SCIENCE Scheme of Work 2023-2024: YEAR 8

Autumn Term 1: SEPT – OCT	Autumn Term 2: OCT - DEC	Spring Term 1: JAN - FEB
Adaption and inheritance **Genes: Evolution and Inheritance**	**Forces: Contact Forces and Pressure** **Electromagnets: Electromagnets and Magnetism**	**Matter: The Periodic Table and Elements** **Reactions: Chemical Energy and Types of Energy**
Interdependence **Objective: Use a model to investigate the impact of changes in a population of one organism on others in the ecosystem** Organisms in a food web (decomposers, producers and consumers) depend on each other for nutrients. So, a change in one population leads to changes in others. The population of a species is affected by the number of its predators and prey, disease, pollution and competition between individuals for limited resources such as water and nutrients. Adaptation - The variation between species and between individuals of the same species means some organisms compete more successfully, which can drive natural selection. **Variation** **Objective: Graph data relating to variation and explain how it may lead to the survival of a species** There is variation between individuals of the same species. Some variation is inherited, some is caused by the environment and some is a combination. Variation between individuals is important for the survival of a species, helping it to avoid extinction in an always changing environment. **Evolution** **Objective: Review the evidence for theories about how a particular species went extinct** Natural selection is a theory that explains how species evolve and why extinction occurs. Biodiversity is vital to maintaining populations. Within a species variation helps against environment changes, avoiding extinction.	**Contact Forces** **Objective: Investigate factors that affect the size of frictional or drag forces** When the resultant force on an object is zero, it is in equilibrium and does not move, or remains at constant speed in a straight line. One effect of a force is to change an object's form, causing it to be stretched or compressed. In some materials, the change is proportional to the force applied. **Pressure** **Objective: Investigate how pressure from your foot onto the ground varies with different footwear** Pressure acts in a fluid in all directions. It increases with depth due to the increased weight of fluid, and results in an upthrust. Objects sink or float depending on whether the weight of the object is bigger or smaller than the upthrust. Different stresses on a solid object can be used to explain observations where objects scratch, sink into or break surfaces. **Electromagnets** **Objective: Investigate ways of varying strength of an electromagnet** An electromagnet uses the principle that a current through a wire causes a magnetic field. Its strength depends on the current, the core and the number of coils in the solenoid. Use a diagram to explain how an electromagnet can be made and how to change its strength. Explain the choice of electromagnets or permanent magnets for a device in terms of their properties. **Static electricity** **Objective: To describe how charged objects interact with each other**	**The Periodic Table** **Objective: Sort elements using chemical data and relate this to their position in the periodic table** The elements in a group all react in a similar way and sometimes show a pattern in reactivity. As you go down a group and across a period the elements show patterns in physical properties. **Elements** **Objective: Compare the properties of elements with the properties of a compound formed from them** Most substances are not pure elements, but compounds or mixtures containing atoms of different elements. They have different properties to the elements they contain. **Chemical Energy** **Objective: Investigate a phenomenon that relies on an exothermic or endothermic reaction** During a chemical reaction bonds are broken (requiring energy) and new bonds formed (releasing energy). If the energy released is greater than the energy required, the reaction is exothermic. If the reverse, it is endothermic. **Types of Reaction** **Objective: Investigate changes in mass for chemical and physical processes** Combustion is a reaction with oxygen in which energy is transferred to the surroundings as heat and light. Thermal decomposition is a reaction where a single reactant is broken down into simpler products by heating.

Within an ecosystem, having many different species ensures resources are available for other populations, like humans. **Inheritance** **Objective: Model the inheritance of a specific trait and explore the variation in the offspring produced** Inherited characteristics are the result of genetic information, in the form of sections of DNA called genes, being transferred from parents to offspring during reproduction. Chromosomes are long pieces of DNA which contain many genes. Gametes, carrying half the total number of chromosomes of each parent, combine during fertilisation. **Extinction** **Biology** Changes in the environment may leave individuals within a species, and some entire species, less well adapted to compete successfully and reproduce, which in turn may lead to extinction. The importance of maintaining biodiversity and the use of gene banks to preserve hereditary material. **WS** Understand that scientific methods and theories develop as earlier explanations are modified to take account of new evidence and ideas, together with the importance of publishing results and peer review	separation of positive or negative charges when objects are rubbed together: transfer of electrons, forces between charged objects the idea of electric field, forces acting across the space between objects not in contact **Magnetism** **Objective: Explore the magnetic field pattern around different types or combinations of magnets** Magnetic materials, electromagnets and the Earth create magnetic fields which can be described by drawing field lines to show the strength and direction. The stronger the magnet, and the smaller the distance from it, the greater the force a magnetic object in the field experiences.	Chemical changes can be described by a model where atoms and molecules in reactants rearrange to make the products and the total number of atoms is conserved.
Spring Term 2: FEB - MAR	**Summer Term 1: APR - MAY**	**Summer Term 2: JUN - JUL**
Energy: Work and Heating & Cooling **Waves: Wave Effects and Wave Properties**	**Organisms: Breathing and Digestion**	**Ecosystems: Photosynthesis** **Earth: Climate and Earth's Resources** **Transition**
Work **Objective: Explain how an electric motor raising a weight is doing work** Work is done and energy transferred when a force moves an object. The bigger the force or distance, the greater the work. Machines make work easier by reducing the force needed. Levers and pulleys do this by increasing the distance moved, and wheels reduce friction. **Heating and Cooling**	**Breathing** **Objective: Investigate a claim linking height to lung volume** In gas exchange, oxygen and carbon dioxide move between alveoli and the blood. Oxygen is transported to cells for aerobic respiration and carbon dioxide, a waste product of respiration, is removed from the body. Breathing occurs through the action of muscles in the ribcage and diaphragm. The amount of oxygen required by body cells determines the rate of breathing.	**Photosynthesis** **Objective: Use lab tests on variegated leaves to show that chlorophyll is essential for photosynthesis** Plants and algae do not eat, but use energy from light, together with carbon dioxide and water to make glucose (food) through photosynthesis. They either use the glucose as an energy source, to build new tissue or store it for later use. Plants have specially-adapted organs that allow them to obtain resources needed for photosynthesis.

Objective: Investigate how to prevent heat loss by conduction, convection and radiation

The thermal energy of an object depends upon its mass, temperature and what it's made of. When there is a temperature difference, energy transfers from the hotter to the cooler object.
Thermal energy is transferred through different pathways, by particles in conduction and convection, and by radiation.

Wave Effects
Objective: Relate the impact of different types of waves on living cells to their frequency and the energy carried by the wave

When a wave travels through a substance, particles move to and fro. Energy is transferred in the direction of movement of the wave. Waves of higher amplitude or higher frequency transfer more energy.

Wave Properties
Objective: Use the wave model to explain observations of the reflection, absorption and transmission of waves

A physical model of a transverse wave demonstrates it moves from place to place, while the material it travels through does not, and describes the properties of speed, wavelength and reflection.

Respiration
Objective: Use data from investigating fermentation with yeast to explore respiration
Respiration is a series of chemical reactions, in cells, that breaks down glucose to provide energy and form new molecules. Most living things use aerobic respiration but switch to anaerobic respiration, which provides less energy, when oxygen is unavailable.

Digestion
Objective: Evaluate how well a model represents key features of the digestive system

The body needs a balanced diet with carbohydrates, lipids, proteins, vitamins, minerals, dietary fibre and water, for its cells' energy, growth and maintenance.
Organs of the digestive system are adapted to break large food molecules into small ones which can travel in the blood to cells and are used for life processes.

Climate
Objective: Investigate the contribution that natural and human chemical processes make to our carbon dioxide emissions

Carbon is recycled through natural processes in the atmosphere, ecosystems, oceans and the Earth's crust (such as photosynthesis and respiration) as well as human activities (burning fuels).
Greenhouse gases reduce the amount of energy lost from the Earth through radiation and therefore the temperature has been rising as the concentration of those gases has risen. Scientists have evidence that global warming caused by human activity is causing changes in climate.

Earth's Resources
Objective: Predict the method used for extracting metal based on its position in the reactivity series

There is only a certain quantity of any resource on Earth, so the faster it is extracted, the sooner it will run out. Recycling reduces the need to extract resources.
Most metals are found combined with other elements, as a compound, in ores. The more reactive a metal, the more difficult it is to separate it from its compound. Carbon displaces less reactive metals, while electrolysis is needed for more reactive metals.

Transition
Exploring variables
Writing scientific methods
Identifying hazards