Cromwell High School

Long term plan for Science at Key Stage 4- September 2022

Balance between part modules and meaningful access to Cultural Capital to vary by group needs especially level of cognition - KS1 core, +CC KS2 Cultural Capital, ++CC KS3 (simplified) Cultural Capital

	Autumn Term		Spring Term		Summer Term	
Yr A	The Human Machine, Healthy living- TC: Feeling Good – personal hygiene: including healthy **diet**, **exercise** and **hygiene**. **NC Humans** **+CC Human** **+CC Human Animals**	Sports Science **NC Humans** **+CC Human** **+CC Human Animals** Nutrition for sport - **Energy** - **Nutrients** (building blocks) Stronger **muscles** Stronger **heart and lungs** Positive body thinking ++CC KS3 Health (simplified)	Energy & Forces in the home TC: Taking the Lead – an action for change- Including- **safety** in the home, electricity, **Electricity** – safety, uses and saving **lights** & mirrors TV & Radio and music (**sound**) Keeping a home **warm** (heating & insulation) **Levers** in the home +CC Forces (yr5) +CC Light +CC sound ++CC KS3 Calculation of fuel uses and costs in the domestic context (simplified) ++CC KS3 Energy changes and transfers (simplified)	Energy & Forces in the wider world- **road traffic and electricity** Where does our electricity come from? Magnets generating electricity through turbines- eg wind turbine. Saving Energy Burning fossil fuels is dirty and messes up the world Speed, momentum and stopping distances +CC Forces/Magnets +CC Electricity +CC Forces (yr5) *++CC KS3 Forces and motion* (simplified) *++CC KS3 Balanced forces* (simplified) *++CC KS3 Describing motion* (simplified) *++CC KS3 Forces* (simplified) ++CC KS3 Energy changes and transfers (simplified) ++CC KS3 Changes in systems (simplified)	Growing food - farming - Be environmentally friendly Local tidiness and pollution Recycling NC Plants +CC Plants NC Animals +CC Animals NC Habitats +CC Habitats NC Seasonal Changes + CC Water/weather *++CC KS3 reproduction in plants,* *++CC KS3 Photosynthesis*	Habitats and food energy chains Woods, moors, ponds, rivers & lakes NC Plants +CC Plants NC Animals +CC Animals NC Habitats +CC Habitats NC Seasonal Changes + CC Water/weather *++CC KS3 Photosynthesis*

Yr B	Materials in the home TC: Making choices – Materials changing through cooking – **Cooking** **NC Humans 1,2,4** +CC Human +CC Human animals 1 **NC Everyday Materials** +CC Materials **Cleaning** **NC Everyday Materials** *++CC KS3 Chemical reactions* (simplified) **Recycling** **NC Everyday Materials** *++CC KS3 The particulate nature of matter* (simplified) *++CC KS3 Atoms, elements and compounds* (simplified) *++CC KS3 Pure and impure substances* (simplified) *++CC KS3 Materials* (simplified) *++CC KS3 Energetics* (simplified)	Materials in the wider world Caring for the Wider environment **Plastic** Pollution: **NC Everyday Materials** +CC Materials **Mining**: **Deforestation**: *++CC KS3 Earth and atmosphere* (simplified) *++CC KS3 Chemical reactions* (simplified)	The Science of the family- TC:Knowing How- difference between self and others- including: **puberty**, **reproduction** and inheritance, child care & safeguarding, growth & **aging**,. +CC Reproduction Caring for babies - NC Humans Caring for pets - NC Animals *++CC KS3 Reproduction humans (simplified)* ++CC KS3 Inheritance, chromosomes, DNA and genes (simplified) ++CC KS3 Health (simplified) – disabled due to foetal+ physical difference	The Science of Disability, Care and Medicine How our bodies fight disease Caring for someone who is ill – rest and warmth **NC Humans** *+CC Human* *+CC Human Animals* *CC Medicines and drugs – safety & uses ++CC KS3 Health (simplified) *CC Vaccinations *CC Opticians & how eyes and glasses work **NC Humans** +CC Light *CC Hearing Impaired **NC Humans** +CC Sound *CC Physical Disability – paralysis - nerves *CC Dentist & teeth +CC Human *CC Surgery & hospitals	The Science of Gardening TC: Moving Forward – Care for a plant or animal - including inheritance, reproduction and growth of **plants** and garden **animals** NC Plants +CC Plants NC Animals +CC Animals NC Habitats +CC Habitats NC Seasonal Changes + CC Water/weather *CC KS3 reproduction in plants,* *++CC KS3 Photosynthesis* *++CC KS3 Pressure in fluids* (simplified) – hose pipes	The Science of the natural Environment NC Plants +CC Plants NC Animals +CC Animals NC Habitats +CC Habitats NC Seasonal Changes + CC Water/weather +CC Rocks *++CC KS3 Earth and atmosphere* (simplified) Clean **water** *++CC KS3 Pure and impure substances* (simplified) The water cycle NC Seasonal Changes +CC water/weather The **Carbon** cycle The **Rock** cycle +CC Rocks

NC References:

NC Plants

1. identify and name a variety of common wild and garden plants, including deciduous and evergreen trees
2. identify and describe the basic structure of a variety of common flowering plants, including trees
3. observe and describe how seeds and bulbs grow into mature plants
4. find out and describe how plants need water, light and a suitable temperature to grow and stay healthy

CC Plants

+ *identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers*
+ *explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant*
+ *investigate the way in which water is transported within plants*
+ *explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.*

++CC KS3 reproduction in plants,

+ *including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms.*

++CC KS3 Photosynthesis

+ *the reactants in, and products of, photosynthesis, and a word summary for Photosynthesis*
+ *the dependence of almost all life on Earth on the ability of photosynthetic organisms, such as plants and algae, to use sunlight in photosynthesis to build organic molecules that are an essential energy store and to maintain levels of oxygen and carbon dioxide in the atmosphere the adaptations of leaves for photosynthesis.*

NC Animals

1. identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals
2. identify and name a variety of common animals that are carnivores, herbivores and omnivores
3. describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals including pets)
4. notice that animals have offspring which grow into adults
5. find out about and describe the basic needs of animals for survival (water, food and air)

CC Animals

+ *identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat*
+ *identify that humans and some other animals have skeletons and muscles for support, protection and movement.*
+ *recognise that living things can be grouped in a variety of ways*
+ *explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment*

NC Habitats- Living things and their habitats

1. explore and compare the differences between things that are living, dead, and things that have never been alive

2. identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other
3. identify and name a variety of plants and animals in their habitats, including microhabitats
4. describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food

CC Habitats

+ *recognise that environments can change and that this can sometimes pose dangers to living things.*
+ *construct and interpret a variety of food chains, identifying producers, predators and prey.*

NC Humans

1. identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense
2. notice that animals, including humans, have offspring which grow into adults
3. find out about and describe the basic needs of animals, including humans, for survival (water, food and air)
4. describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene

+CC Human

1. describe the simple functions of the basic parts of the digestive system in humans
2. identify the different types of teeth in humans and their simple functions

+CC Human Animals

1. identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat
2. identify that humans and some other animals have skeletons and muscles for support, protection and movement.

++CC KS3 Reproduction humans (simplified)

+ *reproduction in humans (as an example of a mammal), including the structure and function of the male and female reproductive systems, menstrual cycle (without details of hormones), gametes, fertilisation, gestation and birth, to include the effect of* maternal lifestyle on the foetus through the placenta

++CC KS3 Inheritance, chromosomes, DNA and genes (simplified)

+ heredity as the process by which genetic information is transmitted from one generation to the next
+ differences between species
+ the variation between individuals within a species being continuous or discontinuous, to include measurement and graphical representation of variation

++CC KS3 Health (simplified)

+ the effects of recreational drugs (including substance misuse) on behaviour, health and life processes.

NC Everyday materials

1. distinguish between an object and the material from which it is made
2. identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock
3. describe the simple physical properties of a variety of everyday materials
4. compare and group together a variety of everyday materials on the basis of their simple physical properties
5. identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses
6. find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching

+CC Materials

+ *compare and group materials together, according to whether they are solids, liquids or gases*
+ *observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C)*

+CC water/weather
+ identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.
++CC KS3 The particulate nature of matter (simplified)
+ the properties of the different states of matter (solid, liquid and gas) in terms of the
+ particle model, including gas pressure
+ changes of state in terms of the particle model.
++CC KS3 Atoms, elements and compounds (simplified)
+ a simple (Dalton) atomic model
+ differences between atoms, elements and compounds
+ chemical symbols and formulae for elements and compounds
+ conservation of mass changes of state and chemical reactions.
++CC KS3 Pure and impure substances (simplified)
+ the concept of a pure substance
+ mixtures, including dissolving
+ diffusion in terms of the particle model
+ simple techniques for separating mixtures: filtration, evaporation, distillation and chromatography
+ the identification of pure substances.
++CC KS3 Chemical reactions (simplified)
+ chemical reactions as the rearrangement of atoms
+ representing chemical reactions using formulae and using equations
+ combustion, thermal decomposition, oxidation and displacement reactions
+ defining acids and alkalis in terms of neutralisation reactions
+ the pH scale for measuring acidity/alkalinity; and indicators
+ reactions of acids with metals to produce a salt plus hydrogen
+ reactions of acids with alkalis to produce a salt plus water
+ what catalysts do.
++CC KS3 Energetics (simplified)
+ energy changes on changes of state (qualitative)
+ exothermic and endothermic chemical reactions (qualitative).
++CC KS3 Materials (simplified)
+ properties of ceramics, polymers and composites (qualitative).
++CC KS3 Earth and atmosphere (simplified)
+ the composition of the Earth
+ the structure of the Earth
+ the rock cycle and the formation of igneous, sedimentary and metamorphic rocks
+ Earth as a source of limited resources and the efficacy of recycling
+ the carbon cycle
+ the composition of the atmosphere
+ the production of carbon dioxide by human activity and the impact on climate.

++CC KS3 Physical changes (simplified)
+ conservation of material and of mass, and reversibility, in melting, freezing,

+ *evaporation, sublimation, condensation, dissolving*
+ *similarities and differences, including density differences, between solids, liquids and gases*
+ *Brownian motion in gases*
+ *diffusion in liquids and gases driven by differences in concentration*
+ *the difference between chemical and physical changes.*

++*CC KS3 Particle model* (simplified)
+ *the differences in arrangements, in motion and in closeness of particles explaining changes of state, shape and density, the anomaly of ice-water transition*
+ *atoms and molecules as particles.*

++*CC KS3 Energy in matter* (simplified)
+ *changes with temperature in motion and spacing of particles*
+ *internal energy stored in materials.*

++*CC KS3 Space physics* (simplified)
+ *gravity force, weight = mass x gravitational field strength (g), on Earth g=10 N/kg, different on other planets and stars; gravity forces between Earth and Moon, and between Earth and Sun (qualitative only)*
+ *our Sun as a star, other stars in our galaxy, other galaxies*
+ *the seasons and the Earth's tilt, day length at different times of year, in different hemispheres*
+ *the light year as a unit of astronomical distance.*

+*CC Rocks*
+ *compare and group together different kinds of rocks on the basis of their appearance and simple physical properties*
+ *describe in simple terms how fossils are formed when things that have lived are trapped within rock*
+ *recognise that soils are made from rocks and organic matter.*

NC Seasonal changes
- observe changes across the 4 seasons
- observe and describe weather associated with the seasons and how day length varies

+*CC water/weather*
+ *identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.*

++CC KS3 Calculation of fuel uses and costs in the domestic context (simplified)
+ comparing energy values of different foods (from labels) (kJ)
+ comparing power ratings of appliances in watts (W, kW)
+ comparing amounts of energy transferred (J, kJ, kW hour)
+ domestic fuel bills, fuel use and costs
+ fuels and energy resources.

++CC KS3 Energy changes and transfers (simplified)
+ simple machines give bigger force but at the expense of smaller movement (and vice

versa): product of force and displacement unchanged

+ heating and thermal equilibrium: temperature difference between two objects leading to energy transfer from the hotter to the cooler one, through contact (conduction) or radiation; such transfers tending to reduce the temperature difference: use of insulators
+ other processes that involve energy transfer: changing motion, dropping an object, completing an electrical circuit, stretching a spring, metabolism of food, burning fuels.

++CC KS3 Changes in systems (simplified)

+ energy as a quantity that can be quantified and calculated; the total energy has the same value before and after a change
+ comparing the starting with the final conditions of a system and describing increases and decreases in the amounts of energy associated with movements, temperatures, changes in positions in a field, in elastic distortions and in chemical compositions
+ using physical processes and mechanisms, rather than energy, to explain the intermediate steps that bring about such changes.

+CC Forces (Yr5)

+ *explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object*
+ *identify the effects of air resistance, water resistance and friction, that act between moving surfaces*
+ *recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.*

KS3 Motion and forces

++CC KS3 Describing motion (simplified)

+ *speed and the quantitative relationship between average speed, distance and time (speed = distance ÷ time)*
+ *the representation of a journey on a distance-time graph*
+ *relative motion: trains and cars passing one another.*

++CC KS3 Forces (simplified)

+ *forces as pushes or pulls, arising from the interaction between two objects*
+ *using force arrows in diagrams, adding forces in one dimension, balanced and unbalanced forces*
+ *moment as the turning effect of a force*
+ *forces: associated with deforming objects; stretching and squashing – springs; with rubbing and friction between surfaces, with pushing things out of the way; resistance to motion of air and water*
+ *forces measured in newtons, measurements of stretch or compression as force is changed*
+ *work done and energy changes on deformation*
+ *non-contact forces: gravity forces acting at a distance on Earth and in space, forces between magnets and forces due to static electricity.*

++*CC KS3 Pressure in fluids* (simplified)

+ *atmospheric pressure, decreases with increase of height as weight of air above decreases with height*
+ *pressure in liquids, increasing with depth; upthrust effects, floating and sinking*
+ *pressure measured by ratio of force over area – acting normal to any surface.*

++*CC KS3 Balanced forces* (simplified)

+ *opposing forces and equilibrium: weight held by stretched spring or supported on a compressed surface.*

++*CC KS3 Forces and motion* (simplified)

+ *forces being needed to cause objects to stop or start moving, or to change their speed or direction of motion (qualitative only)*
+ *change depending on direction of force and its size*

CC Light

+ *recognise that they need light in order to see things and that dark is the absence of light*
+ *notice that light is reflected from surfaces*
+ *recognise that light from the sun can be dangerous and that there are ways to protect their eyes*
+ *recognise that shadows are formed when the light from a light source is blocked by an opaque object*
+ *find patterns in the way that the size of shadows change.*

CC Sound

+ *identify how sounds are made, associating some of them with something vibrating*
+ *recognise that vibrations from sounds travel through a medium to the ear*
+ *find patterns between the pitch of a sound and features of the object that produced it*
  find patterns between the volume of a sound and the strength of the vibrations that produced it
+ *recognise that sounds get fainter as the distance from the sound source increases.*

CC Forces/Magnets

1. *compare how things move on different surfaces*
2. *notice that some forces need contact between two objects, but magnetic forces can act at a distance*
3. *observe how magnets attract or repel each other and attract some materials and not others*
4. *compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials*
5. *describe magnets as having two poles*
6. *predict whether two magnets will attract or repel each other, depending on which poles are facing.*

CC Electricity

+ *identify common appliances that run on electricity*
+ *construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers*
+ *identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery*
+ *recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit*
+ *recognise some common conductors and insulators, and associate metals with being good conductors.*