BIOLOGY ***Organ Systems***	***Students will know and remember…***	***So that they can…***
Describe the structure and function of the human gas exchange system	The structure of the lungs and chest cavity The need to supply oxygen to and remove carbon dioxide from body cells The pathway of the flow of air in and out of the lungs	Label and interpret biological diagrams of the human gas exchange system Use flow charts to summarise the flow of air in and out of the lungs Use pie charts and/or bar charts to compare inhaled and exhaled air
Describe the mechanism of breathing	The roles of the diaphragm, intercostal muscles and rib cage in breathing The link between changes in volume and pressure and the movement of air in and out of the lungs	Use of the bell jar model to explain the volume and pressure changes involved in breathing Label and interpret diagrams to explain the volume and pressure changes involved in breathing
Measure and calculate breathing rate and lung volume	Lung volume varies with sex and age Breathing rate and volume vary between individuals and are controlled by the nervous system Breathing rate and volume and are controlled by the nervous system and change in response to exercise	Observe and record breathing rate and volume Process raw data to find means and make comparisons between different sets of raw data
Describe gas exchange by diffusion in the alveolus in humans	The structure and function of the alveolus and associated blood capillaries in gas exchange The adaptations of the alveolus for efficient gas exchange	Label and interpret biological diagrams to summarise the process of gas exchange in the alveolus Use pie charts and/or bar charts to compare inhaled and exhaled air Apply knowledge about diffusion in a different context
Describe the effects of disease and lifestyle on the human gas exchange system	The beneficial effects of exercise on lung volume and cardiovascular health The causes, symptoms, effects and treatment of asthma The components of cigarette smoke and their effects on the lungs	The analysis and interpretation of statistical data on the effects of exercise, asthma and smoking on the human gas exchange system
Describe the components of a healthy balanced diet and explain their functions in the human body	State the 7 components of a balanced diet Explain the function of each component in the human body Define a balanced diet	Carry out food tests to identify starch, reducing sugars, proteins and fats
Describe and explain the consequences of an unbalanced diet	Describe and explain examples of unbalanced diets and their consequences, including: Being underweight Starvation Being overweight Obesity Vitamin deficiencies Mineral deficiencies	The use of bar charts to compare the energy requirements of people of different age, sex and occupation
Describe the structure and function of the human digestive system	The structure of the human digestive system The functions of the major organs in the human digestive system Define the processes of physical and chemical digestion, peristalsis, absorption and egestion	Label and interpret biological diagrams of the human digestive system

Describe and explain the roles of enzymes and gut bacteria in digestion	The role of enzymes in the chemical digestion of food molecules The specific roles of carbohydrases, proteases and lipases The role of gut bacteria in helping to break food down and the production of some vitamins	Draw diagrams to describe and explain the digestion of different food molecules by enzymes Carry out experiments to investigate the progress of an enzyme controlled reaction, such as starch and amylase, protein and protease or lipid and lipase

CHEMISTRY Reactions	***Students will know and remember…***	***So that they can…***
Describe how new substances are formed	All substances are made of atoms Atoms recombine during chemical reactions The products of a reaction are different from the reactants in a reaction	Make observations during a chemical reaction Identify the products and reactants in a chemical reaction
Use word equations to represent reactions	Chemical reactions are represented using equations The reactants are on the left hand side of the arrow and the products are on the right hand side An arrow represents that a reaction has taken place	
Use symbols equations to represent reactions	All substances have a chemical formula The chemical formula identifies the number of each type of atom in the substance There must be the same numbers of each type of atom on the reactants and products side of the arrow	Balance a symbol equation Identify the states of common substances using state symbols
Explain the theory of the conservation of mass	Mass cannot be created or destroyed Atoms in substances recombine during a chemical reaction	Use masses in reactions to demonstrate the law of the conservation of mass Evaluate a practical method using the masses before and after a reaction has taken place
Describe the process of thermal decomposition	Thermal decomposition is the breaking down of a substance using heat Bonds are broken during a reaction	Measure the mass of reactants and products Calculate the mass of a gas produced during a chemical reaction
Describe how reactions can be endothermic or exothermic	Exothermic reactions release energy into the surrounding Endothermic reactions take energy in from the surrounding	Measure the temperature of a reaction over time Plot a graph of an endothermic or exothermic reaction temperature change Identify if a reaction is endothermic or exothermic using data
Explain how reactions can be endothermic or exothermic	Bond making is endothermic Bond breaking is exothermic Activation energy is the energy required to start a reaction A reaction is endothermic or exothermic depending on the relative size of these numbers	Calculate the enthalpy change of a reaction
Describe how a catalyst works.	Catalysts speed up the rate of reaction Catalysts are not used up an a reaction	Measure the rate of a reaction Identify a catalyst for a specific reaction Justify the choice of a catalyst for a reaction

PHYSICS ***Forces***	***Students will know and remember***	***So that they can***
Describe what forces do	Know what forces are and what they do. Know how to use a Newtonmeter to measure the sizes of forces. Know that a newton is the unit of force.	Use a Newtonmeter to make predictions about sizes of forces. Make predictions about forces in familiar situations.
Describing forces	Identify a 'contact force' and 'non-contact force'. Describe interaction pairs in a simple situation. Understand how force diagrams are used to illustrate problems involving gravity. Describe what 'interaction pair' means.	Categorise everyday forces as 'contact' and 'non-contact' forces. Interpret force diagrams used to illustrate problems involving gravity. Identify interaction pairs in a simple situation.
Know about balanced and unbalanced forces	Understand the difference between balanced and unbalanced forces. Recognise equilibrium. Identify a resultant force. Identify when the speed or direction of motion of an object changes. Describe situations that are in equilibrium.	Draw a force diagram for a problem involving gravity. Give examples of familiar situations of balanced and unbalanced forces. Calculate resultant forces. Explain why the speed or direction of motion of objects can change.
Understand how friction affects moving objects.	Identify examples of drag forces and friction. Know how drag forces and friction arise. Describe the effect of drag forces and friction.	Explain why drag forces and friction arise. Explain what happens to a moving object when the resultant force acting on it is zero. Plan and carry out an experiment to investigate friction, selecting suitable equipment.
Apply knowledge of energy stores and transfers	Explain how conservation of energy applies in one example.	Apply the conservation of energy to simple machines.
Know how work is done by machines.	State how work is calculated. State that machines change the size of forces or distances.	Calculate work done. Compare the work done in different scenarios and by different machines.

Apply energy concepts.	State one way an experiment can be improved. Evaluate results (including random and systematic errors) from a practical.	Suggest how an experiment can be improved.

YEAR 8 TERM 2

YEAR 8 Biology currently under review – please contact nsmith@callingtoncc.net for information

CHEMISTRY Periodic Table	***Students will know and remember…***	***So that they can…***
Describe the development of the Periodic Table	Name the scientists involved in developing the Periodic Table Describe Newlands Octaves Explain why Mendeleev left gaps in the Periodic Table Identify the key parts of the Periodic Table, including Groups, Periods and the metals and non-metals Identify the group and Period of an element Explain why the elements are put into groups	Describe how scientists develop ideas
Compare the properties of metals and non-metals	Identify the position of metals and non-metals on the Periodic Table Name metals and non-metals State the physical properties of metals and non-metals Predict the physical properties of an unknown substance, given its position on the Periodic Table	Compare the conductivity of different metals
Describe the properties of the Group 1 metals	Identify the Group 1 metals Describe how the Group 1 metals react with water Name the products of the reaction of the Group 1 metals with water Name the physical properties of the Group 1 metals Describe how the physical properties of the Group 1 metals change down the group	Create equations to describe the reaction of the Group 1 metals with water
Describe the properties of the Group 7 non-metals	Identfiy the Group 7 elements Describe how the group 7 elements react with metals Name the physical properties of the Group 7 elements Describe how the physical properties of the Group 7 elements change down the group	Use data to identify the state of elements at different temperatures Predict the properties of Astatine
Describe the trends in the physical properties across a period	Identify a period in the Periodic Table Identify the elements that can conduct heat and electricity within a Period Identify the state of different elements in a Period at room temperature	Represent data using a graph

PHYSICS ***Electricity & Magnetism***	***Students will know and remember***	***So that they can***
Know how to make simple circuits	Set up a simple circuit and use appropriate equipment to measure potential difference Use a model to explain how current flows in a circuit	Identify independent, dependent, and control variables. Set up a circuit including an ammeter to measure current
Describe how electric current flows in circuits.	State what current is Describe how current changes in series and parallel circuits when components are changed Describe how to measure current.	Use an ammeter to measure current. Identify the pattern of current in series and parallel circuits. Measure current accurately in a number of places in a series circuit
Know what is meant by potential difference	Describe what is meant by potential difference Describe the effect of a larger potential difference. Explain why potential difference is measured in parallel	Use appropriate equipment to measure potential difference Predict the effect of changing the rating of a battery or bulb in a circuit. Set up and measure potential difference across various components in a circuit
Understand about static electricity	Describe how to charge insulators. State the two types of charge. Describe what happens when you bring similarly charged objects together, and when you bring differently charged objects together Describe what is meant by an electric field Explain, in terms of electrons, why something becomes charged	Use a sketch to explain how objects can become charged. Predict how charged objects will interact Suggest ways to reduce the risk of getting electrostatic shocks
Describe and calculate resistance	Describe what is meant by resistance Describe the difference between conductors and insulators in terms of resistance Explain what factors affect the resistance of a resistor	Calculate the resistance from values of p.d. and current. List examples of conductors and insulators. Independently select and control all the variables in an investigation, considering accuracy and precision

Know the difference between series and parallel circuits	State one difference between series and parallel circuits, Explain why potential difference varies in series and parallel circuits	Identify the pattern of potential difference in series and parallel circuits
Describe how magnets create magnetic fields	Describe features of a magnet. Describe how magnets interact. Describe how to represent magnetic fields. State the Earth has a magnetic field. Describe the Earth's magnetic field.	Use a plotting compass to record the shape of field lines round a magnet.
Understand how to make and use electromagnets	State the main features of an electromagnet State one difference between permanent magnets and electromagnets State where the magnetic field due to a wire or solenoid is strongest State the main parts of an electric bell, circuit breaker, or Loudspeaker. Describe how to make an electromagnet Describe how to change the strength of an electromagnet Explain how an electromagnet works Describe some uses of electromagnets	Ask simple questions about electric bells, circuit breakers, or loudspeakers Predict and test the effect of changes made to an electromagnet Compare and contrast electric bells, circuit breakers, and loudspeakers

YEAR 8 TERM 3

BIOLOGY Evolution & Inheritance	***Students will know and remember…***	***So that they can…***
Describe the structure of DNA, chromosomes and the genome	The structure of DNA as a double helix, held together by the base pairing of the bases adenine & guanine and cytosine and guanine. The formation of chromosomes from coiled lengths of DNA. The genome is one copy of all of an organism's DNA.	Understand how the findings of Chargaff, Wilkins & Franklin and Crick & Watson led to the discovery of the structure of DNA. Make models of DNA and chromosomes to explain their structure.
Describe and explain the role of chromosomes in inheritance	Chromosomes as lengths of DNA, divided up into genes, which code for characteristics. The occurrence of chromosomes in pairs in the nuclei of diploid cells. The formation of haploid gametes, containing half the normal number of chromosomes. The restoration of the normal number of chromosomes in a diploid fertilised egg. The formation of identical and non-identical twins.	Interpret slides or micrographs to describe and explain the structure and behaviour of chromosomes during cell division and fertilisation. Use of diagrams to describe and explain the structure and behaviour of chromosomes during cell division and fertilisation.
Describe and explain how inheritance can be modelled	The concept of dominant and recessive alleles and how they lead to the inheritance of different characteristics. The concept of homozygous and heterozygous pairs of alleles.	Use the Punnett Square and symbols for different alleles to model genetic crosses and make predictions about possible offspring.
Describe variation in living organisms and explain how this affects their survival	The differences between environmental and genetic, or inherited, variation. Genetic variation is the result of genetic mutation. Most variation results from a combination of the two types. The link between these variations and survival. The use of examples to illustrate these points.	Use observation and measurement to record patterns of variation in human and other populations and present data in the form of tables, bar charts and histograms.
Describe and explain the process of natural selection	Darwin's theory of evolution by natural selection, through a "struggle for existence" and "survival of the fittest". The Peppered Moth and Darwin's Finches as examples to illustrate this theory.	Use flow charts, story boards and/or cartoons to present examples to explain the concept of evolution and the mechanism of natural selection. The development of the theory of evolution by observation, hypothesis and peer review.
Describe examples of the fossil evidence for natural selection	Fossils provide strong evidence for natural selection. Examples include: Horses (a key fossil sequence); *Archaeopteryx* (a key "missing link" fossil); Fossils showing human evolution.	Describe and explain how fossil evidence can be used to show evolutionary sequences and the links between different groups and species.
Describe and explain how living organisms may become extinct	Define extinction as when there are no longer any individuals of that species living anywhere in the world. A species may become extinct because of: Changes to its environment; The destruction of its habitat; The outbreak of a new disease; The introduction of a new predator; Increased competition for resources. Extinction is often the result of natural selection. Human activity can cause, or accelerate, extinction.	Use the fossil record to show that species have become extinct in the past. The use of evidence to compare different hypotheses for the extinction of the dinosaurs as an example to illustrate the different causes of extinction.

Explain the importance of maintaining biodiversity	Define biodiversity as a measure of the variety of all of the different living organisms on Earth, or in a particular ecosystem. Biodiversity is vital for maintaining viable populations, which are less likely to become extinct. More biodiverse ecosystems are more stable and less susceptible to environmental change.	Use ecological surveys and monitoring to assess biodiversity. Observe, record and analyse ecological data using quadrats & transects, tables and bar charts. Use ecological data to provide information about the status of endangered species. Use conservation measures, such as habitat protection and captive breeding programmes to maintain biodiversity and prevent extinction.

CHEMISTRY ***Reactions of Metals & Acids***	***Students will know and remember…***	***So that they can…***
Predict reactions using the reactivity series	Define the term reactivity series Identify the most and least reactive metals in a reactivity series Use a reactivity series to predict if a reaction will happen Create a reactivity series using practical data	Design a practical method to test a hypothesis Measure the temperature change of a reaction
Describe displacement reactions	Define the term displacement reaction Identify substances that will displace other substances Name the products of displacement reactions Explain why a displacement reaction may not happen	Write equations to represent displacement reactions Make practical observations to identify if a reaction has occurred Create a conclusion to explain practical observations
Describe the reactions between metal carbonate and acids	Identify a metal carbonate Name common acids Identify the products of the reactions of acids and metal carbonates Describe the gas test for carbon dioxide	Create equations representing the reaction between an acid and a metal carbonate
Describe the reactions between metal oxides and acids	Define neutralisation reactions Identify the products of the reactions between metal oxides and acids	Create equations representing the reaction between an acid and a metal oxide

PHYSICS ***Motion & Pressure***	***Students will know and remember***	***So that they can***
Know how to calculate speed	State the equation for speed and use it to calculate speed. Recognise relative motion	Use appropriate techniques and equipment to measure times and distances
Interpret a graph of motion.	Describe simply what a distance–time graph shows.	Use a distance–time graph to describe a journey. Present data given on a distance–time graph Calculate speed from a distance–time graph
Identify changes in the motion of objects	State the factors that will affect the acceleration of an object acted on by a resultant force. Identify when the speed or direction of motion of an object changes.	Identify a change in speed on a distance–time graph using change in gradient.

Describe and investigate drag	Identify examples of drag forces. Describe how drag forces arise.	Investigate the motion of an object when it falls.
Describe the difference between mass and weight	Describe the difference between mass and weight. Explain why your weight changes in unfamiliar circumstances	Use the formula weight = mass × g.
Understand turning effects	State the law of moments Describe what is meant by a moment Explain why drag forces slow things down in terms of forces	Calculate the moment of a force. Apply the concept of moments to everyday situations
Explain floating, sinking and density	Describe how liquid pressure changes with depth. Explain why some things float and some things sink, using force diagrams	Use the equation for calculating fluid pressure. Predict the changes to the effects of atmospheric pressure at different altitudes or temperatures
Describe pressure in fluids	Describe the motion of particles in a fluid Explain why fluids exert a pressure Describe how atmospheric pressure changes with height	Use the equation for calculating fluid pressure to explain how hydraulic machines work.