



KOINONIA FEDERATION – ALL THROUGH SUBJECT MAP

SUBJECT: Science

CURRICULUM INTENT:

At St Mary Magdalene, we have designed our science curriculum to equip and develop the knowledge and skills our students need to understand the natural world around them. Through the acquisition and exploration of key scientific principles, the curriculum promotes scientific enquiry and curiosity to further our pupils' passion for science and prepare them for society in an ever-expanding scientific and technological world.

Please identify what the key themes / concepts are, that all students at all key stages will study in your subject.

These will obviously get progressively more challenging in terms of content / expectations as the years progress and different language might be used to describe them however, they should still be able to fit under a blanket heading.

Please allocate a colour to each of these themes so that it is clear how they are revisited and built upon throughout the curriculum.
Please add or remove as appropriate



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Biology	Chemistry	Physics	Theme / concept 4
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	AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER 2
EYFS Early Learning Goals	<p><u>Understanding the World</u></p> <p>ELGs:</p> <p>Children at the expected level of development will:</p> <ul style="list-style-type: none"> - Explore the natural world around them, making observations and drawing pictures of animals and plants; - Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class; - Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter. 					
EYFS Content Topic	Throughout EYFS, children will be focusing on the topics: seasonal changes; plants; animals including humans; and everyday materials , in preparations for their Year 1 learning.					
YEAR 1 - KEY THEMES / CONCEPTS	<u>Seasonal Changes</u>	<u>Plants</u>	<u>Animals including Humans</u>		<u>Everyday materials</u>	
YEAR 1 - KEY CONTENT/ LEARNING	<ul style="list-style-type: none"> • Observe and describe weather associated with the seasons and how day length varies. • Observe changes across the four seasons. 	<ul style="list-style-type: none"> • Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. • Identify and describe the 	<ul style="list-style-type: none"> • Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. • Identify and name a variety of 	<ul style="list-style-type: none"> • Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. • Identify and name a variety of 	<ul style="list-style-type: none"> • Distinguish between an object and the material from which it is made. • Identify and name a variety of everyday materials, including wood, plastic, 	<ul style="list-style-type: none"> • Distinguish between an object and the material from which it is made. • Identify and name a variety of everyday materials, including wood, plastic,



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YEAR 2 - KEY THEMES / CONCEPTS	Everyday Materials	Plants	Animals including Humans		Living Things and Habitats.	
YEAR 2 - KEY CONTENT/ LEARNING	<ul style="list-style-type: none"> Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. 	<ul style="list-style-type: none"> Observe and describe how seeds and bulbs grow into mature plants. Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy. 	<ul style="list-style-type: none"> Notice that animals, including humans, have offspring which grow into adults. Find out about and describe the basic needs of animals, including humans, for survival (water, food and air). Describe the importance for humans of exercise, eating the right amounts of different 	<ul style="list-style-type: none"> Notice that animals, including humans, have offspring which grow into adults. Find out about and describe the basic needs of animals, including humans, for survival (water, food and air). Describe the importance for humans of exercise, eating the right amounts of different 	<p>Explore and compare the differences between things that are living, dead, and things that have never been alive.</p> <p>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.</p> <p>Identify and name a variety of plants and animals in their habitats, including microhabitats. Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name</p>	<p>Explore and compare the differences between things that are living, dead, and things that have never been alive.</p> <p>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.</p> <p>Identify and name a variety of plants and animals in their habitats, including microhabitats. Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name</p>



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YEAR 3 - KEY THEMES / CONCEPTS	<u>Animals including Humans</u>	<u>Rocks</u>	<u>Plants</u>	<u>Light</u>	<u>Forces and Magnets</u>	
YEAR 3 - KEY CONTENT/ LEARNING	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Compare how things move on different surfaces. Notice that some forces need contact between two objects, but magnetic forces can act at a distance. Observe how magnets attract or repel each other and attract some materials and not others. Compare and group together a variety of everyday materials on the basis of 	<ul style="list-style-type: none"> Compare how things move on different surfaces. Notice that some forces need contact between two objects, but magnetic forces can act at a distance. Observe how magnets attract or repel each other and attract some materials and not others. Compare and group together a variety of everyday materials on the basis of



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		rocks and organic matter.	<ul style="list-style-type: none"> 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. 	<p>are formed when the light from a light source is blocked by an opaque object.</p> <ul style="list-style-type: none"> Find patterns in the way that the size of shadows change. 	<p>whether they are attracted to a magnet, and identify some magnetic materials.</p> <ul style="list-style-type: none"> Describe magnets as having two poles. Predict whether two magnets will attract or repel each other, depending on which poles are facing. 	<p>whether they are attracted to a magnet, and identify some magnetic materials.</p> <ul style="list-style-type: none"> Describe magnets as having two poles. Predict whether two magnets will attract or repel each other, depending on which poles are facing.
YEAR 4 - KEY THEMES / CONCEPTS	<u>Animals including Humans</u>	<u>States of Matter</u>	<u>Sound</u>	<u>Living Things</u>	<u>Electricity</u>	
YEAR 4 - KEY CONTENT/ LEARNING	<ul style="list-style-type: none"> Describe the simple functions of the basic parts of the digestive system in humans. 	<ul style="list-style-type: none"> Compare and group materials together, according to whether they 	<ul style="list-style-type: none"> Identify how sounds are made, associating some of them with 	<ul style="list-style-type: none"> Recognise that living things can be grouped in a variety of ways. 	<ul style="list-style-type: none"> Identify common appliances that run on electricity. 	<ul style="list-style-type: none"> Identify common appliances that run on electricity.



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	<ul style="list-style-type: none"> • Identify the different types of teeth in humans and their simple functions. • Construct and interpret a variety of food chains, identifying producers, predators and prey. 	<p>are solids, liquids or gases.</p> <ul style="list-style-type: none"> • 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). • Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. 	<p>something vibrating.</p> <ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. • Recognise that environments can change and that this can sometimes pose dangers to living things. 	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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
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			<p>sound source increases.</p>		<p>with whether or not a lamp lights in a simple series circuit.</p> <ul style="list-style-type: none"> Recognise some common conductors and insulators, and associate metals with being good conductors. 	<p>associate this with whether or not a lamp lights in a simple series circuit.</p> <ul style="list-style-type: none"> Recognise some common conductors and insulators, and associate metals with being good conductors.
YEAR 5 - KEY THEMES / CONCEPTS	<u>All Living Things (Living Things and Habitats and Animals including Humans)</u>		<u>Earth and Space</u>	<u>Forces</u>	<u>Properties and their Materials</u>	
YEAR 5 - KEY CONTENT/ LEARNING	<ul style="list-style-type: none"> Describe the life process of reproduction in some plants and animals. Describe the life process of reproduction in 	<ul style="list-style-type: none"> Describe the life process of reproduction in some plants and animals. Describe the life process 	<ul style="list-style-type: none"> Describe the movement of the Earth, and other planets, relative to the Sun in the solar system. Describe the movement of 	<ul style="list-style-type: none"> Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. 	<ul style="list-style-type: none"> Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets. Know that some materials will dissolve in liquid to form a solution, 	



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	<p>some plants and animals.</p> <ul style="list-style-type: none"> Describe the changes as humans develop to old age. 	<p>of reproduction in some plants and animals.</p> <ul style="list-style-type: none"> Describe the changes as humans develop to old age. 	<p>the Moon relative to the Earth.</p> <ul style="list-style-type: none"> Describe the Sun, Earth and Moon as approximately spherical bodies. Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky. 	<ul style="list-style-type: none"> 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. 	<p>and describe how to recover a substance from a solution.</p> <ul style="list-style-type: none"> Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating. Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic. Demonstrate that dissolving, mixing and changes of state are reversible changes. Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.
YEAR 6 - KEY THEMES / CONCEPTS	<u>All Living Things</u>	<u>Electricity</u>	<u>Animals including Humans</u>		<u>Light</u>
YEAR 6 - KEY CONTENT/ LEARNING	<ul style="list-style-type: none"> Describe how living things are classified into broad groups according to common 	<ul style="list-style-type: none"> Associate the brightness of a lamp or the volume of a buzzer with the number 	<ul style="list-style-type: none"> Identify and name the main parts of the human circulatory system, and 	<ul style="list-style-type: none"> Identify and name the main parts of the human circulatory system, and 	<ul style="list-style-type: none"> Recognise that light appears to travel in straight lines. Recognise that light appears to travel in straight lines.



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	<p>observable characteristics and based on similarities and differences, including microorganisms, plants and animals.</p> <ul style="list-style-type: none"> • Give reasons for classifying plants and animals based on specific characteristics. 	<p>and voltage of cells used in the circuit.</p> <ul style="list-style-type: none"> • Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches. • Use recognised symbols when representing a simple circuit in a diagram 	<p>describe the functions of the heart, blood vessels and blood.</p> <ul style="list-style-type: none"> • Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. • Describe the ways in which nutrients and water are transported within animals, including humans 	<p>describe the functions of the heart, blood vessels and blood.</p> <ul style="list-style-type: none"> • Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. • Describe the ways in which nutrients and water are transported within animals, including humans 	<ul style="list-style-type: none"> • Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye. • Explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes. • Use the idea that light travels in straight lines to explain why shadows have the same shape 	<ul style="list-style-type: none"> • Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye. • Explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes. • Use the idea that light travels in straight lines to explain why shadows have the same shape
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					as the objects that cast them.	as the objects that cast them.
YEAR 7 - KEY THEMES / CONCEPTS	<u>Cells and Reproduction</u>	<u>Particles, Mixtures and Solutions</u>	<u>Forces, Speed and Pressure</u>	<u>Diet and Health</u>	<u>Elements, Compounds and Reactions</u>	<u>Energy</u>
YEAR 7 - KEY CONTENT/ LEARNING	<ul style="list-style-type: none"> • Explain why multi-cellular organisms need organ systems to keep their cells alive. • Suggest what kind of tissue or organism a cell is part of, based on its features. • Explain how to use a microscope to identify and compare different types of cells. • Explain how uni-cellular organisms are adapted to carry out functions that in multi-cellular organisms are done by 	<ul style="list-style-type: none"> • Explain unfamiliar observations about gas pressure in terms of particles. • Explain the properties of solids, liquids and gases based on the arrangement and movement of their particles. • Explain changes in states in terms of changes to the energy of particles. • Draw before and after diagrams of 	<ul style="list-style-type: none"> • Explain unfamiliar observations where weight changes. • Draw a force diagram for a problem involving gravity. • Deduce how gravity varies for different masses and distances. • Compare your weight on Earth with your weight on different planets using the formula. • Explain whether an object in an unfamiliar 	<ul style="list-style-type: none"> • Describe possible health effects of unbalanced diets from data provided. • Calculate food requirements for a healthy diet, using information provided. • Describe how organs and tissues involved in digestion are adapted for their role. • Describe the events that take place in order to turn a meal into simple food 	<ul style="list-style-type: none"> • Name compounds using their chemical formulae. • Given chemical formulae, name the elements present and their relative proportions. • Represent atoms, molecules and elements, mixtures and compounds using particle diagrams. • Use observations from chemical reactions to decide if an unknown substance is an 	<ul style="list-style-type: none"> • Describe how the energy of an object depends on its speed, temperature, height or whether it is stretched or compressed. • Show how energy is transferred between energy stores in a range of real-life examples. • Calculate the useful energy and the amount dissipated, given values of input and output energy.



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<p>different types of cell.</p> <ul style="list-style-type: none"> • Explain whether substances are passed from the mother to the fetus or not. • Use a diagram to show stages in development of a fetus from the production of sex cells to birth. • Describe causes of low fertility in male and female reproductive systems. • Identify key events on a diagram of the menstrual cycle. 	<p>particles to explain observations about changes of state, gas pressure and diffusion</p> <ul style="list-style-type: none"> • Explain how substances dissolve using the particle model. Use the solubility curve of a solute to explain observations about solutions. • Use evidence from chromatography to identify unknown substances in mixtures. • Choose the most suitable technique to separate out a 	<p>situation is in equilibrium.</p> <ul style="list-style-type: none"> • Describe factors which affect the size of frictional and drag forces. • Describe how materials behave as they are stretched or squashed. • Describe what happens to the length of a spring when the force on it changes. • Use diagrams to explain observations of fluids in terms of unequal pressure. • Explain why objects either sink or float depending upon their weight and the upthrust acting on them. 	<p>molecules inside a cell.</p>	<p>element or a compound.</p> <ul style="list-style-type: none"> • Use data to describe a trend in physical properties. • Describe the reaction of an unfamiliar Group 1 or 7 element. • Use data showing a pattern in physical properties to estimate a missing value for an element. • Use observations of a pattern in chemical reactions to predict the behaviour of an element in a group. 	<ul style="list-style-type: none"> • Explain how energy is dissipated in a range of situations. • Explain observations about changing temperature in terms of energy transfer. Describe how an object's temperature changes over time when heated or cooled. • Explain how a method of thermal insulation works in terms of conduction, convection and radiation. • Sketch diagrams to show convection currents in
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		mixture of substances.	<ul style="list-style-type: none">• Explain observations where the effects of forces are different because of differences in the area over which they apply.• Given unfamiliar situations, use the formula to calculate fluid pressure or stress on a surface.• Illustrate a journey with changing speed on a distance-time graph, and label changes in motion.• Describe how the speed of an object varies when measured by observers who are not moving, or moving			unfamiliar situations.
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			relative to the object.			
YEAR 8 - KEY THEMES / CONCEPTS	<u>Plant Reproduction</u>	<u>Electricity, Electromagnets and Space</u>	<u>Gas Exchange and Respiration</u>	<u>Earth and Atmosphere</u>	<u>Interaction, Interdependence and Genetics</u>	<u>Waves</u>
	<u>Chemical Reactions</u>					<u>Energetics</u> <u>Material Properties</u>



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<p>YEAR 8 - KEY CONTENT/ LEARNING</p>	<ul style="list-style-type: none"> Describe the main steps that take place when a plant reproduces successfully. Identify parts of the flower and link their structure to their function. Suggest how a plant carried out seed dispersal based on the features of its fruit or seed. Explain why seed dispersal is important to survival of the parent plant and its offspring. 	<ul style="list-style-type: none"> Draw a circuit diagram to show how voltage can be measured in a simple circuit. Use the idea of energy to explain how voltage and resistance affect the way components work. Given a table of voltage against current. Use the ratio of voltage to current to determine the resistance. Use an analogy like water in pipes to explain why part of a circuit has higher resistance. Describe how current changes in series and parallel circuits 	<ul style="list-style-type: none"> Explain how exercise, smoking and asthma affect the gas exchange system. Explain how the parts of the gas exchange system are adapted to their function. Explain observations about changes to breathing rate and volume. Explain how changes in volume and pressure inside the chest move gases in and out of the lungs. Use word equations to describe aerobic and anaerobic respiration. 	<ul style="list-style-type: none"> Use a diagram to show how carbon is recycled in the environment and through living things. Describe how human activities affect the carbon cycle. Describe how global warming can impact on climate and local weather patterns. Explain why a rock has a particular property based on how it was formed. Identify the causes of weathering and erosion and describe how they occur. 	<ul style="list-style-type: none"> Describe how a species' population changes as its predator or prey population changes. Explain effects of environmental changes and toxic materials on a species' population. Combine food chains to form a food web. Explain issues with human food supplies in terms of insect pollinators. Explain whether characteristics are inherited, environmental or both. 	<ul style="list-style-type: none"> Explain observations where sound is reflected, transmitted or absorbed by different media. Explain observations of how sound travels using the idea of a longitudinal wave. Describe the amplitude and frequency of a wave from a diagram or oscilloscope picture. Use drawings of waves to describe how sound waves change with volume or pitch. Use ray diagrams of eclipses to
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		<p>when components are changed.</p> <ul style="list-style-type: none"> • Turn circuit diagrams into real series and parallel circuits, and vice versa. • Describe what happens when charged objects are placed near to each other or touching. • Use a sketch to describe how an object charged positively or negatively became charged up. • Use a diagram to explain how an electromagnet can be made and how to change its strength. • Explain the choice of 	<ul style="list-style-type: none"> • Explain how specific activities involve aerobic or anaerobic respiration. 	<ul style="list-style-type: none"> • Construct a labelled diagram to identify the processes of the rock cycle • Explain why a rock has a particular property based on how it was formed. • Identify the causes of weathering and erosion and describe how they occur. • Construct a labelled diagram to identify the processes of the rock cycle 	<ul style="list-style-type: none"> • Plot bar charts or line graphs to show discontinuous or continuous variation data. • Explain how variation helps a particular species in a changing environment. • Explain how characteristics of a species are adapted to particular environmental conditions. • Use evidence to explain why a species has become extinct or adapted to changing conditions. • Evaluate whether evidence for a species changing over time 	<p>describe what is seen by observers in different places.</p> <ul style="list-style-type: none"> • Explain observations where coloured lights are mixed or objects are viewed in different lights. • Use ray diagrams to describe how light passes through lenses and transparent materials. • Describe how lenses may be used to correct vision. • Describe the properties of different longitudinal and transverse waves. • Use the wave model to explain
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		<p>electromagnets or permanent magnets for a device in terms of their properties.</p> <ul style="list-style-type: none">• Use the idea of field lines to show how the direction or strength of the field around a magnet varies. Explain observations about navigation using Earth's magnetic field.			<p>supports natural selection.</p> <ul style="list-style-type: none">• Explain how a lack of biodiversity can affect an ecosystem.• Describe how preserving biodiversity can provide useful products and services for humans.• Use a diagram to show the relationship between DNA, chromosomes and genes.	<p>observations of the reflection, absorption and transmission of a wave.</p>
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- Identify the best indicator to distinguish between solutions of different pH, using data provided.
- Use data and observations to determine the pH of a solution and explain what this shows.
- Explain how neutralisation reactions are used in a range of situations.
- Describe a method for how to make a neutral solution from an acid and alkali.
- Explain why a reaction is an example of combustion or thermal decomposition.
- Predict the products of the

- Describe the appearance of planets or moons from diagrams showing their position in relation to the Earth and Sun.
- Explain why places on the Earth experience different daylight hours and amounts of sunlight during the year.
- Describe how space exploration and observations of stars are affected by the scale of the universe.
- Explain the choice of particular units for measuring distance.

- Use a diagram to show how genes are inherited.
- Explain how a change in the DNA (mutation) may affect an organism and its future offspring.
- Explain why offspring from the same parents look similar but are not usually identical.

- Describe an oxidation, displacement, or metal-acid reaction with a word equation.
- Use particle diagrams to represent oxidation, displacement and metal-acid reactions.
- Identify an unknown element from its physical and chemical properties.
- Place an unfamiliar metal into the reactivity series based on information about its reactions.



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	<p>combustion or thermal decomposition of a given reactant and show the reaction as a word equation.</p> <ul style="list-style-type: none"> • Explain observations about mass in a chemical or physical change. Use particle diagrams to show what happens in a reaction. 					
<p>YEAR 9 - KEY THEMES / CONCEPTS</p>	<p>Cell Biology</p>	<p>Bonding, Structure and Properties of Matter</p> <p>Atomic Structure</p>	<p>Energy</p>	<p>Organisation</p>	<p>Energy</p>	<p>Particle Model of Matter</p>



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<p>YEAR 9 - KEY CONTENT/ LEARNING</p>	<ul style="list-style-type: none"> • Describe how cells are the basic unit of all forms of life. • Explain how structural differences between types of cells enables them to perform specific functions within the organism. • State how differences in cells are controlled by genes in the nucleus. • Describe how an organism to grow, the cells must divide by mitosis producing two new identical cells. • Explain how if cells are isolated at an early stage of growth before they 	<ul style="list-style-type: none"> • Use the periodic table to construct chemical equations • Suggest and justify separation and purification techniques • Link changes in evidence to development of atomic model theory • Use atomic number and mass number to calculate the numbers of subatomic particles in atoms. • Explain how the position of an element in the periodic table (period and group) is related to its structure and properties. • Describe the development of the periodic table. 	<ul style="list-style-type: none"> • Describe all changes in the way that energy is stored when a system changes. • Calculate the amount of energy associated with a moving object, a stretched spring and an object raised above ground level. • Use given and experimental data to calculate the specific heat capacity of a material. • Use examples to illustrate the definition of power. • Explain how efficiency of a thermal transfer can be affected by insulation and thermal conductivity. 	<ul style="list-style-type: none"> • Describe and explain the structure and function of key organs and enzymes in the digestive system. • Describe how to use qualitative reagents to test for carbohydrates, lipids and proteins. • Use continuous sampling to investigate the effect of pH on the rate of reaction in enzymes. • Explain structure and function of key components of the cardiovascular system. • Explain adaptations to key blood cells. 	<ul style="list-style-type: none"> • Explain chemical bonding in terms of electron transfer, charges and electrostatic forces. • Recognise ionic and covalent bonding from a diagram of a substance's structure. • Create scientific diagrams to show the bonding in a molecule. • Use particle theory and relevant data to predict state and properties of materials. • Use the idea of inter- and intramolecular forces to explain the bulk properties of a substance (ionic, 	<ul style="list-style-type: none"> • Explain the differences in density between substances and states of matter. • Describe how to experimentally find the density of regular and irregular solids. • Interpret heating and cooling graphs to determine changes of state and latent heat. • Explain qualitatively the relationship between temperature and pressure of a gas at constant volume.
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	<p>have become too specialised, they can retain their ability to grow into a range of different types of cells.</p>	<ul style="list-style-type: none">• Predict properties of an element using trends.	<ul style="list-style-type: none">• Consider the environmental, political, economic, ethical and social issues related to the use of energy resources.	<ul style="list-style-type: none">• Evaluate risks and treatments for disease, including cardiovascular disease and cancers.• Describe the processes of transpiration and translocation	<p>covalent, metallic and carbon).</p>	
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- Use the nuclear model of the explain differences between isotopes.
- Explain the effect of absorption and emission of radiation on the electronic structure of an atom.
- Evaluate how new evidence changed the models of the atom.
- Relate penetrative and ionising properties of alpha, beta and gamma radiation to their relative dangers and uses
- Calculate and interpret



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balanced nuclear decay equations.

- Explain and determine the half-life of a radioactive substance.
- Evaluate the hazards and protections against contamination and irradiation.



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YEAR 10 - KEY THEMES / CONCEPTS	Infection and Response & Bioenergetics	Chemical Changes & Energy Changes	Electricity	Homeostasis and Response	Magnetism and Electromagnetism & Waves
				Quantitative Chemistry	



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<p>YEAR 10 - KEY CONTENT/ LEARNING</p>	<ul style="list-style-type: none"> • Explain how communicable diseases can be spread and prevented. • Explain the role of non-specific and specific defences in the human immune system. • Explain how vaccinations work. • Explain the use of antibiotics and other medicines in treating disease. • Describe the process of discovery and development of new medicines. • Explain the effect of limiting factors on photosynthesis. Describe how to investigate limiting 	<ul style="list-style-type: none"> • Explain and identify reduction and oxidation in terms of oxygen. • Deduce an order of reactivity of metals based on the observations of their reactions. • Write ionic half equations and use these to identify species that are oxidised and reduced (in terms of electrons). (HT) • Predict products from given reactants in neutralisation reactions. • Describe how to produce a pure, dry sample of a salt. • Use the pH scale and H+ 	<ul style="list-style-type: none"> • Draw and interpret circuit symbols and diagrams. • Investigate factors that affect the resistance of a circuit. • Design a circuit to investigate the I-V characteristics of a variety of components. • Compare, calculate and qualitatively explain the properties of P.D., current and resistance in series and parallel circuits. • Explain the difference between D.C. and A.C. • Explain the dangers and relevant safety 	<ul style="list-style-type: none"> • Explain homeostasis as the regulation of internal conditions to maintain optimum conditions. • Explain how the structure of the nervous system is adapted to its functions. • Describe how to investigate the effect of a factor on reaction time. • Describe the structure and function of the human endocrine system. • Explain the control of blood glucose levels in the body, including diabetes. • Describe the roles of hormones in 	<ul style="list-style-type: none"> • Describe the difference between longitudinal and transverse waves. • Determine amplitude and wavelength from diagrams. • Measure frequency, wavelength and speed of waves in a ripple tank and a solid. • Give examples that illustrate the transfer of energy by electromagnetic waves. • Construct ray diagrams (and wave front diagrams HT) to illustrate and explain refraction. • Investigate how the amount of 	<ul style="list-style-type: none"> • Describe the reasons for attraction and repulsion in permanent and induced magnets. • Describe how to plot the magnetic field using a compass, showing how strength and direction change. • Explain the motor effect and its applications.
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<p>factors.</p> <ul style="list-style-type: none"> • Describe the uses of glucose produced in photosynthesis. Compare aerobic and anaerobic respiration processes. • Describe what is meant by metabolism. 	<p>concentration to explain strong or weak acids.</p> <ul style="list-style-type: none"> • Predict the products of electrolysis (molten and aqueous). • Explain the process of using a mixture to extract aluminium through electrolysis. • Represent reactions at the electrodes as ionic half equations. (HT) • Explain using simple calculations from observations and reaction profiles whether a 	<p>measures when using mains electricity.</p> <ul style="list-style-type: none"> • Explain the relationship between power, P.D. & current; power, current and resistance; and power, energy and time (using 3 power equations). • Explain why the national grid is an efficient way to transfer energy. 	<p>human reproduction and the menstrual cycle.</p> <ul style="list-style-type: none"> • Evaluate hormonal and non-hormonal methods of contraception and fertility treatments. • Explain the roles of thyroxine and adrenaline (HT) 	<p>infrared radiation absorbed or radiated by a surface depends on the nature of that surface.</p> <ul style="list-style-type: none"> • Explain why each type of electromagnetic wave is suitable for its practical application. 	
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reaction is exothermic or endothermic.

- Produce a balanced chemical equation.
- Explain conservation of mass, including in a non-closed system.
- Calculate Mr of a substance and use this to calculate moles. (HT)
- Use concentration to calculate mass of a solvent in a given volume of solution.



KOINONIA FEDERATION – ALL THROUGH SUBJECT MAP

YEAR 11 - KEY THEMES / CONCEPTS	Inheritance, variation and Evolution & Ecology	Rate and Extent of Chemical Change & Organic Chemistry & Chemical Analysis & Chemistry of Atmosphere & Using Resources	Forces	Exams	
YEAR 11 - KEY CONTENT/ LEARNING	<ul style="list-style-type: none"> Describe the process and outcome of meiosis. Describe the structure of DNA and genomes. Explain inheritance, including using punnet squares. Make informed judgements about the economic, social and ethical issues concerning embryo screening. Describe how the genome and environmental factors influence the phenotype. 	<ul style="list-style-type: none"> Calculate mean rate of reaction. Use tangents to a curve as a measure of rate of reaction. Investigate how changes in concentration affects the rate of reaction. Predict and explain using collision theory how factors affect the rate of reaction. Identify and explain the effect of catalysts in a reaction. Make qualitative predictions about the effect of changes on systems at equilibrium. Recognise substances as alkanes given their formula. Explain how fractional distillation works in terms of evaporation and condensation. Write balanced equations for the complete combustion of hydrocarbons. Describe the conditions used for catalytic 	<ul style="list-style-type: none"> Describe the interaction between pairs of objects which produce a force, represented as vectors. Calculate weight using mass and GFS Calculate resultant forces on an object. Describe the energy transfer involved when work is done. Describe the difference between elastic 		



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<ul style="list-style-type: none"> • Explain how evolution occurs through natural selection, including evidence. • Evaluate the processes of selective breeding and genetic engineering. • Describe factors that contribute to extinction, interpreting information from the fossil record. • Explain the development of antibiotic resistant strains of bacteria. • Use information to show understanding of the Linnaean system 	<ul style="list-style-type: none"> • and steam cracking. • Give examples to illustrate the usefulness of cracking. • Use melting and boiling point data to distinguish pure from impure substances. • Investigate how paper chromatography can be used to separate and compare coloured substances, including calculating the R_f value. • Recall the tests for hydrogen, oxygen, carbon dioxide and chlorine. • Describe and explain the main changes in the atmosphere over time. • Describe and explain the formation of limestone, coal, crude oil and natural gas. • Describe the greenhouse effect in terms of short and long wavelength radiation. • Recall human activities that increase the amounts of greenhouse gases carbon dioxide and methane in the atmosphere. • Describe the impacts and risk associated with global climate change. • Describe actions to reduce emissions of carbon dioxide and why these may be limited. 	<ul style="list-style-type: none"> • and inelastic deformation. • Calculate work done in stretching a spring. • Investigate the relationship between force and extension for a spring. • Express displacement in terms of magnitude and direction. • Calculate the average speed of an object. • Explain the vector-scalar distinction. • Draw and interpret data from distance-time graphs. • Calculate acceleration, including from a 		
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<ul style="list-style-type: none"> • Describe the importance of interdependence and competition in a community. • Explain how changes in biotic and abiotic factors might affect a given community. • Explain how organisms are adapted to live in their natural environment. • Measure the population size of a common species in a habitat, using sampling techniques to investigate the effect of a factor on distribution. • Explain the importance of the carbon and water cycles to living organisms. 	<ul style="list-style-type: none"> • Describe how carbon monoxide, soot, sulfur dioxide and oxides of nitrogen are produced by burning fuels. • Describe and explain the problems caused by these pollutants in the air. • Distinguish between finite and renewable resources. • Distinguish between pure and potable water. • Analyse and purify water samples from different sources. • Carry out simple comparative LCAs for shopping bags made of plastic and paper. 	<ul style="list-style-type: none"> • velocity-time graph. • Recall and apply Newton’s 3 laws of motion. • Investigate how varying the force and mass affects the acceleration of an object. • Evaluate the effect of various factors on thinking, braking and total stopping distance. • Use the concept of momentum to explain examples of momentum in an event, such as a collision. 		
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	<ul style="list-style-type: none">• Describe what is meant by biodiversity and the effect of humans on ecosystems.• Describe some of the biological consequences of global warming.• Explain and evaluate conflicting pressures on maintaining biodiversity.				
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