

## S2/3 SCIENCE

### COURSE CONTENT

The Course is split up into 7 Units of theory to learn, which includes practical, experimental work too. There are also opportunities for the pupils to be working outside their classroom and for them to get involved in some trips related to their course work. The content of the Units is outlined below:

**Healthy Bodies** - In this Unit, the 'key areas' covered are :

- **Surviving & Organs:**

What we need to be able to survive.  
The main organs in the human body

- **Gas exchange:**

Learning about how your body needs Oxygen and why it needs to get rid of Carbon-Dioxide,  
...and how your blood helps you do this !  
...along with your lungs.

- **Lungs:**

Learning about where your lungs are – in your rib-cage – and your wind-pipe, and your bronchi.  
How your lungs work and what they look like,  
...you might even be able to have a look at some real lungs !

- **Breathing:**

Learning about how you breathe and the muscles involved in doing that,  
...and how it involves your rib-cage too.

- **Keeping the lungs clean:**

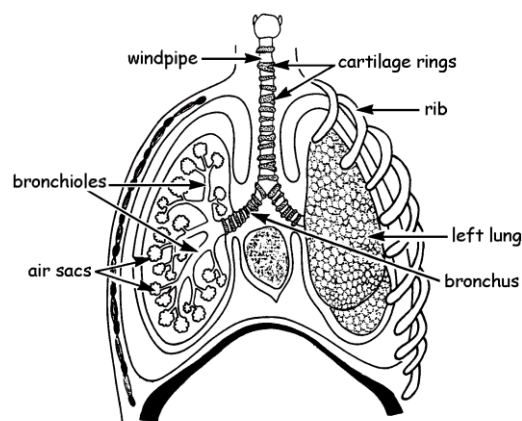
Learning about what is inside your windpipe and 'air passages' that helps keep your lungs clean, so that you can breathe properly,  
...and then learn about some things will damage your lungs, including...

- **Effects of smoking:**

Learning about the things involved in smoking that will harm you, including: nicotine, tar & Carbon-Monoxide.

- **Lung Measurements:**

Making measurements of your lungs and learning how that can help tell you about your health, your fitness – and even how it can be different if you're a boy or a girl, or if you're taller, or even what age you are.



**Metals** - In this Unit, the 'key areas' covered are:

- **Elements & the Periodic Table:**

Learning about what an element is and about how the periodic-table lists all of them, in different groups.  
...and that they can all be split into 2 groups called Metals and Non-metals.

- **The Properties of Metals:**

Learning about some of the main properties of metals, including,  
...being a conductor of heat & electricity, how they can have their shape changed, they are strong !

- **Alkali Metals:**

Learning about what an alkali is. How they can be dangerous...but they are also very useful.  
They must be stored under oil to keep them safe !  
They produce Hydrogen gas when they react with just water !

- **Reactivity of Metals:**

Learning about how Hydrogen can be produced (made) when some metals react with water or an acid.

Hydrogen gas is flammable and can burst into flames !

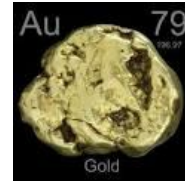
Learning about some very reactive metals, including: Calcium, Magnesium, Zinc, etc.



- **Extraction of Metals:**

Learning about how metals are often found in the ground, 'mixed up' with other stuff, in what we call an 'ore'.

Learning about how we can get metals out of the 'ore' from the ground,  
Learning that some metals are not reactive at all and so they can be found in the ground in their 'pure' form...not 'mixed up' with anything else,  
You'll also learn about 'panning' for Gold ! – you might even get a chance to go on a trip to a 'gold mine' !



- **Getting Iron:**

Iron is one of the most important and useful metals, so you'll learn more about:

-how we get it out of the ground, how it's used with a furnace, with Carbon and how it is used to make Steel.

- **The problem with Rust:**

Learning that iron can corrode, which is what we call rusting,  
...and rust will be made when iron is exposed to water and Oxygen (in the Air).

- **Preventing Rust:**

Learning about how we can protect iron from rusting by different methods, including:

- covering it with a layer of paint, grease, oil, plastic,
- or 'galvanising' it, by coating it with a thin layer of another metal called Zinc.



## Energy in the Home - In this Unit, the 'key areas' covered are:

- **Burning Fuels:**

Comparing how much energy fuels release when they are burned.

- **Energy Sources and Uses:**

Learning about different sources of energy that we have, and...  
Different uses we have for energy in the Home, and at School.

- **Electrical Energy Costs:**

Learning about what appliances / machines / devices that get used in the house use more energy than others,

...and how that makes some appliances more expensive to use.

Learning about the Power (P) of different appliances, which is measured in units called watts (W), or if it's a very powerful thing then it could be kilowatts (kW).

Energy (E) is measured in units called joules (J), but if an appliance uses lots of joules then we can use a different unit called a 'kilowatt-hour' (kW.hr).

Electricity companies charge people for the electricity they use and the cost is shown on your electricity bill, so we learn about those too.

- **Heat Loss from a House – and how we can prevent it:**

Learning about how heat can escape from a house – and where it usually gets out !

How you can reduce the heat from escaping from your house,

...and how that can end up saving you money !

Then we learn about the 3 different ways that Heat can 'move', or escape, which are...



- **Conduction:**

This is when things are touching each other and heat is transferred from the hot thing to the colder thing.

- **Convection:**

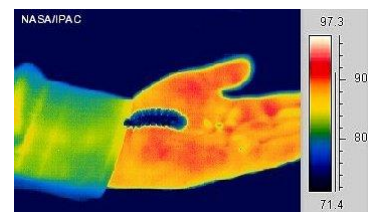
This is when heat moves upwards – which is why warm air always moves up to the top of a room,

...it's also how birds and gliders can stay in the air, without needing to do anything !

The same thing happens with hot water in a bath !

- **Radiation:**

This is when heat is given off from an object and it goes out 'side-ways'...not just 'up the way'...we say that the heat has been radiated...for example from a radiator !



**Plants** - In this Unit, the 'key areas' covered are:

- **Life Cycle of a Flowering Plant:**

Learning about the main stages of a flowering plant, including:  
- pollination, fertilisation, seed & fruits, seed dispersal, seed germination.

- **Seed Structure:**

Learning about how seeds are formed and the different parts that they have that make them be able to grow into plants !

- **Seed Dispersal:**

Learning about how seeds get to be 'spread out', so that they can grow over a wide range of places. This can happen by the wind blowing them, animals getting them stuck in their fur, ...or even by the plant exploding !

- **Seed Germination - Investigation:**

You will be given some seeds to plant them and watch them grow and see how they change over a few weeks.

You'll learn about the different conditions that are best for them growing, ...WOW ... they need Water, Oxygen and Warmth !

- **Testing a leaf for Starch:**

Learning about what starch is and how it is such an important part of a plant, ...and for lots of other things too.

- **Photosynthesis:**

Learning about what photosynthesis ( foto-sin-th-esis ) means, ...and how it is the name of the process that explains how a plant can 'make it's food' (in the form of sugar), from the sun !

Photosynthesis needs Carbon-Dioxide, Water & Light, ...and it produces food & Oxygen.

This is why photosynthesis is great for us, because the plants can help get rid of Carbon-Dioxide, which is very harmful ( poisonous ) to us – and at the same time it makes Oxygen, which we need to breathe ... brilliant eh !

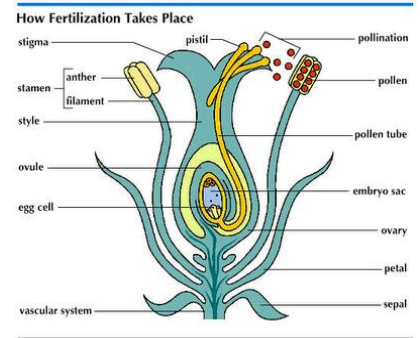
Only plants that have green bits can do this ... and the green bits are green because of the chlorophyll in them ... the green bits are usually the leaves.

- **Water transport in Plants:**

Learning about how a plant gets water to move through it to keep it alive, using the roots, etc. ...it's a wee bit like how people have blood flowing through them to keep them alive, ...it's a wee bit like plumbing for plants !

- **Gas exchange in leaves:**

Learning about how the green leaves are able to 'take-in' Carbon-Dioxide and 'give-out' Oxygen.



**Sound Waves** - In this Unit, the 'key areas' covered are:

- **How Sound Travels:**

Learning about how a wave transfers energy from one place to another. How a sound is actually made by something vibrating, the vibration of particles, of any solid, liquid or gas, ...which is why sound cannot travel through Space, or any vacuum. ...so, like in the film, Alien – in Space no-one can hear you scream !

- **Sound Waves:**

Finding out about what different noises sound like, by learning about frequency ( or pitch ) and the wavelength of a wave, as well as the volume ( amplitude ).

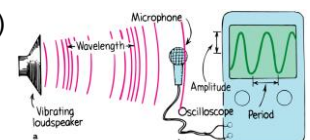
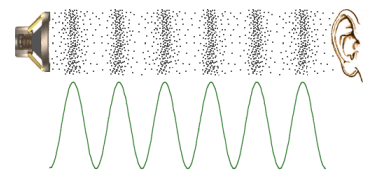
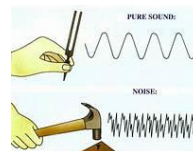
Finding out what different sounds 'look like', by using an oscilloscope to see the shape of sound waves ( signals ).

- **Musical Instruments:**

Learning about how some musical instruments can make different sounds, ...depending on how long, or how tight, the part that vibrates is ( eg. guitar strings, drum skins, etc. )

- **Human Hearing:**

Learning about the range of frequencies that humans can hear, ...and how some animals can hear frequencies that we can't, ...so don't take your dog-whistle back to the shop complaining that it doesn't work !



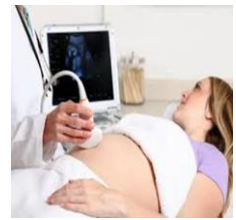


- **Ultra-Sound:**

Learning about the frequencies that we can't hear – all those higher than 20,000 Hz, and that we call these frequencies ultra-sound.

Learning about other really good uses of ultrasound, including how it is used in hospitals to 'see' an unborn baby and other uses in medicine.

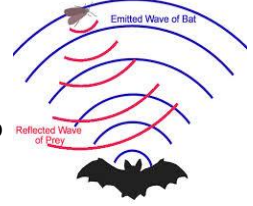
Ultrasound is what bats use to let them 'see' ( ...well 'hear' really ) where they're going in the dark, and some other animals use ultrasound to let them communicate with each other !



- **Sound Levels:**

Learning about how very loud sounds can actually damage your ear, so we need to be able to measure how loud sounds are – by using a sound-level meter, which measures how loud a sound is in units called decibels ( dB )

...so don't have the volume of your ear-phones too high !

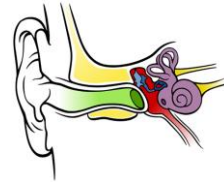


- **The Ear:**

Learning about the main parts of the ear and how it works.

...and where the smallest bone in your body is !

...and how your ears help you balance !



**Water** - In this Unit, the 'key areas' covered are:

- **Uses of Water:**

Learning about domestic uses in the house, agricultural and industrial uses, as well as some leisure uses, like swimming and sailing.



- **Water and the Human Body:**

Learning about some of the uses that your body makes of water, including removing waste, regulating (controlling) your body temperature and cushioning your joints !

- **Fresh Water and Salt Water:**

Learning about the 3 states of matter – solid, liquid & gas – and about freezing & melting, along with evaporating & condensing.

Learning what distillation is and how it can be used to get fresh water from salty water.

- **Distillation for Survival:**

Learning how it can be important for some people to be able to make 'fresh' water that's safe to drink, from dirty, muddy or salty water that would make you very ill if you drank it.

Learning how to make a 'solar furnace', which could be used to 'cook' using the sunlight !



- **Water Cycle:**

Learning about the stages of the 'water cycle', that explains how all the water in the world just keeps getting changed and 'moved' in a 'cycle', including:

Evaporation, condensation, precipitation (eg. rain) and 'run-off', along with transpiration where water evaporates from plants.

- **Water Supply Treatment:**

Learning about how water is stored in reservoirs and how it then flows through pipes to your house. How the water gets 'treated' to make it safe to drink, including filtering it and adding Chlorine to it to kill any bugs in it !



- **Hard & Soft Water:**

Learning about the differences between these two types of water, and how one of them gives you lots of lather and bubbles while the other causes a lot of white 'lime scale' to build up inside your kettle after it's been used for a while.



**Environment** - In this Unit, the 'key areas' covered are:

- **Food in Plants:**

Learning about how plants make food, by photosynthesis, and how they store this food in them as starch.

Doing experiments to learn how plants need Carbon-Dioxide and light to make food.

...and learning how you can do a test using Iodine to see if there is any starch food in your plant.

- **Food Chains:**

Learning about how plants and animals can all be mixed together in groups or 'chains' to show where each of them gets its food from – what eats what !

Learning about: Producers (ie. green plants) Primary Consumers & Secondary Consumers, as well as learning about Herbivores (ie. animals that eat plants), Carnivores (ie. animals that eat meat / other

animals) and Omnivores (ie. animals that eat both plants and meat/animals).  
 Learning how Energy is 'used-up' at each step in a food-chain.  
 ...and these ideas lead on to...



- **Food Webs:**

Learning how 'food chains' can get connected with other food chains to make a 'food web'.

- **Predator & Prey relationships:**

This has nothing to do with Predators & Aliens !

-instead, you'll learn about what we mean when we call an animal a Predator or a Prey, or maybe even both !

Learning about how the number of Predators & Prey animals are needed to be 'just right' so that they can all survive – before they get eaten at least !



- **Stability in Food Webs:**

Learning about how the population (ie. the number) of different animals can let you predict the effect of any changes in other animal populations.

Understanding how the more links there are in a food web the better it is ie. the more stable the whole thing is.



- **Energy loss in Food Chains:**

Learning about how energy is 'passed on' through a food chain, but that some energy is 'used up' at each step.

Learning how animals need the energy for growing, moving and keeping warm.



- **Pyramid of Numbers:**

This has got nothing really to do with the Egyptians !

- instead, it's a way of showing how the different number of animals at each stage of a food chain can be shown as a 'pyramid', that shows that as you go along a food chain there are fewer animals at each stage.

- **Adaptations:**

Learning how plants and animals have managed to change, or adapt, themselves to help them survive in their environment.



- **Endangered Species:**

Learning about how some animal species can become extinct – often because of what humans do !

Learning about some of the activities that humans have done, and still do, that can endanger some animal species – like deforestation, hunting, over fishing.

Learning how some animal species can be protected by conservation methods, for example making National Parks for animals to live free and safe, without being hunted. Captive breeding and Zoo's can help as well – like the Pandas in Edinburgh ! Having agreed 'quotas' for things like fishing and hunting, which means that there is only a certain number of the animals/fish that can be caught.



All students will have access to textbooks appropriate to the Course and they could also be given access to some content by using computers.

There are lots of chances for pupils to be involved in trips or learning outside, if possible and appropriate.

The pupils can be involved in project work and some Science teachers are available either at lunchtimes and/or at the end of the day to give extra support if and when needed, throughout the year.

## ASSESSMENT

There is a range of ways that teachers will assess the pupils, including:

- 1) checking **class-work**,
- 2) making **posters**,
- 3) doing **Investigation** or **Project** work,
- 4) making a **power-point** on related course-work on a computer,
- 5) a **Unit Test**.

## HOMEWORK ...

## **HOMEWORK**

Homework can be an essential part of the course for those students who want to make good progress. Homework could include questions and problems from worksheets and regular revision of the material covered in the class.

Some of the Science teachers are usually available at lunchtimes and/or at the end of the day to give you help with your Homework – so it's easy to get it all done...correctly !

## **TRANSFERABLE SKILLS**

There are many very useful and valuable transferable skills gained by studying S2/3 Science, including: researching, ICT, reporting, numeracy, literacy, graphing, investigating, practical experimental skills, analysing, presentation, evaluating... to name just a few.

## **PROGRESSION**

There is good progression from this Course on to the N3/4 Science course in S4.

The S2/3 Science Course is **not** intended for those pupils who are aiming to go directly into N5 Biology, Chemistry or Physics.