



## Examples of Activities available for Key Stage Two

### Plants - year 3

#### **Seed dispersal**

This experiment looks at the various mechanisms of seed dispersal, by carrying out a series of small investigations to demonstrate each method.

#### **Build a model flower**

By making a 3d model the children learn each part of the flower, the function and how the different parts work together.

#### **Water movement through plants**

Using coloured water the plant concentrates dye in areas where the water has moved to in the flower. The children are able to study the flowers. The flower can be dissected and to see the different structures.

#### **How does a plant work?**

This is a group activity where each child is doing the job of each part of the plant using a large interactive model. Children learn the functions of each part and how the seeds are formed and how they will be distributed.

#### **Life cycle of a dandelion**

The activity starts with short introduction looks at the different stages in the life cycle of the Dandelion

The children make a 'flip book' that continually cycles. Pictures of the dandelion at different stages of growth showing above and below ground level appear in sequence.

#### **Looking at variation using the trees in QM grounds**

Using the trees in QMC grounds to look at variation in seed dispersal, leaf shape, flowers etc. depending on the time of year

### Animals (including humans) - year 3

### **Studying human and other skeletons**

- Use the life sized model skeleton to explore different parts of the skeleton to understand function.
- Compare the human skeleton to 6 other actual skeletons noting the similarities and differences and suggesting reasons for these and those of further animals using X-rays.
- Other activities assemble the x-rays of a life size human child.

### **Build a model arm**

Make a model of the arm to show how the muscles interact with the skeleton

### **Food Testing**

An introductory Discussion about different foods is followed by food testing.

Starch, fats and Vitamin C are tested for.

### **Daily food tray**

An introductory discussion on food groups

The children play a dice game to assemble a daily tray of food.

### **Assembling the skeleton**

Children piece together the set of life size x rays of a human child and learn the names of the main bones and their function in movement support and protection of body organs.

### **Compare how animals move**

A group discussion about vertebrates and invertebrates and the different types of skeleton is followed by comparing the ways that different invertebrates and vertebrates move.

### **How the skeleton works**

The experiment starts with the group studying some large actual bones and discussing what part of the animal they may be from and its function within the skeleton then looks at the differences on shape between a doll with a wire skeleton that of a rag doll and then compare both to themselves. It also looks at the importance of joints and what they couldn't do if their own skeleton wasn't jointed. The children then make a model to take back to school to remind them of what they have found out about the endo skeleton.

## **[Rocks and Soils - year 3](#)**

### **Do rocks change in water?**

The children conduct an experiment to compare metamorphic and sedimentary rocks and to identify whether the rocks absorb water.

### **Fossil Formation**

Making a model fossil which allows us to show the process by which a fossil is formed. The children can take their fossil home.

### **Fossil Hunting**

A set of plaster of Paris fossils layered in a sandbox. Allow the children to be archaeologists and carefully search for fossils and then try to identify what they have found.

### **How hard are rocks?**

As an introduction children are introduced to six different rocks and study them using magnifying glasses. They then try to put the rocks in order of hardness and then test to determine whether their predictions are correct.

### **Volcanic rocks**

The experiment begins with a Group introduction to an erupting volcano so the pupils can understand the process by which basalt and pumice are formed. The children will study actual samples of basalt and pumice using hand lenses/microscopes to see the difference in structure. Then they then produce a model showing how basalt and pumice are formed using molten wax.

### **What is in soil?**

Children are asked to think about what a soil sample consists of. As they discuss each constituent they are given something to represent this from a hidden cache of constituents and they gradually create their own 'soil sample'. This can then be extended by looking at the Wormery to see how compost is being formed from rotting vegetable matter and also discuss why each constituent is necessary for good plant growth.

### **Drainage of soils**

Children are introduced to three different types of soil (sandy, loam and clay) and look at the structure under the microscopes and discuss the differences they can see. They then carry out an investigation to determine how fast water can flow through and how much water the soil can hold.

## Light - Year 3

### **Investigating shadows**

The children conduct three experiments to show how the shape of a shadow will be related to the shape of the object casting the shadow

### **Which materials make a shadow**

The children will find out if materials with different properties will make a shadow. The children have to predict whether or not six different materials will make a shadow.

### **Make a kaleidoscope**

The children construct their own kaleidoscope to take home and discover what interesting patterns are made when the image is reflected a number of times in the kaleidoscope.

### **Reflecting light**

The children find out that for anything to be seen it must reflect some light and some materials are much better at reflecting light than others. They place materials in front of the beam from a light box and discover if the beam of light bounces off of the material or object it will travel and hit the white board. This is followed by a group discussion of the results and understanding what it is about the materials that bounce light well.

### **We need light to see things**

The children discover some things become visible with only a small amount of light whereas others cannot be clearly distinguished without a lot of light by looking through spy holes in a box. The box has 12 different spy holes and a central light and in each compartment there is a different object. They have to decide what the object is, its colour and features. By increasing the light the children will eventually see all the objects. They will then have to group the set of objects depending upon the amount of light required to see them and discuss what the object in each group have in common (reflective, light in colour, shiny, dull etc.).

## Forces and magnets - year 3

### **Design a magnetic fishing game**

The children learn how magnets have everyday uses. Each child then makes their own magnetic fishing game to take home.

Experiments based around an airport theme:

### **Objects attracted to a magnet**

The children use magnets to find objects hidden in a jacket and consider the materials that are not attracted and so understand the limitations for magnets for detecting different materials.

### **Magnetic trucks**

Children can investigate a train of trucks held together with magnets and how loading the trucks affects the length of the train that can be pulled, also the effect of pulling the train over different surfaces.

### **Make your own compass**

Children learn about how a compass can be used to find North, what affects the compass function. The children make their own compass to take home.

### **Testing magnetic strength**

Using different magnets to launch aeroplane shaped paperclips along the runway, making sure that the experiment is working scientifically so that the strength of different magnets can be compared.

### **Exploring different types of magnets**

The Science centre has a number of different types of magnets that allow the children to have free investigation to find out the properties of the magnets.

## **[Living things and their habitats - year 4](#)**

### **Classifying animals using their skeletons**

Children start off by having a group discussion using skeletons of some animals, x rays of a number of vertebrates and invertebrates to understand the differences between vertebrates and invertebrates then use skulls of several different vertebrates to study the teeth and try to work out the diet of the animal and place the skulls into the correct place on a Venn diagram or make a simple key to differentiate them.

### **Looking at the habitats in QM grounds**

Walking round QMC grounds to look at the range of habitats available and then using their observations and information cards about British wildlife to consider whether a particular animal is definitely living in the grounds, wasn't seen but the conditions are suitable, whether they may visit or the conditions are definitely unsuitable and so could never live in the College grounds.

### **'Classification practice'**

Children to use a key to name the toys thinking about how the key is constructed, the type of questions that need to be asked and understanding that careful observation is needed to ensure these questions aren't accurate and specific to achieve the correct answer. The group is then split in half and each half works to make their own 3D key to identify a group of model dinosaurs/other models using only observable features. Each group will test the effectiveness of the keys made by the other group.

### **Identify the flowers in the Science Centre garden**

Use the information provided in the experiment to identify specific plants in the garden.

The experiment requires the children to look in detail at the flowers of each plant and then to follow the key to correctly name the plant

### **Looking at measures QMC takes to manage the environment for wildlife**

An experiment to study the way that the College encourages wildlife through habitat creation, how items are recycled and reused and measures taken to ensure that rubbish is correctly dealt with

### **Animals (including humans) - Year 4**

#### **Banana digestion**

Introduction to the main organs for digestion by looking at the torso models

Practical activity to show how the different parts of the digestive system work sequentially to digest a banana by looking at the processes occurring in the mouth , oesophagus, stomach and intestines

#### **Keeping teeth healthy**

Three small investigations:

- Investigating the anatomy of the tooth using a model and discussion of the importance of maintain healthy gums.
- Looking at the function of incisors, canines and molars by simple little practical investigations
- Looking at the effect of acid erosion of an egg shell and then relating this to teeth cleaning. Practical investigations to show how different foods stick the teeth surface and how to clean their teeth properly and practicing on giant teeth models.

#### **Classifying animals using their skeletons**

Discussion of the differences of vertebrates /invertebrates using x-rays

The children then study the teeth of a number of animal skeletons to understand that animals have adapted to eat different diets.

### **Materials - year 4**

#### **What is a solid liquid or gas?**

Investigate how the particles in solids, liquids and gases behave and are arranged in relation to each other by using marbles

They use an air filled syringe system and compare to a liquid filled syringes to see how pneumatics work

They watch a demonstration of the difference in volume occupied when water is in a liquid or gaseous state by heating/cooling a water filled balloon

### **Changing state of water**

Three investigations to help the children understand how substances can change state using water

Measuring the temperature of water as it boils using analogue and digital equipment

Investigating as a group the behaviour of solids liquids and gases

Watching water as it is heated and the solid ice changes to liquid and then to steam, and showing the process is reversible and learning the words associated with each change.

### **Looking at material states**

Looking at range of materials under the microscope, performing simple tests to determine what state each substance is in.

### **The water cycle**

Group activity 1:

This starts with a short introduction and discussion about the behaviour of water when it is heated.

Watching how water evaporates

Group activity 2:

Observing the water cycle model to see how the water evaporates from the sea, how the water condenses to form clouds and what happens as it begins to rain.

The children then fill in an activity sheet

### **Investigating plastics**

A group discussion about plastics is followed by making a list of the things in the classroom that are made from plastics.

The children investigate Polymorph a thermoplastic with a low melting point that can be made into any shape and that it can be remoulded as many times as they would like.

That they understand that as long as the Polymorph isn't overheated softening remoulding and hardening is reversible.

The children take their piece of Polymorph home with them.

### **Chocolate, butter, wax**

An investigation looking at reversible reactions that happen when the materials are heated and cooled and using thermometers to measure the temperatures needed to change state.

Compare the melting points of different types of chocolate.

### **Sound - year 4**

#### **Investigate how sound changes**

Group introduction Using similar sized containers made from different materials to explore the types/pitch of sound that are made when balls of various materials/ sizes and number are put in and shaken.

Working in pairs investigating how the pitch of a twanged elastic band changes with how much it is stretched and the effect of different thicknesses of bands.

If time making a very simple 3 band guitar to take away and further experiment with.

#### **Investigate sound toys**

Children work out how to play a series of different instruments, how the sound is produced and what is vibrating. Examples of some of the instruments are dismantled to show the inner workings.

#### **Making pan pipes**

The experiment begins with an adult introduction and demonstration of how the pipes are played leads into a group discussion of how the panpipes work and the effect of pipe length on the pitch of the note.

The children then make a set of pan pipes to take away from drinking straw sections mounted on card.

#### **Sound muffling**

After a short introduction the children work in pairs to find out which materials are the best for sound muffling, using data-loggers to measure the sound level and make sure that they work scientifically so their results are comparable.

#### **Travelling sound**

A series of activities to enable the children to understand that sound is a vibration, how the vibrations travel and how the medium it is travelling through may affect the vibration.

#### **Making an elastic band 'tree' guitar**

Children can explore the effects of tension of the elastic band on pitch and related to the length of the string.



## Electricity - year 4

Session in electricity begin with the whole class making a human circuit model.

The children work through a series of little circuit challenges individually then in pairs and groups to familiarise themselves with the equipment before carrying out more applied investigations.

**Clowns face** (or Christmas Santa's face or Pudsey bear or Red-nosed clowns around red-nose day)

Can the children make the clowns eyes light, can they make him blink.

Can they make his bow tie go round?

### **Picture animation**

Children apply their knowledge design an appropriate circuits to animate a range of pictures, e.g. flashing light for a fire engine, make the bicycle wheels go round.

### **Conductivity**

The investigation uses a clown that, when the circuit is completed his nose will light.

Two different children hold the left and right hands of the clown and the rest of the group hold hands to make a circle and complete the circuit. If the circle is broken the clown's nose will not light

Children can then try holding different materials at a gap in the circuit to test whether it is a conductor or an insulator.

### **Electricity quiz game**

A group activity answering a series of questions about electricity

## Plants - year 5

### **Plants in winter**

Looking at the strategies that plants use to survive winter conditions:

- Comparison of deciduous and evergreen
- Look at storage organs - modified roots, stems and leaves
- Seed production in annuals
- Comparison of frozen and fresh lettuce leaves and how this relates to plants that are frost sensitive

### **Asexual reproduction in plants**

Using the plants in the science centre garden to understand the different methods that plants reproduce asexually and planting up some examples to take back to school:

- Potatoes
- Strawberry runners
- Tradescantia cuttings
- Black berry tip layering
- Mexican hat plant new plantlets (plants kept sealed in transparent container because poisonous)
- Bulb formation

### **Dismantle a flower**

Describe the life process of reproduction in some plants:

Looking at a flower in detail by carefully dissecting a whole flower and identifying each structure the children can determine the processes involved in pollination and seed formation.

### **Living things and their habitats year 5**

#### **Life cycle dial**

The life stages of a bird, mammal amphibian and insect are displayed on 4 dials that when assembled correctly show the life cycle of one of the organisms in the horizontal window. The central dial gives the first stage and the outside dial shows the adult.

#### **Asexual reproduction in plants - (See Plants year 5)**

#### **Dismantle a flower - (See Plants year 5)**

### **Animals (including humans) year 5**

#### **Gestation period of animals**

Introduction to gestation, and then using the information to plot gestational age for various animals compared to their adult size or other factors and suggesting reasons for the differences. Looking at further information such as longevity animal size animal habitat to refine and suggest further reasons.

#### **How humans grow**

Exploring the children's current level of knowledge and then using the build a body models to make humans at different stages in their life cycle so they can compare what areas of the body grow at different times and how the relative proportions change. This also gives practice in interpreting data from charts.

#### **Variation in human growth**

Collecting data about their height and foot length to answer the question 'Is foot size correlated to height'.

### **Human life cycle time line**

Collecting data from different sources to establish a time line of human life span. Studying the human gestation models to understand the development that occurs before birth.

### **Properties and changes of materials - year 5**

#### **Beach in a bucket**

The bucket contains material from a beach: Pebbles, shells, gravel of different stone sizes, sand metallic and plastic objects, driftwood, seaweed, sea water.

All the items have to be separated into individual constituents using manual sorting, magnets, sieving and filtering, evaporation

If time the children to make a simple flow chart to explain to younger children the detailing the steps they needed to separate each item.

#### **Burning investigation**

First, a group discussion of the fire triangle and the conditions needed for burning to take place and noting that fire is an irreversible process

Investigation - Children observe how a range of natural materials burn comparing the rate and efficiency of burning to paper

#### **Cooked Breakfast**

This investigation looks at irreversible reactions and reversible reactions used in the cooking process. The experiment looks at changes that occur when bread is toasted, an egg is cooked and butter melting.

Toasting is done over a tea light lame so the irreversible and reversible changes taking place as the candle burns can also be studied.

#### **Looking at reversible and irreversible reactions**

A number of different materials are added to water. The children observe the changes and determine whether the reaction is reversible.

#### **Rate of dissolving**

The children design and carryout an investigation to determine whether the rate that salt dissolves in water is temperature dependent

#### **Weather proof coat investigation**

Children are given a set of fabrics and design an experiment to test the fabric for different for thermal insulation properties, whether the fabric is wind proof and waterproof.

If time there are a number of extension questions that could be investigated.

### **Separating mixtures**

Children determine the best way to separate mixtures of 2 components.

Each mixture can be separated by more than one method so successful methods can be compared

- Floating and sinking
- Spinning
- Straining
- Filtering
- Static electricity
- Manual separation
- Moving air
- Rolling

### **Chromatography**

Separating the constituents of secondary and tertiary colours in felt pen ink and colours on the outside of sweets

### **Earth and space - year 5**

#### **Day and Night**

The children use the Sun and Earth model to see how the rotation of the Earth gives day and night, and how the Earth's orbit around the sun and the tilt of the Earth give us the seasonal changes that occur throughout the year.

They then make a paper 2D model looking down on the Earth from the North Pole to show the Earth rotation and how places get light and then are in shadow during the night as the Earth spins and use this to answer questions.

#### **Looking at Planetary Orbits**

The children observe the planetarium model and see the planets in orbit around the sun and consider the time taken for a single orbit and relate this to the distance away from the sun and the distance each planet travel to complete the orbit.

Using charts and books provided the children compile an information sheet about the orbits of the planets

#### **The Moon Cycle**

The moon cycle model allows the different phases of the moon to be studied and how these relate to the position of the sun.

A second model if needed also shows how the moon is not a source of light but is only reflecting light from the sun.

The children then make their own moon- phase dial and use books and charts to label each phase.

### **Shadows throughout the day**

An interactive demonstration set up in the Science Centre dark area allows the children to see how the sun appears to move across the sky during the day, and how the sun's position in the sky and the direction from which it is shining accounts for changes in the shadows.

## **Plants - year 6**

### **Looking at adaptation in plant leaves**

Studying plant material from different climates and then building models of the leaves that can be made into a display poster showing adaptations

## **Living things and their habitats - year 6**

### **Practice in using keys – Pond dipping**

The wide range of invertebrates in the Science Centre ponds provides a good opportunity for the children use microscopes and other magnifying equipment and underwater camera to accurately classify creatures using simple and more complicated keys pictures and charts.

### **Classifying the organisms in the Science Centre garden**

The science centre garden has a wide variety of plants and habitats and is therefore ideal finding many creatures even at less favourable times of the year for the children to produce their own classification charts.

Organisms are classified into vertebrates, invertebrates, flowering and non-flowering plants and then subdividing these groups. For example: vertebrates into birds, amphibians and mammals and recognising that not all habitats will contain all the vertebrate classes; invertebrate classes or all types of plants.

### **Recognising and classifying the trees in QMC grounds**

Looking for clues to the type of tree using observations that they have collected from the tree itself, and realising that, unlike animals the clues may not be attached to the tree. For example, seeds or seed cases may be under the tree, and if the tree is growing in a mixed group there may be seeds from another tree there as well.

### **Tree jigsaw**

Collecting the correct pieces: bark, seed, flower, leaf, by correctly interpreting audio clues that make up the jigsaw for each tree species.

### **Sub-classification of insects**

The group is presented with new information about insect wing types and observation of wings on microscope slides and then allowing the group to build a paper model for each one. Then to use these models to make a classification key to sort out the insects using only wing type.

### **Animals including humans - year 6**

#### **How much food?**

In the first part of the experiment the children think about portion size by seeing how the same portion looks larger or smaller depending on the size and shape of the container it is served in.

The second part thinks about snacks – what a snack is, how big it should be and the best food for a snack.

The third part of the experiment asks the children to interpret information from the nutritional information given on the back of all food packets

#### **Why do we need water in our bodies?**

A series of investigations allow the children to understand the importance of water. How it is involved in digestion, sweating and maintaining the cells of the body in balance.

#### **Lungs and breathing**

Studying various models to understand where the lungs are and how they respire.

The children use lung volume kits to find out the volume of their own lungs and collect data that can be used at school for further analysis.

#### **The heart**

The circulatory system and the heart are studied using a series of models that show the position of the heart, the difference between veins and arteries, the structure of the heart and how the double circulation works.

They use stethoscopes to locate their own heart beat and data-loggers to monitor their pulse rate before and after exercise.

#### **What is in blood?**

A group activity looking at 4 functions of the blood by using interactive models that show:

- The red blood cells transport gases via the circulatory system and the gaseous exchange that happens in the tissues and the lungs.
- How digested food is carried around the body and the function of the kidneys
- The children pretend they are the white blood cells and fight an infection represented by different coloured Smarties.
- How constituents of the blood start the repair of the broken blood vessels

## Light - year 6

### **Light absorption**

The children find out that materials reflect or absorb light depending on their colour. They are asked to predict how two pieces of paper (one black and one white) will either reflect or absorb the light. Their predictions are tested by the use of light sensor equipment and will discuss their results identifying the difference between reflection and absorption.

### **Investigating refraction**

The children undertake four different experiments to show how altering the path of light (refraction) can give interesting effects.

### **Light maze**

A series of challenges using reflections allow the children working in small groups to discover the nature of reflections and how they can be used to redirect the path of light ray to light the streets of a model town with a single light ray.

### **Pinhole viewer**

The group is first introduced to the idea of a pinhole camera and the theory is demonstrated using the model.

The children then construct their own camera to take away with them, and complete a result sheet.

### **Reflection from a flat mirror**

Children use a flat mirror to reflect light rays to compare the angle that the incident ray hits the mirror relates to the angle that the reflected ray leaves the mirror. The angles are measured using protractors or compared by using wedge shaped pieces of paper cut at different angles.

### **Studying how we see**

This group activity first looking at the 2d foam model and then 3d model of the eye itself, and the 3d working model to see how the image is formed on the retina. Then completing the worksheet to show the path of light from the source to the retina

### **Make a periscope**

Children make a simple periscope so that they understand the principle involved in the workings of the periscope.

## **Forces - year 6**

### **Air resistance and parachutes**

Experiment to consider the forces acting on a parachute as it falls how size affects the speed of the fall. Parachutes are launched from the first floor balcony.

### **Water Resistance**

Investigation of how the shape of a boat bow affects the movement of the boat through the water using a set of 6 different shapes. The children work in small groups to plan the experiment design the experiment so the tests are fair and results for each boat can be compared

### **Investigating pulleys**

Using different pulley sets to understand how mechanical advantage can be gained by using pulley and their application.

### **Investigating gears**

Experiment in development.

### **Investigating friction**

Investigation to understand friction and how it can be reduced and increased and the implications for different applications

### **Investigating levers**

Experiment under development.

## **Electricity - year 6**

Children make their own switches and apply this to making a burglar alarm.

### **Investigation into the loudness of buzzers**

Measuring the difference using data-loggers: the data can be used for further work at school.

Children use circuit diagrams children build circuits or build circuits for a purpose (some of the circuits they built in year 4) then draw the circuit diagram that represents it.

Investigation into motor speed

Covering various percentages of a solar panel to find out how this affects the motor speed by counting the revolutions of the turntable.



Christmas themed activities to build circuits from Hotwires kit that will help out at Santa's factory (different scenarios for other times of the year)

## Evolution and inheritance - year 6

### **Camouflage and mimicry**

The pupils stand a distance away from a picture onto which a number of butterflies have been added. Starting at 10 paces away they note down how many are visible then approach the picture 2 paces at a time noting how many more can be discerned.

They then study a series of pictures where the animals use camouflage or mimicry techniques as a defence mechanism. Extension work looks at the differences between the adult and juvenile colouring of a robin.

### **Classifying beak shapes**

The children pretend they are birds and use a variety of shaped tongs/tweezers as beaks to try and pick up materials representing the diets of different bird species. This allows them to think about the various types of diets available to birds and how the shape of the beak has adapted for optimum use.

In The second part of the experiment the children use the shape of the beak to work out the probable diet of the particular species of bird.

### **Frog adaptation to habitat**

As a group the children spend a short time looking at the habitat in the science Centre Garden and the areas that may be particularly useful to the frog.

Then study an actual frog skeleton to look at the features that allow the frog thrive in the habitat at all stages of the life cycle and how the frog adult and the tadpoles are adapted to their particular environment and make a booklet .

### **Variation and adaptation in a population**

Children are introduced to variation within a population using pictures of a litter of Labrador puppies. Children see that there is a big a variation in colour and size and consider how these traits could provide advantages or disadvantages to survival in the wild.

### **Activity**

Children then introduce to the Science Centre population of paper frogs and note the variations. A series of scenarios are proposed and frogs that are least likely to survive are removed, leaving the rest to breed (More frogs are made) and pass on traits to the population that are helpful to survival.

(It is stressed that the changes in this population have occurred in a couple of generations, but in the wild changes in population occur over many generations)

**Adaptation in plants - see year 6 plants**