GRACE COLLEGE **Curriculum Outline Year 7** **Science**

Year 7 Curriculum Intent

"Students will learn...a broad and informative curriculum that encompasses the key concepts of biology, chemistry and physics and how they link together to allow students to enjoy the awe and wonder of Science.
Students will be able to...deploy their scientific literacy and skills effectively, enabling them to not only think critically but also engage as informed citizens in scientific discussions, and recognize the value of science when making informed decisions; ultimately contributing as functional members of society."
Students will become...appreciative of the world around them, how it works, where it began and the impact they can have on it - all while being prepared for further study and employment in scientific fields, achieving their personal best regardless of their background".

Year 7 Curriculum Overview

Half term 1	Half term 2	Half term 3	Half term 4	Half term 5	Half term 6
Lab Safety Matter: Particle Model Organisms: Cells	Forces: Speed Matter: Separating Mixtures Organisms: Movement	Waves: Sound Waves: Light Earth: Universe	Genes: Variation and Classification Reactions: Acids and Alkalis Energy: Energy Costs	Energy: Energy Transfers and Work Genes: Human Reproduction	Earth: Earth Structure Ecosystems: Plant Reproduction
Key Question					
How can I keep myself and others safe in the laboratory? What is matter made up of? What are living organisms made of?	How do forces affect motion? How can we separate mixtures? How do humans move?	How do waves cause sound? How does light interact with different materials? What is the Universe?	What makes us different? What are chemical reactions? How do acids react? Where does energy come from?	How is energy stored and transferred? How do humans reproduce?	What is the structure of the Earth? How are materials recycled in the rock cycle? How do plants reproduce?
Key Vocabulary					
Risk, Hazard, Risk Assessment, Goggles, Hazard Symbols, Lab Rules Particle, melt, freeze, evaporate, condense, diffusion, pressure. Cell, tissue, organ, organ system, multi-cellular, uni-cellular	Force, newton, motion, speed, resultant, acceleration Solvent, solute, dissolve, solution, soluble, pure, filtration, distillation, chromatography. Skeleton, muscles, joints, ligament, tendon, cartilage, antagonistic pair	Vibration, pitch, volume, amplitude, wavelength, frequency Transparent, translucent, opaque, absorption, reflection, refraction, normal, concave, convex Galaxy, solar system, stars, orbit, seasons	Species, variation, continuous, discontinuous, adaptation, classification pH, indicator, base, concentration, neutralisation Joule, fuel, renewable, non-renewable, power, replenished,	Thermal, chemical, kinetic, gravitational potential, elastic, dissipated. Puberty, gamete, fertilisation, foetus, menstruation, contraception	Weathering, erosion, minerals, sedimentary, igneous, metamorphic, Pollen, pollination, fertilisation, seed dispersal, selective breeding

Biology Chemistry Physics

GRACE COLLEGE
CORE KNOWLEDGE

Year 7 – SCIENCE HALF TERM 1

	The knowledge you will need to recall:	How you will apply this knowledge:	This links to:
1	**Lab Safety** • Safety rules in a lab • Some common hazard symbols for chemicals • How to use a Bunsen burner and the difference between a safety flame and roaring flame. • To recognise some common lab equipment and the diagram that represents it. • How to measure volume and mass including their units.	• Identify hazards in the lab. • Describe how to work safely in a lab • Identify hazard symbols and describe the risks associated with them. • Safely set up and use a Bunsen burner • Identify common lab equipment. • Draw and label scientific equipment • Use appropriate equipment to measure volume and mass. • Convert between units for volume and mass.	All practical Science lessons
2	**Matter: Particle model** • Properties of solids, liquids and gases can be described in terms of particles in motion but with differences in the arrangement and movement of these same particles. • Observations where substances change temperature or state can be described in terms of particles gaining or losing energy. • How evaporation occurs and how it has a cooling effect. • The definition of diffusion. • The factors that affect the rate of diffusion • What causes gas pressure.	• Draw particle diagrams for solids, liquids and gases. • Describe the arrangement and motion of particles in solids, liquids and gases. • Identify changes of state • Explain changes of state in terms of changes to the energy of the particles. • Investigate the boiling point of water. • Describe evaporation using the particle model. • Explain how evaporation is useful. • Use the particle model to explain diffusion. • Explain factors that affect the speed of diffusion. • Investigate how temperature affects the rate of diffusion. • Explain what affects pressure.	Year 7 Matter: Separating mixtures. Year 8 Matter: Elements Year 9 Forces: Pressure GCSE: Particle model of matter
3	**Organisms: Cells** • All organisms are made of cells, and they can be unicellular or multicellular. • The structure or animal and plant cells- the different parts and the functions of each part. • How light microscopes work, including the idea of magnification, and the steps in setting up a microscope and using it to observe cells. • The rules we use when drawing cells as seen under a microscope. • Plant and animal cells are specialised to perform specific functions and organisms are made up of a variety of specialised cells. • Cells are organised into tissues, tissues into organs and organs into organ systems which made up an organism.	• Draw and label a plant and animal cell. • Explain the function of each part of a cell. • Compare and contrast plant and animal cells. • Prepare a microscope slide for viewing plant cells and set up and use a light microscope to view cells. • Use biological drawing conventions to draw cells as seen under a microscope. • List a number of specialized cells, explain how they are adapted to their function and recognize them from a diagram, including labelling key parts. • Name some common animal organs and organ systems, recognize them from diagrams and describe their function.	Year 7 Organisms: Movement Year 8 Organisms: Digestion Year 8 Ecosystems: Photosynthesis Year 8 Ecosystems: Breathing and respiration Year 9 Organisms: Microbes, disease and immune system GCSE: Cell Biology, Organisation, Bioenergetics

GRACE COLLEGE
CORE KNOWLEDGE

Year 7 – SCIENCE HALF TERM 2

	The knowledge you will need to recall:	How you will apply this knowledge:	This links to:
1	**Forces: Speed** • Types of forces • The unit for force • What are contact and non-contact forces. • What a resultant force is. • What speed is. • The formula for speed • The units of speed. • What acceleration is, how to calculate it and the units for acceleration. • The key features of a distance time graph.	• Measure forces • Describe forces as contact or non contact. • Calculate resultant forces • Describe how forces affect motion. • Predict changes in an objects speed when the forces on it change. • Use the equation to calculate speed. • Calculate acceleration • Describe a journey from a distance- time graph. • Illustrate a journey with changing speed on a distance-time graph, and label changes in motion.	Year 7 Earth: Universe Year 8 Forces: Gravity Year 9 Forces: Contact forces GCSE: Forces
2	**Matter: Separating mixtures** • What pure substances and mixtures are. • Definitions for soluble, insoluble, solvent, solution. • That filtration is used to separate insoluble substance from a mixture. • That distillation is separating substances by boiling and condensing liquids. • That chromatography is used to separate different coloured substances.	• Identify pure substances and mixtures from particle diagrams. • Describe how we can use melting and boiling points to identify pure substances. • Explain how substances dissolve using the particle model. • Investigate factors that affect solubility. • Describe the process of filtration. • Describe the process of distillation. • Describe the process of chromatography. • Use evidence from chromatography to identify unknown substances in mixtures. • Choose the most suitable technique to separate out a mixture of substances.	Year 8 Matter: Elements GCSE: Atomic structure, Chemical analysis
3	**Organisms: Movement** • The structure and function of the skeleton. • How joints enable movement and the structure of different types of joint. • The function of muscles and the action of antagonist pairs. • The effect of recreational drugs and alcohol on body systems.	• Label key bones in the human skeleton. • Identify examples of the different types of joint and explain how antagonistic muscle pairs bring about movement at joints. • Explain the difference in structure and function of ligaments and tendons. • Investigate muscle fatigue over time. • Explain the detrimental effects of recreational drugs and alcohol on health.	Year 8 Ecosystems: Breathing and respiration GCSE: Cell Biology, Organisation, Bioenergetics

GRACE COLLEGE
CORE KNOWLEDGE

Year 7 – SCIENCE HALF TERM 3

	The knowledge you will need to recall:	How you will apply this knowledge:	This links to:
1	**Waves: Sound** • Sound consists of vibrations which travel as a longitudinal wave • through substances. • The speed of sound. • The denser the medium, the faster sound travels. • How the amplitude of a wave affects volume. • How the frequency of a wave affects pitch. • The structure and function of parts of the ear. • Things that could cause loss of hearing.	• Describe how sound travels. • Explain why sound travels at different speeds through different mediums. • 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. • Label the parts of the ear. • Describe how we hear. • Suggest the effects of particular ear problems on a person's hearing. • Describe how your hearing can be damaged and suggest ways to protect your hearing.	Year 7 Waves: Light Year 8 Waves: Properties and effects GCSE: Waves
2	**Waves: Light** - When a light ray meets a different medium, some of it is absorbed and some reflected. - The law of reflection: the angle of incidence equals the angle of reflection. - Use ray models to describe the formation of an image in a mirror - Describe how objects appear different colours (basic colour wheel understanding) - Understand that all the colours of light combined makes white light - State how light behaves when it enters a medium of differently with reference to refraction and angles - Refraction through lenses and prisms can be described using a ray diagram as a model.	• Use ray diagrams of eclipses to describe what is seen by observers in different places. • 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. • Use a ray diagram to predict how an image will change in different situations. Predict whether light will reflect, refract or scatter when it hits the surface of a given material. • Use ray diagrams to explain how a device with multiple mirrors works	Year 7 Waves: Sound Matter: Particle Model Waves: Effects and Properties Year 8 Energy: Heating and Cooling Year 10: P6 Waves
3	**Earth: Universe** - The solar system can be modelled as planets rotating on tilted axes while orbiting the Sun, moons orbiting planets and sunlight spreading out and being reflected. - Explains day and year length, seasons and the visibility of objects from Earth. - Our solar system is a tiny part of a galaxy, one of many billions in the Universe. - Light takes minutes to reach Earth from the Sun, four years from our nearest star and billions of years from other galaxies	• 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. • Predict patterns in day length, the Sun's intensity or an object's shadow at different latitudes. • Make deductions from observation data of planets, stars and galaxies. Compare explanations from different periods in history about the motion of objects and structure of the Universe.	Year 7; Earth Structure Year 8 Earth Climate Earth Resources Year 10: C9: Atmosphere C10: Using Resources

GRACE COLLEGE

CORE KNOWLEDGE

Year 7 – SCIENCE HALF TERM 4

	The knowledge you will need to recall:	How you will apply this knowledge:	This links to:
1	Genes: Variation and Classification There is variation between individuals of the same species. Some variation is inherited, some is caused by the environment and some is a combination. Variation between individuals is important for the survival of a species, helping it to avoid extinction in an always changing environment. Understand the principles of biodiversity Understand how living organisms are classified into groups and named	• Explain whether characteristics are inherited, environmental or both. • 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 • Predict implications of a change in the environment on a population. • Use the ideas of variation to explain why one species may adapt better than another to environmental change. • Critique a claim that a particular characteristic is inherited or environmental.	Year 7: Ecosystems: Plant Reproduction Genes: Human Reproduction Year 9: Evolution and Inheritance Year 10: B7 Ecology Year 11: B6 Inheritance, variation and evolution
2	Reactions: Acids and Alkalis The pH of a solution depends on the strength of the acid: strong acids have lower pH values than weak acids. Identify different chemicals pHs based on practical observations with indicators Mixing an acid and alkali produces a chemical reaction, neutralisation, forming a chemical called a salt and water (neutralisation) Acids have a pH below 7, neutral solutions have a pH of 7, alkalis have a pH above 7. Acids and alkalis can be corrosive or irritant and require safe handling. Hydrochloric, sulfuric and nitric acid are strong acids. Acetic and citric acid are weak acids.	• 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 • Given the names of an acid and an alkali, work out the name of the salt produced when they react. • Deduce the hazards of different alkalis and acids using data about their concentration and pH. • Estimate the pH of an acid based on information from reactions	Year 10: C4 Chemical Changes
3	Energy: Energy Costs - We pay for our domestic electricity usage based on the amount of energy transferred. - Electricity is generated by a combination of resources which each have advantages and disadvantages. - Calculate the cost of home energy usage, using the formula: cost = power (kW) x time (hours) x price (per kWh)	• Compare the amounts of energy transferred by different foods and activities. • Compare the energy usage and cost of running different home devices • Explain the advantages and disadvantages of different energy resources. • Represent the energy transfers from a renewable or non-renewable resource to an electrical device in the home • Evaluate the social, economic and environmental consequences of using a resource to generate electricity, from data. • Suggest actions a government or communities could take in response to rising energy demand. • Suggest ways to reduce costs, by examining data on a home energy bill	Year 7: Energy: Transfers and Work Energy: Cost Year 8: Energy Heating and Cooling

GRACE COLLEGE
CORE KNOWLEDGE

Year 7 – SCIENCE HALF TERM 5

	The knowledge you will need to recall:	How you will apply this knowledge:	This links to:
1	Energy: Energy Transfers and Work - We can describe how jobs get done using an energy model where energy is transferred from one store at the start to another at the end. - When energy is transferred, the total is conserved, but some energy is dissipated, reducing the useful energy - Work is done and energy transferred when a force moves an object. The bigger the force or distance, the greater the work. - Machines make work easier by reducing the force needed. Levers and pulleys do this by increasing the distance moved, and wheels reduce friction	• 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. • Explain how energy is dissipated in a range of situations • Compare the percentages of energy wasted by renewable energy sources. Explain why processes such as swinging pendulums or bouncing balls cannot go on forever, in terms of energy. • Evaluate analogies and explanations for the transfer of energy. • Draw a diagram to explain how a lever makes a job easier. • Compare the work needed to move objects different distances • Use the formula: work done (J) = force (N) x distance moved (m) to compare energy transferred for objects moving horizontally. • Compare and contrast the advantages of different levers in terms of the forces need and distance moved	Year 7: Energy: Transfers and Work Energy: Cost Year 8: Energy Heating and Cooling Year 10: P5 Forces
2	Genes: Human Reproduction - The menstrual cycle prepares the female for pregnancy and stops if the egg is fertilised by a sperm. - Identify parts of the male and female reproductive system - The developing foetus relies on the mother to provide it with oxygen and nutrients, to remove waste and protect it against harmful substances.	• Explain whether substances are passed from the mother to the foetus or not. Use a diagram to show stages in development of a foetus 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. • Explain why pregnancy is more or less likely at certain stages of the menstrual cycle. • Make deductions about how contraception and fertility treatments work. • Predict the effect of cigarettes, alcohol or drugs on the developing foetus	Year 7: Ecosystems: Plant Reproduction Genes: Variation and Classification Year 9: Evolution and Inheritance Year 10: B7 Ecology Year 11: B6 Inheritance, variation and evolution

GRACE COLLEGE
CORE KNOWLEDGE

Year 7 – SCIENCE HALF TERM 6

	The knowledge you will need to recall:	How you will apply this knowledge:	This links to:
1	Earth: Earth Structure Sedimentary, igneous and metamorphic rocks can be inter converted over millions of years through weathering and erosion, heat and pressure, and melting and cooling.	• 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 • Identify circumstances that indicate fast processes of change on Earth and those that indicate slower processes. • Predict planetary conditions from descriptions of rocks on other planets. • Describe similarities and differences between the rock cycle and everyday physical and chemical processes. • Suggest how ceramics might be similar to some types of rock	Year 7; Earth: Universe Year 8 Earth Climate Earth Resources Year 10: C9: Atmosphere C10: Using Resources
2	Ecosystems: Plant Reproduction Plants have adaptations to disperse seeds using wind, water or animals. Plants reproduce sexually to produce seeds, which are formed following fertilisation in the ovary	• 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 • Describe similarities and differences between the structures of wind pollinated and insect pollinated plants. • Suggest how plant breeders use knowledge of pollination to carry out selective breeding. • Develop an argument why a particular plant structure increases the likelihood of successful production of offspring	Year 7: Ecosystems: Human Reproduction Genes: Variation and Classification Year 9: Evolution and Inheritance Year 10: B7 Ecology Year 11: B6 Inheritance, variation and evolution