W.S.20. Drugs and health.

Name .....

Drugs affect the way the body works. Some drugs are used by doctors to treat sick people. These can be very useful but they must be taken in the correct amounts. It is illegal (against the law) to take certain drugs because they are so dangerous to health. Even legal drugs such as alcohol can be very harmful if too much is taken. Some drugs are ADDICTIVE. This means that a person can become dependent on them and if they do not have the drug they may develop WITHDRAWAL SYMPTOMS such as shaking and sickness. The table below gives information about the effects of various drugs on health.

Type of drug	How it affects the body
Alcohol	Alcohol slows down the speed at which the brain and nervous system works. A little alcohol makes people feel happy and relaxed. More alcohol makes a person feel dizzy and affects their judgement. Large amounts may make a person unconscious and they may even die. An alcoholic is a person who is addicted to alcohol. Heavy drinking over several years causes damage to the brain, liver, and heart.
Tobacco	Tobacco smoke is very poisonous. A person can become addicted to smoking because of a chemical called nicotine in the smoke. Smoking causes cancers, heart disease, bronchitis, and damaged lungs. Smoking also makes a person short of breath and more tense.
Cannabis	Cannabis or 'pot' causes hallucinations. This is when a person thinks that they are seeing or hearing something that does not exist. They can then become confused and do dangerous things and may have a fatal accident.
Solvents	Some people like to breathe in the fumes from substances such as glue and paint (glue sniffing). This makes them feel dizzy and they may have hallucinations. The fumes get into the blood and damage the heart. Many people have died as a result of breathing in solvents.

Exercise – Fill in the missing words in the passage below.

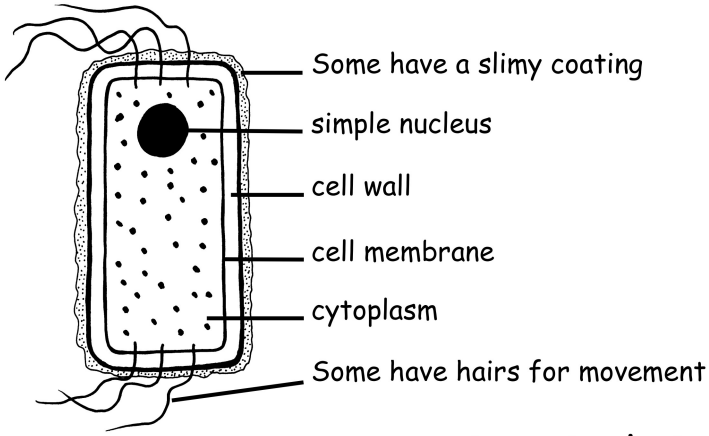
An ..... is a person who has become dependent on a certain drug. It is very dangerous to drink alcohol and then drive because the ..... are slowed down. An ..... is a person who is addicted to alcohol. They may damage their brain, ... and heart. People who smoke are usually more tense and ..... as a result of the nicotine in their blood. The risk of developing ..... cancer is much greater in smokers. Drugs such as cannabis make a person ..... This can make them behave ..... The fumes from ..... may damage the heart and even cause death.

hallucinate addict reactions liver lung nervous dangerously solvents alcoholic

W.S.21. **Germs and health.** Name ……

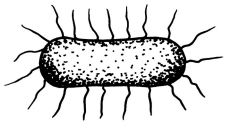
Germs are MICROBES that can live inside our bodies. The two main types of germ are BACTERIA and VIRUSES. Only some types of bacteria are germs. They cause us harm by attacking our cells or by producing waste poisonous chemicals. Viruses are much smaller than bacteria and they can only exist inside living cells. A virus injects its DNA (instructions) into a cell. The virus DNA tells the cell to make more viruses. The cell then bursts open to release the new viruses.

A typical bacterium



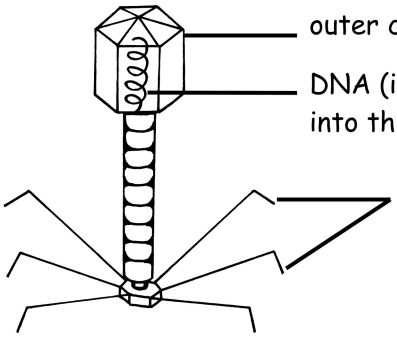
Types of bacteria

COCCI (round)
e.g. cause sore throat.



BACILLI (rod)
e.g. cause typhoid.

A typical virus



Exercise - Complete the sentences below.

1) Germs are microbes that live _ _ _ _ _ _ our bodies.

2) Bacteria and viruses are too _ _ _ _ _ to see.

3) Bacteria may cause disease by attacking body _ _ _ _ _

4) Bacteria may produce _ _ _ _ _ _ _ _ _ waste chemicals.

5) _ _ _ _ _ _ _ are much smaller than bacteria.

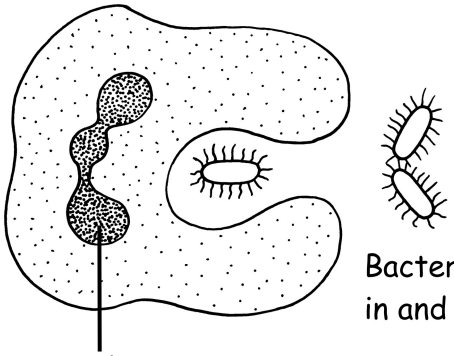
6) Viruses can only live and multiply inside _ _ _ _ _ _ cells.

7) A virus injects its _ _ _ into the cell it is attacking.

W.S.22. **Fighting germs.** Name .....

There are huge numbers of microbes in the air, soil and water. Some of these are germs. Therefore our bodies need a defence system. The skin helps to stop germs entering the body. The breathing system is lined with a sticky liquid called mucus which traps the dirt and germs that we breathe in. Tiny hairs called CILIA gradually waft the dirty mucus up to the throat where it is swallowed. The germs are then killed by hydrochloric acid in the stomach. Germs sometimes get into the bloodstream through wounds. If this happens white blood cells attack them. The diagrams below show how they do this.

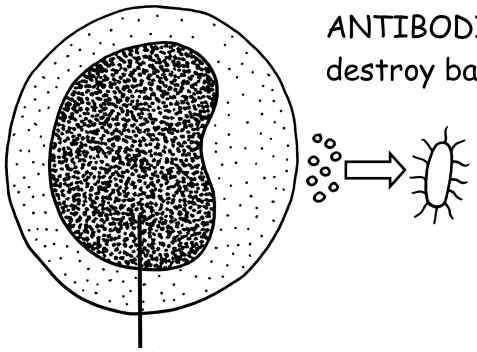
Phagocyte



Bacteria are taken in and digested.

Lymphocyte

The lymphocte sends out chemicals called ANTIBODIES to destroy bacteria.



Exercise - Complete the missing words in the passage below.

Most microbes are ..... but some are germs that can live inside our bodies. The body needs to ..... itself from invading germs. The ..... forms a barrier that stops germs getting into the body. Any germs that are ..... in are trapped by sticky mucus in the nose, ... and lungs. Eventually dirty mucus is ..... and the hydrochloric acid inside the ..... destroys the germs. The two types of white blood cell that kill germs are ..... and lymphocytes. Phagocytes ..... germs and lymphocytes make .....

A ..... contains dead or harmless germs. It allows antibodies to build up in the body. ..... are chemicals that can also be used to help us fight germs.

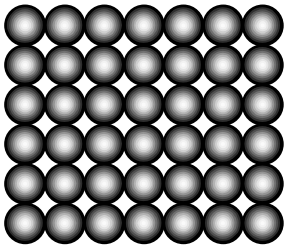
defend phagocytes medicines harmless skin antibodies eat breathed trachea vaccine stomach swallowed

W.S.38. **Solids, liquids and gases.** Name ……

Everything is made up of particles that are too small to see. The three states of matter are SOLID, LIQUID and GAS. They all have different properties due to the arrangement and movement of their particles.

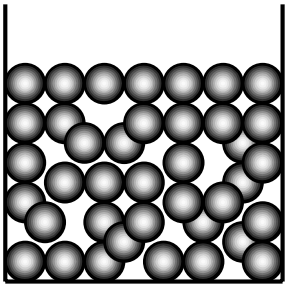
Solids.

The particles are held tightly together by strong forces. They make small vibrations but they stay in place. This gives solids a definite shape and volume. Solids are DENSE (heavy) and they can not be compressed (squashed) easily because the particles are already packed closely together.



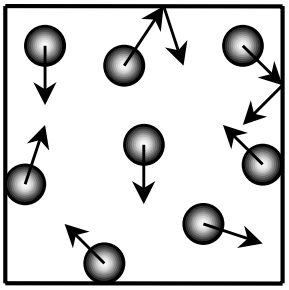
Liquids.

A liquid can flow because the particles can move past each other. The particles are still held closely together by strong forces. Liquids are DENSE and they can not be compressed easily. A liquid can change its shape but not its volume.



Gases.

There are only very weak forces between the particles which are far apart. The particles move around very quickly and bounce off each other. Gases have a low density (they are very light) and they do not have a definite shape or volume.

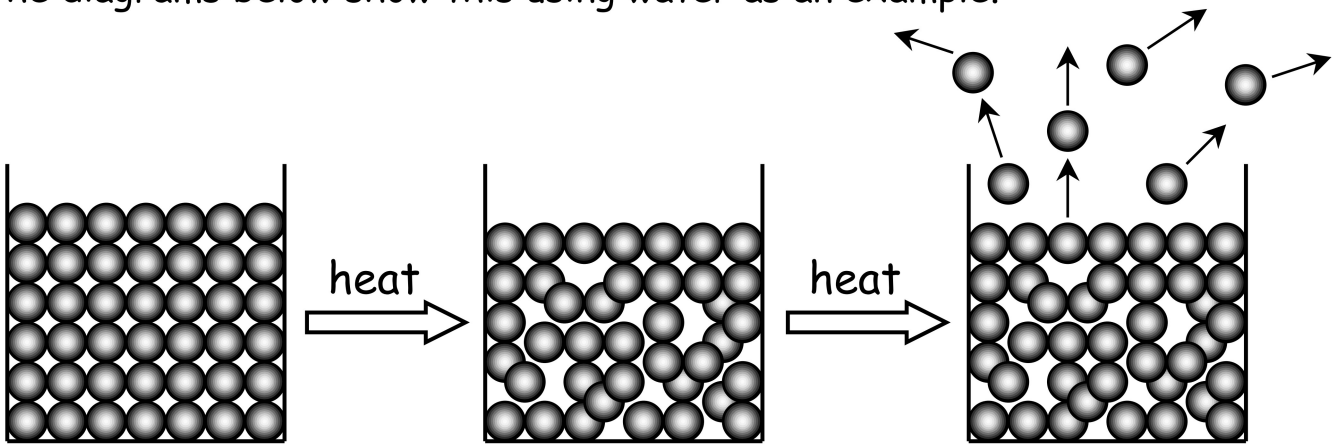


Exercise – Complete the spaces in the table below.

Property	Solids	Liquids	Gases
Density (heavy or light)	High density (heavy)		Low density (light)
How easy are they to compress (squash)?	Hard		Easy
Do they flow?		Yes	Yes
Do they keep the same shape?		No	
Do they keep the same volume?	Yes		

W.S.39. **Changes of state.** Name ……

When a solid is heated it changes into a liquid state and then a gas state. When a gas is cooled it changes back into a liquid and then into a solid. The diagrams below show this using water as an example.



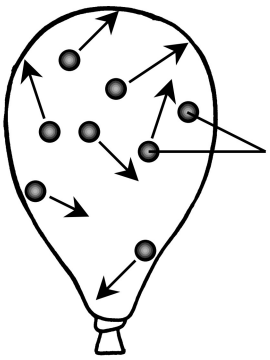
Solid – ice.
The particles are held firmly in place but they vibrate.

Liquid – water.
The particles gain more energy. The vibrations become stronger until they break apart.

Gas – steam.
The particles have gained enough energy to break free. They are moving very quickly.

Gas pressure and diffusion.

If a gas is squeezed into a small space e.g. when air is pumped into a balloon, the particles bump against the walls. This causes a PRESSURE.
A gas will DIFFUSE (spread out) until it fills up any area that it is contained in. The gas particles diffuse until they are EVENLY SPREAD OUT.



Air particles move around quickly and bump against the inside of the balloon.

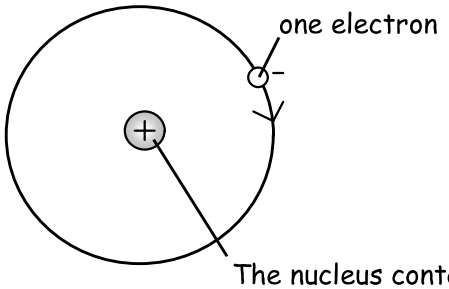
Exercise – Join up the words in the left-hand column with their meanings in the right-hand column.

DIFFUSION	A solid changing to a liquid.
ICE	The spreading out of particles.
MELTING	The solid state of water.
STATE OF MATTER	A solid, liquid or gas.
EVAPORATION	A gas changing to a liquid.
CONDENSING	A liquid changing to a gas.

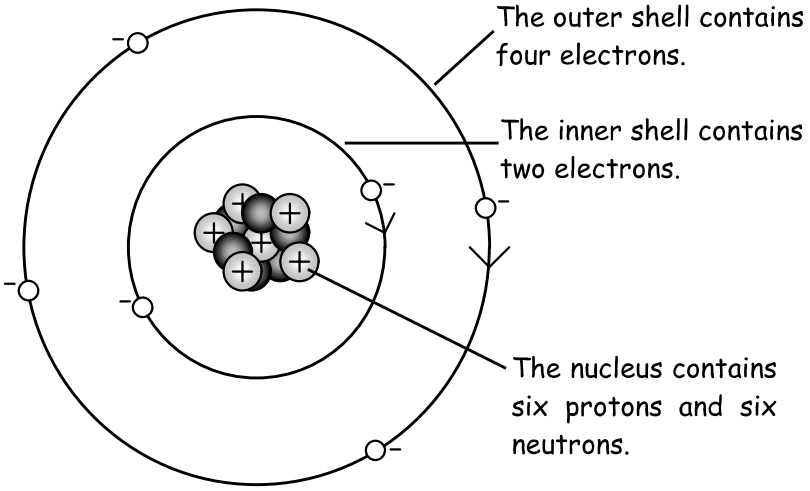
W.S.40. **Elements.** Name .....

An element is a pure substance that cannot be broken down into anything simpler. Everything on Earth is made from about one hundred different elements. An ATOM is the smallest particle of an element. They are much too small to be seen even with the most powerful microscope. Each element contains only one type of atom. Atoms have a NUCLEUS in the centre with ELECTRONS moving around it.

hydrogen atom



carbon atom



= positively charged proton

= neutron (no charge)

= negatively charged electron

Atoms always have the same number of electrons and protons so that their overall charge is neutral (no charge).

Different elements have different numbers of protons in their atoms. The ATOMIC NUMBER is the number of protons that an atom contains. The smallest atom is hydrogen with an atomic number of one. Lead is one of the largest atoms with an atomic number of eighty two.

Exercise - Complete the missing words in the sentences below.

1) An _ _ _ _ _ _ _ cannot be broken down into anything simpler.

2) The smallest particle of an element is called an _ _ _ _

3) The _ _ _ _ _ _ _ is in the centre of an atom.

4) Electrons have a _ _ _ _ _ _ _ _ _ charge.

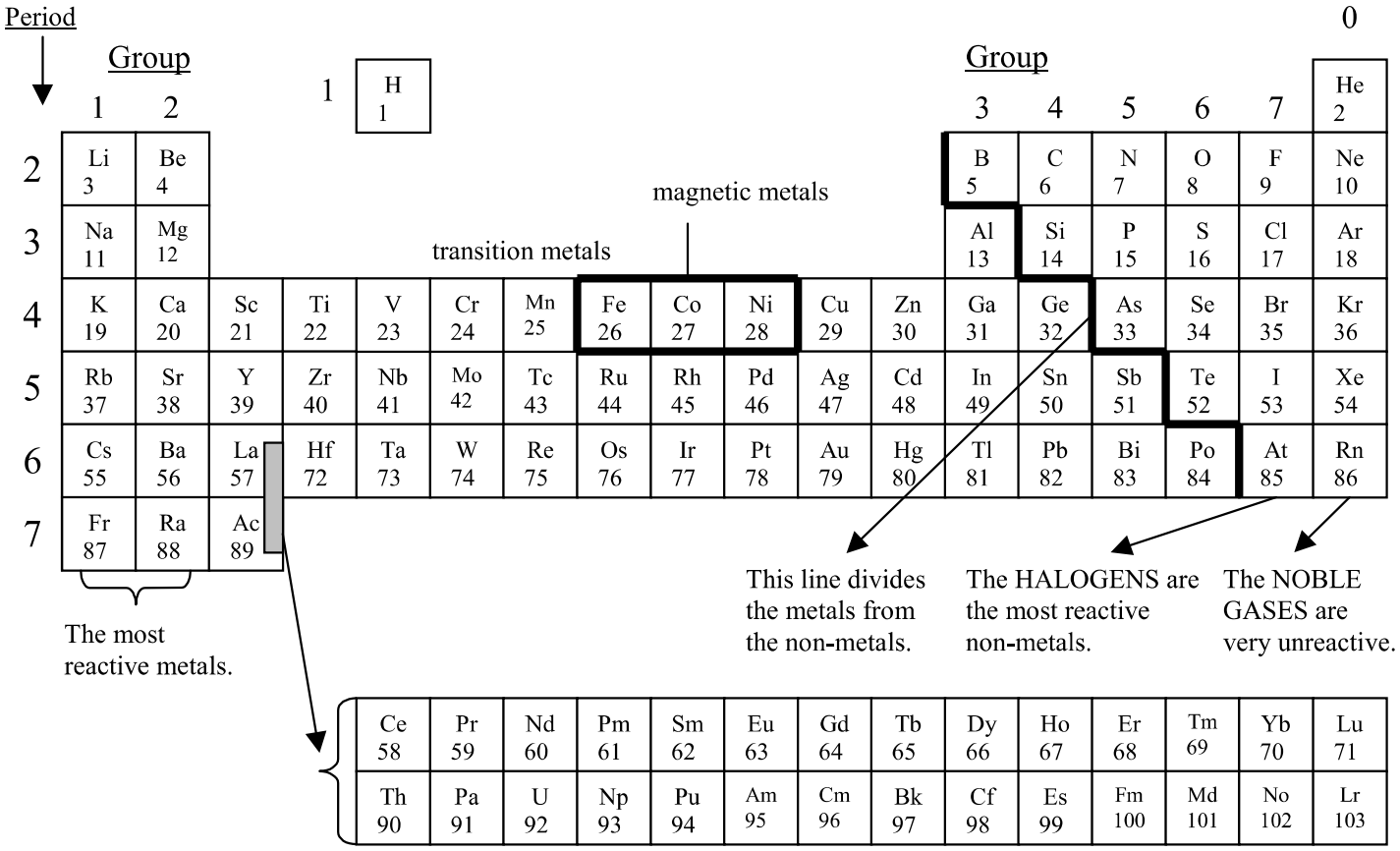
5) Protons have a _ _ _ _ _ _ _ _ _ charge.

6) The atomic number is the number of _ _ _ _ _ _ _ in an atom.

W.S.41. The periodic table.

Name ……

All of the elements have been arranged into the PERIODIC TABLE. This contains seven rows of elements called PERIODS. These are arranged so that each column contains elements with similar properties. The table shows the symbol and ATOMIC NUMBER (number of protons) for every element.



	1	2											3	4	5	6	7	0
1	H 1																	He 2
2	Li 3	Be 4											B 5	C 6	N 7	O 8	F 9	Ne 10
3	Na 11	Mg 12											Al 13	Si 14	P 15	S 16	Cl 17	Ar 18
4	K 19	Ca 20	Sc 21	Ti 22	V 23	Cr 24	Mn 25	Fe 26	Co 27	Ni 28	Cu 29	Zn 30	Ga 31	Ge 32	As 33	Se 34	Br 35	Kr 36
5	Rb 37	Sr 38	Y 39	Zr 40	Nb 41	Mo 42	Tc 43	Ru 44	Rh 45	Pd 46	Ag 47	Cd 48	In 49	Sn 50	Sb 51	Te 52	I 53	Xe 54
6	Cs 55	Ba 56	La 57	Hf 72	Ta 73	W 74	Re 75	Os 76	Ir 77	Pt 78	Au 79	Hg 80	Tl 81	Pb 82	Bi 83	Po 84	At 85	Rn 86
7	Fr 87	Ra 88	Ac 89															

Ce 58	Pr 59	Nd 60	Pm 61	Sm 62	Eu 63	Gd 64	Tb 65	Dy 66	Ho 67	Er 68	Tm 69	Yb 70	Lu 71
Th 90	Pa 91	U 92	Np 93	Pu 94	Am 95	Cm 96	Bk 97	Cf 98	Es 99	Fm 100	Md 101	No 102	Lr 103

Exercise - Complete the missing words in the passage below.

Each group in the periodic table contains elements that have similar …… The atomic number gives the number of …… that an element contains. The lightest element is …… (H) which has an atomic number of one. The atomic number of …… is eight. Sodium (Na) and potassium (K) are two very …… metals. Iron (Fe) and nickel (Ni) are two of the …… metals. The most reactive non-metals are called the …… The …… gases are very unreactive. Magnesium (Mg) and calcium (Ca) are both in group …… of the periodic table. Nitrogen (N) and phosphorus (P) are both in group …… of the periodic table.

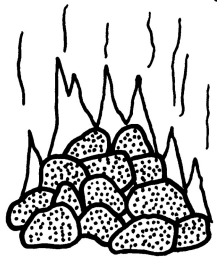
magnetic noble two hydrogen reactive five halogens properties oxygen protons

W.S.42. **Compounds.** Name .....

Elements join together by chemical reactions to form compounds. Compounds have different properties to the elements that formed them. In a chemical reaction new substances are formed and energy is taken in or given out. It is also difficult to make a reaction go backwards.

Exercise 1 - Fill in the missing words or symbols for the chemical reactions below.

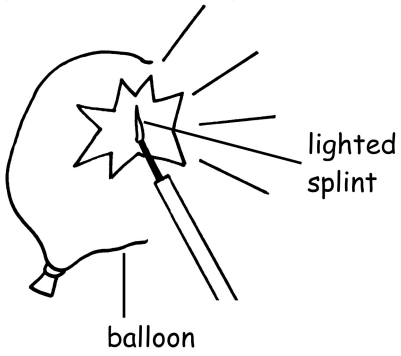
Coal burning



CARBON + OXYGEN ⇨ CARBON DIOXIDE + HEAT

..... + O_2 ⇨ CO_2 + HEAT

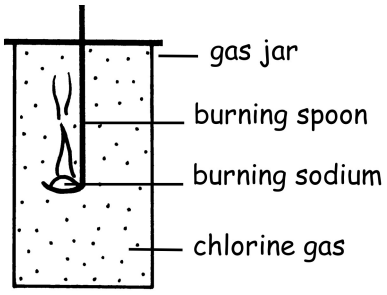
Hydrogen exploding



HYDROGEN + ... ⇨ WATER + HEAT

$2H_2$ + O_2 ⇨ $2H_2O$ + HEAT

Making salt



SODIUM + CHLORINE ⇨ SODIUM CHLORIDE (salt)

Na + Cl ⇨ .....

Exercise 2 - For each of the changes below write down if it is a physical or chemical change.

When a firework explodes it is a _____ change.

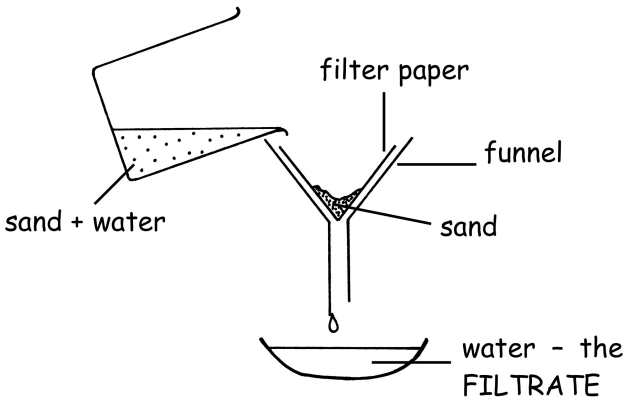
When salt dissolves in water it is a _____ change.

When a cake is baked in an oven it is a _____ change.

When ice melts it is a _____ change.

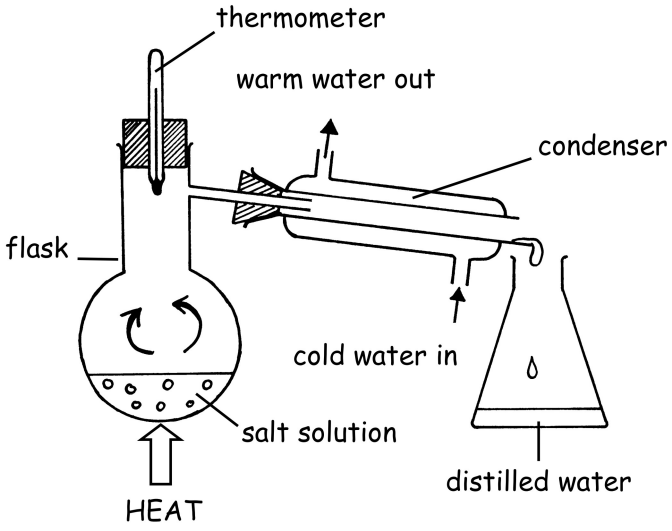
W.S.43. **Separating mixtures.** Name .....

A mixture contains a number of substances that are not chemically joined. The diagrams below show different ways of separating mixtures. Fill in the missing words in the paragraphs beside each method.



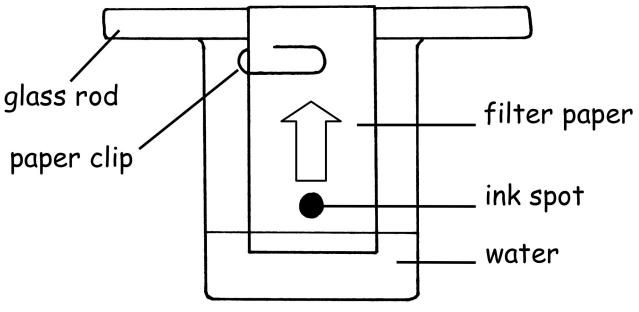
Filtration.

This method separates small, solid particles from liquids. In the diagram a mixture of sand and water is being filtered. The ..... passes through the filter paper and the ..... is held back. The sand particles are too big to pass through the pores in the .....



Distillation.

This method separates dissolved chemicals (SOLUTES) from the liquids that they are dissolved in (SOLVENTS). In the diagram salt solution is being separated into salt and ..... The water evaporates from the boiling solution and then condenses as it is ..... in the condenser. The salt is left behind in the .....



Chromatography.

In the diagram the colours in pen ink are being separated. As water rises up the ..... it takes the colours with it. Different colours travel at different ..... If the ink contains more than one colour they will separate out along the paper.

Exercise 2 - Join up each mixture below with the correct method for separating it.

muddy water	distillation
copper sulphate solution	filtration
peas and sand	magnetic attraction
iron filings and sawdust	sieving

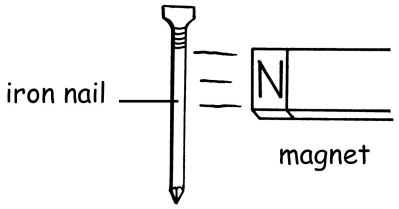
W.S.44. Metals and non-metals.

Name ……

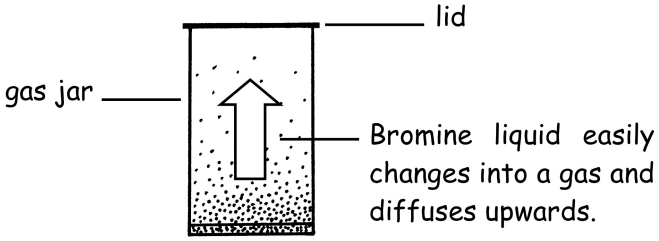
The elements can be divided into two main groups which are METALS and NON-METALS. The table below shows the properties of each group.

Metals	Non-metals
Most are shiny solids at room temperature although mercury is a liquid. They usually have high melting points.	They vary in their properties. They usually have low melting points and many are gases at room temperature.
Good conductors of heat.	Most are poor conductors of heat.
Good conductors of electricity.	Poor conductors of electricity except for graphite which is a form of carbon.
A few are magnetic (iron, cobalt and nickel).	None are magnetic.
They are often flexible (bendy) and can be hammered into shape.	They are often brittle (hard but break easily).

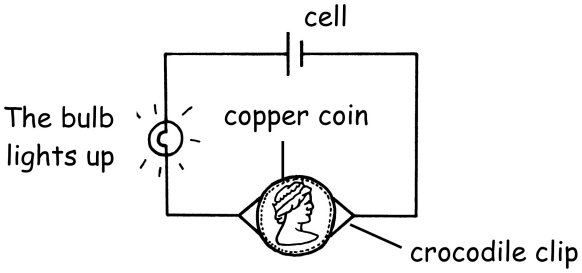
Exercise 1 - For each diagram below write down if the element is a metal or a non-metal.



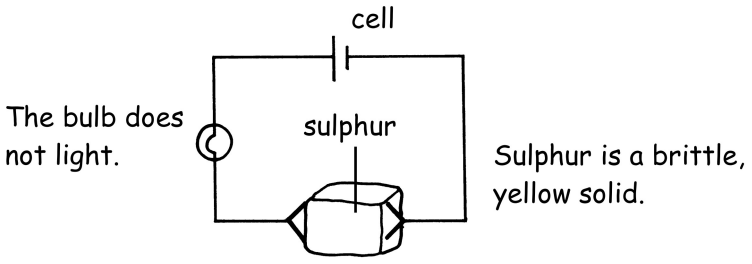
Iron is a _____



Bromine is a _____



Copper is a _____



Sulphur is a _____

Exercise 2 - Complete the sentences below.

1) M _ _ _ _ _ _ is the only metal that is a liquid at room temperature.

2) G _ _ _ _ _ _ _ is the only non-metal that is a good conductor of electricity.

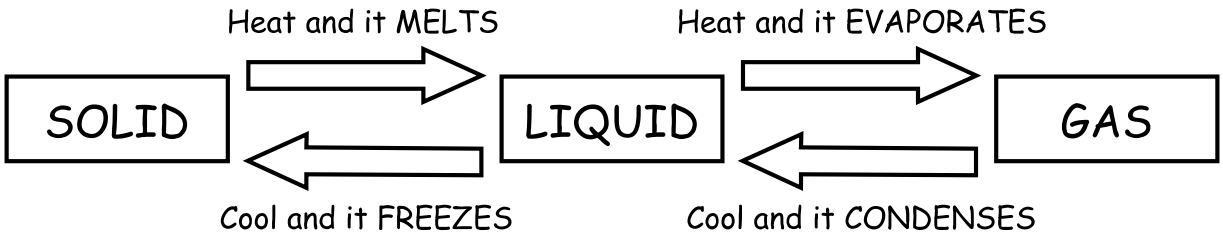
3) The M _ _ _ _ _ _ _ metals are iron, cobalt and nickel.

4) M _ _ _ _ _ can be hammered into shape.

W.S.45. Changes of state.

Name .....

The three states of matter are SOLID, LIQUID and GAS. One state can change into another. The diagram below shows this.



When a solid changes to a liquid, or a liquid changes to a gas, heat is absorbed. This is because the particles that make up the substance need more energy to move faster and overcome the forces that hold them together. When a gas changes to a liquid, or a liquid changes to a solid, heat is given out. This is because the particles lose energy as they slow down. The substance still keeps the SAME MASS because it still contains the SAME NUMBER OF PARTICLES.

Exercise - Use the information in the table below to help you complete the sentences at the bottom of this page.

Substance	Melting point (°C)	Boiling point (°C)
Oxygen	-219	-183
Ethanol	-15	78
Water	0	100
Sulphur	119	445
Iron	1,540	2,900

1) Oxygen is a _ _ _ at room temperature.

2) Water and _ _ _ _ _ _ _ are liquids at room temperature.

3) _ _ _ _ _ _ _ and iron are solids at room temperature.

4) Sulphur melts at a temperature of _____ °C

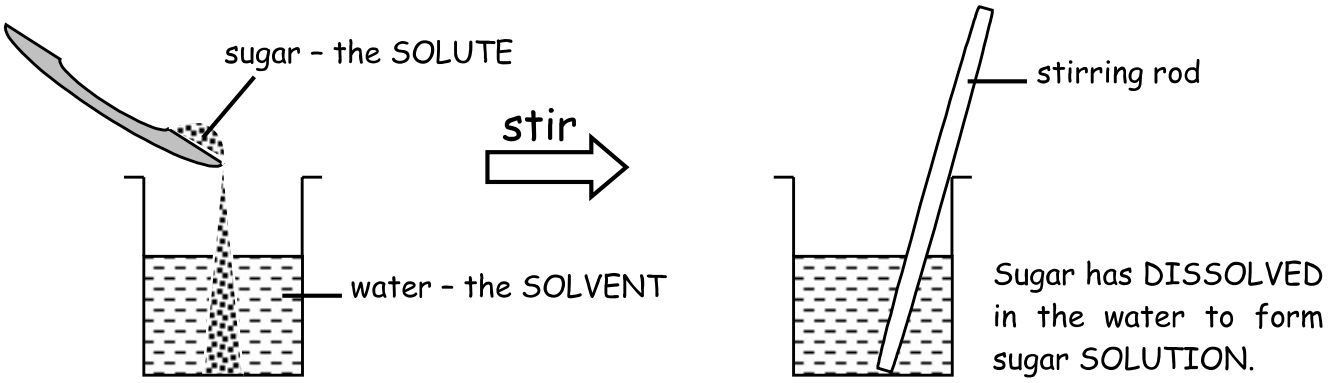
5) Iron melts at a temperature of _____ °C

6) The substance with the lowest melting point in the table is _ _ _ _ _ _

7) Ethanol has a _ _ _ _ _ boiling point than water.

W.S.46. **Solubility.** Name ……

The diagrams below show how sugar can be dissolved in water.

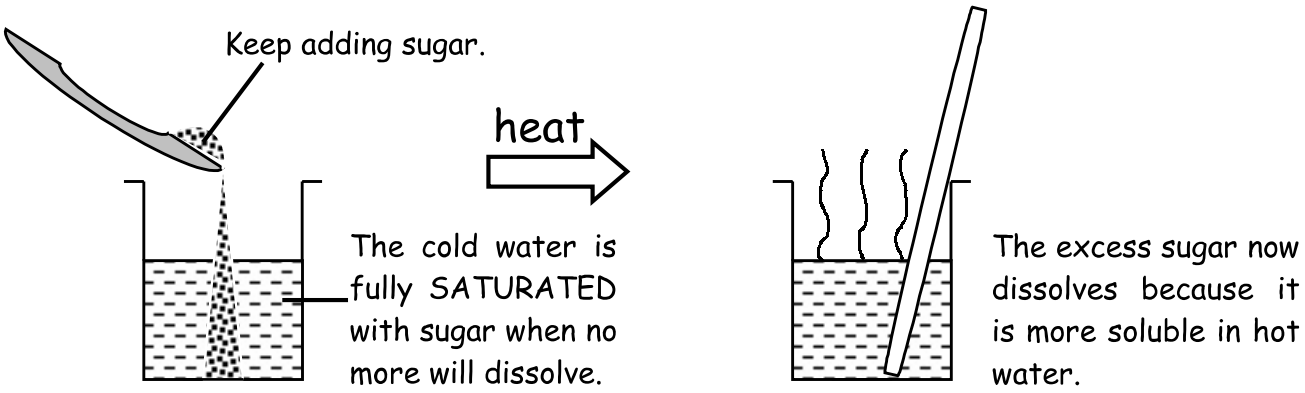


Exercise 1 – Fill in the missing words in the passage below.

If a solid …… in water we say that it is SOLUBLE. The substance that dissolves is called the SOLUTE and the liquid that it dissolves in is called the SOLVENT. Water is a good …… because many substances will dissolve in it. If you have been using …… paint you can not wash your brush in …… because the paint will not dissolve. The correct solvent for gloss paint is white ……

spirit **solvent** **dissolves** **gloss** **water**

The effect of temperature on solubility.



Exercise 2 – Complete the sentences below.

1) If you keep adding sugar to cold water you reach a point where no more sugar will _ _ _ _ _ _ _ _

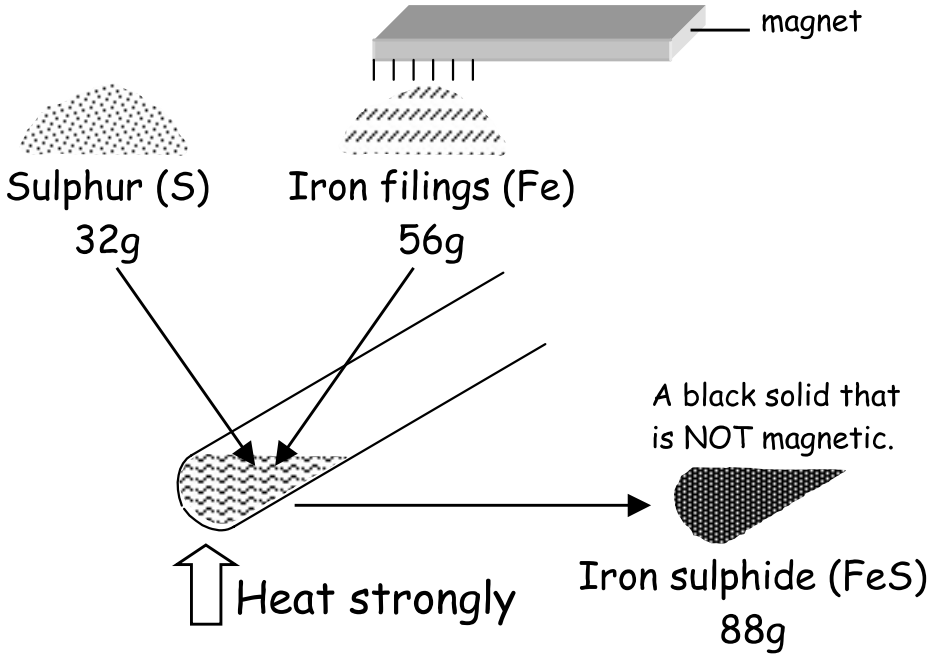
2) A solution that cannot dissolve any more solute is fully _ _ _ _ _ _ _ _ _ _

3) Solids are _ _ _ _ soluble in water as the temperature rises.

W.S.51. Chemical reactions.

Name ……

All of the different materials around us have been formed by chemical reactions from about one hundred simple elements. The diagram below shows a chemical reaction between the elements iron and sulphur.



This reaction can be shown as a word equation:

IRON + SULPHUR ⟹ IRON SULPHIDE
(REACTANTS) (PRODUCT)

The new substance formed is a compound called iron sulphide. It has different properties to the iron and sulphur that it is made from.

Exercise 1 – fill in the missing words in the sentences below.

1. The mass of the reactants (starting chemicals) is E _ _ _ _ to the mass of the products (the chemicals that are made).
2. The products have different P _ _ _ _ _ _ _ _ _ _ to the reactants.
3. During a chemical reaction H _ _ _ is either taken in or given out.
4. A chemical change is difficult to R _ _ _ _ _ _ (go backwards).

Exercise 2 – Join up each word in the left hand column with its meaning on the right.

ELEMENTS	The chemicals that are made.
PRODUCTS	The simplest substances.
COMPOUND	Starting chemicals.
REACTANTS	Elements joined together.

W.S.52. Types of chemical reaction. Name .....

There are several different types of chemical reaction.

Synthesis

Two or more substances join together to make a single new substance. For example when iron and sulphur are heated together :

$$\text{IRON} + \text{SULPHUR} \xrightarrow{\text{heat}} \text{IRON SULPHIDE}$$

Decomposition

A substance breaks down into simpler substances. For example, if calcium carbonate (limestone) is heated to a very high temperature :

$$\text{CALCIUM CARBONATE} \xrightarrow{\text{heat}} \text{CALCIUM OXIDE} + \text{CARBON DIOXIDE}$$

Oxidation

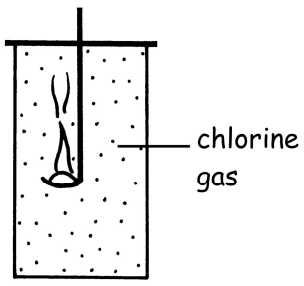
A substance gains oxygen during a chemical reaction. The substance that gains the oxygen is OXIDISED. For example, if copper is heated in air :

$$\text{COPPER} + \text{OXYGEN} \xrightarrow{\text{heat}} \text{COPPER OXIDE}$$

Exercise 1 - Complete the sentences below.

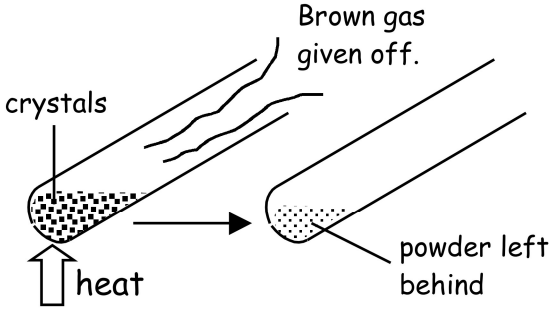
1) Synthesis means when substances _ _ _ _ together.
2) Decomposition means when a substance _ _ _ _ _ _ down.
3) Oxidation is when a substance gains _ _ _ _ _ _ in a chemical reaction.

Exercise 2 - For each diagram below write down the type of chemical reaction it shows.



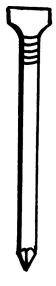
1) Burning sodium metal in chlorine gas to form sodium chloride (salt). This type of reaction is :

_____



2) Heating white lead nitrate crystals to produce a yellow powder and a brown gas. This type of reaction is :

_____



3) If an iron nail is exposed to air it forms orange iron oxide (rust). This type of reaction is :

_____

W.S.53. **Burning.** Name ……

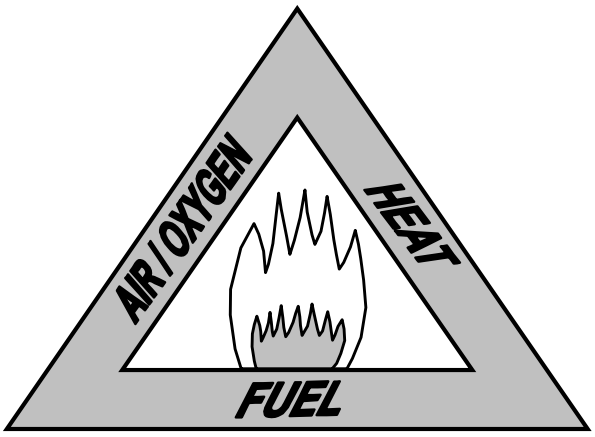
Burning is a type of oxidation reaction. It happens when a substance reacts with oxygen in the air to produce heat and light. The substance that burns is oxidised during the reaction. For example when carbon in the form of coke is burnt :

CARBON + OXYGEN ⟹ CARBON DIOXIDE + heat and light.

FUELS can be burnt to release useful energy. They burn more strongly in pure oxygen. If a smouldering wooden splint is placed into a jar that contains oxygen it will relight. This is a test for oxygen gas.

The fire triangle.

The fire triangle shows the three things that are needed for burning to happen. Removing any of them stops a fire.



Exercise - Complete the sentences below.

1) Burning is a chemical reaction between fuel and O _ _ _ _ _

2) When carbon burns C _ _ _ _ _ D _ _ _ _ _ _ gas is produced.

3) Burning can be useful because it releases E _ _ _ _ _

4) The test for oxygen is a smouldering S _ _ _ _ _

5) The three things needed for a fire are oxygen, F _ _ _ and heat.

6) A fire blanket is used to stop A _ _ getting to a fire.

7) Pouring water onto a fire takes away the H _ _ _

W.S.54. Products from chemical reactions. Name .....

Most of the materials that we use every day have been made by chemical reactions. Some of the most common products are made from two important raw materials, METAL ORES and CRUDE OIL.

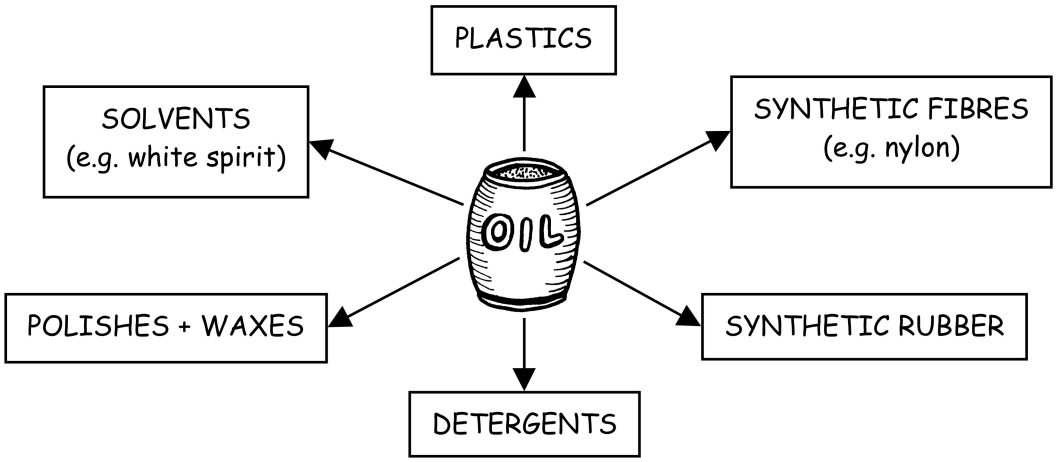
Metal ores.

Most metals exist as compounds called ORES inside rocks. Ores must be reacted with other chemicals to extract the metals that they contain. The more reactive the metal is, the more difficult it is to release from its ore. If a metal is less reactive than carbon it can be extracted by heating its ore with coke in a furnace. For example HAEMATITE (iron ore) contains iron oxide :

IRON OXIDE + CARBON → IRON

Crude oil.

Natural oil from the ground is called CRUDE OIL. It contains a mixture of substances that can be changed into many useful products.



Exercise - Complete the sentences below.

1) Many useful materials are made by chemical R _ _ _ _ _ _ _ _

2) An ore contains a M _ _ _ _ joined to other elements.

3) If a metal is less reactive than C _ _ _ _ _ it can be extracted using coke in a furnace.

4) Crude oil is a M _ _ _ _ _ _ of useful substances.

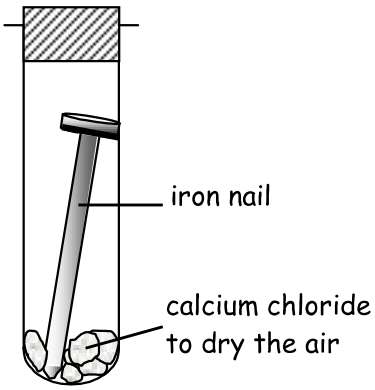
5) N _ _ _ _ is a synthetic fibre.

W.S.55. Harmful chemical reactions. Name ……

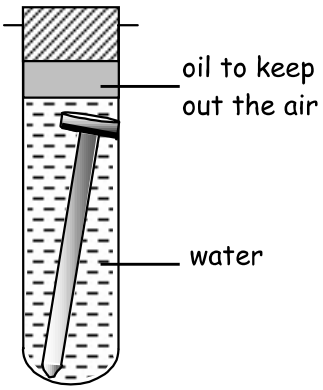
Some chemical reactions are harmful because they destroy our products.

Corrosion of metals.

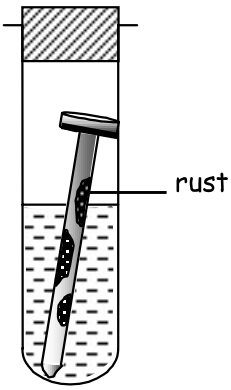
Metals may be attacked by air, water or other substances around them. Usually the more reactive the metal is, the faster it corrodes. The corrosion of iron and steel is called RUSTING. The experiment below shows that both air and water are needed for rusting to happen.



In dry air the iron nail does not rust.



In water without air the iron nail does not rust.



In air and water the iron nail rusts.

To stop rusting metals can be coated with a substance that keeps out air and water. Paint, grease, plastic, or a thin layer of tin or zinc can be used.

Oxidation of foods.

Some foods react with oxygen gas in the air. This makes them taste unpleasant. Fat can be oxidised quickly, therefore fatty foods such as butter should be kept in a fridge to slow down the rate of oxidation. Another way of stopping oxidation is to keep air away from the food by using sealed packets or tins.

Exercise – Fill in the missing words in the passage below.

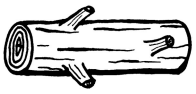
The corrosion of iron and steel is called …… Iron will only rust if it is exposed to both air and …… We can stop rusting by …… the metal with a substance that keeps out …… and water. This is why motor cars are given several layers of ……
Some foods are …… when exposed to air. This gives them an unpleasant …… Keeping foods …… will slow down the rate of oxidation. Another way of stopping …… is to make sure that the food does not come into contact with air.

air rusting taste cool water oxidation coating oxidised paint

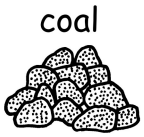
W.S.56. Energy from chemical reactions. Name .....

Heat may be taken in or given out during a reaction. Sound, light, movement or electrical energy may also be produced. When fuels are burnt they give out heat and light energy. Explosive fuels give out movement and sound energy as well. The chemical reaction that takes place inside a torch battery gives out electrical energy.

Energy from fuels.



Wood can be burnt as a fuel.



Fossil fuels form over millions of years.

Burning of fuels makes carbon dioxide, water and heat energy :

FUEL + OXYGEN ⇨ CARBON DIOXIDE + WATER + ENERGY

The heat energy can be used to keep our houses warm and to cook food. It can also be changed into movement energy to drive engines.

Effects on the environment.

Burning fuels release carbon dioxide into the air. This stops heat escaping from the surface of the Earth back into space. This is called the GREENHOUSE EFFECT and it may lead to GLOBAL WARMING.

Oil and coal release sulphur dioxide gas when they burn. This gas goes into the air and dissolves in rain droplets to form ACID RAIN. In some parts of Europe acid rain has destroyed plant and animal life in lakes and forests. Acid rain also causes corrosion of buildings and statues.

Exercise – Complete the sentences below.

1) Different types of E _ _ _ _ _ can be produced by chemical reactions.

2) When fuels are burnt they give out heat and L _ _ _ _ energy.

3) The reaction inside a battery produces E _ _ _ _ _ _ _ _ _ energy.

4) Extra carbon dioxide gas in the air may lead to G _ _ _ _ _ warming.

5) Burning of oil and C _ _ _ releases sulphur dioxide gas.

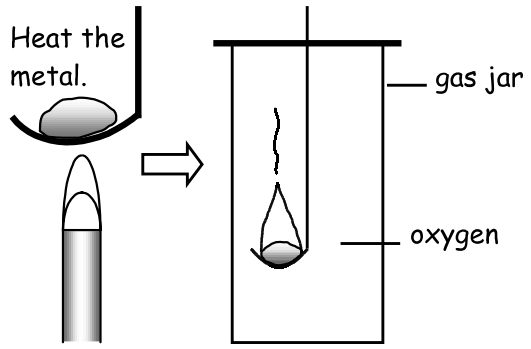
6) Sulphur dioxide gas forms A _ _ _ rain

W.S.57. Reactivity of metals.

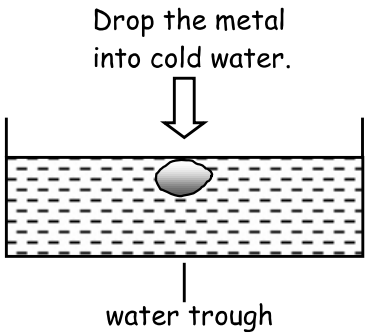
Name ……

We can arrange the metals in order of most to least reactive. The three tests below are used to judge how reactive different metals are :

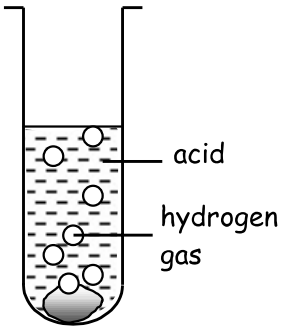
Reaction with oxygen.



Reaction with water.



Reaction with acid.



most reactive

Metal	Reaction with oxygen	Reaction with water	Reaction with acid
Potassium	Burns strongly with a lilac flame.	Very fierce and ignites (catches fire).	Too dangerous to perform.
Sodium	Burns strongly with a yellow flame.	Fierce but it does not ignite.	Too dangerous to perform.
Magnesium	Burns with a blinding white flame.	Very slow reaction but it reacts with steam.	Very fast reaction that produces hydrogen gas.
Zinc	Burns slowly with a dull red flame.	Reacts slowly with steam.	Quite a slow reaction. Some hydrogen produced.
Iron	Does not burn but it glows brightly.	Very slow reaction with steam.	Very slow reaction.
Lead	Melts but does not burn.	No reaction.	Extremely slow.
Copper	Does not burn but it forms a black coating.	No reaction.	No reaction.
Gold	No reaction.	No reaction.	No reaction.

least reactive

Exercise – Complete the sentences below.

1) _ _ _ _ _ _ _ _ _ _ is the most reactive metal.

2) _ _ _ _ is the least reactive metal.

3) Potassium and sodium are too reactive to add to _ _ _ _

4) You should not look at _ _ _ _ _ _ _ _ _ _ when it burns in oxygen.

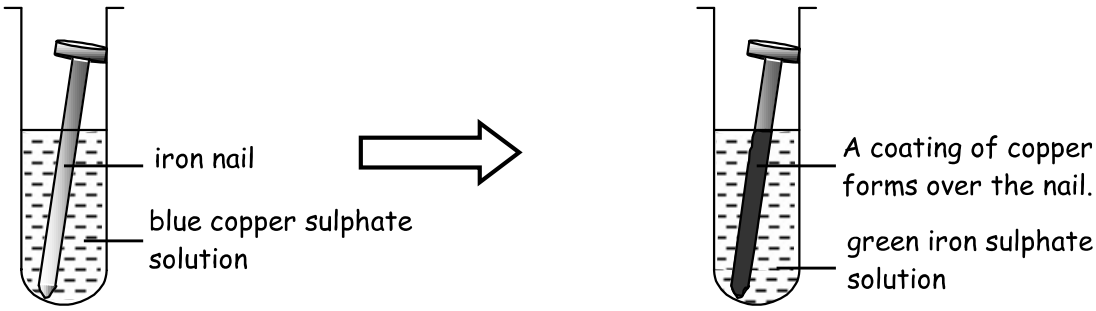
5) _ _ _ _ does not corrode because it is an unreactive metal.

6) Metals react faster with _ _ _ _ _ than they do with water.

W.S.58. Displacement reactions.

Name ……

If two metals are put together the more reactive metal will 'win' any competition to form a compound. The experiment below shows a reaction between an iron nail and copper sulphate solution.

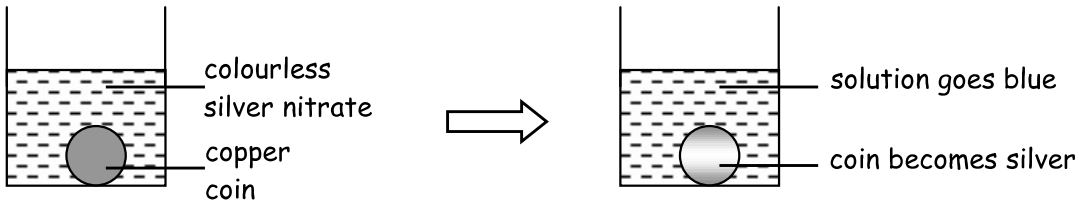


Iron and copper compete to be the compound in the solution. Iron is more reactive and so it DISPLACES (pushes out) the copper in the solution.

IRON + COPPER SULPHATE (blue solution) ⟹ IRON SULPHATE (green solution) + COPPER

A metal will always displace a less reactive metal from solutions of its compounds.

Exercise 1 – Study the experiment below and then try to complete the missing words.



COPPER + SILVER NITRATE (colourless) ⟹ COPPER _ _ _ _ _ _ _ (blue) + SILVER

Copper is _ _ _ _ reactive than silver so it displaces silver in the solution.

Displacement reactions with metal oxides.

Two metals can also compete for oxygen. For example, if magnesium powder is heated with copper oxide there is an explosive reaction :

MAGNESIUM + COPPER OXIDE ⟹ MAGNESIUM OXIDE + COPPER

Exercise 2 -Complete the missing words in the sentences below.

Magnesium 'wins' the competition for _ _ _ _ _ _ _ because it is higher in the reactivity series than _ _ _ _ _ _ _ When a metal is heated with the oxide of a _ _ _ _ reactive metal it will remove the oxygen from it.

W.S.59. Acids and alkalis.

Name .....

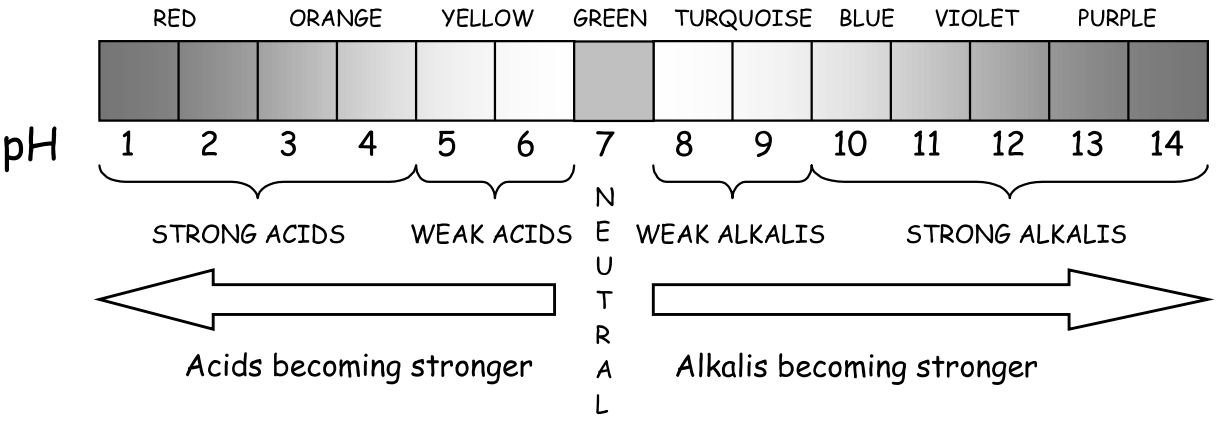
Acids are CORROSIVE (eat into materials). They react with some metals to form hydrogen gas and a salt. Acids have a sour taste, and many are poisonous. A purple dye called LITMUS changes to a **red** colour in acids.

Alkalis are the chemical opposites of acids, but some of them are also very corrosive. They dissolve in water and often have a soapy feel. Alkalis turn litmus **blue** and they can be used to NEUTRALISE (cancel out) acids. A NEUTRAL solution is neither acid or alkali.

Acids		**Alkalis**	
STRONG	WEAK	STRONG	WEAK
These are the poisonous mineral acids: - hydrochloric acid - sulphuric acid	ethanoic acid in vinegar citric acid in fruit juices carbonic acid in soda water	sodium hydroxide oven cleaner washing powder	soap sodium bicarbonate (baking powder)

Universal Indicator and the pH scale.

Universal indicator changes to different colours with acids and alkalis. The colour change tells us the pH number of the substance being tested which tells us how strong the acid or alkali is.



Exercise - Complete the sentences below.

1) If a chemical is _ _ _ _ _ _ _ _ _ _ it will eat into materials.

2) Acids react with some _ _ _ _ _ _ _ to produce hydrogen gas.

3) Litmus turns _ _ _ in acid and _ _ _ _ in alkali.

4) The pH is a measure of how _ _ _ _ _ _ _ the acid or alkali is.

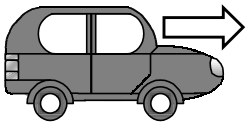
5) A chemical with a pH number of six is a _ _ _ _ acid.

W.S.71. Force and movement.

Name .....

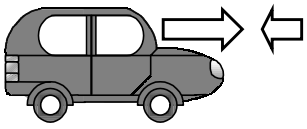
A FORCE is a PUSH or PULL. Force is measured in NEWTONS (N). Forces can speed up or slow down objects. The diagrams below show how different forces can affect the movement of a car.

1. Force from the engine makes the car begin to move.



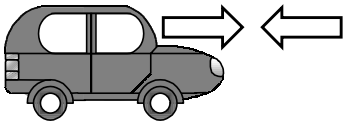
unbalanced force

2. As the car speeds up the force of air resistance gets bigger.



unbalanced force

3. The car reaches a steady speed when the two forces are equal.

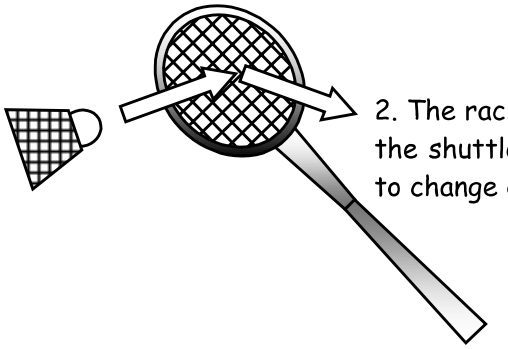


balanced force

When the force pushing against the car is the same size as the force from the engine the car stops accelerating and travels at a steady speed.

Forces can also make objects change direction. The diagram below shows this.

1. Shuttlecock moving in one direction hits the racket with a force.



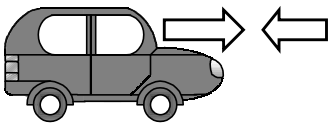
2. The racket gives a force to the shuttlecock and causes it to change direction.

The important rules from this are :

1. Unbalanced forces change the speed and/or direction of moving objects.
2. Balanced forces produce no change in the movement of an object.

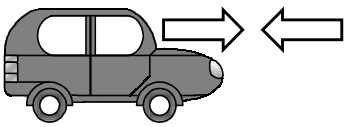
Exercise - Complete the sentences underneath each of the diagrams below.

Force from engine is 500N. Force of air resistance is 300N.



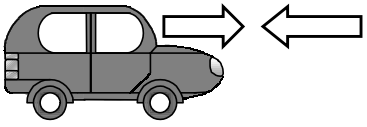
1) The car will _____

Force from engine is 500N. Force of air resistance is 500N.

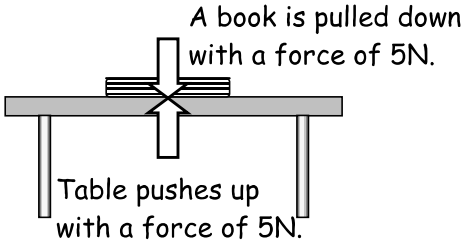


2) The car will _____

Force from engine is 500N. Force of air resistance is 700N



3) The car will _____



4) The book will not _____

W.S.72. Friction.

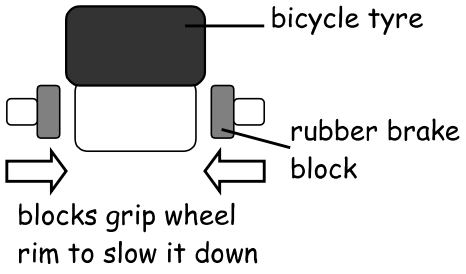
Name ……

Friction is a force that stops two surfaces sliding past each other. It is caused by tiny bumps on the surfaces which catch together.

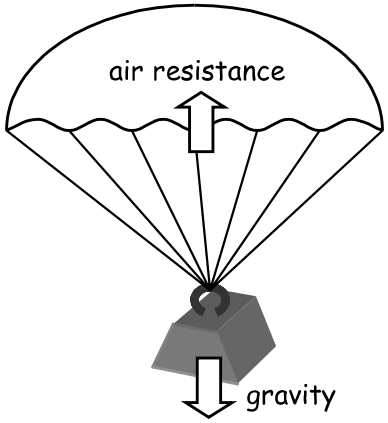
Uses of friction.

1. Friction gives grip for shoes and tyres. We could not move over the ground without friction.

2. Brakes on bicycles and cars use friction to slow down the wheels.



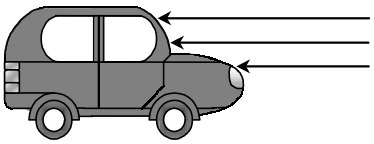
3. Air resistance is a type of friction that slows down parachutes.



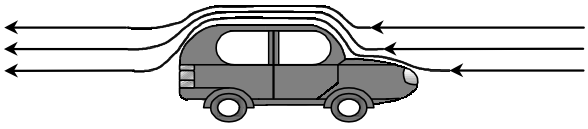
Problems caused by friction.

1. Friction slows down moving machinery. It can also make machinery over heat. Grease and oil must be used to reduce friction.

2. Air resistance is a type of friction that slows down vehicles. The faster the vehicle travels the greater the air resistance becomes. Car bodies are designed so that the air slips smoothly over the bonnet.



Poor design – air hits against bonnet and slows the car down. The engine must work hard to keep at a high speed.



Good design – air slips smoothly over the bonnet. The air resistance is low and the car travels at high speed easily.

Exercise – Complete the missing words in the passage below.

The force that stops two surfaces sliding past each other is called …… If there was no friction between our shoes and the ground our feet would …… when we tried to walk. Rubber brake blocks grip against the …… of a bicycle wheel in order to slow it down. A parachute reaches a steady speed when the force of …… pulling it down is balanced by the air resistance pushing …… Friction between the moving parts of machinery can cause it to over …… The friction can be …… by using oil or …… The …… a car moves the greater the air resistance is that pushes against it.

slip reduced friction faster heat rims gravity grease upwards

Worksheet 16 Breathing (1).

oxygen trachea cartilage bronchus alveoli capillaries blood

Worksheet 17 Breathing (2).

1) muscle 2) inhale 3) exhale 4) contract 5) volume 6) decrease 7) relax 8) increase

Worksheet 18 Keeping the lungs clean.

1) mucus 2) hairs 3) acid 4) beating 5) oxygen 6) cancer

Worksheet 19 Respiration.

Exercise 1 oxygen on left-hand side, water and carbon dioxide and on right-hand side

Exercise 2 1) energy 2) move 3) glucose 4) burning 5) carbon dioxide 6) breathing 7) oxygen

Worksheet 20 Drugs and health.

addict reactions alcoholic liver nervous lung hallucinate dangerously solvents

Worksheet 21 Germs and health.

1) inside 2) small 3) cells 4) poisonous 5) viruses 6) living 7) DNA

Worksheet 22 Fighting germs.

harmless defend skin breathed trachea swallowed stomach phagocytes eat antibodies vaccine medicines

Worksheet 23 Photosynthesis.

1) food 2) light 3) leaf 4) carbon dioxide 5) chlorophyll 6) respiration 7) oxygen

Worksheet 24 Plant nutrition.

elements dissolved hair stem increase magnesium nitrogen root

Worksheet 25 Classification.

groups features chlorophyll roots spores cones

Worksheet 26 Flowering plants.

seeds pollen insects nectar scented coloured join ovules fruit disperse

Worksheet 27 Animals without backbones (1).

1) vertebrates 2) invertebrates 3) tentacles 4) tapeworm 5) segments 6) snail 7) spines

Worksheet 28 Animals without backbones (2).

1) arthropods 2) insect 3) six, four 4) eight 5) sting 6) shrimps 7) segments

Worksheet 29 Animals with backbones.

gills reptiles amphibians damp birds feathers wings mammals hair milk

Worksheet 30 Variation

1) variation 2) continuous 3) height 4) genes, environment 5) ovum 6) growth 7) minerals

Worksheet 31 Selective breeding.

1) changed 2) features 3) fastest 4) tallest 5) evolution 6) selection

Worksheet 32 A place to live.

Exercise 1 shark – ocean, buttercup – meadow, newt – pond, monkey – jungle, fox - woodland

Exercise 2 1) habitat 2) adaptation 3) waterproof 4) environment 5) water

Worksheet 33 Changing habitats.

Exercise 1 nocturnal hibernation migrate

Exercise 2 changing cold nocturnal food thicker fat energy

Worksheet 34 Food chains and pyramids of numbers.

plants animals eaten predators prey greater food fewer

Worksheet 35 Food webs.

TADPOLE SMALL FISH

1) large fish, grebes 2) tadpoles 3) small fish, newts 4) water louse

5) tadpole, water snail, water louse 6) large fish, grebe

Worksheet 36 Poisoned food chains.

1) pesticides 2) chains 3) birds 4) poisoned 5) streams, ponds 6) biological

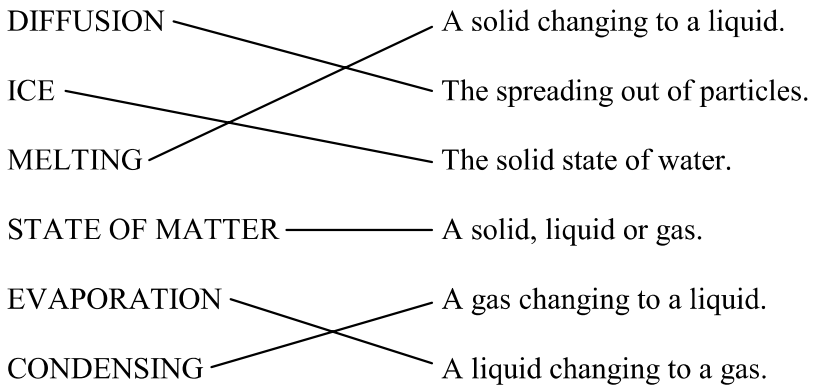
Worksheet 37 Populations.

population grow food greater die prey killed survive size deaths

Worksheet 38 Solids, liquids and gases.

Property	Solids	Liquids	Gases
Density	High density	**High density**	Low density
How easy are they to compress?	Hard	**Hard**	Easy
Do they flow?	**No**	Yes	Yes
Do they keep the same shape?	**Yes**	No	**No**
Do they keep the same volume?	Yes	**Yes**	**No**

Worksheet 39 Changes of state.



Worksheet 40 Elements.

1) element 2) atom 3) nucleus 4) negative 5) positive 6) protons

Worksheet 41 The periodic table.

properties protons hydrogen oxygen reactive magnetic halogens noble two five

Worksheet 42 Compounds.

Exercise 1 C oxygen NaCl

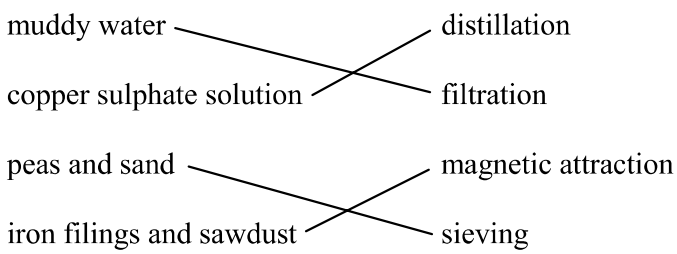
Exercise 2 chemical physical chemical physical

Worksheet 43 Separating mixtures.

Filtration water sand paper

Distillation water cooled flask

Chromatography paper speeds



Worksheet 44 Metals and non-metals.

Exercise 1 iron – metal bromine – non-metal copper – metal sulphur – non-metal

Exercise 2 1) mercury 2) graphite 3) magnetic 4) metals

Worksheet 45 Changes of state.

1) gas 2) ethanol 3) sulphur 4) 119 °C 5) 1,540 °C 6) oxygen 7) lower

Worksheet 46 Solubility.

Exercise 1 dissolves solvent gloss water spirit

Exercise 2 1) dissolve 2) saturated 3) more

Worksheet 47 Expansion.

expand contract vibrate apart buckle snap thermometer scale

Worksheet 48 Rocks and weathering.

1) weathering 2) rain 3) sand 4) contraction 5) expands

Worksheet 49 The rock cycle.

sediments transported layers sedimentary mudstone metamorphic magma eruptions igneous

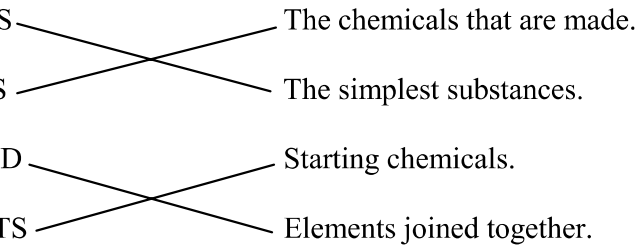
Worksheet 50 Types of rock.

1) magma 2) large 3) sediments 4) strata 5) crumble 6) heat 7) marble

Worksheet 51 Chemical reactions.

Exercise 1 1) equal 2) properties 3) heat 4) reverse

Exercise 2



Worksheet 52 Types of chemical reaction.

Exercise 1 join breaks oxygen

Exercise 2 1) synthesis 2) decomposition 3) oxidation

Worksheet 53 Burning.

1) oxygen 2) carbon dioxide 3) energy 4) splint 5) fuel 6) air 7) heat

Worksheet 54 Products from chemical reactions.

1) reactions 2) metal 3) carbon 4) mixture 5) nylon

Worksheet 55 Harmful chemical reactions.

rusting water coating air paint oxidised taste cool oxidation

Worksheet 56 Energy from chemical reactions.

1) energy 2) light 3) electrical 4) global 5) coal 6) acid

Worksheet 57 Reactivity of metals.

1) potassium 2) gold 3) acid 4) magnesium 5) gold 6) steam

Worksheet 58 Displacement reactions.

Exercise 1 COPPER + SILVER NITRATE (colourless) ⟶ COPPER **NITRATE** (blue) + SILVER

Copper is **more** reactive than silver therefore it displaces silver in the solution.

Exercise 2 oxygen copper less

Worksheet 59 Acids and alkalis.

1) corrosive 2) metals 3) red, blue 4) strong 5) weak

Worksheet 60 Acids and metals

1) copper 2) salt 3) faster 4) hydrogen 5) explosive 6) hydrogen 7) acid 8) salt

Worksheet 61 Acids and bases.

1) base 2) alkalis 3) salt 4) chloride 5) oxygen 6) carbon dioxide 7) fizz

Worksheet 62 Neutralisation.

hydrochloric indigestion alkali acidic bicarbonate vinegar rain limestone powdered

Worksheet 63 Acid rain.

1) sulphur 2) coal 3) electricity 4) rain 5) die 6) minerals 7) metals

Worksheet 64 Electric current and voltage.

current voltmeter twice brighter positive flow

Worksheet 65 Series and parallel circuits.

Exercise 1 Bulbs in series small resistance ammeter

Bulbs in parallel voltage larger bright

Exercise 2 1) go out 2) brighter 3) B

Worksheet 66 Electrical resistance.

filament current resistance heat copper more high size lights volume

Worksheet 67 Magnets.

Exercise 1 1) attract 2) repel 3) repel

Exercise 2 A and C

Worksheet 68 Electromagnets.

1) field 2) stronger 3) solenoid 4) more 5) electromagnet

Worksheet 69 Uses of electromagnets.

An electric bell. coil arm gong off

Sorting scrap metal steel cable off

Electromagnetic switches relay input lever contacts output

Worksheet 70 Speed.

Exercise 1 1) 10 m/s 2) 120 km/h 3) 10 mph

Exercise 2 1) $S \times T = 40 \text{ mph} \times 3\text{h} = 120 \text{ miles}$

2) $\frac{D}{S} = \frac{200\text{m}}{10\text{m/s}} = 20\text{s}$

Worksheet 71 Force and movement.

1) speed up
2) travel at a steady speed
3) slow down
4) move

Worksheet 72 Friction

friction slip rims gravity upwards heat reduced grease faster

Worksheet 73 Turning forces.

1) pivot 2) lever 3) turning force 4) crowbar 5) long