

# YEAR 9 TERM 1

Biology Overview under review – please contact [nsmith@callingtoncc.net](mailto:nsmith@callingtoncc.net) for information

<b>CHEMISTRY</b> <b>Atomic Structure</b> <b>&amp; Bonding</b>	<b>Students will know and remember...</b>	<b>So that they can...</b>
Describe how matter is made of particles	Name Atoms Identify the atoms of different elements Name the properties of different molecules	
Use a chemical equation to describe a reaction	Atoms are not created or destroyed, only rearranged How to write a word equation How to write a symbol equation	Write word equations to represent reactions Write symbol equations to represent reactions
Describe the methods of separating mixtures	Identify mixtures Name the methods for separating mixtures	Carry out a method for separating a mixture
Describe the process of chromatography	Describe the chromatography method Calculate R <sub>f</sub> values Explain why different substances travel different distances	
Describe the process of fractional distillation	Draw the fractional distillation equipment Identify the mixtures that can be separated by fraction distillation Explain why different molecules have different boiling points	Evaluate the choice of a method to separate a mixture
Explain the development of the history of the atom	Name the different scientists involved in the development of the structure of the atom Name the different models that were developed Identify the evidence that led to changes in the structure of the atom Describe the experiments that were undertaken	Evaluate the different models of the atom Describe how scientists develop previous ideas and models
Describe the structure of an atom	Identify charge and mass of sub-atomic particles Describe position of sub atomic particles Identify number of sub atomic particles Explain the charge of the nucleus and the atom as a whole	Calculate the number of sub atomic particles in atoms of an element
Explain the electronic structure of an atom	Identify position of the shells in the atom Identify number of electrons in each atom Identify number of electrons in each shell Explain why electrons are placed on the first shell first Compare the energy levels of different shells	Draw the electronic structure of an atom Write out the electronic configuration of an atom
Explain why ions are charged particles	Explain why electrons can move Recall the charges on the sub atomic particles Identify that metal atoms lose electrons Identify that non-metal atoms gain electrons Explain that atoms can be oxidised or reduced	Calculate the charge on an ion
Explain the chemical properties of isotopes	Define the term isotope Identify isotopes of the same element Explain how the masses of different isotopes are different	Calculate the isotopic abundance given the percentage masses of each atom Calculate the number of electrons, protons and neutrons in an isotope
Describe the development of the Periodic Table	Identify the key points in the development of the Periodic Table	Explain how models are developed over time

	<p>Name the scientist that were involved in developing the periodic table</p> <p>Explain how Mendeleev ordered the elements in his Periodic Table</p>	
Relate the electronic structure of atoms to their position on the Periodic Table	<p>Draw the electronic structure of the atom</p> <p>Identify the number of valence electrons when given the group of an element</p> <p>Identify the number of shells when given the Period of the element</p>	
Describe the trends in Group 1	<p>Identify Group 1 as the Alkali metals</p> <p>Describe the reactions of the alkali metals with water</p> <p>Describe the trend down the group of: reactivity, density and melting point</p>	<p>Interpret melting point and density data when in a table and in a graph</p> <p>Identify the safety apparatus</p> <p>Write equations for the reaction of the alkali metals and water</p>
Describe the trends in Group 7	<p>Identify Group 7 as the Halogens</p> <p>Describe the reactions of the halogens and halides</p> <p>Describe the trend in the reactivity, melting point and boiling point</p>	<p>Interpret melting point and boiling point data represented in a graph or a table</p> <p>Interpret observations in reactions</p>
Explain the trends down Groups 1, 7 and 0 on the Periodic Table	<p>Describe the trends in Group 1, 7 and 0</p> <p>Explain why increasing the size of the atom affects the reactivity down the group</p> <p>Explain why increasing the size of the atom affect the melting point of the element</p>	<p>Relate the reactivity of an element to its position on the Periodic Table</p>

<b>PHYSICS</b> <b>Conservation &amp; Dissipation</b>	<b>Students will know and remember</b>	<b>So that they can...</b>
Describe how energy can be stored and transferred	Name the different energy stores Name the four energy transfers Energy is transferred between different stores	Use energy transfer diagrams to identify energy stores and methods of transfer during processes
Explain why conservation of energy is a very important idea	Energy is not created or destroyed, A closed system has no energy transfers in or out	
Describe what work done is in Physics	Work done = energy transferred $W = Fs$ Friction and thermal energy are linked	How to apply the equation for work done.  Use the equation to calculate an unknown.  Interpret thermal images
Describe how we can change the gravitational potential energy of an object	Gravitational Potential energy depends upon height, mass and gravitational field strength $E_p = mgh$	How to apply the equation for gravitational potential energy.  Use the equation to calculate gravitational potential energy and other unknowns  Collect data from an experiment and calculate the gravitational potential energy
Describe how we can change the kinetic energy of a moving object and the elastic potential energy of an elastic object.	Kinetic energy depends upon mass and velocity. $E_k = \frac{1}{2}mv^2$  Elastic potential energy is the energy stored in an elastic object	How to apply the equation for Kinetic energy and elastic potential energy.  Use the equations to calculate kinetic energy and elastic potential energy and other unknowns.  Investigate the transfer of energy from a gravitational potential energy store to a kinetic energy store
Describe how energy is dissipated	Useful and wasted energy is transferred during a process.  Explain why Surroundings become warmer when energy is wasted	Identify useful and wasted energy from a range of processes

Explain why no energy transfer is 100% efficient	<p>Efficiency = useful energy transferred by a device ÷ total energy supplied to the device.</p> <p>Machines waste energy due to friction</p> <p><b><i>H describe how machines can be made more efficient</i></b></p>	<p>How to apply the equation for efficiency.</p> <p>Use the equation to calculate efficiency or an unknown.</p>
Explain why electrical appliances are so useful	<p>Name the origins of energy used in our homes</p> <p>State the uses of electrical appliances</p> <p>Electrical appliances should waste as little energy as possible</p>	
Describe how we can make an appliance more powerful	<p>Power is rate of transfer of energy</p> <p><math>P = E/t</math></p> <p>Power wasted by an appliance = total power input – useful power output</p>	<p>How to apply the equation linking energy and power.</p> <p>Use the equation to calculate power and other unknowns.</p> <p>Recall: Efficiency = useful energy transferred by a device ÷ total energy supplied to the device.</p>

## YEAR 9 TERM 2

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<b>Chemistry</b> <b>Structure &amp; Bonding</b>	<b>Students will know and remember...</b>	<b>So that they can...</b>
Describe the transitions between the states of matter	<p>Identify the three states of matter</p> <p>Name the transitions between the states of matter</p> <p>Describe the differences in particles in solids, liquids and gases</p> <p>Explain how substances transition between</p> <p>Explain why melting and boiling points are bulk properties</p>	<p>Represent the states of matter using a simple model</p> <p>Evaluate the use of a simple model to represent particles</p> <p>Measure the temperature of a substance</p>
Describe how atoms become ions	<p>Define the term ion</p> <p>Identify the ions that are formed by elements in Group 1 to 0</p>	Write ionisation equations
Explain how an ionic compound is formed	<p>Identify positive and negative ions</p> <p>Identify ionically bonded compounds</p> <p>Describe the movement of electrons when an ionic bond is formed</p>	Write symbol and half equations to represent the formation of ionic compounds

Explain the properties of an ionic compound	<p>Draw a giant ionic lattice</p> <p>Explain why solid ionic compounds do not conduct electricity and are brittle</p> <p>Explain why molten and aqueous ionic compounds will conduct electricity</p>	
Describe how a covalent bond is formed	<p>Identify why electrons are shared between atoms</p> <p>Draw dot and cross diagrams representing covalent bonds</p>	
Explain the properties of small covalent molecules	<p>Identify that small covalent molecules cannot conduct electricity or heat well</p> <p>Describe the melting and boiling points of small covalent molecules</p> <p>Use the strength of intermolecular forces to explain the boiling and melting points of small covalent compounds</p>	
Explain the properties of giant covalent compounds	<p>Identify the allotropes of carbon</p> <p>Identify large covalent molecules</p> <p>Define the term lattice</p> <p>Compare the properties of graphite and diamond, including conducting heat and electricity, hardness, melting point and solubility in water.</p>	
Explain the properties of fullerenes and graphene	<p>Describe the covalent bonding in allotropes of carbon</p> <p>Evaluate the use of different allotropes of carbon for different purposes</p>	
Describe the formation of a metallic bond	<p>Identify metallically bonded compounds</p> <p>Draw a diagram of a metallically bonded compound</p> <p>Define the term lattice</p>	
Explain the properties of metallically bonded compounds	<p>Define the term alloy</p> <p>Explain how an alloy is formed</p> <p>Explain how metals can conduct electricity, are sonorous, are ductile, are malleable, conduct heat</p> <p>Explain why alloys have different properties than pure metals</p>	Represent particles using a simple model
Explain why nanoparticles are used	<p>Define the term nanoparticle</p> <p>Identify uses for a nanoparticle</p>	Calculate surface area and volume

	Define the term catalyst Identify the positive and negative implications of using nanoparticles Compare coarse, fine and nano particles Justify the use of nanoparticles	Calculate surface area to volume ratio
<b>PHYSICS</b> <b>Energy Transfer by Heating</b>	<b><i>Students will know and remember</i></b>	<b><i>So that they can</i></b>
Describe how energy can be transferred through conduction	Identify good conductors and good insulators Thermal conductivity is linked to rate of energy transfer	Investigate thermal conductivity using rods of different materials
Describe how infrared radiation is produced	How infrared radiation and the temperature of an object are linked. Describe what is meant by a black body <b><i>HT describe what happens to the temperature of an object if it absorbs more radiation than it emits</i></b>	Interpret thermal images
<b><i>HT Explain how the temperature of the Earth is affected by the balance of absorbed and emitted radiation</i></b>	Radiation is emitted and absorbed by the Earth Identify the factors that the Earth's temperature depends upon	Understand the greenhouse effect, its importance and its role in global warming
Describe how to find the specific heat capacity of a material	Specific Heat capacity depends upon mass, temperature change and energy transferred.	How to apply the SHC equation. Locate $\Delta E = mc\Delta\theta$ on the Physics equation sheet Use the equations to calculate energy transfer and other unknowns. Investigate SHC (Required practical)
Describe how to reduce the rate of energy transfer from a building	State the different measures used to reduce energy transfers in homes Explain what cavity wall insulation is	Interpret thermal images Require practical activity 2 – investigate the effectiveness of different materials

## YEAR 9 TERM 3

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<b>CHEMISTRY</b> <b>Chemical Changes</b>	<b><i>Students will know and remember...</i></b>	<b><i>So that they can...</i></b>
Describe the process of oxidation	Define the term oxidation in terms of electrons and oxygen Identify species that are oxidised in a reaction	

Use the Reactivity Series to explain the feasibility of reactions	<p>Write out a reactivity series</p> <p>Identify the feasibility of a reaction using the reactivity series</p> <p>Explain why copper will not react with water or acids</p> <p>Predict reactions using the reactivity series</p>	<p>Make qualitative/ quantitative observations as to whether a reaction has occurred</p> <p>Create a method to test the reactivity of an unknown metal</p>
Describe how a displacement reaction occurs	<p>Define the term displacement</p> <p>Predict the feasibility of a reaction using the reactivity series</p>	Create word/ symbol equations to represent a reaction
Explain the process of REDOX	<p>Define the term REDOX in terms of electrons and oxygen</p> <p>Identify reduction and oxidation during a reaction</p>	Create equations to represent reduction and oxidation
Describe how extract metals from ores	<p>Define the term ore</p> <p>Identify metals that can be extracted from their ore using carbon</p> <p>Describe the process that occur in a Blast Furnace</p> <p>Explain why metals such as aluminium cannot be extracted using carbon</p>	Create equations representing the production of pure metal from its ore
Describe how salts are formed from metals	<p>Define the term salt</p> <p>Describe the reaction between metals and acid</p> <p>Describe the gas test for hydrogen</p> <p>Identify the products of the reaction between metals and acids</p>	
Describe how salts are formed from insoluble bases	<p>Define the terms base and alkali</p> <p>Describe the reaction between acids and bases</p> <p>Describe the gas test for carbon dioxide</p> <p>Identify the products of the reaction between acids and bases</p> <p>Explain how crystals are formed at the crystallisation point</p>	
Describe how salts are produced		RP1 – Describe the process of producing crystals of a soluble salt
Describe how salts are produced during	<p>Define the term neutralisation</p> <p>Describe the reaction between an acid and an alkali</p>	

neutralisation reactions		
Explain the process of neutralisation	<p>Identify the pH of an acid and an alkali</p> <p>Identify the pH of neutralisation</p>	Draw a neutralisation curve
Explain the difference between a strong and weak acid	<p>Define the term strong and weak acid</p> <p>Define the terms concentrated and dilute</p> <p>Describe how acids and water ionise</p> <p>Explain why strong acids react faster than weak acids</p> <p>Compare the reactivity of strong and weak acids</p>	<p>Create ionisation equations for strong and weak acids</p> <p>Draw neutralisation curves for strong and weak acids</p>