Roundwood Park School

Science

Curriculum Map

Year 7 and 8

Skills descriptors

Demonstrating knowledge

Applying and communication in science

Investigative skills

Maths skills

Year 7 Curriculum Map

Topic	No. of weeks	Core knowledge	Key concepts / skills
Introduction to Science	1	To be able to highlight the dangers that exist in a Science lab. To be able to prevent injuries during science practical lessons. To understand and describe the need for laboratory rules. To be able to recognise common lab apparatus. To be able to draw and label a scientific diagram accurately. To be able to label and use a Bunsen to boil water safely. To make observations accurately to measure and record temperature.	Demonstrating knowledge Applying and communicating in science Investigative skills Maths skills
Particles / Pure and Impure Substances	6	How are particles arranged in a solid, a liquid and a gas and how do they behave? What happens when you heat particles? What happens when you cool particles? What is diffusion? What affects the speed of diffusion? What is the difference between a pure substance and an impure substance? What happens when salt dissolves in water? Can we ever get the salt back? How can we find out how soluble something is? What are the five ways of separating a mixture? How can we use filtration to separate a mixture? How can we use distillation to separate a mixture? How can we use chromatography to separate a mixture?	Demonstrating knowledge Applying and communicating in science Investigative skills Maths skills

Forces, effects and motion	**3**	**What can a force do?** **How do we measure a force?** **What forces are acting on something moving at a constant speed?** **What causes friction and is it useful or not?** **What is the effect of friction?** **How do you decide which material causes more friction? What will you change during your investigation? What will you measure? What will you keep the same?** **How can we tell how fast something is travelling?** **How can we investigate the time it takes to an object to fall from a given height? What could be a source of error? What types of error do you know?** **Which factors affect air resistance? In which cases air resistance is useful and in which cases is not?**	**Demonstrating knowledge** **Applying and communicating in science** **Investigative skills** **Maths skills**
Cells and tissues, food and digestion	**4**	**How does a microscope work?** **How can you work out the magnification power of a microscope?** **How do you prepare a microscope slide?** **What are main parts of plant and animal cells?** **What are the functions of different parts of a cell?** **How are animal and plant cells different from each other?** **How are different cells specialised for their function?** **What are the structural adaptations of two unicellular organisms?** **What are the main organs in the digestive system?** **How is food digested by the body?** ***Physically and chemically using enzymes.*** **How is the small intestine adapted for the absorption of food?** **What is a balanced diet and what are the sources of the main food groups?**	**Demonstrating knowledge** **Applying and communicating in science** **Investigative skills** **Maths skills**

Electricity/ Magnets and Electromagnets	**3**	**Can you recall some basic electrical circuit symbols?** **Do you know the difference between conductors and insulators, and common materials for each?** **Can you recall the basic differences between series and parallel circuits?** **Do you know that a potential difference and a complete circuit are both necessary for a current to flow?** **What are the units for current, p.d. and resistance?** **Can you predict how differing values of resistance will affect the amount of current that flows? (qualitative)** **Are you able to predict how changing the thickness and length of a wire will affect its resistance (qualitative)?** **Can you name some common magnetic material and do you realise not all metals are magnetic?** **Do you know how soft and hard magnetic materials make temporary and permanent magnets respectively?** **Do you recall that a pole is the strongest part of a magnet and that there are two poles on every magnet?** **Can you explain why the Earth's geographical north pole is a magnetic south pole?** **Can you trace a magnetic field using iron filings or plotting compasses?** **Can you build an electromagnet and test ways of increasing its strength?** **Can you list the stages in the operation of an electric bell?** **Are you able to use the domain theory of magnetism to explain magnetisation and demagnetisation?** **Can you explain the operation of a loudspeaker in terms of magnetic fields?**	**Demonstrating knowledge** **Applying and communicating in science** **Investigative skills** **Maths skills**
Atoms, elements and compounds	**3**	**What are atoms and how do they make up all known substances?** **What is an element?** **What is a molecule?** **On the periodic table, where are the metals and non-metals found?** **What are chemical symbols? Why do they sometimes look completely different to the name of an element?**	**Demonstrating knowledge** **Applying and communicating in science** **Investigative skills** **Maths skills**

		What is a compound? **How do you write chemical formulae?** **How is a mixture different to a compound?** **What is the Law of Conservation of mass?** **How can you show this Law in the laboratory?**	
Animal and plant reproduction	**2**	**What are the main organs of the reproductive system?** **What are the functions of the organs of the reproductive system?** **What changes take place in boys and girls during puberty?** **What are the stages of the menstrual cycle?** **What are gametes?** **What is fertilisation?** **How is a baby made?** **What happens in the 9 months between a fertilised egg and birth?** **What are the different parts of a flower called?** **What are seeds?** **What are the functions of the parts of a flower?** **What is pollen?** **What is pollination?** **What are the differences between wind and insect pollinated flowers?** **How does fertilisation take place in flowers?** **How may insect pollination affect food security?** **How are seeds spread away from the parent plant?**	**Demonstrating knowledge** **Applying and communicating in science** **Investigative skills** **Maths skills**

Acids and alkalis, simple chemical reactions	**3**	**What types of substances are acids and alkalis and where might you find them in the home?** **What are the hazards associated with acids and alkalis? How can we reduce the risk?** **What is an indicator and how can we make one of our own?** **What is the pH scale and how can we use it to find out which substances are acids and alkalis?** **What happens when an acid reacts with an alkali?** **How is neutralisation used?** **How can we tell when a chemical reaction has taken place?** **How do we represent a chemical reaction?** **How do we write a word equation for a chemical reaction?**	**Demonstrating knowledge** **Applying and communicating in science** **Investigative skills** **Maths skills**
Energy transfers and resources	**3**	**How does energy from the Sun reach us?** **What are fossil fuels, how are they formed and used?** **What is biomass?** **What causes global warming and climate change?** **How are fossil fuels used to generate electricity?** **What are the advantages and disadvantages of using fossil fuels?** **Describe how biomass and nuclear fuel can be used to generate electricity.** **What are the advantages and disadvantages of biomass and nuclear fuel?** **How can moving water be used as an energy resource?** **Discuss the advantages and disadvantages of using moving water for energy.** **How can the sun be used to produce heat and electricity?** **How is wind and geothermal power used?**	**Demonstrating knowledge** **Applying and communicating in science** **Investigative skills** **Maths skills**

		What are the different ways energy can be stored? **What is the law of conservation of energy?** **How can energy be transferred or dissipated?** **How can energy be transferred to and from a gravitational store?** **How is food an energy store?**	
Environment, adaptation and photosynthesis	**3**	**What is the equation for photosynthesis?** **What is the function of chlorophyll in plants?** **What happens to the glucose made by plants?** **Where in the plant does photosynthesis happen and how are the products stored/released?** **How do we know that carbon dioxide is used in photosynthesis and oxygen is produced?** **How are the leaves well adapted for photosynthesis?** **What is a habitat?** **How are organisms adapted to their habitat?** **What is a food chain and what does it show?** **How can feeding relationships be shown in food webs, pyramids of number and pyramids of biomass?** **How can food chains be affected by changes in the environment and accumulation of toxins (DDT)?** **What resources to plants and animals compete for?** **How do some animals work together to aid survival?** **How can we estimate population size using sampling?**	**Demonstrating knowledge** **Applying and communicating in science** **Investigative skills** **Maths skills**

Year 8 Curriculum Map

Topic	Weeks	Lesson objectives	Key concepts and skills
Waves and Sound / Light	3	What is a random error? What is a systematic error? Is there a difference between the speed of light and the speed of sound? What are the properties shared by all waves? How are sound waves produced and propagated? What is the wavelength and frequency of a wave? How do wavelength and frequency vary for different musical instruments? What are the differences and similarities between longitudinal waves and transverse waves? Why is the speed of sound much greater in solids and liquids than in air? What is an echo? How do bats and dolphins communicate? What is the difference between luminous and non-luminous objects? How can we see non-luminous objects? How do we know that light travels in straight lines? Does light require a medium to travel from place to place? How do we know this? What is the law of reflection? What is refraction of light? What happens when primary colours of light combine? Why do different surfaces appear as different colours?	Demonstrating knowledge Applying and communicating in science Investigative skills Maths skills
Periodic table / Innovative materials	4	How is the periodic table arranged? What is the difference between periods and groups?	Demonstrating knowledge Applying and communicating in science

		How does the periodic table act as a toolkit for chemists? **Which scientists were involved in the development of the periodic table?** **Why was Mendeleev's discoveries accepted more easily than Newlands?** **What patterns can you see in the physical properties of the elements?** **What patterns can you see in the reactivity of elements?** **How can we predict reactivity using the periodic table?** **What is the difference between natural and synthetic materials?** **What are the properties of a material?** **How do the properties of a material determine its use?** **What are polymers and composites?**	**Investigative skills** **Maths skills**
Variation and Classification/Inheritance and Evolution	3	**How are plants and animals classified?** **What is continuous variation?** **What is discontinuous variation?** **Can I graphically represent data for continuous variation?** **Can I graphically represent data for discontinuous variation?** **What is a species?** **How do genetic factors affect variation?** **How do environmental factors affect variation?** **What is artificial selection and how does it occur?**	**Demonstrating knowledge** **Applying and communicating in science** **Investigative skills** **Maths skills**
Domestic and Static Electricity / Heat Transfer	4	**Can you recall the charge combinations that attract or repel due to the electrostatic force?** **What is the p.d. of mains electricity?** **Do you know a high power appliance draws more current from the mains than a lower one?**	**Demonstrating knowledge** **Applying and communicating in science**

		Can you calculate the cost of the electricity used for two meter readings and the price per unit? **Are you able to explain why it is easier to charge an insulator than to charge a conductor?** **Do you know that an electric current is a flow of charge?** **Can you explain how objects become charged by friction in terms of transfer of electrons?** **Do you know the relationship power = current x potential difference?** **Do you know the relationship energy = power x time to find energy in Joules and kilowatt-hours?** **How does heat travel in solids?** **Why do metals conduct heat more quickly than non-metals?** **How does heat travel in fluids?** **How does a hot air balloon work?** **How is heat radiated and absorbed?** **How do we know that heat radiation can travel in a vacuum?** **How do we know that heat radiation can travel in a vacuum?** **Why does a vacuum flask keep things hot for a long period of time?**	**Investigative skills** **Maths skills**
Movement and respiration	3	**What is respiration?** **What type of organisms respire?** **What products are made by respiring microorganisms?** **What is the equation for aerobic respiration?** **What is the equation for anaerobic respiration?** **What gases are found in inhaled and exhaled air?** **How much energy is in different foods?**	**Demonstrating knowledge** **Applying and communicating in science** **Investigative skills** **Maths skills**

		What is the advantage of having an internal skeleton? **What type of joints are there in the body?** **How do our bones & joints allow movement?** **How do our joints become damaged?** **How do muscles cause body movement?** **Why is exercise good for you?**	
Reactions of acids / Describing Reactions	3	**Can you use general equations for reactions between acids and metals?** **Can you use general equations for reactions between acids and metal compounds?** **Do you know if metal compounds are acid or alkali?** **What are neutralisation reactions?** **Do you know what sort of chemicals 'salts' are?** **What is the word equation for combustion reactions?** **What are thermal decomposition reactions?** **What happens in oxidation and reduction reactions?** **What are displacement reactions?** **What is meant by the Rate of a reaction?** **How does temperature affect the rate of a reaction?** **How does the concentration of a solution affect the rate of a reaction?** **How can we tell which gas is made during a chemical reaction?**	**Demonstrating knowledge** **Applying and communicating in science** **Investigative skills** **Maths skills**
Breathing and circulation	3	**How have organisms adapted to breathing on land & in water?** **How do we inhale & exhale?**	**Demonstrating knowledge** **Applying and communicating in science**

		What factors affect lung capacity? **Why is a healthy lifestyle important for our body?** **What causes Asthma and Emphysema?** **How does oxygen pass from our lungs to our body tissues?** **How does our circulatory system work?** **Why is exercise important for our breathing & circulatory systems?**	**Investigative skills** **Maths skills**
Application of forces	3	**Why are door handles on the edge of the door & not in the middle?** **How does the length of a lever affect the force you need to lift a load? Is it better to have a long or a short lever?** **Why don't you cut bread with a butter knife?** **What would ruin your Mum's new wooden floor more easily - stiletto heels or wellingtons? Why?** **Why is so much of the ocean unexplored? Why can't humans/machines go to the deepest part of the ocean?** **Why do you float in water but not in air? Why would you float higher than normal in the Dead Sea?**	**Demonstrating knowledge** **Applying and communicating in science** **Investigative skills** **Maths skills**
Exploring Space	3	**Why do we get day and night?** **Why do we get seasons?** **What are the phases of the moon and why do they happen?** **How does a lunar eclipse happen?** **How does a solar eclipse happen?** **Describe the stages in star birth and death.** **How and why do planets orbit the sun?** **Explain the motion of the sun and moon and stars as seen from Earth.**	**Demonstrating knowledge** **Applying and communicating in science** **Investigative skills** **Maths skills**

		How have ideas about the solar system changed over time? **What are comets and how do they orbit?** **Describe some methods of space travel.** **What are satellites used for?** **What are the advantages of exploring space and what are the challenges?**	
Extracting metals / Earth and Atmosphere	3	**What is a displacement reaction?** **How can we extract metals from their ores using carbon?** **How can we separate ionic compounds using electricity?** **Which properties of metals make them useful?** **What is the Earth like inside?** **Where do rocks come from?** **How do rocks change over time?** **Is global warming really happening?** **What is meant by "your carbon footprint"?**	**Demonstrating knowledge** **Applying and communicating in science** **Investigative skills** **Maths skills**

Science – Demonstrating knowledge

YEAR 7	YEAR 8
	MASTERING + Working above a mastering level
MASTERING + Working above a mastering level	**MASTERING** Make explicit connections between abstract ideas and/or models in explaining processes or phenomena, systematically deciding the importance of each. Explain how different pieces of evidence support accepted scientific ideas or contribute to questions that science cannot fully answer. Explain the processes by which ideas and evidence are accepted or rejected by the scientific community.
MASTERING Use abstract ideas, models or multiple factors when explaining processes or phenomena. Identify the strengths and weaknesses of particular models. Describe some scientific evidence that supports or refutes particular ideas or arguments, including those in development. Explain how new scientific evidence is discussed and interpreted by the scientific community and how this may lead to changes in scientific ideas.	**SECURING** Use abstract ideas, models or multiple factors when explaining processes or phenomena. Identify the strengths and weaknesses of particular models. Describe some scientific evidence that supports or refutes particular ideas or arguments, including those in development. Explain how new scientific evidence is discussed and interpreted by the scientific community and how this may lead to changes in scientific ideas.
SECURING Use abstract ideas or models or more than one step when describing processes. Explain processes, suggest solutions to problems or answer questions by drawing on abstract ideas or models. Recognise scientific questions that do not yet have definitive answers. Identify the use of evidence and creative thinking by scientists in the development of scientific ideas	**DEVELOPING** Use abstract ideas or models or more than one step when describing processes. Explain processes, suggest solutions to problems or answer questions by drawing on abstract ideas or models. Recognise scientific questions that do not yet have definitive answers. Identify the use of evidence and creative thinking by scientists in the development of scientific ideas
DEVELOPING Use scientific ideas when describing simple processes. Use simple models to describe scientific ideas. Identify scientific evidence that is being used to support or refute ideas or arguments.	**ACQUIRING** Use scientific ideas when describing simple processes. Use simple models to describe scientific ideas. Identify scientific evidence that is being used to support or refute ideas or arguments.
ACQUIRING Identify differences, similarities or changes related to simple scientific ideas and processes. Respond to ideas given to them to answer questions or suggest solutions to problems. Represent things in the real world using simple physical models. Use straightforward scientific evidence to answer questions, or to support their findings.	

Science – Applying and communicating in science

YEAR 7	YEAR 8
	MASTERING + Working above a mastering level
MASTERING + Working above a mastering level	**MASTERING** Explain how information or evidence from various sources may been manipulated in order to influence interpretation. Effectively represent abstract ideas using appropriate symbols, flow diagrams and different kinds of graphs to present explanations and arguments. Explain how scientists with different specialisms and skills have contributed to particular scientific or technological developments. Explain and evaluate the power, limitations and ethical implications of science.
MASTERING Identify lack of balance in the presentation of information or evidence. Choose forms to communicate qualitative or quantitative data appropriate to the data and the purpose of the communication. Distinguish between data and information from primary sources, secondary sources and simulations, and present them in the most appropriate form. Explain and evaluate the power, limitations and ethical implications of science. Present data to support hypotheses.	**SECURING** Identify lack of balance in the presentation of information or evidence. Choose forms to communicate qualitative or quantitative data appropriate to the data and the purpose of the communication. Distinguish between data and information from primary sources, secondary sources and simulations, and present them in the most appropriate form. Explain and evaluate the power, limitations and ethical implications of science. Present data to support hypotheses.
SECURING Distinguish between opinion and scientific evidence in contexts related to science, and use evidence rather than opinion to support or challenge scientific arguments. Use appropriate scientific and mathematical conventions and terminology to communicate abstract ideas. Suggest how collaborative approaches to specific experiments or investigations may improve the evidence collected. Appreciate the power, limitations and ethical implications of science.	**DEVELOPING** Distinguish between opinion and scientific evidence in contexts related to science, and use evidence rather than opinion to support or challenge scientific arguments. Use appropriate scientific and mathematical conventions and terminology to communicate abstract ideas. Suggest how collaborative approaches to specific experiments or investigations may improve the evidence collected. Appreciate the power, limitations and ethical implications of science.
DEVELOPING Select appropriate ways of presenting scientific data. Use appropriate scientific forms of language to communicate scientific ideas and processes. Use scientific and mathematical conventions when communicating information or ideas. Identify some limitations and ethical implications of science. State whether or not data supports the hypothesis.	**ACQUIRING** Select appropriate ways of presenting scientific data. Use appropriate scientific forms of language to communicate scientific ideas and processes. Use scientific and mathematical conventions when communicating information or ideas. Identify some limitations and ethical implications of science. State whether or not data supports the hypothesis.
ACQUIRING Use scientific forms of language when communicating simple scientific ideas and processes. Identify simple advantages of working together on experiments or investigations. Suggest improvements to their working methods. Identify some things in science that people might disagree with.	

Science – Investigative skills

YEAR 7	YEAR 8
	MASTERING + Working above a mastering level
MASTERING + Working above a mastering level	**MASTERING** Formulate hypotheses using information from a range of sources. Identify key variables in complex contexts, explaining why some cannot readily be controlled and planning appropriate approaches to investigations to take account of this. Explain how to take account of sources of error in order to collect reliable data. Recognise the need for risk assessments and consult, and act on, appropriate sources of information. Explain ways of modifying working methods to improve reliability. Present data to support hypotheses.
MASTERING Apply scientific knowledge and understanding in the planning of investigations and making predictions, identifying significant variables, including independent, dependent and control variables. Justify their method choice and number of observations/measurements. Collect data, choosing appropriate ranges, numbers and values for measurements and observations. Independently recognise a range of familiar risks and take action to control them. Evaluate data to identify sources of error.	**SECURING** Apply scientific knowledge and understanding in the planning of investigations and making predictions, identifying significant variables, including independent, dependent and control variables. Justify their method choice and number of observations/measurements. Collect data, choosing appropriate ranges, numbers and values for measurements and observations. Independently recognise a range of familiar risks and take action to control them. Evaluate data to identify sources of error.
SECURING Recognise significant variables in investigations, selecting the most suitable to investigate. Explain why particular pieces of equipment or information sources are appropriate for the questions or ideas under investigation. Repeat sets of observations or measurements in case of error, selecting suitable ranges and intervals. Make, and act on, suggestions to control obvious risks to themselves and others. Evaluate the effectiveness of their working methods, making practical suggestions for improving them.	**DEVELOPING** Recognise significant variables in investigations, selecting the most suitable to investigate. Explain why particular pieces of equipment or information sources are appropriate for the questions or ideas under investigation. Repeat sets of observations or measurements in case of error, selecting suitable ranges and intervals. Make, and act on, suggestions to control obvious risks to themselves and others. Evaluate the effectiveness of their working methods, making practical suggestions for improving them.
DEVELOPING Decide when it is appropriate to carry out fair tests in investigations. Select appropriate equipment or information sources to address specific questions or ideas under investigation. Make sets of observations or measurements, identifying the ranges and intervals used. Identify possible risks to themselves and others. Suggest improvements to their working methods, giving reasons.	**ACQUIRING** Decide when it is appropriate to carry out fair tests in investigations. Select appropriate equipment or information sources to address specific questions or ideas under investigation. Make sets of observations or measurements, identifying the ranges and intervals used. Identify possible risks to themselves and others. Suggest improvements to their working methods, giving reasons.
ACQUIRING Identify one or more control variables in investigations from those provided. Select equipment or information sources from those provided to address a question or idea. Make some accurate observations or whole number measurements relevant to questions or ideas under investigation. Recognise obvious risks when prompted.	

Science – Maths Skills

YEAR 7	YEAR 8
MASTERING + Working above a mastering level	**MASTERING +** Working above a mastering level
MASTERING Suggest reasons based on scientific knowledge and understanding for any limitations or inconsistencies in evidence collected. Select and manipulate data and information and use them to contribute to conclusions. Draw conclusions that are consistent with the evidence they have collected and explain them using scientific knowledge and understanding. Make valid comments on the quality of their data. Be able to rearrange equations to find the missing variable. Present data (their own or a secondary source) using results tables and graphs.	**MASTERING** Explain how data can be interpreted in different ways and how unexpected outcomes could be significant. Identify quantitative relationships between variables, using them to inform conclusions and make further predictions. Assess the strength of evidence, deciding whether it is sufficient to support a conclusion. Be able to rearrange equations and input data with various different units, selecting the most appropriate one to represent the data. Produce graphs and tables using your own data, or from secondary sources.
SECURING Decide on the most appropriate formats to present sets of scientific data, such as using line graphs for continuous variables. Interpret data in a variety of formats, recognising obvious inconsistencies. Provide straightforward explanations for differences in repeated observations or measurements. Draw valid conclusions that utilise more than one piece of supporting evidence, including results tables and line graphs.	**SECURING** Suggest reasons based on scientific knowledge and understanding for any limitations or inconsistencies in evidence collected. Select and manipulate data and information and use them to contribute to conclusions. Draw conclusions that are consistent with the evidence they have collected and explain them using scientific knowledge and understanding. Make valid comments on the quality of their data. Be able to rearrange equations to find the missing variable. Present data (their own or a secondary source) using results tables and graphs.
DEVELOPING Identify patterns in data presented in various formats, including line graphs. Draw straightforward conclusions from data presented in various formats. Identify scientific evidence they have used in drawing conclusions. Use simple equations to input data to find the missing variable, changing the units where appropriate.	**DEVELOPING** Decide on the most appropriate formats to present sets of scientific data, such as using line graphs for continuous variables. Interpret data in a variety of formats, recognising obvious inconsistencies. Provide straightforward explanations for differences in repeated observations or measurements. Draw valid conclusions that utilise more than one piece of supporting evidence, including results tables and line graphs.
ACQUIRING Identify straightforward patterns in observations or in data presented in various formats, including tables, pie and bar charts. Present simple scientific data in more than one way, including tables and bar charts. Use simple equations to input data to find the missing variable.	**ACQUIRING** Identify patterns in data presented in various formats, including line graphs. Draw straightforward conclusions from data presented in various formats. Identify scientific evidence they have used in drawing conclusions. Use simple equations to input data to find the missing variable, changing the units where appropriate.