the power of the drill.

$\text{power} = \text{current} \times \text{potential difference}$
--

Show clearly how you work out your answer.

.....

.....

Power watts

(2)

- (c) A householder needs to replace a damaged plug. Most replacement plugs are sold with a 13 amp fuse fitted inside. The householder thinks it would be better for shops to sell the plugs without a fuse. He could then buy either a 3 A, 5 A or 13 A fuse to fit inside the plug.

Explain an advantage of selling plugs without a fuse, rather than with a 13 amp fuse fitted.

.....

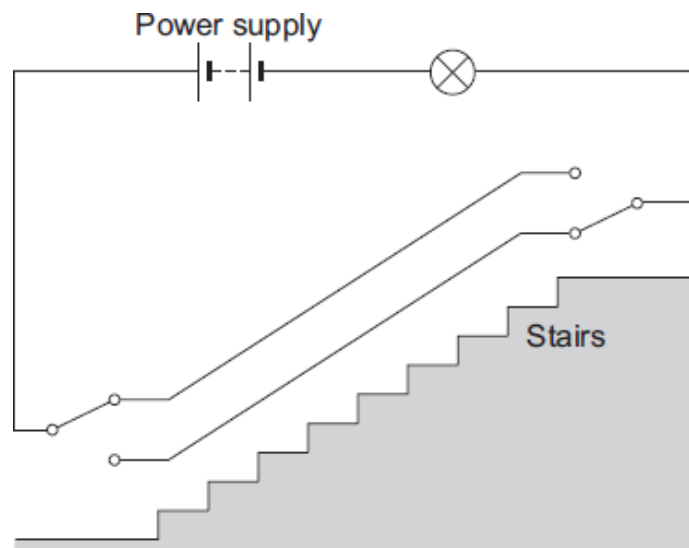
.....

.....

.....

(2)
(Total 6 marks)

- Q13.** The diagram shows an electric circuit used in a dolls' house. The switches are 2-way switches; this means that each switch has a connecting wire that can be in one of two positions.



- (a) (i) With the connecting wire in each switch in the position shown in the diagram, the lamp is off. Why?

.....

.....

(1)

- (ii) When switched on, the lamp has a resistance of $18\ \Omega$ and draws a current of $0.5\ \text{A}$ from the power supply.

Use the equation in the box to calculate the potential difference of the power supply used in the circuit.

potential difference = current \times resistance
--

Show clearly how you work out your answer.

.....
.....

Potential difference = V

(2)

- (iii) A second, identical lamp is added to the circuit. The two lamps are joined in series.

Calculate the total resistance of the two lamps.

.....

Total resistance = Ω

(1)

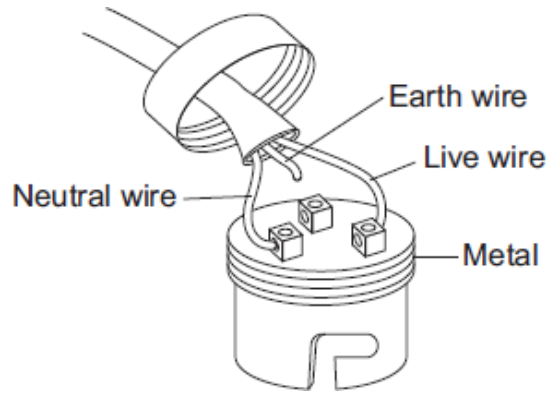
- (b) This type of circuit is also used in real houses. One of the switches is at the top of the stairs, and the other switch is at the bottom of the stairs.

What is the advantage of using this circuit to switch a lamp on or off, rather than using a more simple circuit that has only one switch?

.....
.....

(1)

- (c) The diagram shows an old type of metal lamp fitting.



The cable has been connected to the lamp fitting in a way that makes the lamp fitting unsafe.

- (i) What is the possible risk to someone touching the lamp fitting while the lamp is switched on?

.....
.....

(1)

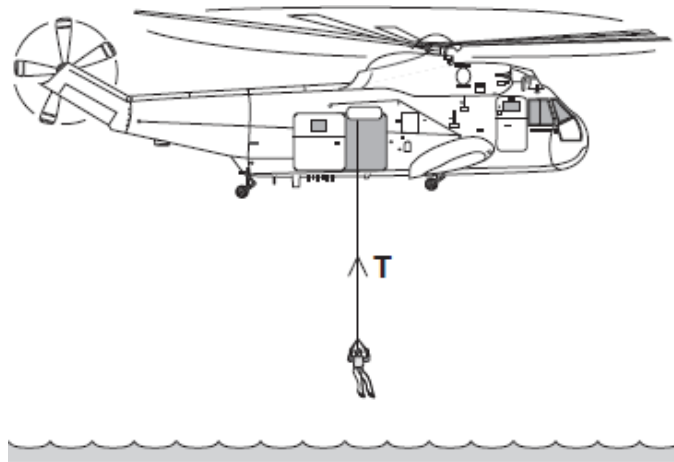
- (ii) What should be done to make **this** lamp fitting safe to use?

.....
.....

(1)

(Total 7 marks)

Q14. The diagram shows a helicopter being used to rescue a person from the sea.



- (a) (i) The mass of the rescued person is 72 kg.

Use the equation in the box to calculate the weight of the rescued person.

$\text{weight} = \text{mass} \times \text{gravitational field strength}$
--

gravitational field strength = 10 N/kg

Show clearly how you work out your answer.

.....

Weight = N

(2)

- (ii) An electric motor is used to lift the person up to the helicopter.
 The motor lifts the person at a constant speed.

State the size of the force, **T**, in the cable.

Force **T** = N

(1)

- (b) To lift the person up to the helicopter, the electric motor transformed 21 600 joules of energy usefully.

- (i) Use a form of energy from the box to complete the following sentence.

gravitational potential	heat	sound
-------------------------	------	-------

The electric motor transforms electrical energy to kinetic energy. The kinetic energy is then transformed into useful energy.

(1)

- (ii) It takes 50 seconds for the electric motor to lift the person up to the helicopter.

Use the equation in the box to calculate the power of the electric motor.

power	=	$\frac{\text{energy transformed}}{\text{time}}$
-------	---	---

Show clearly how you work out your answer and give the unit.

Choose the unit from the list below.

coulomb (C)

hertz (Hz)

watt (W)

.....

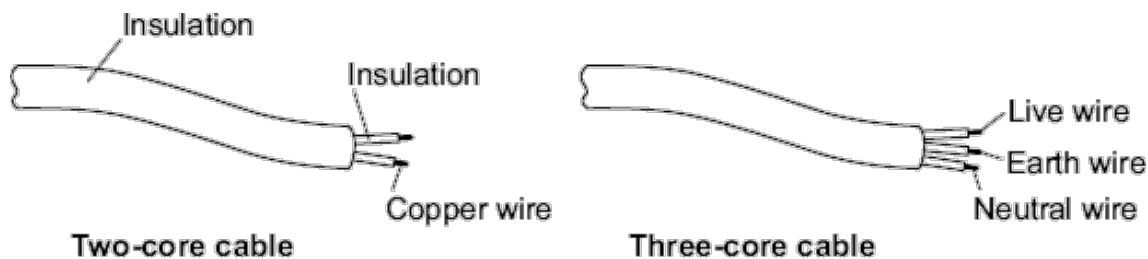
.....

Power =

(3)

(Total 7 marks)

- Q15.** (a) The diagram shows a piece of two-core cable and a piece of three-core cable.



- (i) Which **one** of the wires inside a three-core cable is missing from a two-core cable?

Draw a ring around your answer.

earth wire

live wire

neutral wire

(1)

- (ii) Use a word from the box to complete the following sentence.

double	extra	totally
---------------	--------------	----------------

A pottery table lamp fitted with a two-core cable is safe to use because it is

..... insulated.

(1)

- (b) The cables connecting the power sockets in a building contain wires 1.8 mm thick. The maximum current that can safely pass through these wires is 20 amps. A fuse is included in the circuit to protect the wiring.

Explain how a fuse protects the wiring of a circuit.

.....

.....

.....

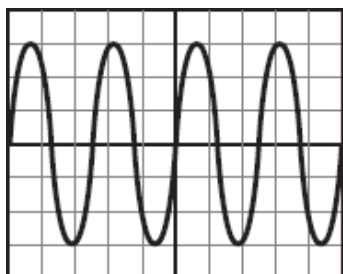
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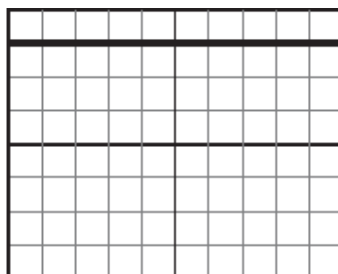
.....

(3)
(Total 5 marks)

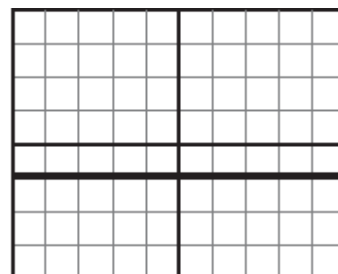
- Q16.** (a) The diagram shows the traces produced on an oscilloscope when it is connected across different electricity supplies.



A



B



C

Which of the traces could have been produced by the mains electricity supply?

.....

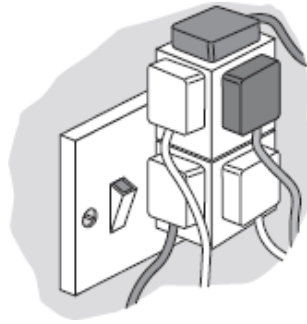
Give a reason for your answer.

.....

.....

(2)

- (b) The picture shows two adaptors being used to plug five electrical appliances into the same socket.



Explain why it is dangerous to have all five appliances switched on and working at the same time.

.....

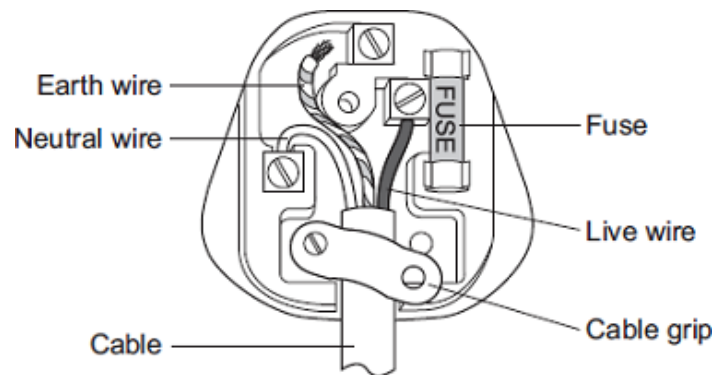
.....

.....

.....

(2)
(Total 4 marks)

- Q17.** (a) The diagram shows the inside of an incorrectly wired three-pin plug.



- (i) What **two** changes need to be made so that the plug is wired correctly?

1

.....

2

.....

(2)

- (ii) The fuse inside a plug is a safety device.

Explain what happens when too much current passes through a fuse.

.....

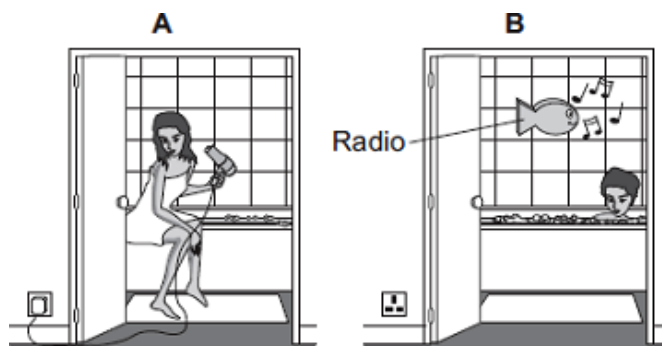
.....

.....

.....

(2)

- (b) Each of these pictures shows an electrical appliance being used in a bathroom.



Using the hairdryer in picture **A** is dangerous. However, it is safe to use the battery-operated radio in picture **B**.

Explain why.

.....

.....

.....

.....

(2)

(Total 6 marks)

- Q18.** (a) The diagram shows the information plate on an electric kettle. The kettle is plugged into the a.c. mains electricity supply.

230 V	2760 W
50 Hz	

Use the information from the plate to answer the following questions.

- (i) What is the frequency of the a.c. mains electricity supply?

.....

(1)

(ii) What is the power of the electric kettle?

.....

(1)

- (b) To boil the water in the kettle, 2400 coulombs of charge pass through the heating element in 200 seconds.

Calculate the current flowing through the heating element and give the unit.

Use the correct equation from the Physics Equations Sheet.

Choose the unit from the list below.

amps

volts

watts

.....

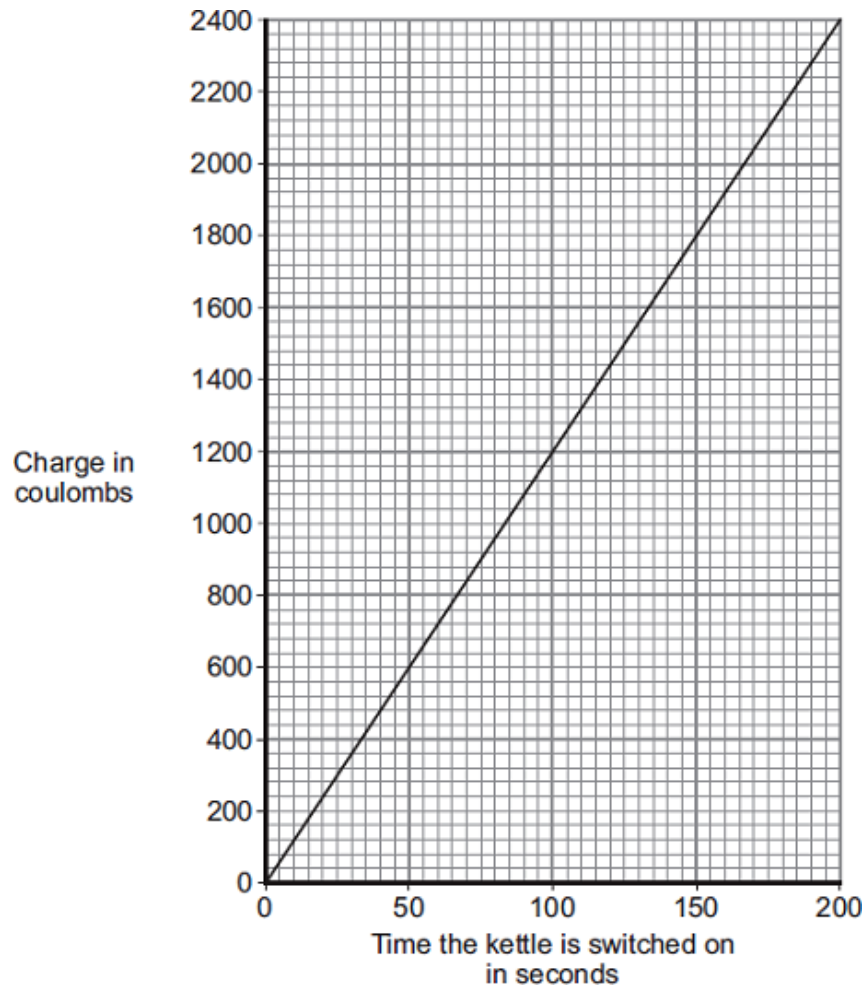
.....

.....

Current =

(3)

- (c) The amount of charge passing through the heating element of an electric kettle depends on the time the kettle is switched on.

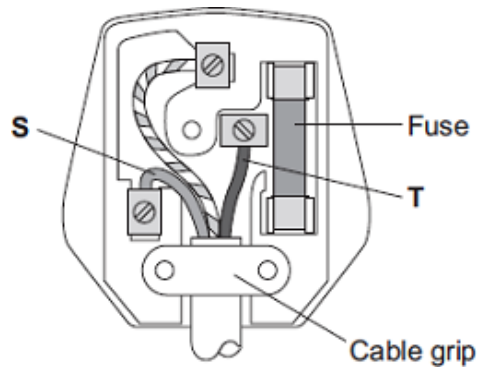


What pattern links the amount of charge passing through the heating element and the time the kettle is switched on?

.....
.....

(2)
(Total 7 marks)

- Q19.** (a) The diagram shows the inside of a three-pin plug.



- (i) What name is given to the wire labelled **S**?

Draw a ring around the correct answer.

earth

live

neutral

(1)

- (ii) What is the colour of the insulation around the wire labelled **T**?

Draw a ring around the correct answer.

blue

brown

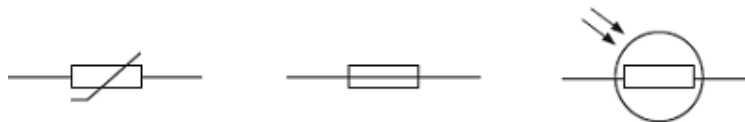
green and yellow

(1)

- (b) The plug contains a 13 amp fuse.

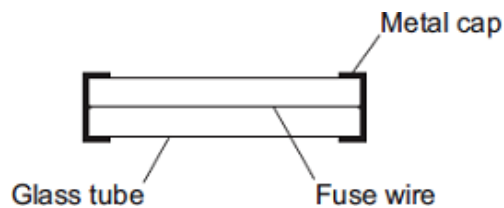
- (i) Which **one** of the following is the correct circuit symbol for a fuse?

Draw a ring around the correct answer.



(1)

- (ii) The diagram shows the parts of the fuse.



What would happen if a current of 20 amps passed through the 13 amp fuse?

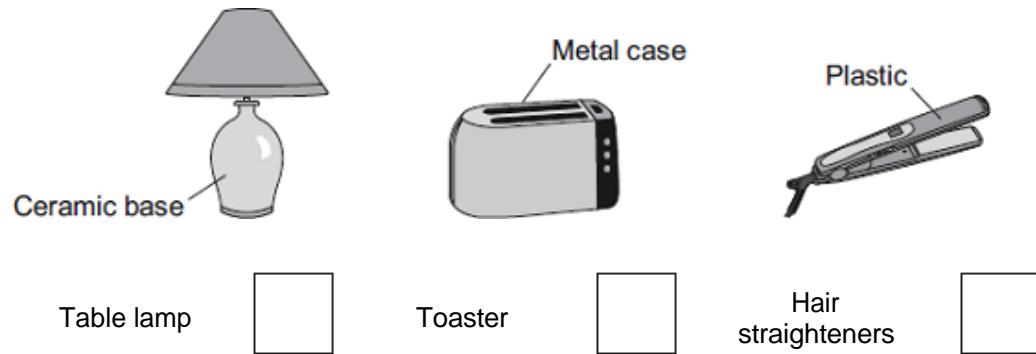
.....

(1)

(c) Not all electrical appliances are earthed.

(i) Which **one** of the following appliances must be earthed?

Tick (✓) **one** box.



Give a reason for your answer.

.....
.....

(2)

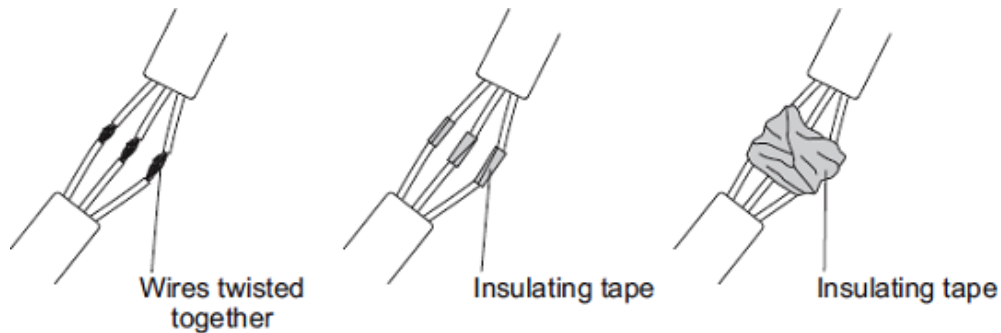
(ii) Earthing an appliance helps to protect a person against a possible risk.

What is the risk?

.....

(1)

(d) The diagrams show how two lengths of mains electrical cable were joined. The individual wires have been twisted together and covered with insulating tape. This is not a safe way to join the cables.

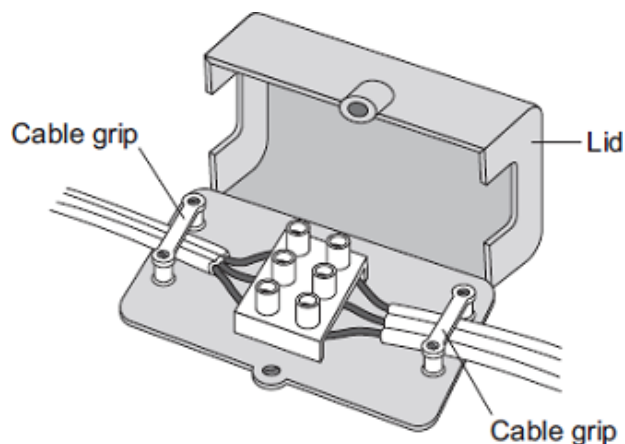


What is the possible risk from joining the two lengths of mains electrical cable in this way?

.....
.....

(1)

- (e) The diagram below shows a connecting box being used to join two lengths of electrical cable. This is a safe way to join the cables.



The cable grips are important parts of the connecting box.

Explain why.

.....

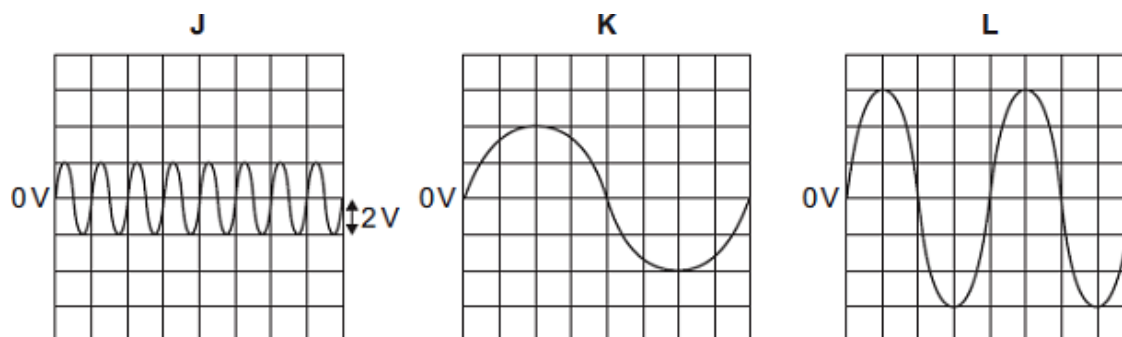
.....

.....

.....

(2)
(Total 10 marks)

- Q20.** The diagrams show oscilloscope traces. Three different alternating current (a.c.) electricity supplies, **J**, **K** and **L**, produce these traces.



In each diagram, one vertical division on the oscilloscope screen represents 2 volts.

- (a) Which **one** of the electricity supplies, **J**, **K** or **L**, has the largest peak potential difference?

Write your answer, **J**, **K** or **L**, in the box.

(1)

- (b) Calculate the value of the largest peak potential difference.

.....

Largest peak potential difference = V

(1)

- (c) The oscilloscope is now connected across a 3 V battery. The battery supplies direct current (d.c.). The settings on the oscilloscope are **not** changed.

On the diagram below draw the trace you would see on the oscilloscope screen.



(2)

(Total 4 marks)

