

Standard Grade Science

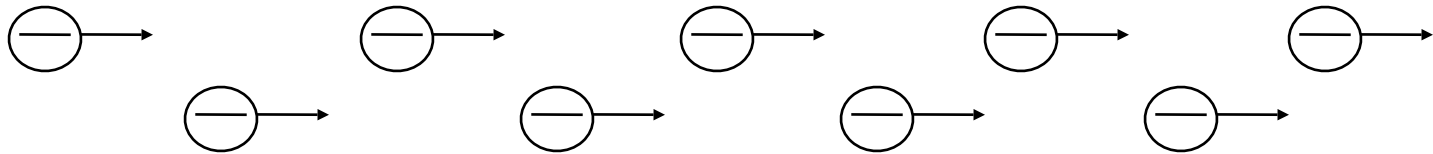
Electrical Safety in the Home

From this lesson you will learn:

- The effects of electric shocks.
- How a plug should be wired correctly.
- How a plug works.
- How electrical safety devices work.
- The various faults that can develop.

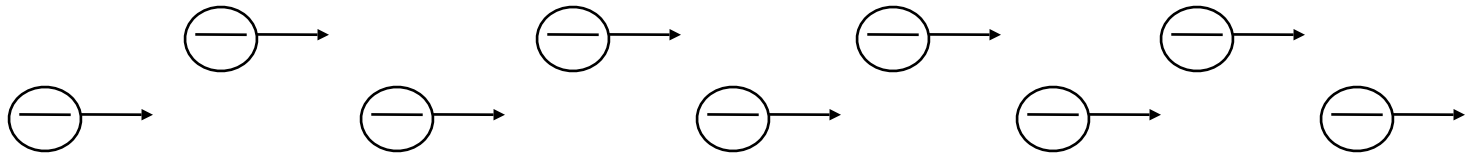
Electricity

Electricity is a flow of electric charges along a wire.



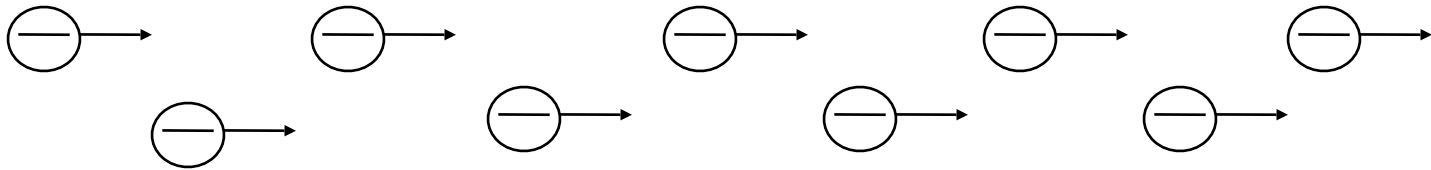
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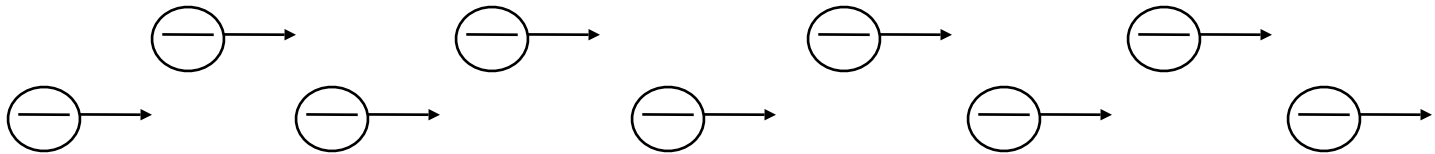
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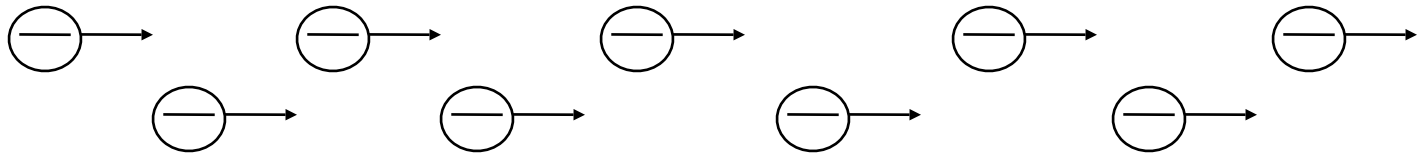
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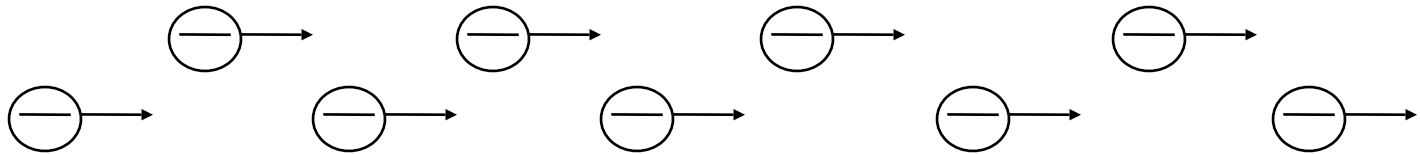
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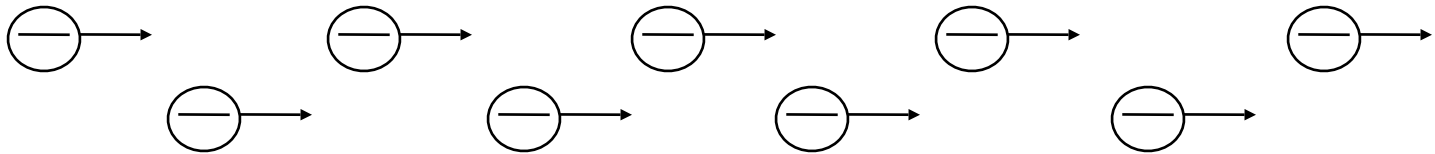
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Electricity is a flow of electric charges along a wire.



Electricity

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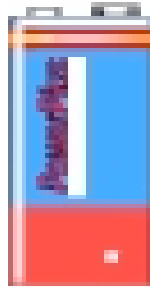


This flow of electric charge is called a current.

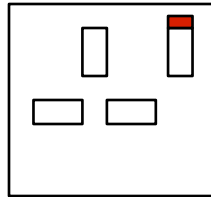
Electricity

Electricity can be supplied from either:

- A battery.

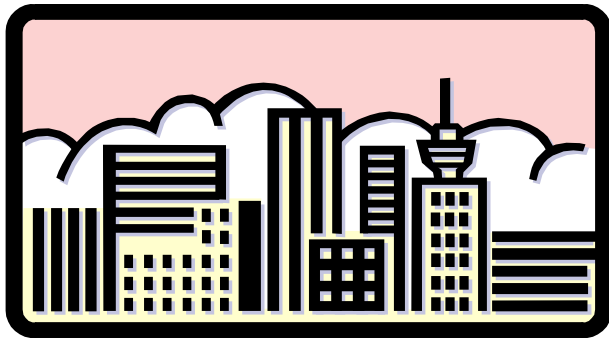


- The mains supply.



Electricity

Wires carry electricity from power stations to our homes/schools/offices.



The main advantage of electrical energy is that it can be transported over large distances to our homes.

Electricity Check Test

Copy and complete the following notes filling in the blanks using words from the word bank.

Electricity

distances	battery	charges	mains	current	large
	electric	mains	transported	supply	

Electricity is a flow of _____ along a wire which is also called a _____.

Electricity can be supplied from either a _____ or from the _____.

The main advantage of electrical energy is that it can be _____ over _____.

Electricity Check Test Answers

Electricity is a flow of electric charges along a wire which is also called a current.

Electricity can be supplied from either a battery or from the mains supply.

The main advantage of electrical energy is that it can be transported over large distances.

Electric Shocks

Electricity is dangerous and can kill!!

An electric shock can:

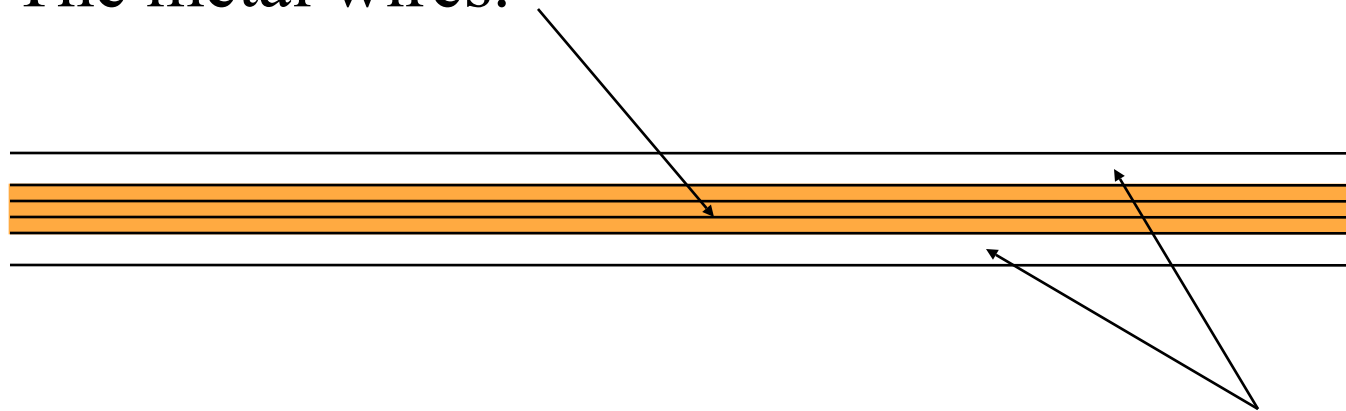
- Affect your muscles.
- Affect your nerves.
- Paralyse you.
- Stop your heart beating.

You can get an electric shock from anything which is plugged in or connected to the mains supply.

Electrical Safety

The wires which carry electricity consist of two parts:

- The metal wires.



- The plastic coating round the metal wires.

Electrical Safety

The metal wires act as a conductor of electricity.

Conductors are materials which allow electricity to pass through them easily.

The plastic coating acts as an insulator which prevents people from being electrocuted.

Insulators are materials which do not allow electricity to pass through them easily.

Electrical Safety Check Test

The following questions test your understanding of electrical safety so far.

Answer ALL questions in sentences!!

Electrical Safety Check Test

Name three things that an electric shock can do to you?

A wire consists of two parts. Name them and state whether they are a conductor or an insulator of electricity.

Electrical Safety Check Test Answers

Name three things that an electric shock can do to you?

1. Affect your muscles.
2. Affect your nerves.
3. Paralyse you.
4. Stop your heart beating.

A wire consists of two parts. Name them and state whether they are a conductor or an insulator of electricity.

1. The metal wire – conductor.
2. The plastic coating around the metal wire – insulator.

The Plug

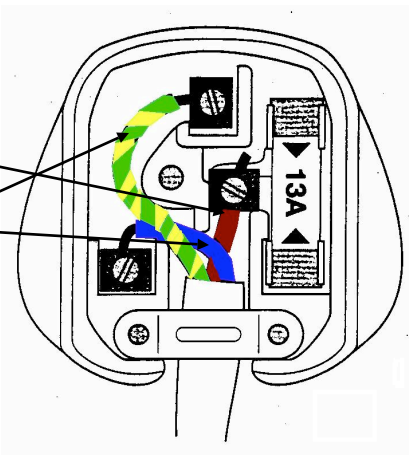
Electrical cables allow you to:

- Plug appliances into the mains supply.
- Draw electricity from the mains supply.

The Plug

Most electric cables normally contain three wires:

- The live wire.
- The neutral wire.
- The earth wire.



Each of these three wire have different colours of insulation.

The Plug

You have to remember the names and colours of each of these three wires. You also have to remember the position of each of these three wires in a standard plug.

Wire	Insulation Colour	Location
LIVE	BRown	BR – bottom right
NEUTRAL	BLue	BL – bottom left
EARTH	Green/Yellow	Centre

Electrical Safety

It is very important that all plugs are wired correctly.

If they are not, then a number of things can go wrong!!!

The Plug Check Test

The following questions test your understanding of the plug so far.

Answer ALL questions in sentences!!

The Plug Check Test

1. What two things do electric cables allow you to do?
2. How many wires do most electric cables normally have?
3. Copy and complete the following table:

Wire	Insulation Colour	Location

4. Why do all of the three wires have different colours of insulation?

The Plug Check Test Answers

1. What two things do electric cables allow you to do?
 - Plug appliances into the mains supply.
 - Draw electricity from the mains supply.
2. How many wires do most electric cables normally have?

Three.

The Plug Check Test Answers

3. Copy and complete the following table:

Wire	Insulation Colour	Location
LIVE	BRown	BR – bottom right
NEUTRAL	BLue	BL – bottom left
EARTH	Green/Yellow	Centre

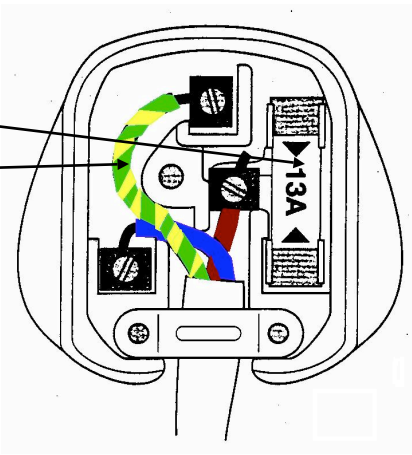
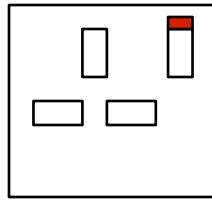
4. Why do all of the three wires have different colours of insulation?

So you can clearly tell which one is which.

Electrical Safety

Appliances have three safety devices:

- The fuse.
- The earth wire.
- The switch.



These devices are designed to stop you from being electrocuted and to prevent the appliance from being damaged.

The Fuse

A fuse is a thin piece of wire which will melt when too much current passes through it.

Current is a flow of electricity and is measured in amps (A).

Example



A 3A fuse will melt when the current is greater than 3A.

When a fuse has blown, the wire inside it has melted.

The Fuse

When the wire melts, all current is stopped from reaching the appliance and switches it off.

The fuse stops a large current from flowing through the appliance which could cause wires to overheat, melt or catch fire.

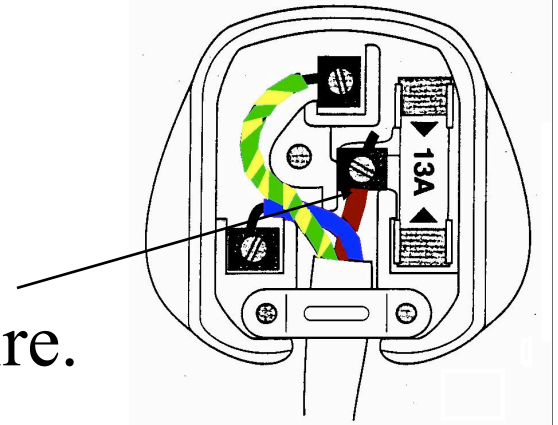
The Switch

Together, the fuse and switch control the amount of electricity that enters an appliance.

The fuse and the switch are connected to the live wire.

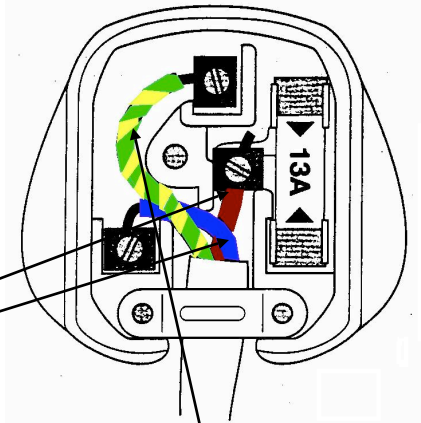
Electricity comes in through the live wire.

If the fuse is blown, or the switch is off, then the electricity cannot reach the appliance.



The Earth Wire

Plugs have 3 pins on them.



The live and neutral pins allow electricity to pass through the appliance and cause it to work.

The earth wire does nothing unless something goes wrong.

What can go wrong!

The most dangerous thing that can happen is that the live wire can become loose inside an appliance and touches the casing.

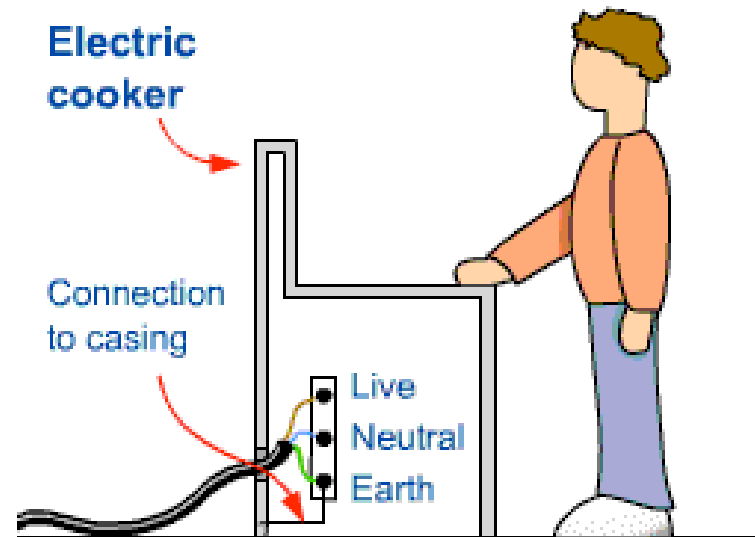
This makes the casing LIVE!

If you touch the LIVE casing, you could be electrocuted as you are providing a path for the electricity to flow.

Prevention

To prevent electrocution, the earth wire is connected to the casing of the appliance.

If the live wire touches the casing, the earth wire provides a path for the electricity to flow.



This blows the fuse and switches the appliance off, leaving you safe.

Fault Spotting

Fault	What could happen!
bare wires showing	Danger of electrocution.
live and neutral wires reversed	The appliance will still work but when it is switched off it can still electrocute you.
wrong fuse used	The fuse will not blow when it should and there is a danger of overheating and/or fire.

Electrical Safety Check Test

1. Name three safety devices that appliances have.
2. Copy and complete the following notes filling in the blanks using words from the word bank.

electrocuted	damaged	devices
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These _____ are designed to stop you from being
_____ and to prevent the appliance from
being _____.

Electrical Safety Check Test

3. Copy and complete the following notes filling in the blanks using words from the word bank.

current amps melt fuse wire current electricity

A _____ is a thin piece of _____ which will _____ when too much _____ passes through it.

_____ is a flow of _____ and is measured in _____ (A).

Electrical Safety Check Test

4. What 2 safety devices control the amount of electricity that enters an appliance?
5. Which wire are these 2 safety devices connected to ?
6. Which wire allows electricity to enter an appliance?

Electrical Safety Check Test

7. Copy and complete the following notes filling in the blanks using words from the word bank.

switched fuse live blown prevent
connected switch fuse live wire

The _____ and _____ must be _____ to the
_____ wire to _____ the _____ from remaining
_____ when the _____ is _____ or the appliance is
_____ off.

Electrical Safety Check Test

8. Describe the most dangerous thing that can happen to an appliance.
9. What happens to you if you touch the casing of an appliance which is live and why?
10. Describe how the earth wire acts as a safety device?

Electrical Safety Check Test

11. Copy and complete the following notes filling in the blanks using words from the word bank.

appliance	current	live	earth	loose
safety	casing	melt	path	current

The _____ wire is a _____ device which is connected to the _____ of appliances. The earth wire provides a _____ for the electrical _____ to flow if the live wire becomes _____ and touches the casing making it _____. The large _____ which flows through the earth wire will _____ the fuse switching the _____ off.

Electrical Safety Check Test Answers

1. Name three safety devices that appliances have.

- The fuse.
- The switch.
- The earth wire.

2. These devices are designed to stop you from being electrocuted and to prevent the appliance from being damaged.

Electrical Safety Check Test Answers

3. A fuse is a thin piece of wire which will melt when too much current passes through it.

Current is a flow of electricity and is measured in amps (A).

4. What 2 safety devices control the amount of electricity that enters an appliance?

- The fuse.
- The switch.

Electrical Safety Check Test Answers

5. Which wire are these 2 safety devices connected to ?

The live wire.

6. Which wire allows electricity to enter an appliance?

The live wire.

Electrical Safety Check Test

7. The fuse and switch must be connected to the live wire to prevent the appliance from remaining live when the fuse is blown or the appliance is switched off.

8. Describe the most dangerous thing that can happen to an appliance.

The most dangerous thing that can happen is that the live wire can become loose inside an appliance and touches the casing.

Electrical Safety Check Test Answers

9. What happens to you if you touch the casing of an appliance which is live and why?

If you touch the LIVE casing, you could be electrocuted as you are providing a path for the electricity to flow.

10. Describe how the earth wire acts as a safety device?

The earth wire is connected to the casing of the appliance. If the live wire touches the casing, the earth wire provides a path for the electricity to flow. This blows the fuse and switches the appliance off, leaving you safe.

Electrical Safety Check Test Answers

11. The earth wire is a safety device which is connected to the casing of appliances. The earth wire provides a path for the electrical current to flow if the live wire becomes loose and touches the casing making it live. The large current which flows through the earth wire will melt the fuse switching the appliance off.