KS3 curriculum map

| Timing | **Topic** | **Key concept – what do I want the students to learn from this unit?** | **What knowledge will they acquire?** |
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| **YEAR 8 OVERVIEW** | | | |
| **Year 8 are on a rotation so they will cover all of these topics but different classes will complete them in a different order.** | **Forces**  Contact forces  Pressure  **Electromagnets**  Electromagnets  Magnetism  **Energy**  Work  Heating and Cooling  **Waves**  Wave effects and wave properties  **Matter**  Periodic Table  Elements  **Reactions**  Chemical energy  Types of reaction  **Earth**  Climate  Earth resources  **Organisms**  Breathing  Digestion  **Ecosystems**  Respiration  Photosynthesis  **Genes**  Evolution  Inheritance | 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 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.  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.  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.  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.  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.  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.  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.  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.  Most substances are not pure elements, but  compounds or mixtures containing atoms of  different elements. They have different properties to the elements they contain.  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.  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. 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.  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.  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.  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.  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.  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.  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.  Natural selection is a theory which explains how species evolve and why extinction occurs. Biodiversity is vital to maintaining populations. Within a species variation helps against environment changes, avoiding extinction.  Within an ecosystem, having many different species ensures resources are available for other populations, like humans.  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. | Friction and drag.  Squashing and stretching.  Direct proportionality.  The Law of moments.  Pressure in gases and liquids.  Stress on solids.  Permanent magnets and magnetic fields.  Electromagnets and their uses.  Work done and machines.  Temperature and heat energy.  The particle model linked to energy transfer in solids and fluids.  Radiation and thermal insulation.  Sound and ultrasound.  The electromagnetic spectrum.  Models of waves (transverse and longitudinal).  Reflection, refraction and superposition of waves.  Elements and atoms.  Compounds and molecules.  Chemical formulae.  Polymers.  The Periodic Table.  Group 1.  Group 7.  Group 0.  Reactants and products.  Combustion.  Thermal decomposition.  Conservation of mass.  Exothermic and endothermic reactions.  Energy level diagrams.  Bond energies.  Global warming  The carbon cycle  Climate change  Extracting less reactive metals.  Extracting more reactive metals.  Recycling.  Gas exchange.  Breathing.  Drugs and alcohol.  Smoking.  Nutrients and food tests.  Unhealthy diets.  The digestive system.  Bacteria and enzymes in digestion.  Aerobic respiration.  Anaerobic respiration.  Biotechnology.  Photosynthesis.  Leaves.  Plant minerals.  Natural selection.  Charles Darwin.  Extinction.  Biodiversity.  Inheritance.  DNA, genetics and genetic modification. |