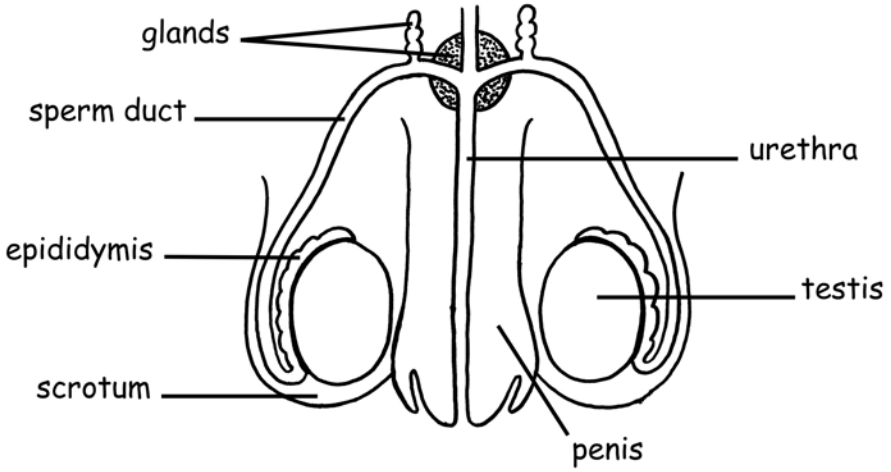
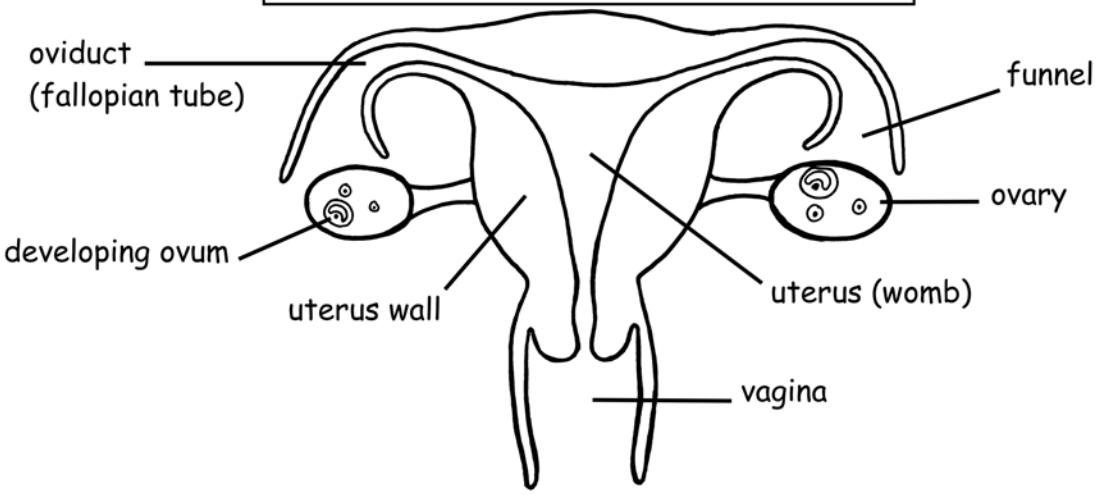
W.S.12. **The human reproductive system.** Name ……

The diagrams below show the male and female reproductive systems.

The male reproductive system



The female reproductive system



Exercise - fill in the missing words in the passage below.

In the man the testes make the …… cells. The sperms are stored in a coiled …… called the epididymis. The …… becomes erect during sexual intercourse. The sperms are carried through a long tube called the sperm …… to the top of the penis. Here glands make fluids that help the sperms to …… The urethra is a tube that carries sperms and …… out of the body.

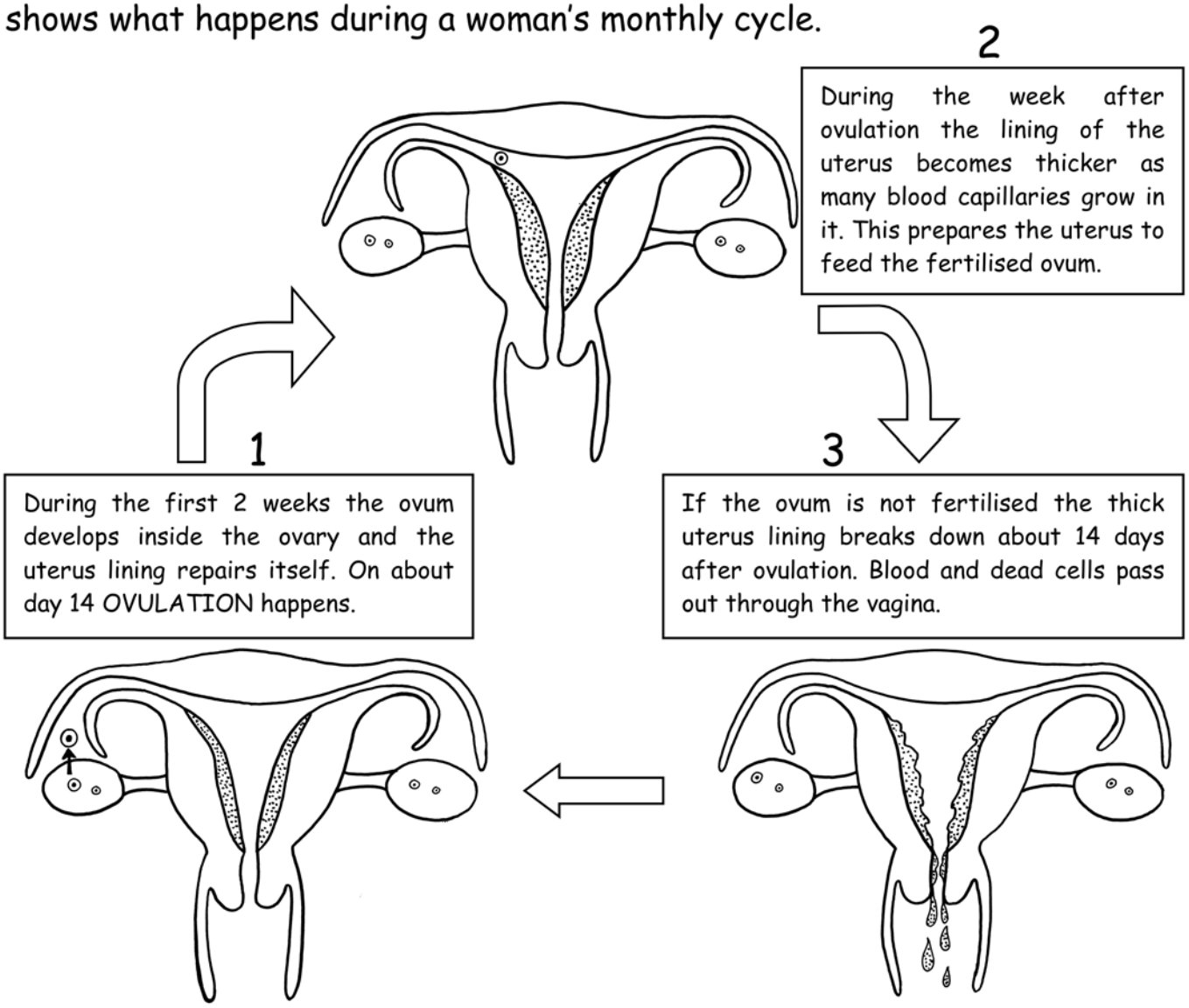
In the woman the ovaries make the …… (egg cells). One ovum is produced every …… The ovum is carried along the …… (fallopian tubes) down to the uterus (womb). The placenta grows in the uterus wall during pregnancy. This gives the developing baby …… and oxygen.

duct urine ova food sperm tube month swim oviducts penis

W.S.13. The menstrual cycle.

Name ……

Once every month a woman's body releases an ovum (egg cell) into the oviduct (fallopian tubes). Usually the ovum is not fertilised and it dies. The woman has her period when the lining of the uterus breaks down and blood and dead cells pass out through the vagina. The diagram below shows what happens during a woman's monthly cycle.



Exercise - Complete the sentences below.

1) Only one ovum is released every _ _ _ _ _

2) The release of an ovum from the ovary is called _ _ _ _ _ _ _ _ _ _

3) Ovulation happens after about ____ days.

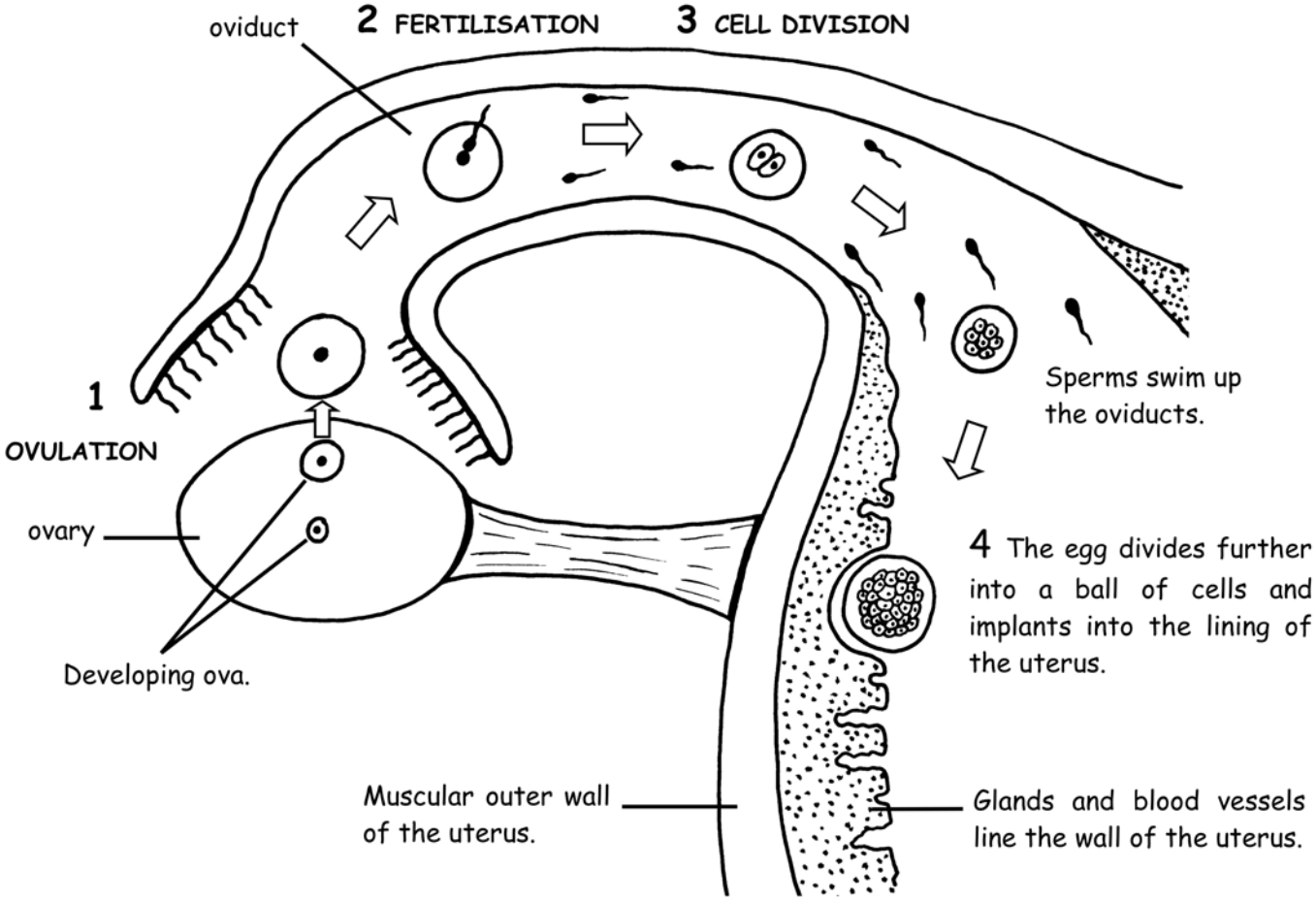
4) The uterus lining _ _ _ _ _ the fertilised ovum.

5) If the ovum is not fertilised it will _ _ _

6) A woman has her period when the _ _ _ _ _ _ lining breaks down.

W.S.14. Ovulation and fertilisation. Name .....

Every month an ovum (egg cell) is released from an ovary into the oviduct. This is called OVULATION. If there are sperm cells in the oviduct the ovum may join with one of them. This is called FERTILISATION. The fertilised ovum then travels down to the uterus where it grows into a baby. The diagram below shows what happens to the ovum after it is released from the ovary if it is fertilised.



Exercise - Complete the sentences below.

1) O _ _ _ _ _ _ _ _ means when the ovum is released from the ovary.

2) The joining of the ovum and sperm is called F _ _ _ _ _ _ _ _ _ _ _ _ _

3) Fertilisation usually happens in the O _ _ _ _ _ _

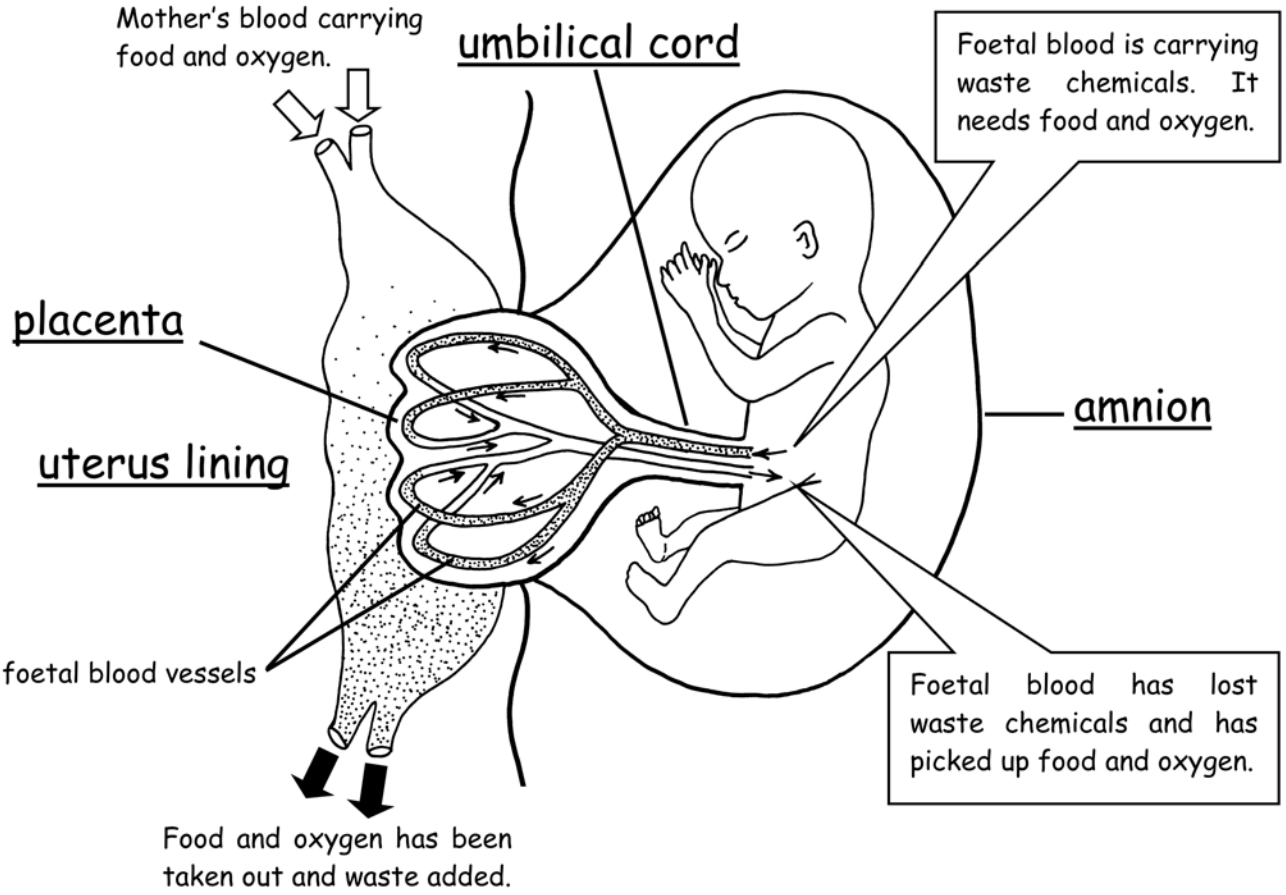
4) After fertilisation the egg begins to D _ _ _ _ _

5) The egg develops into a ball of C _ _ _ _

6) The baby develops in the U _ _ _ _ _

W.S.15. **The developing baby.** Name .....

When the baby starts to grow inside the uterus it is called an EMBRYO. By the time it reaches 9 weeks old it looks like a tiny human being and it is then called a FOETUS. The PLACENTA is a special organ that develops in the wall of the uterus. It gives the baby food and oxygen. The placenta also removes waste chemicals such as carbon dioxide and urea from the baby. The baby is attached to the placenta by the UMBILICAL CORD. This contains blood vessels that carry chemicals to and from the baby. The diagram below shows how this happens.



Exercise – Complete the sentences below.

1) When the baby reaches 9 weeks old it is called a _ _ _ _ _ _

2) The baby is surrounded by a bag of fluid called the _ _ _ _ _ _

3) The amnion _ _ _ _ _ _ _ _ the baby if the mother is knocked.

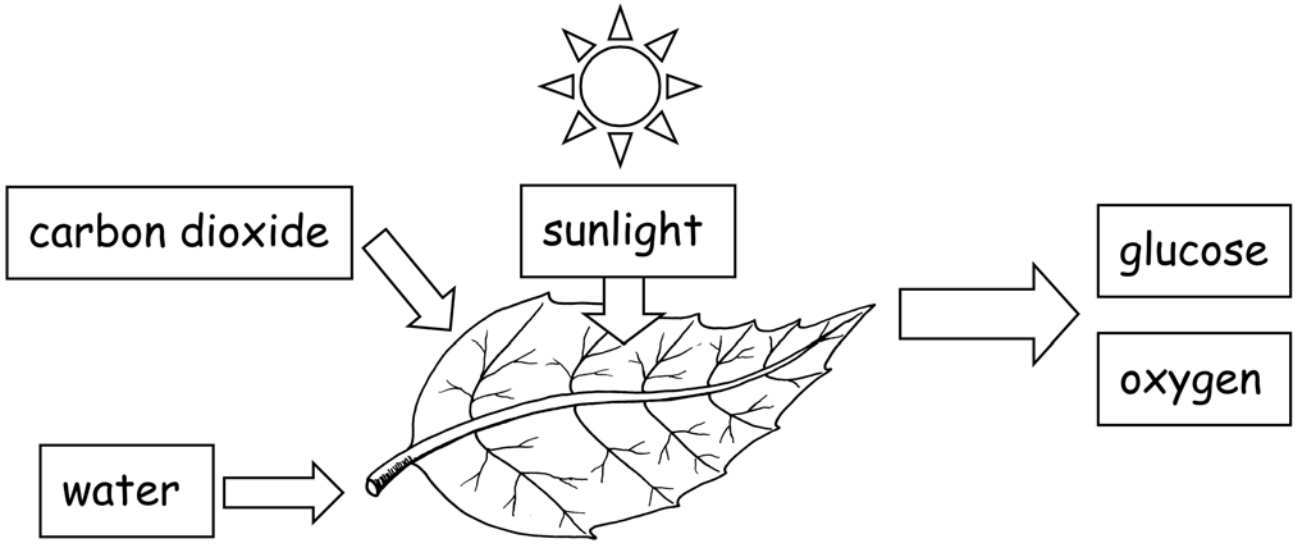
4) The placenta gives the baby food and _ _ _ _ _ _

5) The palcenta takes _ _ _ _ _ chemicals away from the baby.

6) The U _ _ _ _ _ _ _ _ C _ _ _ attaches the baby to the placenta.

W.S.23. **Photosynthesis.** Name ……

Animals feed on plants or other animals but most plants make their own food by using light energy and simple chemicals. This process is called PHOTOSYNTHESIS. Water and carbon dioxide molecules are joined together to make GLUCOSE sugar and waste oxygen gas. This happens in the leaf cells inside tiny discs called CHLOROPLASTS. The chloroplasts contain a green chemical called CHLOROPHYLL which absorbs light energy. The diagram below shows this process.



The glucose sugar that is made may be changed into other useful chemicals for growth or storage. The plant also uses glucose as a fuel in RESPIRATION to release energy when it is needed in the cells. Respiration is the opposite process of photosynthesis :

FOOD + OXYGEN ⟹ CARBON DIOXIDE + WATER + ENERGY

Exercise - Complete the sentences below.

1) Animals can not make their own F _ _ _

2) Plants use L _ _ _ _ energy to help them make their food.

3) Photosynthesis happens in the L _ _ _ cells.

4) The gas needed for photosynthesis is C _ _ _ _ _ D _ _ _ _ _ _

5) C _ _ _ _ _ _ _ _ _ _ is the green chemical that absorbs light energy.

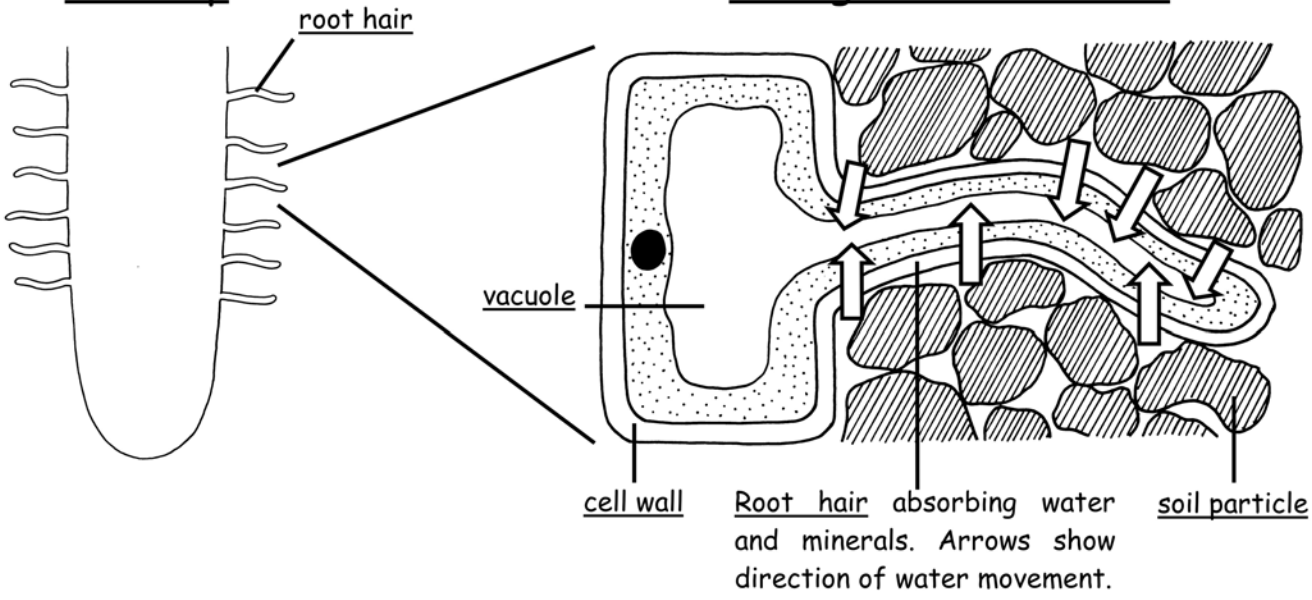
6) The opposite reaction to photosynthesis is R _ _ _ _ _ _ _ _ _ _

7) Plants give animals food and O _ _ _ _ _

W.S.24. Plant nutrition.

Name .....

Plants make glucose sugar by the process of photosynthesis. For healthy growth they also need to absorb mineral salts that are dissolved in the soil water. Mineral salts contain elements such as nitrogen, phosphorus and magnesium. Water and mineral salts are absorbed from the soil by the ROOT HAIR CELLS which cover the surface of the root. These cells greatly increase the surface area for absorption.



Element	Why it is needed
Nitrogen	To make proteins for good growth.
Magnesium	To make the green chemical CHLOROPHYLL needed in photosynthesis.
Phosphorus	For good root growth.

Exercise - Complete the missing words in the passage below.

Certain chemical ..... are needed for healthy growth in plants. They are obtained from mineral salts ..... in the soil water. Root ..... cells absorb water and mineral salts which are then carried up the ..... to the leaves. The root hair cells greatly ..... the surface area of the root. If a plant does not have enough ..... it cannot make chlorophyll and its leaves turn yellow. If a plant does not have enough ..... it cannot make proteins and its growth is stunted. Phosphorus is needed for good ..... growth.

root elements hair magnesium nitrogen dissolved stem increase

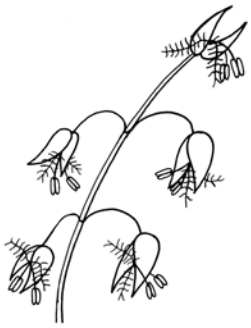
W.S.26. **Flowering plants.** Name .....

Flowers contain sex organs which produce seeds for reproduction. The male sex cells are inside the pollen grains. The female sex cells are called OVULES. Pollen grains are carried from one flower to another by insects or wind. This is called POLLINATION. The sex cells then join together. This is called FERTILISATION. The fertilised ovules develop into seeds.

buttercup – insect pollinated.

The flowers are colourful and scented to attract insects.

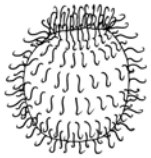
grass flowers – wind pollinated.



The flowers are light and feathery to catch the breeze.

When the flower dies the seeds are left inside a FRUIT. Fruits help to DISPERSE (spread out) the seeds. Three types of fruit are shown below.

Sycamore seeds have wings. They are dispersed by wind.



Burdock seeds have hooks that catch onto animals fur.

Blackberries are juicy but the seeds do not digest.

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

Flowers make ..... so that plants can reproduce. Pollination is when ..... is carried from one flower to another. Pollen can be carried by wind or ..... The insects visit the flower to drink the ..... Flowers are colourful and ..... to attract insects. Plants that use wind to pollinate their flowers are not brightly ..... They are light and feathery to catch the breeze.

Fertilisation is when the male and female sex cells ..... The fertilised ..... then develop into seeds. When the flower dies a ..... is left behind. Fruits help to ..... the seeds.

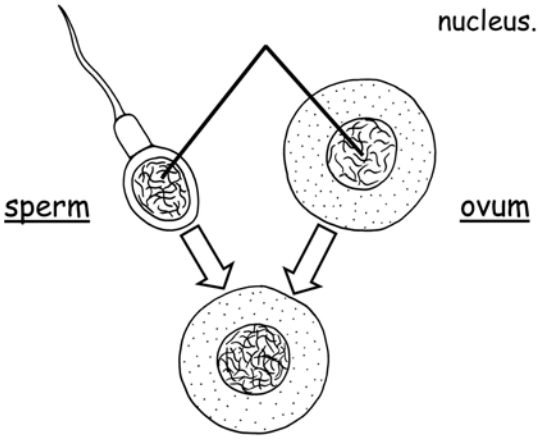
insects join pollen seeds ovules scented coloured nectar fruit disperse

W.S.30. Variation.

Name ……

All animals and plants are different from each other. Even members of the same species (type) show small differences and no two humans are exactly alike. This is called VARIATION. Some features that vary which are easy to study in humans are height, mass, hair colour, eye colour and shoe size. CONTINUOUS VARIATION is when a feature shows many different types eg. height. DISCONTINUOUS VARIATION is when a feature only shows a few different types eg. human blood groups and whether a person can roll their tongue or not.
Variation is caused partly by different GENES (instructions) that individuals inherit from their parents and partly by different ENVIRONMENTS (surroundings) that individuals live in :

Genetic (inherited)



The chromosomes hold the GENES that control a person's features and how they develop. All sperms and ova contain a different set of genes therefore every person receives a different combination from their parents.

Environment (surroundings)

FOOD SUPPLY affects the growth rate of young animals. Two identical twins have the same genes but one may be heavier than the other due to eating more food. Plants also grow better in soil that has a good water and mineral supply.

CLIMATE affects how animals and plants develop. Some animals grow a thicker coat if their environment becomes colder. Plants usually grow faster in the sun than they do in the shade. A person's skin may become darker (tanned) if they are exposed to more sunlight.

Exercise - Complete the sentences below.

1) We are all different from each other. This is called V _ _ _ _ _ _ _ _

2) The two types of variation are C _ _ _ _ _ _ _ _ _ and discontinuous.

3) An example of continuous variation in humans is H _ _ _ _ _

4) We are all different, partly because of the G _ _ _ _ we inherited from our parents and partly because of our E _ _ _ _ _ _ _ _ _ _

5) Every sperm and O _ _ _ contains a different set of genes.

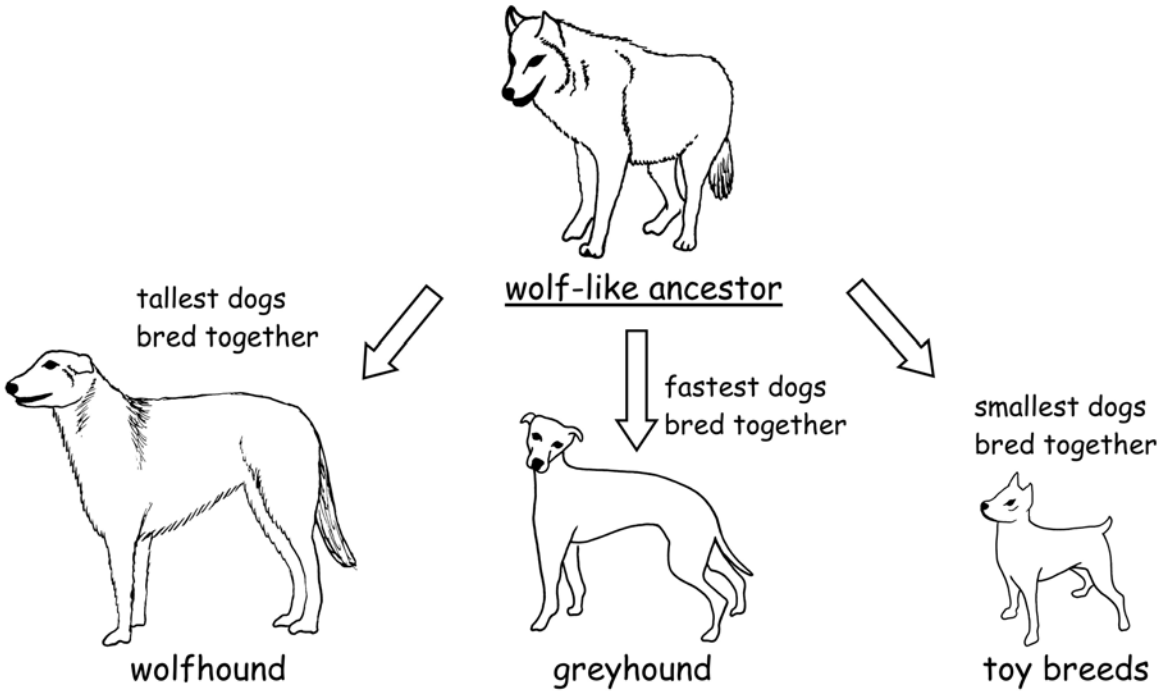
6) Food supply affects the G _ _ _ _ _ rate of young animals.

7) Plants will grow larger in soil that is rich in M _ _ _ _ _ _ _

W.S.31. Selective breeding.

Name .....

Humans have changed wild plants and animals by SELECTIVE BREEDING. This means picking out plants or animals that show the features that humans like. These are then bred together so that they pass on their features to the next generation. After many generations the plant or animal may look quite different to its wild ancestor. Dogs, cats, pigeons, rabbits, goldfish, farm animals and crops have all been produced in this way. Dog breeds have been developed from a wild wolf-like ancestor.



Scientists think that in nature all plants and animals have slowly changed over millions of years. This is called EVOLUTION. Those that are the best adapted to their environments (surroundings) have a better chance of surviving and passing on their features. Therefore nature is selecting which ones survive and breed. This idea is called NATURAL SELECTION.

Exercise - Complete the sentences below.

1) Humans have C _ _ _ _ _ _ animals and plants by selective breeding.

2) Only those that show the best F _ _ _ _ _ _ _ are allowed to breed.

3) Racing pigeons have been developed by selecting the F _ _ _ _ _ _ birds.

4) Wolfhounds have been developed by selecting the T _ _ _ _ _ _ dogs.

5) E _ _ _ _ _ _ _ _ means how plants and animals have slowly changed.

6) Natural S _ _ _ _ _ _ _ _ causes evolution.

W.S.32. A place to live.

Name ……

The place where a plant or animal lives is called its HABITAT. All species have special features called ADAPTATIONS which help them to survive in their habitats. For example a polar bear has a thick coat of fur to protect it from the cold and a camel can store large amounts of water in its stomach. The table below shows some of the ENVIRONMENTAL CONDITIONS that are important for survival.

Environmental condition	Why it is important for survival
Temperature	This affects the chemical reactions inside the cells of living organisms. When it is cold organisms slow down.
Light	Plants need light to make food by photosynthesis. Animals need the food that plants make.
Water	Water is needed to dissolve chemicals for transport and so that chemical reactions can take place.
Oxygen	This is needed so that energy can be released inside the cells by respiration. There is plenty of oxygen in the air but it may be in short supply in water, soil or mud.

Exercise 1 – Join up the organisms below to their correct habitats.

shark

buttercup

newt

monkey

fox

meadow ocean woodland pond jungle

Exercise 2 – Complete the sentences below.

1) A _____ is the place where an organism lives.

2) An _____ is a special feature that helps an organism to survive.

3) An adaptation of a cactus is a thick _____ outer covering.

4) An organism's surroundings are called its _____

5) _____ is needed for chemical reactions to take place inside cells.

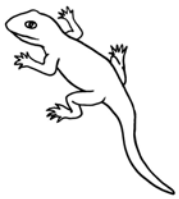
environment adaptation water habitat waterproof

W.S.33. Changing habitats.

Name ……

The conditions in a habitat are always changing from day to night and from one season to the next. Light and temperature increase after sunrise and usually reach a peak at midday. In dry deserts the days are very hot but the nights are cold. Lizards and snakes need to absorb heat from their surroundings to keep their bodies working quickly.

Early morning the lizard basks in the sun to warm its body so that it can move more quickly.



Later in the morning the lizard is very active and hunts for food.

At midday the temperature in the desert is too high and the lizard hides in the shade.

The lizard's behaviour is an adaptation to help it to survive. Many desert animals are NOCTURNAL (only active at night) when it is cooler.

The British winter is very cold and there is little food. Many animals grow a thicker fur coat to reduce heat loss. Some animals HIBERNATE. This is like a deep sleep. The body temperature falls and the heart and breathing almost stop. The body needs less energy and the animal can use its stored fat reserves over the winter.

Many birds MIGRATE during the winter months. This means that they fly to warmer countries where they can find enough food.

Exercise 1 – Write down the correct words beside their meanings.

Word	Meaning
_____	Only active at night.
_____	A deep sleep to save energy.
_____	Fly to a warmer country.

Exercise 2 – Complete the missing words in the passage below.

The conditions in a habitat are always C _ _ _ _ _ _ _ _ from day to night. In a desert it may be very hot during the day and C _ _ _ at night. Many desert animals are N _ _ _ _ _ _ _ _ _ The British winter is very cold and there is not much F _ _ _ for animals. Some animals adapt to cold winters by growing a T _ _ _ _ _ _ _ fur coat. Most animals store F _ _ under the skin during autumn. Animals hibernate to save E _ _ _ _ _

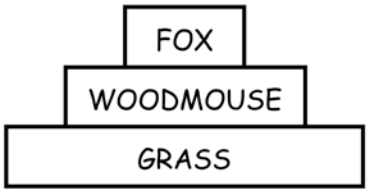
W.S.34. Food chains.

Name .....

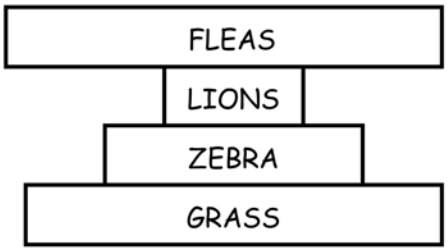
Green plants make food by PHOTOSYNTHESIS. Animals must feed on plants or other animals. The food is passed along a FOOD CHAIN.

grass ⟶ woodmouse ⟶ fox

Food chains always begin with plants. Animals that eat plants are called HERBIVORES. Animals that eat other animals are called CARNIVORES. Carnivores are also called PREDATORS and the animals that they hunt are called the PREY. In most habitats there are more plants than herbivores and more herbivores than carnivores. This can be shown with a PYRAMID OF NUMBERS.



Pyramids of numbers are usually large at the bottom and small at the top. Sometimes they have a different shape because of the different sizes of the organisms in them. Two examples of this are shown below.



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

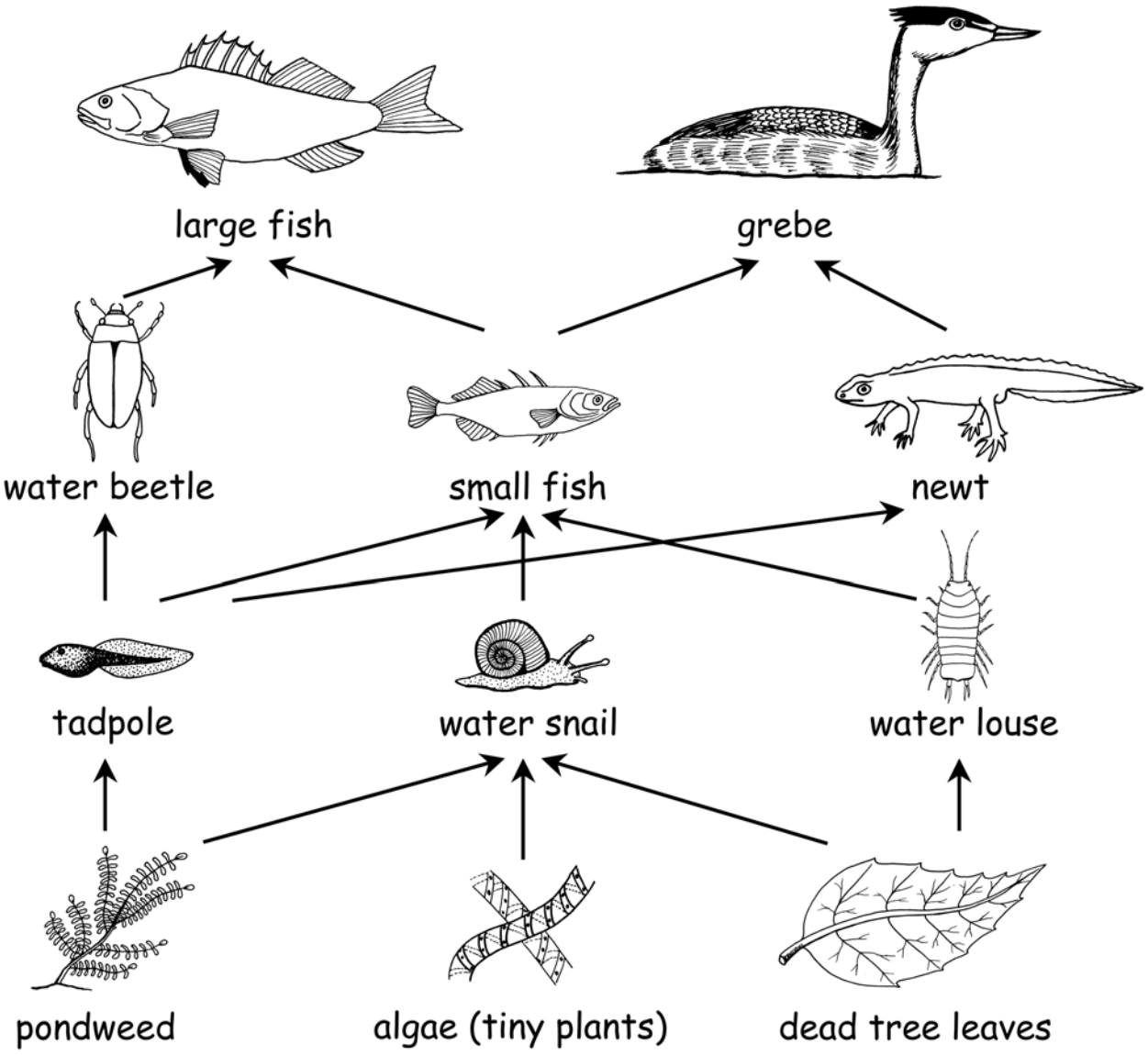
In habitats there is a mixture of ..... herbivores and carnivores. Carnivores are animals that eat other ..... Herbivores eat plants and are ..... by carnivores. Another name for carnivores is ..... and the animals that they hunt are called the ..... The amount of plants in a habitat must be ..... than the amount of herbivores or else the herbivores would run out of ..... In the same way there must be ..... carnivores than herbivores.

predators animals food fewer eaten plants prey greater

W.S.35. **Food webs.**

Name ……

Food chains can be connected together to make FOOD WEBS. The diagram below shows a food web in a lake.



Exercise - Complete the food chains and sentences below.

PONDWEED ⟶ …… ⟶ WATER BEETLE ⟶ LARGE FISH

LEAF ⟶ WATER LOUSE ⟶ …… ⟶ GREBE

1) The predators of small fish are _____ and _____

2) The prey of water beetles are _____

3) The prey of grebes are _____ and _____

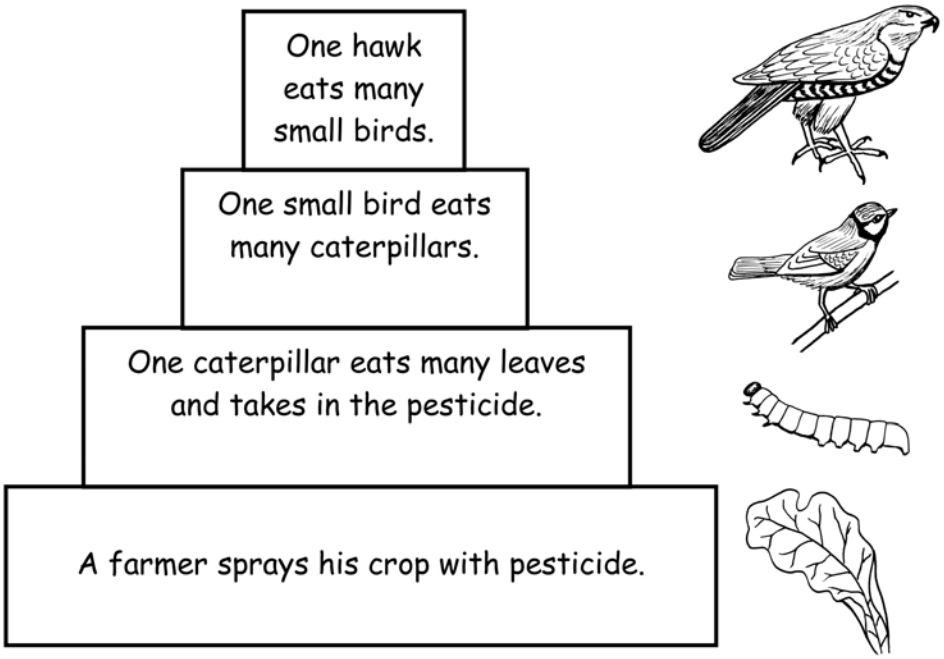
4) The animal that **only** eats dead tree leaves is the _____

5) The 3 **herbivores** are _____ _____ and _____

6) The 2 top **predators** are the _____ and _____

W.S.36. **Poisoned food chains.** Name .....

Farmers often spray their crops with PESTICIDES to kill pests such as insects and weeds. Pesticides may stay in the environment (surroundings) a long time and poison animals higher up the food chains. Pesticides can also be washed into streams and ponds. The diagram below shows how pesticides can build up along food chains.



If the pesticide is passed on from the caterpillars into small birds and then into the hawk we can see how it would quickly build up in the hawk's body. Scientists are now trying to make pesticides that only affect the pest and break down a short time after they have been used. They are also trying to find other ways of controlling pests by using their natural enemies. This is called BIOLOGICAL CONTROL.

Exercise - Complete the sentences below.

1) P _ _ _ _ _ _ _ _ _ _ are poisons that kill pests.

2) Pesticides can get into food C _ _ _ _ _ and poison other animals.

3) Small B _ _ _ _ eat many insects which may have pesticides in them.

4) Hawks may be P _ _ _ _ _ _ _ by eating birds that contain pesticides.

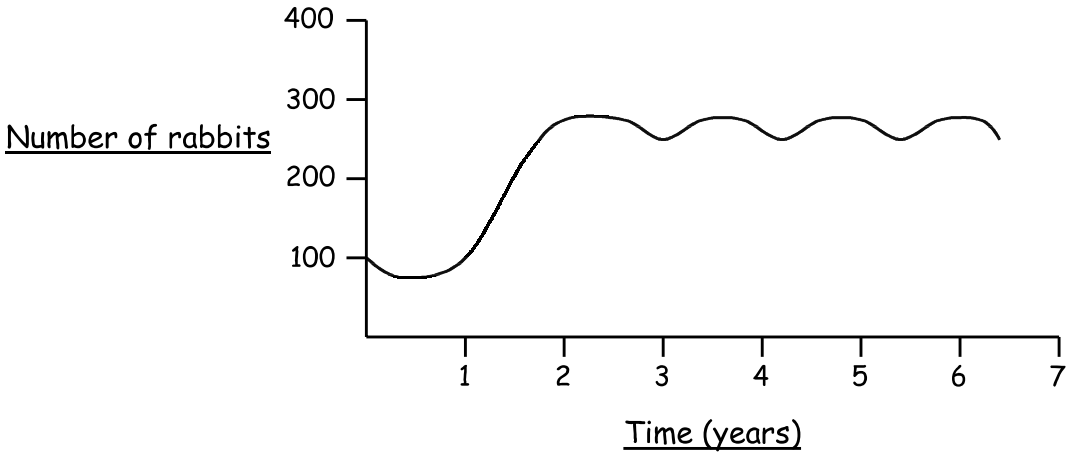
5) Pesticides can also be washed into S _ _ _ _ _ _ and P _ _ _ _

6) B _ _ _ _ _ _ _ _ _ _ control means using a pest's natural enemy to destroy it.

W.S.37. Populations.

Name ……

A population is a number of organisms of the same species (type) living in one place. For example there may be a population of one thousand tadpoles living in a pond, or a population of five hundred oak trees in a wood. The graph below shows how a population of rabbits grew when scientists placed one hundred of them onto an island where rabbits had never lived before.



The population grew slowly at first as the rabbits were getting used to their new habitat. The population then grew very quickly as the rabbits had plenty of food and space and they were reproducing. The growth rate of the population then slowed down until it reached a fairly steady level of about 260 rabbits. At this point competition between the rabbits for food and space had increased and predators were finding and killing the rabbits more easily. When the balance between the number of births and deaths becomes equal the population stops growing.

Exercise – Complete the missing words in the passage below.

A …… is a number of organisms of the same species living in one place. There are a number of factors that control how big a population of animals can …… Competition for …… and space is important. As the population grows there will be …… competition and so more animals will …… Predators are also important in controlling the numbers of …… animals. If the number of predators increases more prey will be …… If the number of predators decreases more prey will …… In the same way, the …… of a predator's population is controlled by the numbers of its prey. If there are more prey there will be more predators. A population stays steady when the number of births equals the number of ……

size greater prey population deaths killed grow survive food die

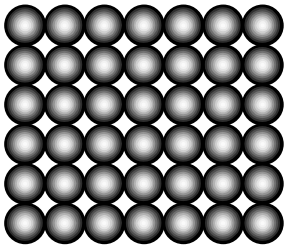
W.S.38. Solids, liquids and gases.

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.

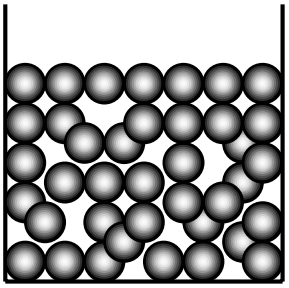
Solids.

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.



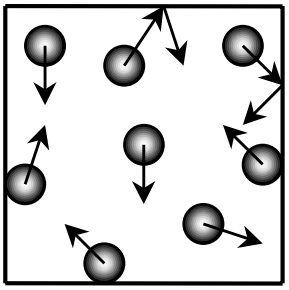
Liquids.

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.

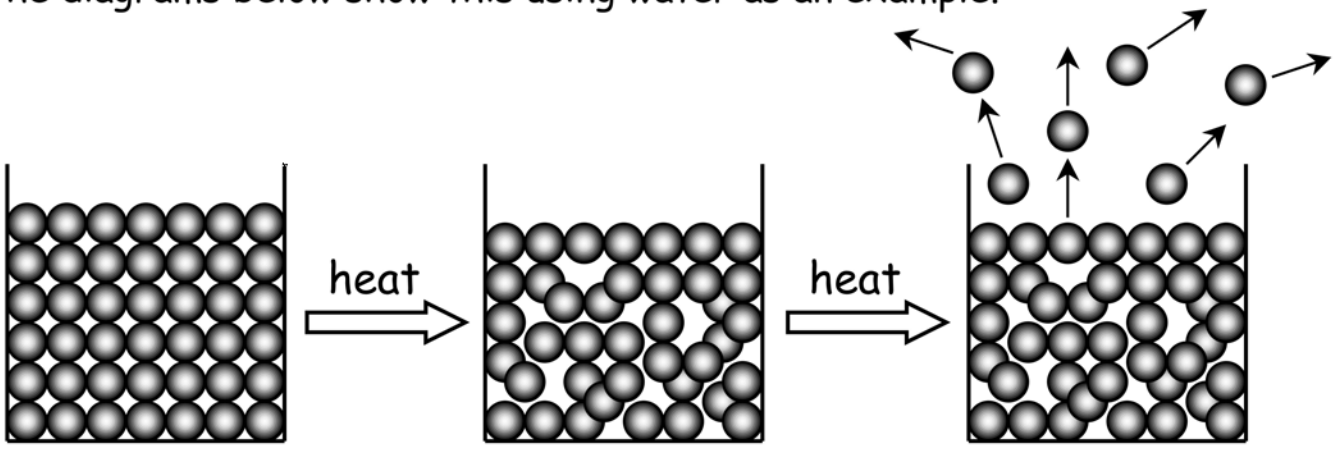


Exercise – Complete the spaces in the table below.

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.



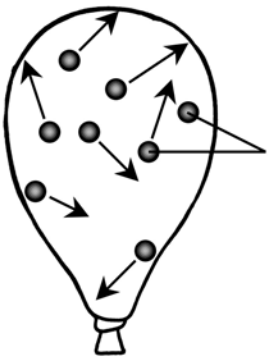
Solid – ice.
The particles are held firmly in place but they vibrate.

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.

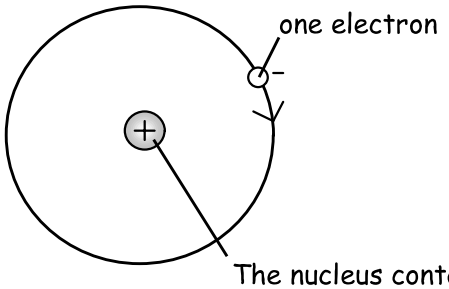
Exercise – Join up the words in the left-hand column with their meanings in the right-hand column.

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.

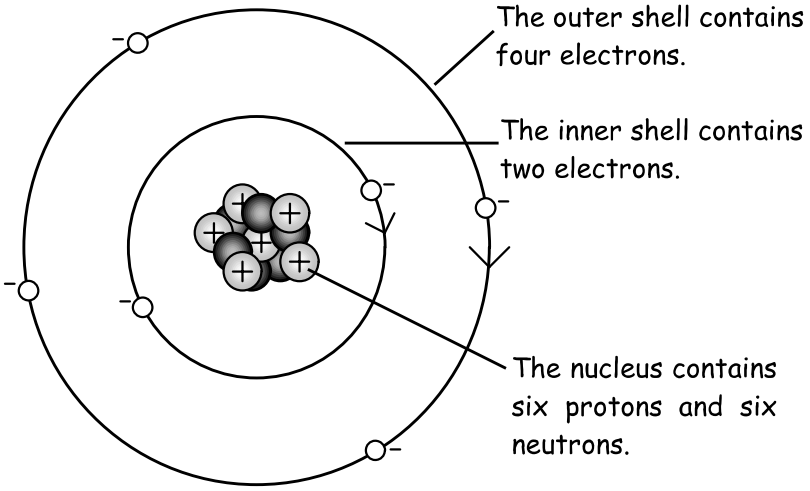
W.S.40. **Elements.** Name .....

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.

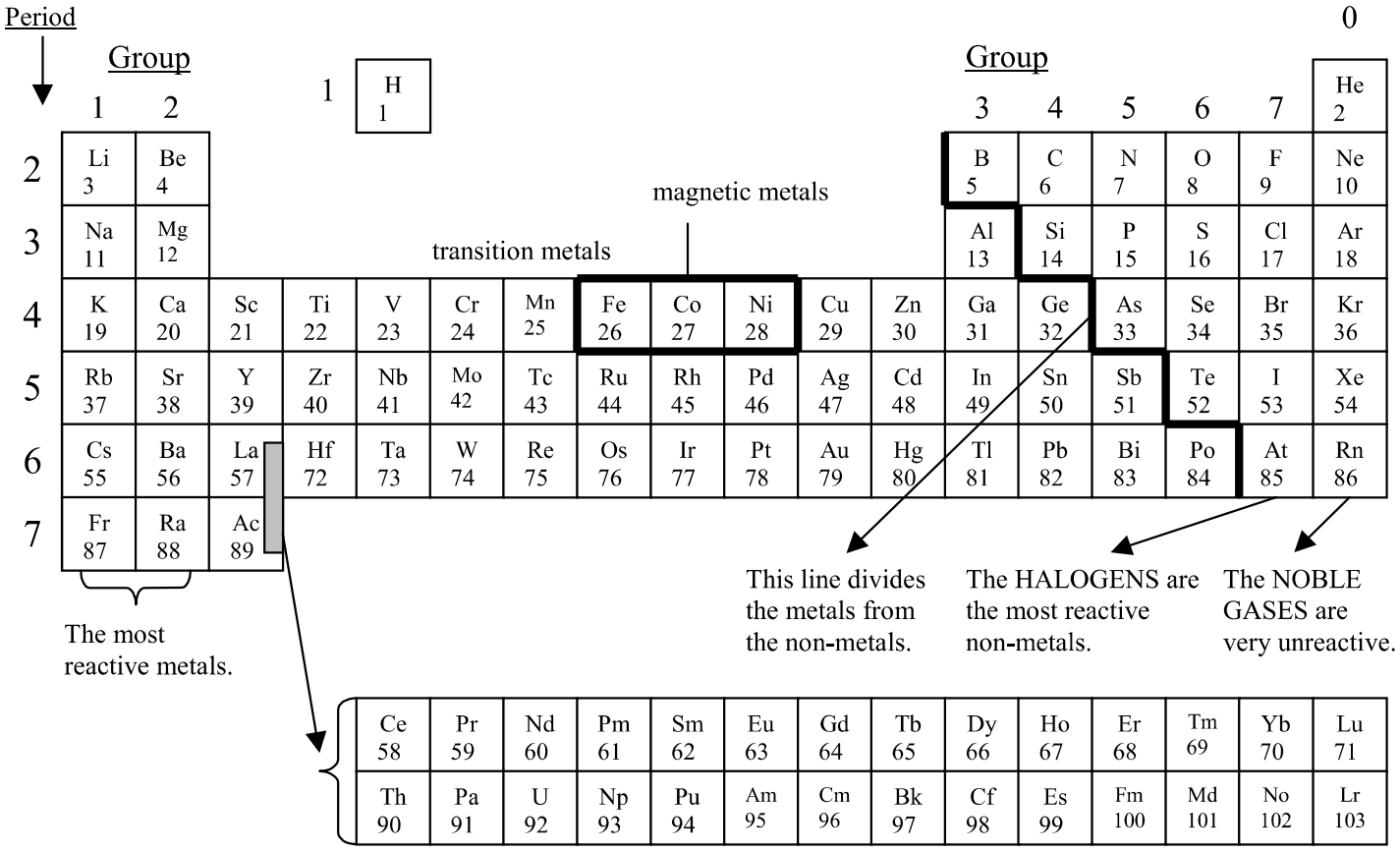
5) Protons have a _ _ _ _ _ _ _ _ _ charge.

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.



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.

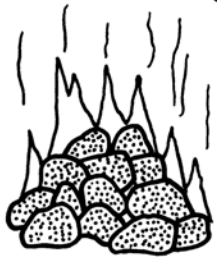
magnetic noble two hydrogen reactive five halogens properties oxygen protons

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.

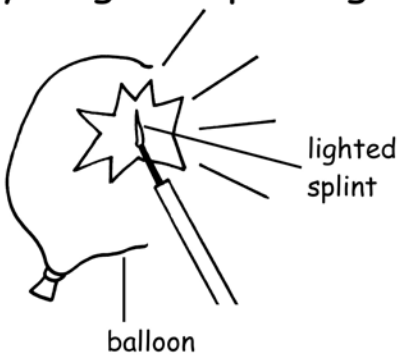
Coal burning



CARBON + OXYGEN ⇨ CARBON DIOXIDE + HEAT

..... + O_2 ⇨ CO_2 + HEAT

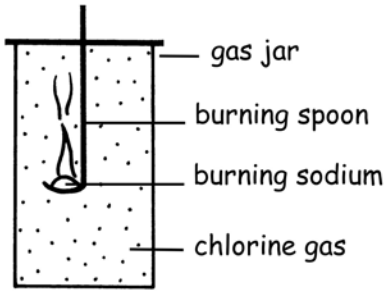
Hydrogen exploding



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.

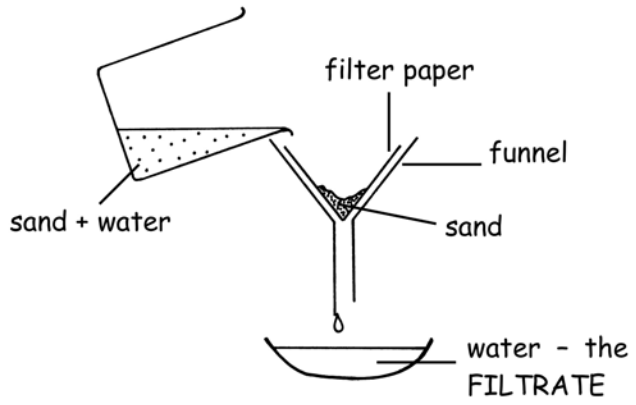
When salt dissolves in water it is a _____ change.

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

When ice melts it is a _____ change.

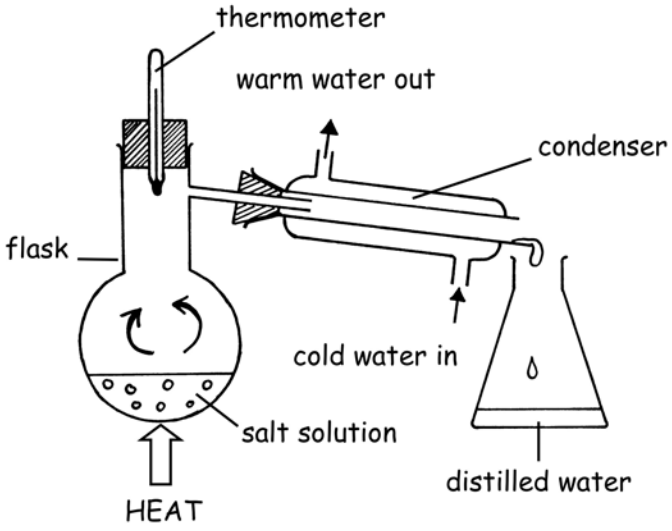
W.S.43. **Separating mixtures.** Name .....

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.



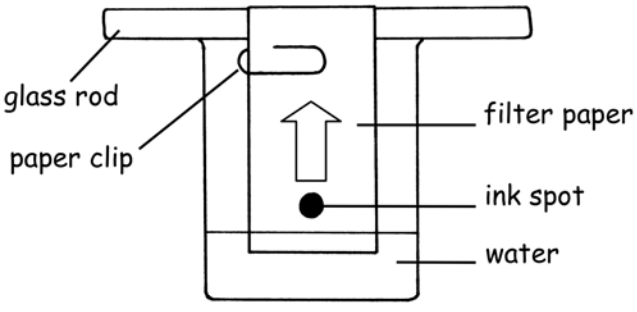
Filtration.

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

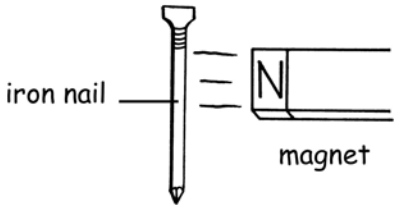
W.S.44. Metals and non-metals.

Name .....

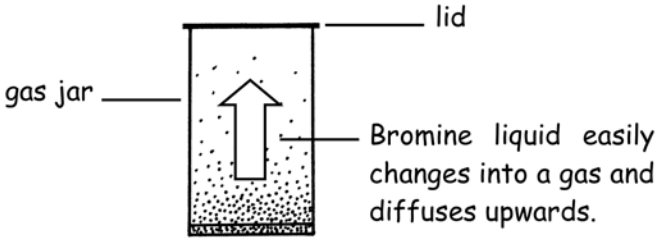
The elements can be divided into two main groups which are METALS and NON-METALS. The table below shows the properties of each group.

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).

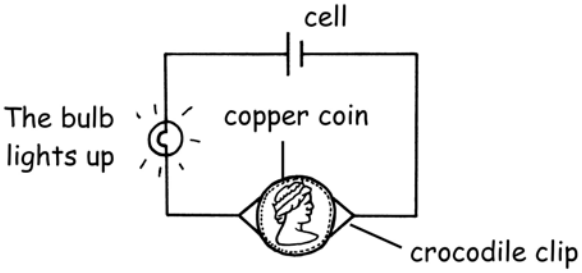
Exercise 1 - For each diagram below write down if the element is a metal or a non-metal.



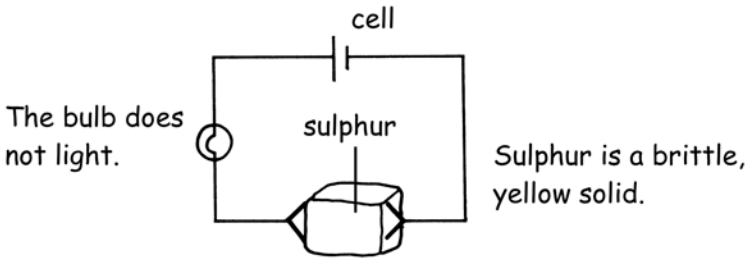
Iron is a _____



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.

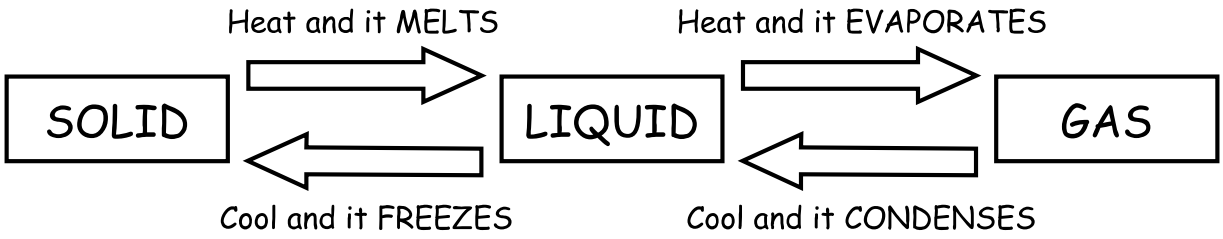
3) The M _ _ _ _ _ _ _ metals are iron, cobalt and nickel.

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

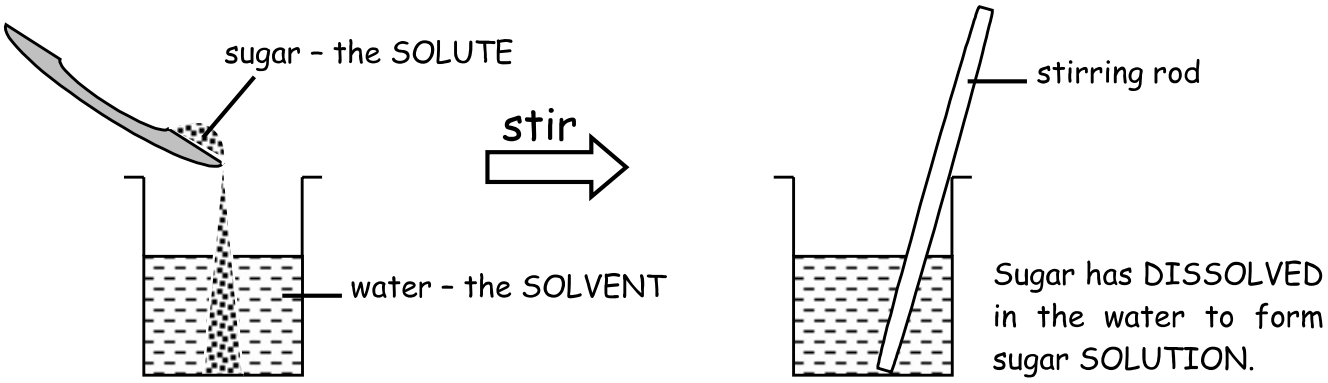
5) Iron melts at a temperature of _____ °C

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.

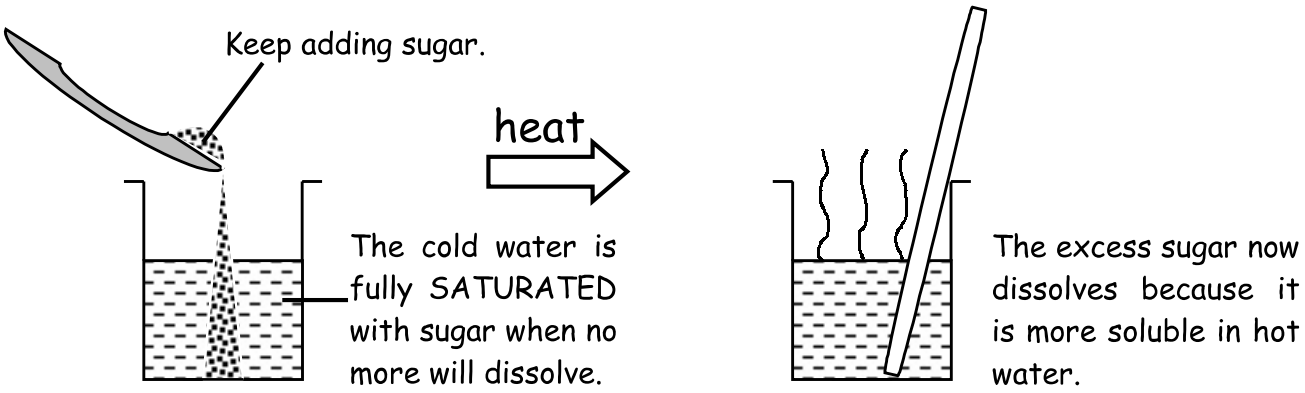


Exercise 1 – Fill in the missing words in the passage below.

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 _ _ _ _ _ _ _ _

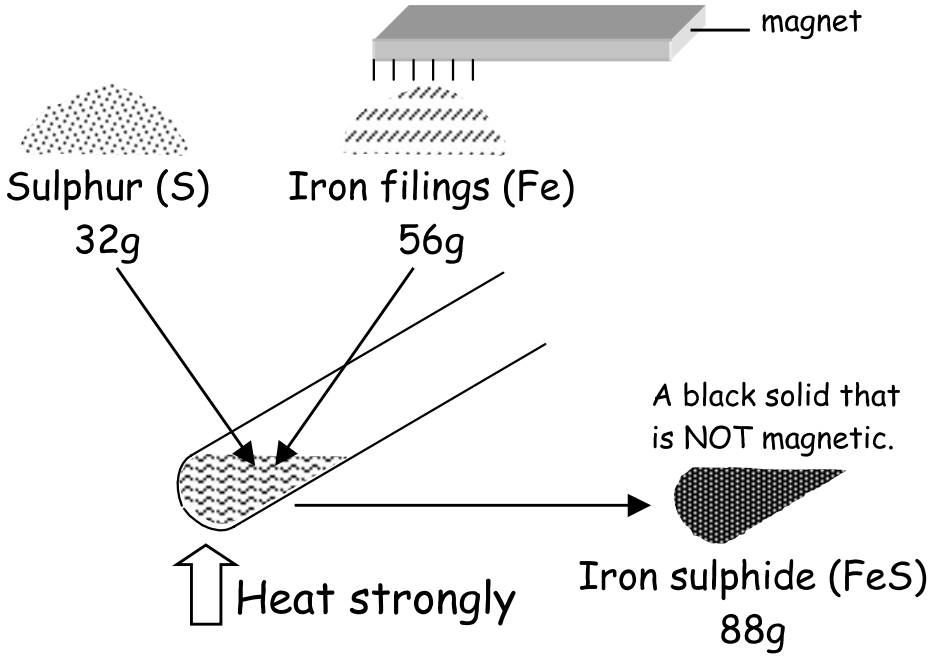
2) A solution that cannot dissolve any more solute is fully _ _ _ _ _ _ _ _ _ _

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 (REACTANTS) ⟹ IRON SULPHIDE (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

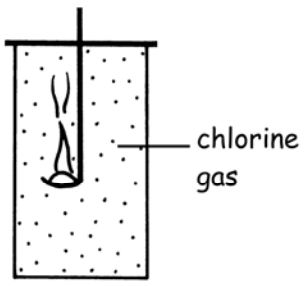
A substance gains oxygen during a chemical reaction. The substance that gains the oxygen is OXIDISED. For example, if copper is heated in air :

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

Exercise 1 - Complete the sentences below.

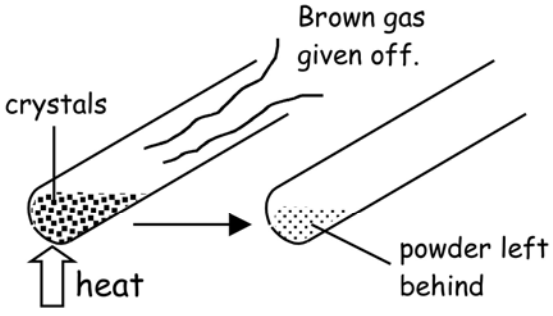
1) Synthesis means when substances _ _ _ _ together.
2) Decomposition means when a substance _ _ _ _ _ _ down.
3) Oxidation is when a substance gains _ _ _ _ _ _ in a chemical reaction.

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 ……

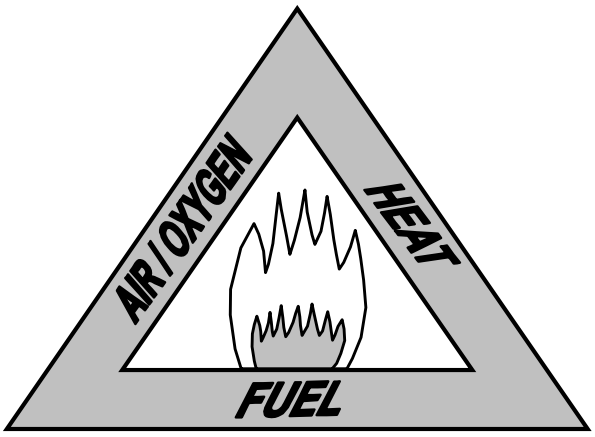
Burning is a type of oxidation reaction. It happens when a substance reacts with oxygen in the air to produce heat and light. The substance that burns is oxidised during the reaction. For example when carbon in the form of coke is burnt :

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.

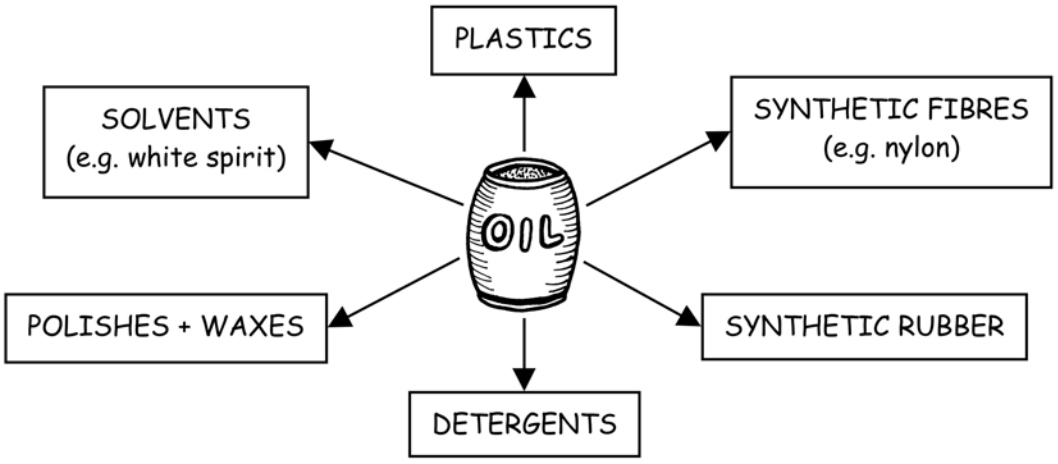
Metal ores.

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.

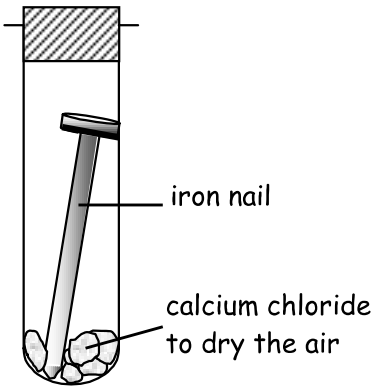
5) N _ _ _ _ is a synthetic fibre.

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

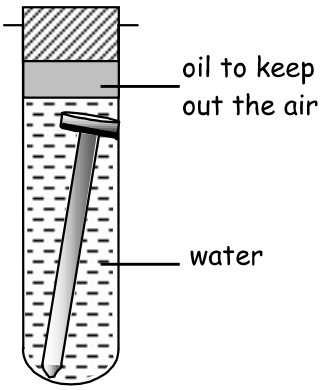
Some chemical reactions are harmful because they destroy our products.

Corrosion of metals.

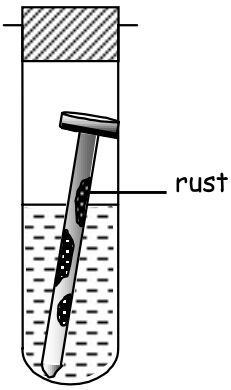
Metals may be attacked by air, water or other substances around them. Usually the more reactive the metal is, the faster it corrodes. The corrosion of iron and steel is called RUSTING. The experiment below shows that both air and water are needed for rusting to happen.



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.

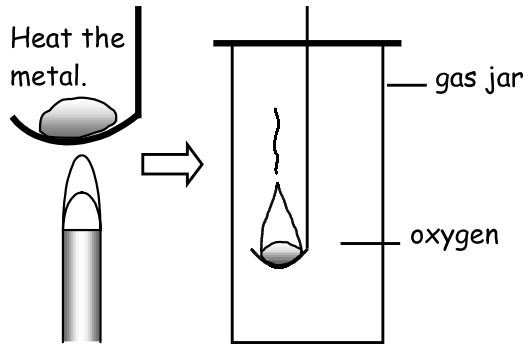
6) Sulphur dioxide gas forms A _ _ _ rain

W.S.57. Reactivity of metals.

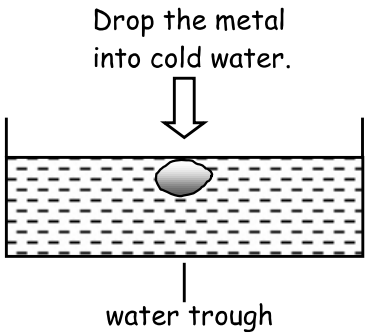
Name ……

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 :

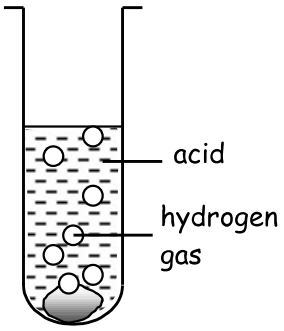
Reaction with oxygen.



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.

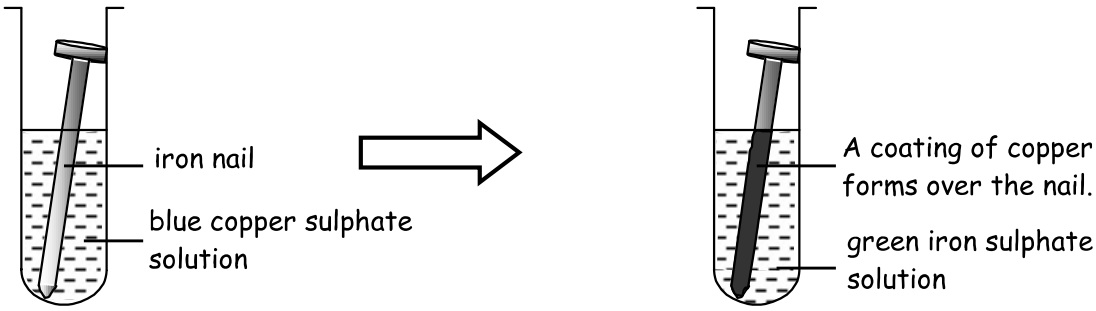
5) _ _ _ _ does not corrode because it is an unreactive metal.

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.

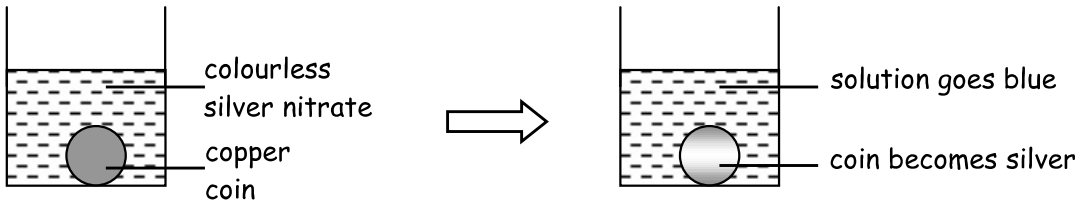


Iron and copper compete to be the compound in the solution. Iron is more reactive and so it DISPLACES (pushes out) the copper in the solution.

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 .....

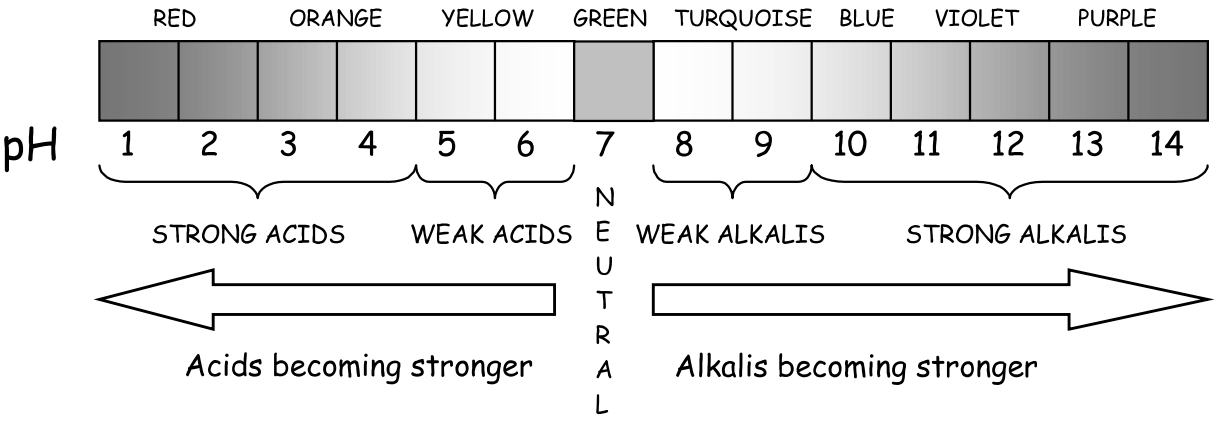
Acids are CORROSIVE (eat into materials). They react with some metals to form hydrogen gas and a salt. Acids have a sour taste, and many are poisonous. A purple dye called LITMUS changes to a **red** colour in acids.

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.

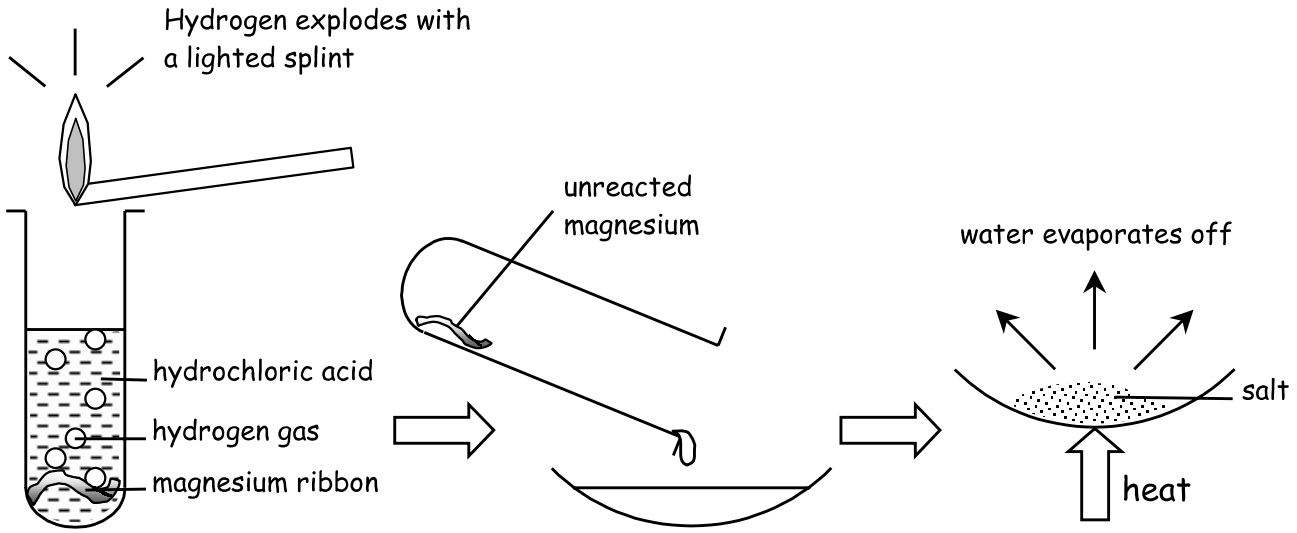
W.S.60. Acids and metals.

Name .....

Metals that are more reactive than copper will react with acids to form hydrogen gas and a salt.

ACID + METAL ⇨ HYDROGEN + SALT

The more reactive the metal is, the faster the reaction will be. The experiment below shows the reaction between hydrochloric acid and magnesium.



1) The magnesium reacts with the acid.

2) A solution of magnesium chloride has formed.

3) **Magnesium chloride** salt is left behind.

Exercise - Complete the missing words in the sentences and equations below.

1) A metal must be more reactive than C _ _ _ _ _ to react with an acid.

2) ACID + METAL ⇨ HYDROGEN + _____

3) Reactive metals produce hydrogen F _ _ _ _ _ than unreactive metals.

4) The test for H _ _ _ _ _ _ _ is a lighted splint.

5) Hydrogen is an E _ _ _ _ _ _ _ _ gas.

6) hydrochloric acid + magnesium ⇨ _____ + magnesium chloride

7) All of the A _ _ _ has reacted when there are no more hydrogen bubbles given off.

8) The S _ _ _ that has been made is magnesium chloride.

W.S.62. **Neutralisation.** Name ……

Sometimes we need to NEUTRALISE (cancel out) acids or alkalis. Acids and alkalis can be used to neutralise each other. The diagrams below show some examples of this.

Acid indigestion

Stomach contains hydrochloric acid. Too much acid causes indigestion.

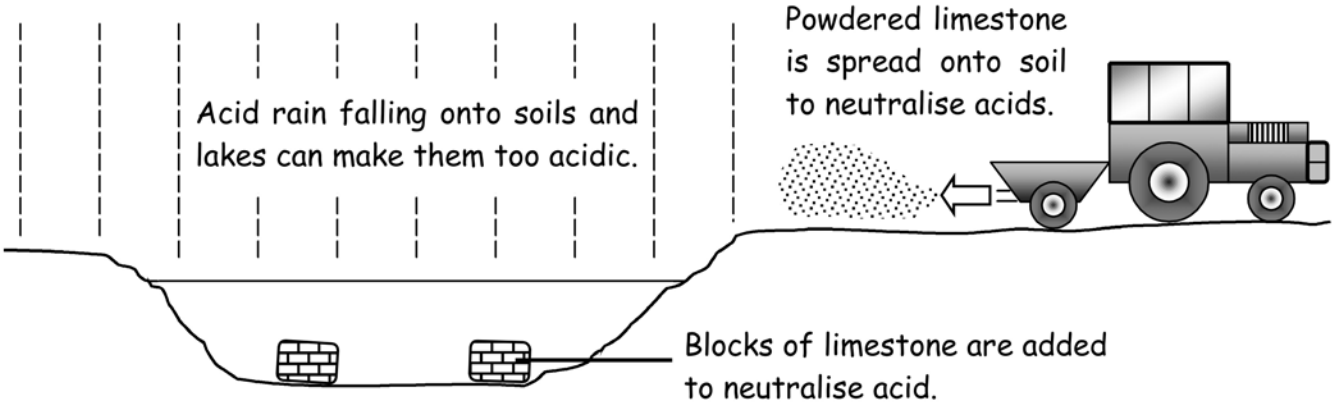
Indigestion tablets contain a weak alkali to neutralise the acid.

Insect stings

Sting injects poison.

WASP STING - alkaline so treat it with a weak acid such as vinegar.
BEE STING – acidic so treat it with a weak alkali such as sodium bicarbonate.

Acid soils and lakes



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

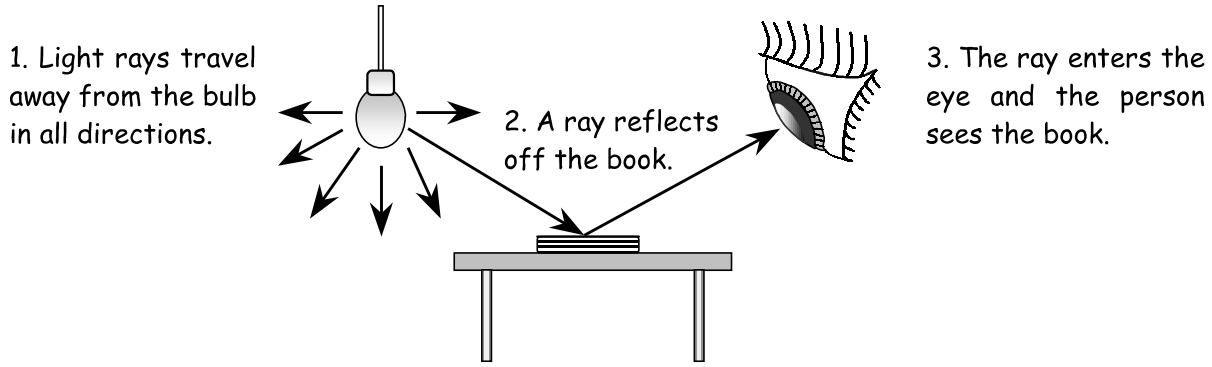
The stomach contains …… acid. If there is too much acid in the stomach it causes …… Tablets can be taken that contain a weak …… to neutralise the acid. A bee sting is …… and must be treated with a weak alkali such as sodium …… A wasp sting is alkaline and must be treated with a weak acid such as …… Soils and lakes can become too acidic in areas that are polluted with acid …… Blocks of …… can be added to lakes to neutralise the acid and …… limestone can be spread onto fields.

powdered vinegar hydrochloric acidic limestone rain alkali bicarbonate indigestion

W.S.75. Reflection.

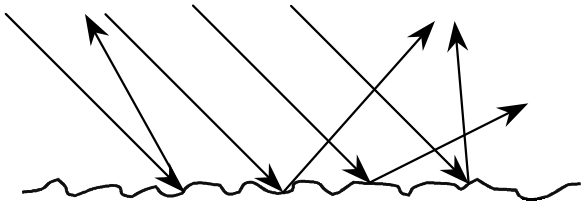
Name ……

We can see objects because light travels from them into our eyes. LUMINOUS objects make their own light, e.g. the Sun, a light bulb and a candle. Most objects do not make their own light. We see them because light bounces off them into our eyes. This is called REFLECTION.

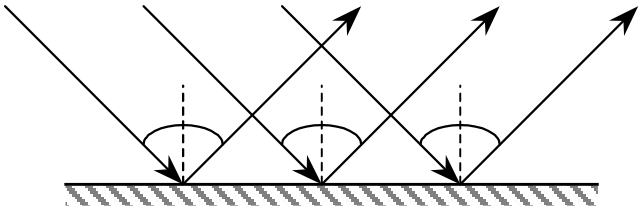


Mirrors.

Mirrors have a very smooth, shiny surface. All of the light rays bounce off them at the same angle. This is what makes a clear REFLECTION.



Light rays are reflected off the paper in all directions due to its rough surface.



Light rays hitting a mirror are all reflected at the same angle due to its smooth surface.

The rays that hit the mirror are called the INCIDENT RAYS. The diagram above shows that the **REFLECTED RAYS leave the surface of the mirror at the same angle that they came in at**.

Exercise – Complete the questions below.

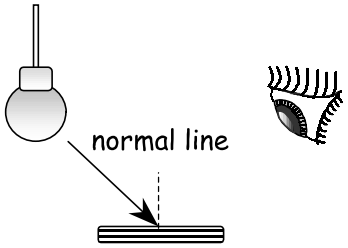
1) A L _ _ _ _ _ _ _ object gives off its own light.

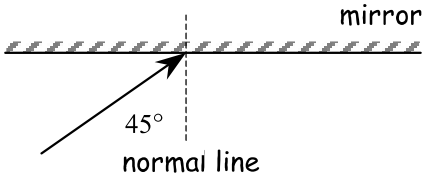
2) Underline the objects below that give off their own light.

TORCH BOOK CANDLE MIRROR GLOW WORM MOON SUN COIN FIREWORK

3) We can see our R _ _ _ _ _ _ _ _ _ _ in shiny, smooth surfaces.

4) Complete the diagrams below.

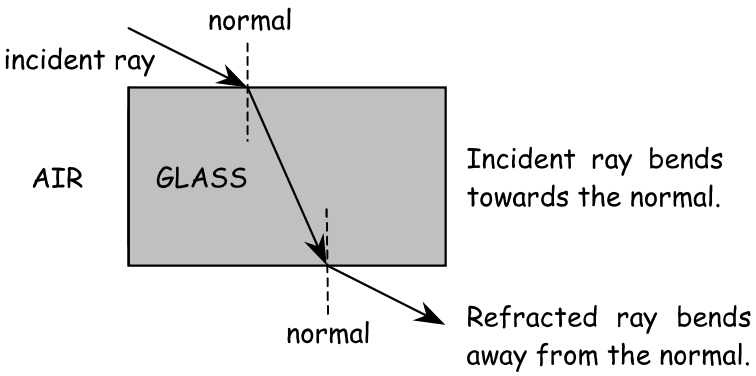




W.S.76. Refraction of light.

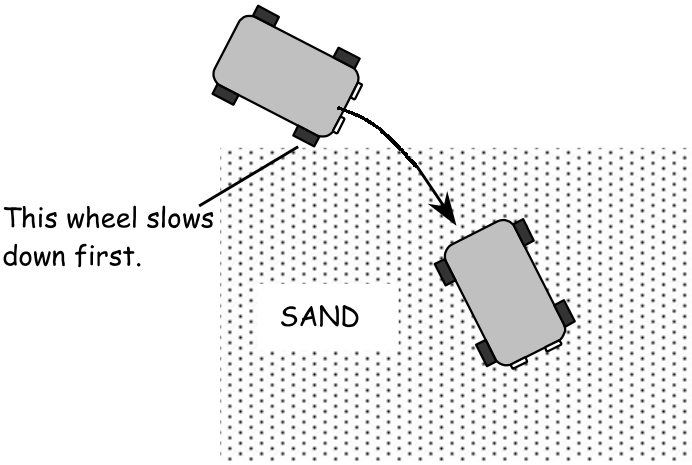
Name .....

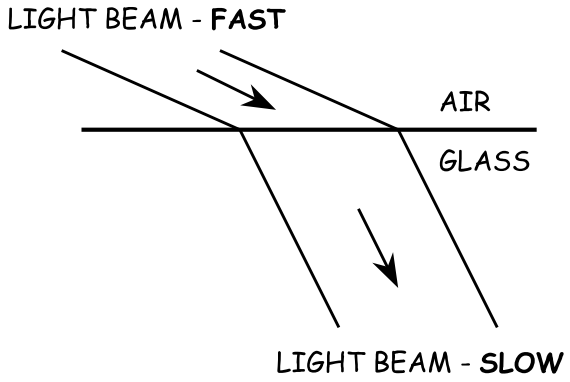
Any material that light can travel through is called a MEDIUM. When light rays travel from one medium to another they bend. This is called REFRACTION. The diagram shows how a ray of light bends as it travels from air, into a glass block, and out again.



How refraction happens.

The light bends because it travels more slowly in glass than it does in air. This can be compared to a car that travels more quickly on a road than it does on sand :





Exercise - Complete the sentences and diagram below.

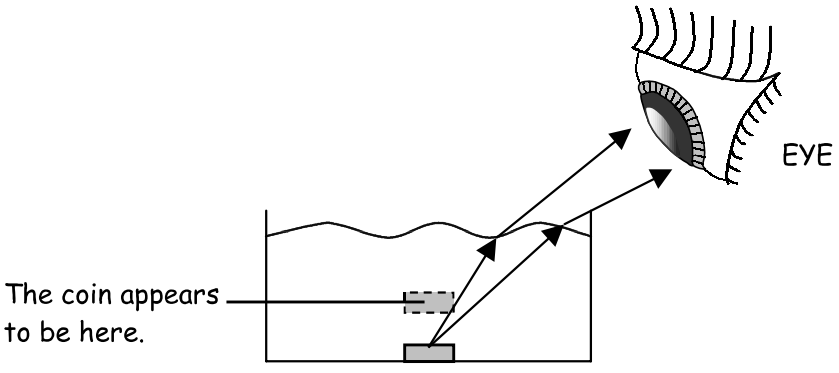
1) Any material that light can travel through is called a M _ _ _ _ _

2) The bending of light is called R _ _ _ _ _ _ _ _ _ _

3) Light travels more _ _ _ _ _ _ in glass than it does in air.

4) Light bends as it passes from air to glass because it changes _ _ _ _ _

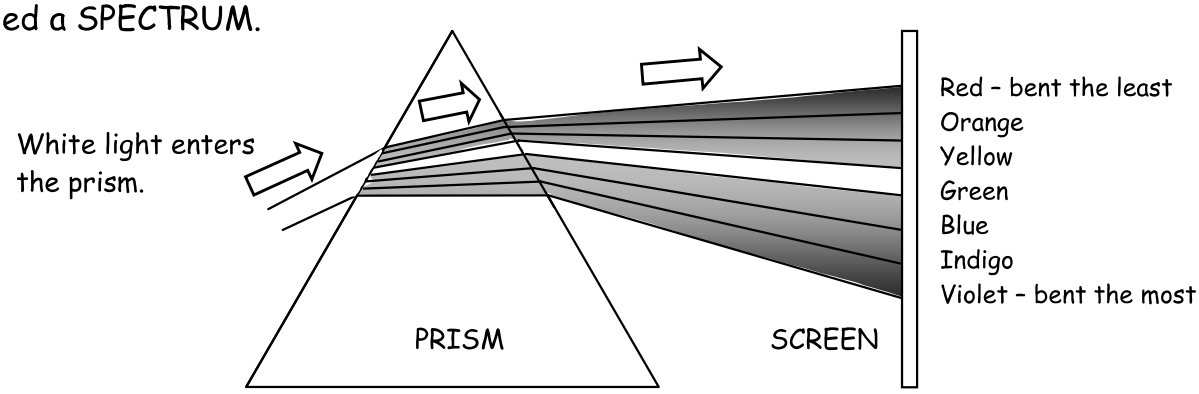
Complete the diagram below to show why the coin appears higher in the water than it really is.



W.S.77. The spectrum.

Name .....

A PRISM is a triangular glass block. If a beam of white light is passed through a prism it is REFRACTED (bent). The light is also split up into seven different colours called a SPECTRUM.

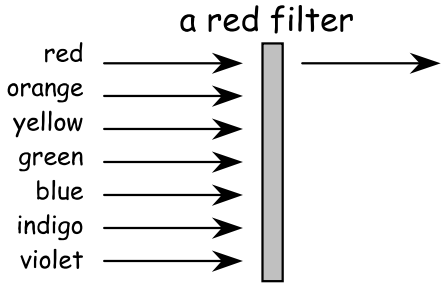


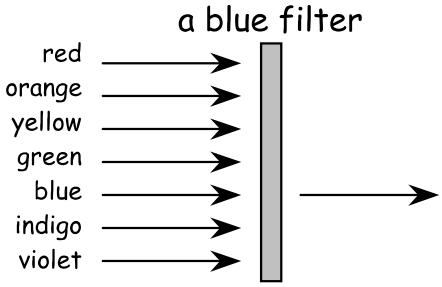
This spreading out of colours is called DISPERSION. It also happens when light hits rain drops which is how rainbows form. An easy way to remember the order that the colours appear in is to remember this rhyme :

Richard **O**f **Y**ork **G**ave **B**attle **I**n **V**ain.

The effect of coloured filters on white light.

A FILTER only allows one colour of light to pass through it. The filter ABSORBS the other colours so they do not pass through.





Exercise – Complete the sentences and diagram below.

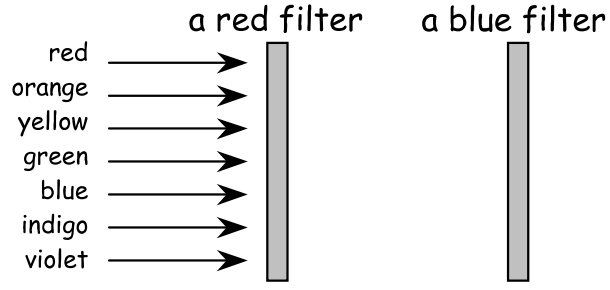
1) The range of colours in white light is called the S _ _ _ _ _ _ _

2) The spreading out of the seven colours is called D _ _ _ _ _ _ _ _ _ _

3) The colour that is bent the least by a prism is _ _ _

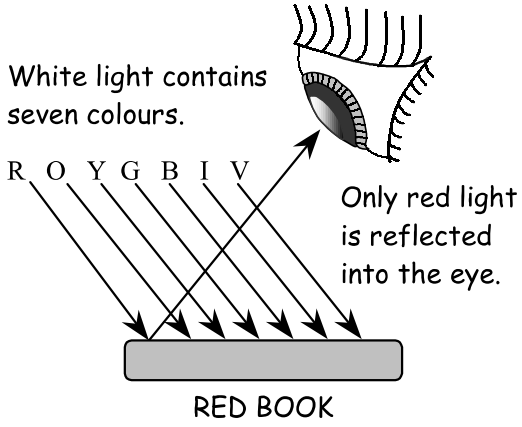
4) The colour that is bent the most by a prism is _ _ _ _ _ _

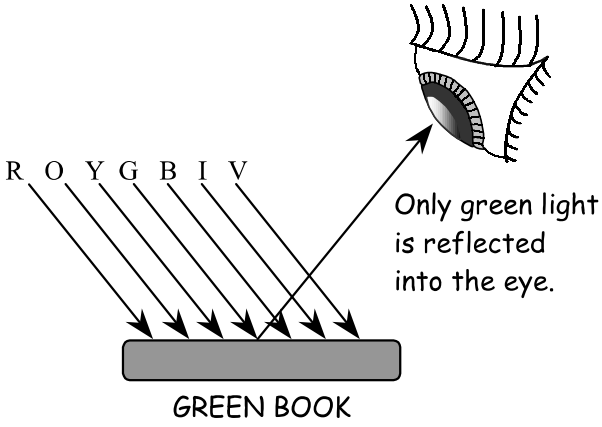
Complete the diagram below to show what would happen to the light as it meets the two filters.



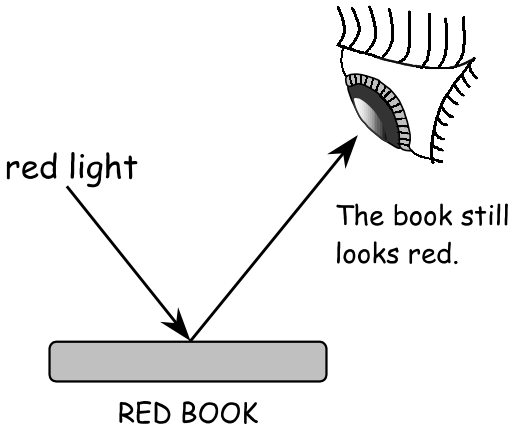
W.S.78. Coloured objects in coloured lights. Name .....

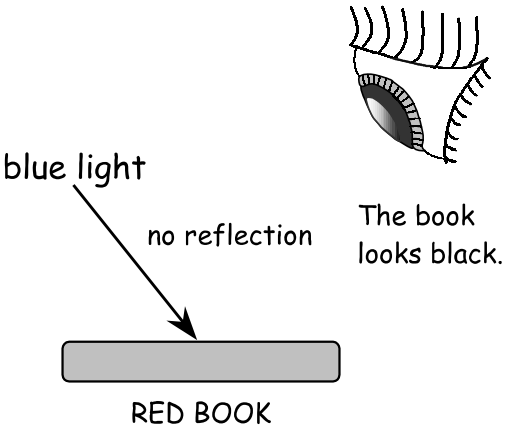
A white object reflects all seven colours of the spectrum. A red object looks red because it only allows red light to reflect off it. The rest of the colours of the spectrum are absorbed by the object.





In red light the red book still looks red because it reflects the red light. If the book is placed in any other colour of light it will absorb the light . No light is reflected off the book into the eye so it looks black.





The important rule from this is :

Coloured objects only reflect their own colour light.

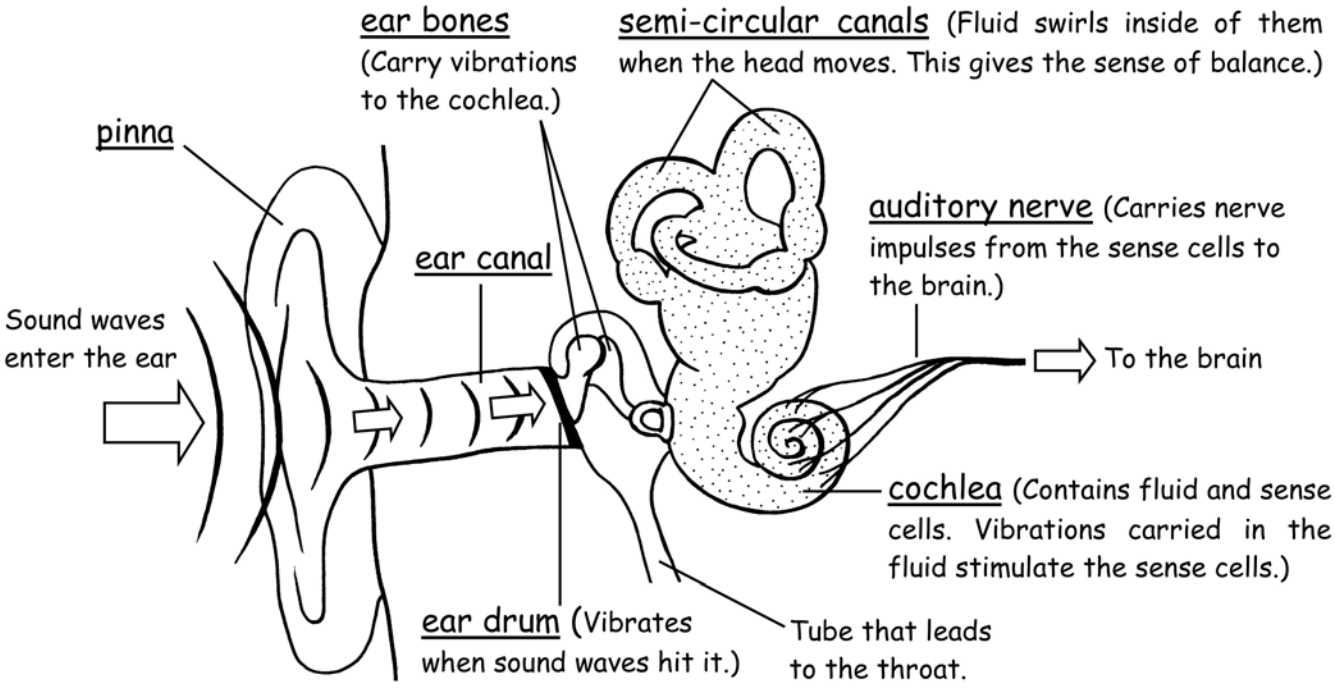
Exercise - For the items of clothing in the table below write down the colours that they would look in the different lights shown. Some have been done for you.

Item of clothing	In white light	In red light	In green light	In blue light
white shirt			GREEN	
red tie	RED			
blue jeans				BLUE
green belt				BLACK

W.S.79. Hearing.

Name ……

We hear things when SOUND WAVES pass into our ears. The diagram below shows the parts of the human ear and how we hear.



Hearing ranges.

The range of pitches that a person can hear is called their HEARING RANGE. Different people have different hearing ranges. Young people can hear higher pitched sounds than older people. Young people can also hear quieter sounds.

Hearing damage.

The sense cells in the cochlea are very delicate. If a person is exposed to very loud noises over a long time the sense cells can become damaged and the person can become partially deaf. This is why people who work in very noisy places must wear ear protection. This is also the reason why it is dangerous to listen to personal stereos at too high a volume.

Exercise - Join up the parts of the ear with their correct descriptions below.

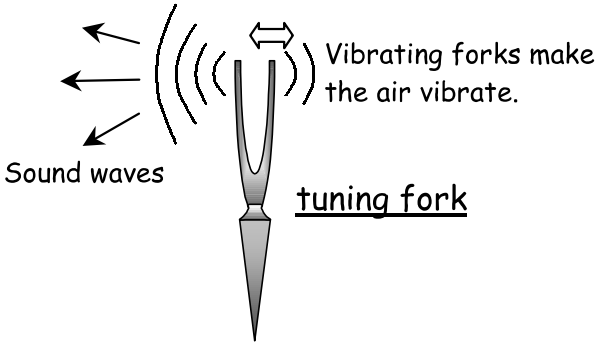
Part of ear	Description
ear drum	a tube that carries sound waves to the ear drum
ear canal	a tight sheet of skin that vibrates when sound waves hit it
auditory nerve	sends nerve messages to the brain
ear bones	contains the sense cells that detect vibrations
cochlea	pass the vibrations from the ear drum to the cochlea

W.S.80. Sound.

Name .....

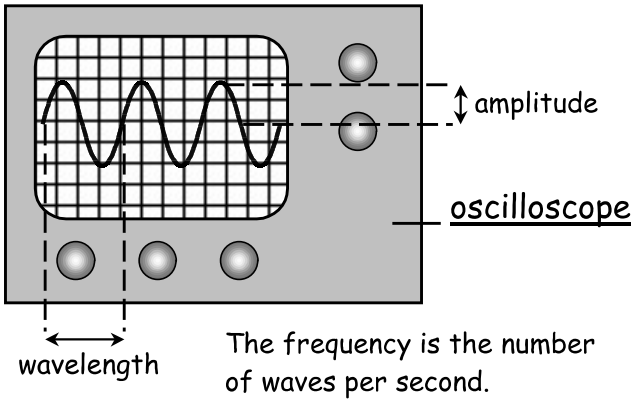
Sound waves.

Sound waves are made by vibrating objects. The diagram shows a tuning fork. The ends of the fork are vibrating (moving backwards and forwards) very quickly. This makes sound waves.



Loudness and pitch.

The diagram shows the shape of sound waves on an oscilloscope screen. The bigger the AMPLITUDE (height of the waves) the louder the sound. The greater the FREQUENCY (number of waves per second) the higher the PITCH. A short wavelength gives a high frequency.



Exercise 1 – Complete the sentences below.

1) Sounds are made by V _ _ _ _ _ _ _ _ objects.

2) Sound travels as W _ _ _ _

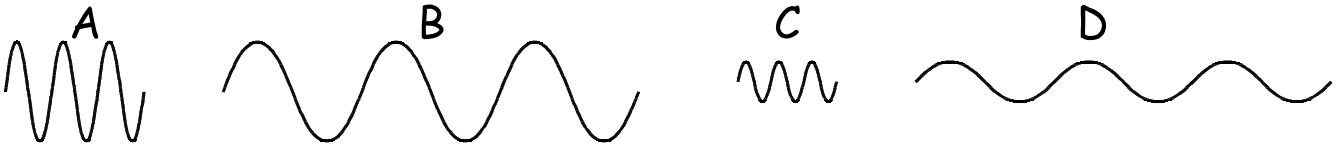
3) The A _ _ _ _ _ _ _ _ means the height of a sound wave.

4) The F _ _ _ _ _ _ _ _ means the number of waves in one second.

5) The greater the frequency the H _ _ _ _ _ the pitch.

6) The longer the wavelength the L _ _ _ _ the frequency.

Exercise 2 – Match the diagrams to their correct descriptions below.



HIGH PITCH AND QUIET = ___

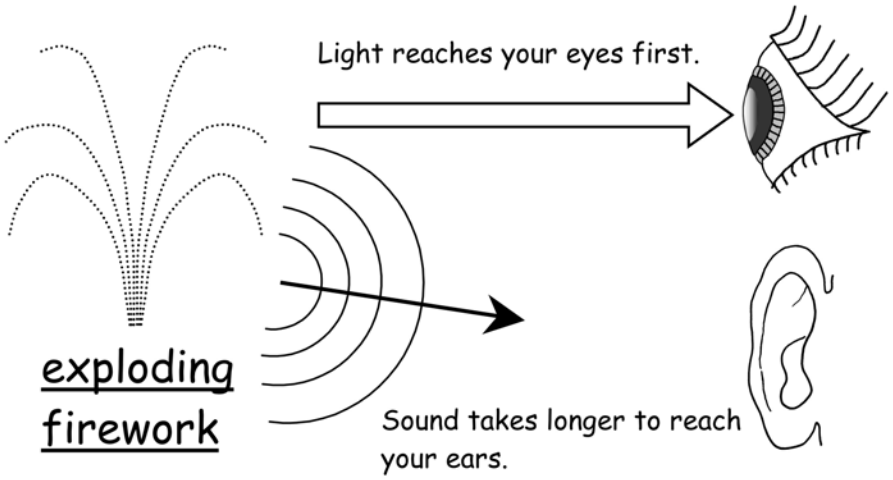
HIGH PITCH AND LOUD = ___

LOW PITCH AND QUIET = ___

LOW PITCH AND LOUD = ___

W.S.81. Comparing Light and Sound. Name .....

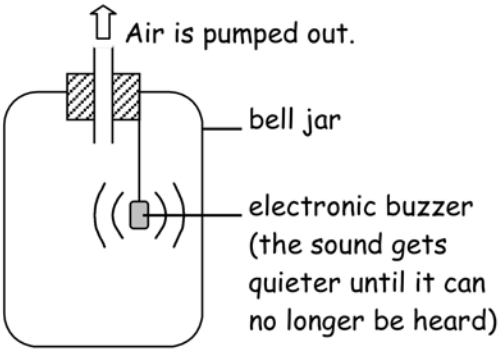
In air light travels at a speed of 300,000,000 metres per second. Sound travels much more slowly at a speed of about 330 metres per second. This is why we see an exploding firework before we hear it.



Light can only travel through TRANSPARENT materials such as water and glass. Sound must have a MEDIUM (substance) to travel through because something is needed to pass on the vibrations. Sound travels better through solids than it does through air.

Sound in a vacuum.

Sound can travel through solids, liquids and gases. The diagram shows a bell jar that contains an electronic buzzer. As the air is pumped out of the jar the sound of the buzzer becomes quieter. When there is no air left inside the jar (a vacuum) the buzzer cannot be heard because there is nothing to carry the vibrations. SOUND CANNOT TRAVEL THROUGH A VACUUM.



Exercise - Complete the sentences below.

1) The speed of light is much _____ than the speed of sound.

2) Light can only travel through _____ materials.

3) You _____ a firework before you _____ it.

4) Sound needs a _____ to travel through.

5) _____ cannot travel through a vacuum.

6) _____ can travel through a vacuum.

see light transparent hear sound faster medium

Worksheet 5 A balanced diet.

Exercise 1 healthy types fats correct starch energy warm protein vitamins intestines

Exercise 2 potato – carbohydrate, fish – protein, fruit – vitamins, minerals and fibre,
sausages – protein and fat, whole grain bread – carbohydrate and fibre,
milk – protein and minerals, chicken – protein, cake – carbohydrate

Worksheet 6 Food and digestion.

Exercise 1 repair energy heat cells digestive intestines

Exercise 2 **clockwise from top right :**

gullet stomach pancreas small intestine rectum anus appendix large intestine
liver gall bladder salivary gland tongue

Worksheet 7 Stages of digestion

mouth gullet stomach small intestine pancreas liver large intestine appendix rectum

Worksheet 8 Blood.

plasma red dissolved oxygen germs platelets cut scabs

Worksheet 9 The blood system.

1) vessels 2) veins 3) pump 4) heart 5) walls 6) cells 7) waste

Worksheet 10 Moving the body.

1) fibres 2) shortens 3) tendons 4) push 5) pairs 6) biceps 7) triceps

Worksheet 11 Growing up.

Exercise 1 children puberty body attracted hormone changes oestrogen

Worksheet 12 The human reproductive system.

sperm tube penis duct swim urine ova month oviducts food

Worksheet 13 The menstrual cycle.

1.) month 2) ovulation 3) 14 days 4) feeds 5) die 6) uterus

Worksheet 14 Ovulation and fertilisation.

1) ovulation 2) fertilisation 3) oviduct 4) divide 5) cells 6) uterus

Worksheet 15 The developing baby.

1) foetus 2) amnion 3) protects 4) oxygen 5) waste 6) umbilical cord

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

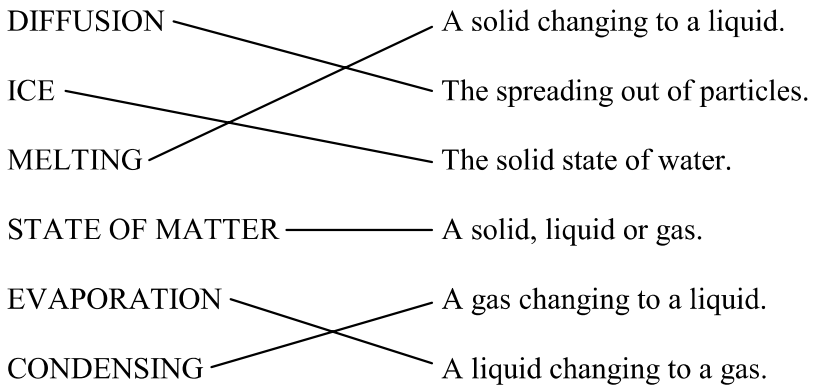
Worksheet 37 Populations.

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

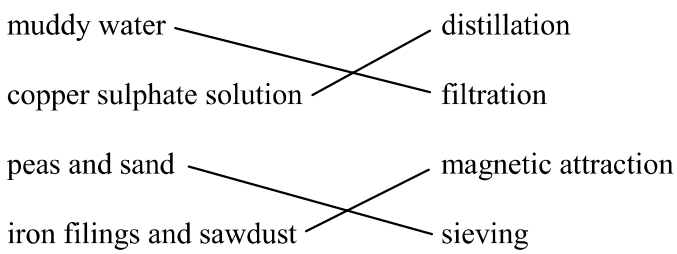
Exercise 2 chemical physical chemical physical

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

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

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 74 Pressure.

1) 10,000N/m^2 2) 2,500,000N/m^2 3) 140N

Worksheet 75 Reflection.

1) luminous 2) torch, candle, glow worm, Sun, firework 3) reflection

4) diagrams are drawn to show that the angle of reflection = the angle of incidence

Worksheet 76 Refraction of light.

1) medium 2) refraction 3) slowly 4) speed light rays traced back to where the coin appears to be

Worksheet 77 The spectrum.

1) spectrum 2) dispersion 3) red 4) violet

only the red light passes through the red filter but it does not pass through the blue filter.

Worksheet 78 Coloured objects in coloured lights.

Item of clothing	In white light	In red light	In green light	In blue light
white shirt	**white**	**red**	green	**blue**
red tie	red	**red**	**black**	**black**
blue jeans	**blue**	**black**	**black**	blue
green belt	**green**	**black**	**green**	black

Worksheet 79 Hearing.

Part of ear	Description
ear drum	a tube that carries sound waves to the ear drum
ear canal	a tight sheet of skin that vibrates when sound waves hit it
auditory nerve	sends nerve messages to the brain
ear bones	contains the sense cells that detect vibrations
cochlea	pass the vibrations from the ear drum to the cochlea

Worksheet 80 Sound

Exercise 1 1) vibrating 2) waves 3) amplitude 4) frequency 5) higher 6) lower

Exercise 2 HIGH PITCH AND QUIET = C HIGH PITCH AND LOUD = A

LOW PITCH AND QUIET = D LOW PITCH AND LOUD = B

Worksheet 81 Comparing light and sound

1) faster 2) transparent 3) see, hear 4) medium 5) sound 6) light

Worksheet 82 Day and night.

1) axis 2) day 3) towards 4) East, West 5) morning 6) midday

Worksheet 83 The seasons.

1) orbit 2) year 3) summer 4) winter 5) towards 6) southern, summer

Worksheet 84 The solar system.

1) Venus 2) Jupiter 3) longer 4) Mars 5) high 6) Saturn

Worksheet 85 Satellites.

gravity satellite Moon orbit full speed Earth telescope air

Worksheet 86 The Moon and its phases.

1) phases 2) new 3) full 4) mass 5) six 6) smaller

Worksheet 87 Energy resources.

1) fossil 2) replaced 3) renewable 4) plants 5) wind 6) expensive

Worksheet 88 The Sun and energy resources.

1) energy 2) plants, animals 3) solar 4) cells 5) heat

Worksheet 89 Generating electricity.

1) turn 2) steam 3) coal 4) third 5) water 6) wind

Worksheet 90 Energy changes.

1) GRAVITATIONAL ⟶ **KINETIC / MOVEMENT**

2) **CHEMICAL** ⟶ HEAT + **LIGHT**

3) **LIGHT** ⟶ ELECTRICAL

4) CHEMICAL ⟶ HEAT ⟶ **KINETIC / MOVEMENT**

3) **MOVEMENT** ⟶ SOUND