Curriculum Overview Statements

Organisms

1. Students know and remember the names, functions, adaptations and differences between plant and animal cells. They understand how to use a light microscope to observe cell features. Students know and remember the structure and functions of the skeletal and muscular systems. They can use this knowledge to explain the role of antagonistic muscles. Students know and remember the effects of recreational drugs on behaviour and health.
   Excelling – Students can describe how to prepare a microscope slide and how to use a microscope to view cells.
2. Students know the components of the respiratory and digestive systems. They understand the processes of inhalation and exhalation and how the lungs have adapted to efficiently exchange gases. They understand the impact of lifestyle choices, including smoking and diet, on their health.
   Excelling – Students will be able to explain adaptations of exchange surfaces in unfamiliar circumstances.

Ecosystems

1. Students know and remember the structure of a flower, its life stages and the methods used to disperse seeds. Students can use this knowledge to explain pollination, fertilisation, and seed and fruit formation. They know the difference between wind and insect pollination and can explain the key features of how flowers are designed to carry these types of pollination out. They can design a quantitative investigation to investigate seed dispersal.
   Excelling - Students can describe how seeds are adapted for seed dispersal
   Students know and remember the equation for photosynthesis and understand the importance of photosynthesis in balancing gases in the atmosphere. They know how leaves are adapted for photosynthesis can additionally explain the role of stomata.
   Excelling - They know how farmers can change conditions to increase photosynthesis and why they do this
2. Students know and understand how food chains and webs interconnect and can explain the concept of interdependence. They know that insect pollination plays an important role in food security. They additionally can explain how the environment can affect organisms and know how toxic materials can build up in food chains (bioaccumulation).
   Excelling – Students can explain why top predators are particularly affected by bioaccumulation.
   Students know and remember the importance of respiration in terms of breaking down organic material and providing energy for all living organisms. They know the equation for aerobic and anaerobic respiration (in humans and microorganisms) and can state the differences between these.

Genes

1. Students will know and remember the structure of the human reproductive system, including the menstrual cycle. Students can use this knowledge to describe fertilisation in humans, how a foetus develop, and will consider the effects of various substances on a developing foetus.
   Excelling – Students can explain why the mass of the placenta increases as the foetus develops.
2. Students will know and remember the structure of chromosomes, genes and DNA, including how scientists discovered the structure of DNA. They will know that there is variation between and within species and the causes. They will use this knowledge to describe the different types of variation. Students will know how to record observations and draw appropriate graphs of their results.
   Excelling -Students can explain why identical twins share some identical characteristics but not others.
3. Students will know and remember that there is variation within and between species and that this leads to competition. They will use this knowledge to describe natural selection. Students will know the causes of extinction and therefore understand the importance of maintaining biodiversity.
   Excelling – Students can explain why Jean Baptiste Lamarck's theory was incorrect.

Matter

1. Students know and remember the states of matter. They can use the particle model to explain the properties of solids, liquids and gases. They then use this model to explain changes of state and diffusion.
   Excelling – Students can explain the changes that take place when a substance sublime
2. Students know the difference between compounds and mixtures. Students can correctly select and perform separation techniques. Students can navigate the periodic table and know the properties of Groups 1 and 7.
   Excelling – Students can describe how to separate a mixture of sea water into sand, salt and pure water

Reactions

1. Students know and remember what an acid and alkali are and know how to use the pH scale. They understand the process of neutralisation and use this knowledge to explain everyday problems, e.g. indigestion.
   Excelling students can explain why water is produced when acids are neutralised by alkalis.

2. Students know and remembers the law of conservation of mass and how this can be used to balance equations. They understand different reactions including thermal decompositions, oxidation, combustion and displacement. They have also used observational data to produce a reactivity series. Students know and remember the differences between exothermic and endothermic reactions and are able to represent these on energy level diagram.
   Excelling – Students can convert a balanced equation into a particle diagram

Earth

1. Students know and remember the composition and structure of the Earth. They understand the rock cycle and how igneous, sedimentary and metamorphic rocks are formed. Students understand the Earth is a source of limited resources and use this knowledge to explain the efficacy of recycling. Students understand carbon is used to obtain metals from metal oxides.
   Excelling students will be able to explain which product has less impact on the environment.

2. Students know and remember the composition of the atmosphere. Students understand that carbon dioxide is produced by human activity and can use this knowledge to explain the impact on climate. Students know and remember the Earth is tilted and can use this knowledge to explain seasons, day length at different times of the year and in different hemispheres. Students know and remember our Sun is a star, that there are other stars in our galaxy and there are other galaxies. Students understand the light year is used as a unit of astronomical distance.
   Excelling students will be able to explain how seasons would be affected if the Earth's axis was at 45°.

Forces

1. Students know the difference between contact and non-contact forces and balanced and unbalanced forces. Students know and remember how to calculate resultant force and be able to explain the effect of this overall force. Students know the effect of drag on the motion of objects and can also describe the difference between mass and weight. Students know how to carry out practical investigations and use data to explain how forces affect the extension of an elastic object.
   Excelling students will be able to explain the effect of multiple forces on an object. They will also be able to predict the extension of an object when more force is added.
2. Students know how to calculate speed and know how to represent, describe and interpret journeys on distance-time graphs. They also know how to calculate pressure in solids and understand how pressure can change in fluids like water and air.
   Excelling students will be able to calculate the total distance covered from a distance-time graph

Energy

1. Students know that energy can be described as being in different 'stores' and know these stores. Students understand that energy can be transferred between these stores and that energy is conserved. Students know how to describe the energy transfers between stores in objects that are speeding up, falling and being stretched. Students also know how to calculate the cost of energy in the home; understand work done; and understand the difference between renewable and non-renewable resources.
   Excelling students will be able to describe the energy transfers taking place when a tennis ball falls, hits the ground and bounces back up again
2. Students understand how thermal energy is transferred via conduction, convection and radiation. Students also know how insulation can decrease the amount of thermal energy being transferred.
   Excelling students will be able to compare the rate of conduction for different materials

Electromagnets

1. Students can draw and build basic electrical circuits. They understand that current is the flow of charged particles and its relationship with potential difference. Students understand what resistance is and can describe prove through experiment that higher resistance causes lower current. Students can describe the difference between series and parallel circuits and describe current and potential difference in series and parallel circuits.
   Excelling students will be able to rearrange the I = V/R formula and use it to calculate resistance.
2. Students know what static charge is and how static charge builds up through transfer of electrons. Students can describe how the forces produced when two charged objects are close to each other. Students know how magnets interact with magnetic metals and other magnets. They can plot magnetic field lines through experiment. Students understand that electrical current causes a magnetic field and can build an electromagnet. Students can test electromagnets to show the variables that affect the strength of the magnetic field. Students know the basic principles of D.C. motors.
   Excelling students will be able to describe how to plot magnetic field lines

Waves

1. Students will know how light travels. They will know the difference between transverse and longitudinal waves. They know that white light can be split up into a spectrum of colours. They will understand how light reflects and refracts.
   Excelling students will be able to identify materials from a ray diagram of refraction with an explanation
2. Students will know how sounds travels and how it behaves through materials. Students will understand what an echo is and also know what ultrasound is and how loudspeakers work.
   Excelling students will be able to give the state of matter in which longitudinal waves transfer energy the fastest through and explain how the energy is transferred.