CURRICULUM CORE KNOWLEDGE PLANSUBJECT: Science YEAR GROUP: 7 DATE: Autumn term

Term and unit	Core knowledge	Core vocabulary	Revisiting prior knowledge	Links to Walney Ways & Employability Careers
Autumn term 1 - Cells and movement	Substantive knowledge: ● Know how to be safe in a lab and identify different safety hazards ● Know the names of all pieces of Science equipment and what they are used for ● Know how to accurately use a microscope in the correct order ● Microscopes, magnification and scale drawings ● Know the name of a plant and animal cell including the structure and the function for each of the different parts ● Describe the similarities and differences between plant and animal cells ● Name different types of specialised cells and describe their structure and function of specialised cells ● Describe simply the process of diffusion Disciplinary knowledge ● Know how to use different pieces of science equipment to measure, eg measuring cylinder for liquids ● Know how to accurately use a microscope ● Calculating magnification ● Making scale drawings ● Making a microscope slide using the equipment given in class ● Creating and evaluating models of specialised cells ● Discuss limitations of models that have been produced	risk hazard beaker measuring cylinder tripod gauze heat proof mat Bunsen burner funnel boiling tube test tube balance spill Microscope Magnification Lens Cell Nucleus Cell membrane Cytoplasm Chloroplast Chlorophyll Cell wall Vacuole Root hair cell Sperm cell Palisade cell Egg cell Red blood cell	From the KS2 national curriculum: Organ systems (but not cells) ● identify that humans and some other animals have skeletons and muscles for support, protection and movement ● describe the simple functions of the basic parts of the digestive system in humans ● identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood	Problem solving Self aware

Term and unit	Core knowledge	Core vocabulary	Revisiting prior knowledge	Links to Walney Ways & Employability Careers
	• Suggest ways in which a model can be improved • Describe and solve risks involved in practical investigations	Diffusion Particles		
Autumn term 1 - particle model	Substantive knowledge: • What are the different parts of a graph are called and where they are supposed to be • Drawing accurate particle diagrams for solids, liquids and gases • know and describe properties of solids, liquids and gases • looking at comparing the properties of solids liquids and gases • State and describe the different changes of state using the particle model above • changes of state graph (including why boiling requires more energy) • Draw and label the simple model of the atom including the charges and masses • Disciplinary knowledge • identifying which graph to draw using given data • Know how to accurately draw a line graph and bar chart adding a line of best fit where appropriate • Draw particle diagrams of solids, liquids and gases • Draw and accurate diagram of an atom • Draw and label the different parts of a changes of state graph • Describe what type of graph to draw based on the given data • Label the x and y axis with the correct variables • Add units onto axis labels • Decide which numbers to start and finish each axis	x-axis y-axis line graph bar chart solid liquid gas melting boiling evaporation condensation freezing forces of attraction particles flow proton neutron electron energy level/shells nucleus atom vibration energy sublimation	From the KS2 national curriculum: • compare and group materials together, according to whether they are solids, liquids or gases • 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.	curious self aware

Term and unit	Core knowledge	Core vocabulary	Revisiting prior knowledge	Links to Walney Ways & Employability Careers
	• Creating and evaluating models of specialised cells • Mark out an equal scale showing what each square on graph paper represents • Accurately use a thermometer • Accurately use and set up a Bunsen burner			
Autumn term 1- Forces- Speed/gravity	Substantive knowledge: • Names of all forces • Describe the directions in which forces act (free body diagrams) • Know how to calculate the resultant force acting on a body • Describe if forces are balanced or unbalanced and represent this on a free body diagram • Know Newton's 3 laws • Describe pressure as force per unit area • Explain how pressure changes in liquids and gases, linking to the particle model from the particle model topic • Disciplinary knowledge • Use and rearrange the equations: • pressure = force/area • force = mass x acceleration • Sketch forces acting on an object and label size and direction (free body diagrams) • Describe how different shapes affect the streamlining of an object • Construct an accurate method which includes the correct scientific terminology, showing that the meaning of the	contact force Relative motion Acceleration Weight Non-contact force Pressure Force Area Newton's Laws Field Equilibrium Newton Resultant force Friction air resistance Tension Upthrust liquids fluid gases particles Mass pressure area distance equipment method	From the KS2 national curriculum: • compare how things move on different surfaces • notice that some forces need contact between 2 objects, but magnetic forces can act at a distance • explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object • identify the effects of air resistance, water resistance and friction,	Curious Wider thinking

Term and unit	Core knowledge	Core vocabulary	Revisiting prior knowledge	Links to Walney Ways & Employability Careers
	words are understood, using correct units and correct chemical nomenclature ● Know how to incorporate a pattern into data analysis ● Identify anomalous results ● Calculate a mean from a set of data ● Identify the correct variable for investigations ● identifying which graph to draw using given data ● Know how to accurately draw a line graph and bar chart adding a line of best fit where appropriate	independent variable dependent variable control variable	that act between moving surfaces ● recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect	

CURRICULUM CORE KNOWLEDGE PLAN

SUBJECT: Science YEAR GROUP: 7 DATE: Spring term

Term and unit	Core knowledge	Core vocabulary	Revisiting prior knowledge	Links to Walney Ways & Employability Careers
Spring term 2- Variation and human reproduction	Substantive knowledge: ● Describe variation in humans (as an example of a mammal) ● Know what happens to males and females during puberty/adolescence and why these happen (revisited from ks2) ● Know the structure and functions of the male reproductive system ● know the structure and functions of the female reproductive system ● Know what happens during the menstrual cycle and why this takes place ● Explain the process of fertilisation and where it takes place (use gametes) ● Describe what happens to a baby during its gestation and birth ● Know the effects of maternal lifestyle on the foetus through the placenta Disciplinary knowledge ● Measure differences and present data in tables and graphs (variation)	Variation Adolescence Puberty Testes Sperm tube Glands Penis Ovary Oviduct Uterus Cervix Vagina Menstruation Gametes Egg (ovum) Ovulation Sperm Ejaculation Fertilisation Implantation foetus Placenta Umbilical cord	From the KS2 national curriculum: ● describe the changes as humans develop to old age From KS3: ● Describe the structure and functions of plant and animal cells ● Describe the structure and function of specialised cells	Curious Resilient Communicative Self-aware

Term and unit	Core knowledge	Core vocabulary	Revisiting prior knowledge	Links to Walney Ways & Employability Careers
	• Draw conclusions from found data • Describe what type of graph to draw based on the given data • Label the x and y axis with the correct variables • add units onto axis labels • decide which numbers to start and finish each axis • Mark out an equal scale showing what each square on graph paper represents •	Amniotic fluid Contractions Labour		
Spring term 2- Earth's structure and the Universe	Substantive knowledge: • Know the structure of the Earth and the properties of each of the different layers • Know the properties and describe how each of the 3 rock types are formed (sedimentary, igneous, metamorphic) • Know the process of chemical and physical weathering • Link the formation of rocks and the process of chemical and physical weathering together in the rock cycle • Know all the different planets in our solar system and order of the solar system and the conditions on each planet • Describe the life cycle of stars that are the same mass and larger than the mass of our sun • Know that space exploration takes place and the things that we have found from these journeys. • Disciplinary knowledge	inner core outer core mantle crust Earth sedimentary metamorphic igneous layers crystals volcanoes physical weathering freeze thaw chemical weathering rock cycle sediments pressure temperature cooling Star Sun	From KS2 • Describe the movement of the Earth, and other planets, relative to the Sun in the solar system • Describe the movement of the Moon relative to the Earth 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. Frome KS3 • Describe the particle model and the properties of each state	

Term and unit	Core knowledge	Core vocabulary	Revisiting prior knowledge	Links to Walney Ways & Employability Careers
	● Identify the relevant hazards and risks that are involved in an investigation and explain how to prevent these ● Understand what peer review and bias are	Moons forces balanced fusion Space exploration peer review bias strata erosion minerals		
Spring term 2- Light and sound	Substantive knowledge: ● Know how to calculate sound and the different properties of sound ● Know the speed of sound in air and how to test for this ● Describe the different properties of sound ● Describe what happens to light as it travels through different mediums ● Know the similarities and differences between light and sound ● Name the different parts of the ear and describe how they work together so we can hear ● Describe different hearing problems and how they can be solved ● know the different auditory ranges in animals and humans ● Name the different parts of a wave; amplitude, wavelength, frequency ● Name the different parts of the eye and describe their functions ● Describe how to correct vision	vibration volume pitch amplitude wavelength frequency oscilloscope auditory range echo waves ear drum pressure waves hammer anvil stirrup oval window cochlea lens pupil iris retina ciliary muscles optic nerve	From the KS2 national curriculum: ● recognise that light appears to travel in straight lines ● 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 as	

Term and unit	Core knowledge	Core vocabulary	Revisiting prior knowledge	Links to Walney Ways & Employability Careers
	● ● Disciplinary knowledge ● Calculating speed of sound using the equation that links, speed, distance and time ● Identify independent variable ● Identify dependent variable ● Identify control variables and explain why these must be controlled within the investigation ● Choose a suitable range for the dependent and independent variables ● Understand what peer review and bias are	cornea peer review	the objects that cast them. ● identify how sounds are made, associating some of them with something vibrating ● 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 sound source increases.	

CURRICULUM CORE KNOWLEDGE PLAN

SUBJECT: Science YEAR GROUP: 7 DATE: Summer term

Term and unit	Core knowledge	Core vocabulary	Revisiting prior knowledge	Links to Walney Ways & Employability Careers
Summer term 3- Interdependence and plant reproduction	Substantive knowledge: ● Know the structure of a flower and the functions for each of the different parts ● know the different process of pollination ● Describe the processes of fruit and seed dispersal ● know what interdependence is ● Know what a food chain is, what the arrows represent and what can happen if one species within the chain increases or decreases ● Know what a food web is and how things within a food web can change ● Describe the adaptations of plants to their environments ● Describe how to complete random sampling techniques using a quadrat ● Describe biodiversity Disciplinary knowledge ● Use quadrats to correctly complete sampling techniques	Petal filament anther stigma style ovule ovary pollen fertilisation seed fruit carpel dispersal ecosystem environment stomata transpiration pollination interdependence energy arrow food chain	From the KS2 national curriculum: ● 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 ● investigate the way in which water is transported within plants	communicative curious wider thinking

Term and unit	Core knowledge	Core vocabulary	Revisiting prior knowledge	Links to Walney Ways & Employability Careers
	● Identify dependent, independent and control variables for investigations ● Choose a suitable range for the dependent and independent variables ● Gather sufficient data for the investigation ● Remove outliers and calculate means. ● Understand what peer review and bias are	food web producer consumer primary secondary top predator prey quadrat transect random biodiversity pesticide bioaccumulation	● explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal ● construct and interpret a variety of food chains, identifying producers, predators and prey ● identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution From KS3: ● Describe the structure and function of both plant and animal cells ● Describe the process of diffusion	

Term and unit	Core knowledge	Core vocabulary	Revisiting prior knowledge	Links to Walney Ways & Employability Careers
Summer term 3- Acids and Alkalis	Substantive knowledge: ● Know the properties of different acids and some examples ● Know the properties of different alkalis and some examples ● Know how to make an indicator from cabbage ● Describe how we know the difference between different concentrations of acids and alkalis ● Compare different indicators and evaluate the most effective ● Know what the pH scale is and how we can use this ● Explain what neutralisation is and how we are able to make a neutral substance ● Investigate using the above knowledge which type of indigestion tablet is best ● Know the difference between physical and chemical changes ● Know the products and reactant of a reaction ● Describe the process of oxidation ● Write word equations using the above reactions ● Know the risks involved and how to control them ● Know the difference between a prediction and hypothesis ● Know what accuracy, precision, repeatability and reproducibility Disciplinary knowledge	Acid Alkali Indicator Neutral Neutralisation Concentration pH scale chemical change physical change reactants products oxidation hazard risk accuracy prediction hypothesis precision repeatability reproducibility	From the KS2 national curriculum: Properties and changes of materials ● 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 From KS3: ● Describe the particles model ● Describe the structure and properties of solids, liquids and gases	Organisation and time management Problem solving Aspirational

Term and unit	Core knowledge	Core vocabulary	Revisiting prior knowledge	Links to Walney Ways & Employability Careers
	• using and analysing indicators • making an indicator • investigating indigestion tablets • using a pipette • Describe what type of graph to draw based on the given data • Label the x and y axis with the correct variables • add units onto axis labels • decide which numbers to start and finish each axis • Mark out an equal scale showing what each square on graph paper represents • Construct an accurate method which includes the correct scientific terminology, showing that the meaning of the words are understood, using correct units and correct chemical nomenclature • Understand risks and how to control them • Make accurate predictions. • Understand accuracy, precision and reliability			
Summer term 3- Energy stores and transfers	Substantive knowledge: • Know the names of all the different stores of energy • Give examples of different stores of energy • Describe energy transfers and their pathways that take place for different objects • Know what efficiency is, how to calculate this and how to improve the efficiency of an object	Thermal Chemical Kinetic gravitational potential elastic potential dissipated wasted conduction	This is not taught at KS2, students will have some understanding of the word energy and know that we get our energy from food	communicative curious resilient

Term and unit	Core knowledge	Core vocabulary	Revisiting prior knowledge	Links to Walney Ways & Employability Careers
	• know the process of conduction and describe in terms of particles • know the process of convection and describe in terms of particles • Know what infrared radiation is and which surfaces are better emitters and absorbers of infrared radiation • Explain how to find energy within food • Using conduction, convection and radiation explain which materials are better thermal insulators Disciplinary knowledge • Use the equations: • efficiency = useful energy out/total energy in • Choose a suitable range for the dependent and independent variables • Gather sufficient data for the investigation • Remove outliers and calculate means. • Identify patterns in data and suggest relationships between variable • Identify variables that could(were not) not be controlled correctly • Suggest reasons for differences in repeat readings • Suggest better ways to control the variables • Suggest ways to improve the method • Identify independent variable • Identify dependent variable • Identify control variables and explain why these must be controlled within the investigation	convection energy transfer infrared radiation vibration particles thermal insulator temperature dissipated		

Term and unit	Core knowledge	Core vocabulary	Revisiting prior knowledge	Links to Walney Ways & Employability Careers
	• Choose a suitable range for the dependent and independent variables • Understand what peer review and bias are			

CURRICULUM CORE KNOWLEDGE PLAN

SUBJECT: Science YEAR GROUP: 8 DATE: Autumn term

Term and unit	Core knowledge	Core vocabulary	Revisiting prior knowledge	Links to Walney Ways & Employability Careers
Autumn term 1- Cells to organ systems	Substantive knowledge: • Describe the structure and functions of plant and animal cells • Functions of cell components • Explain the adaptations and functions of specialised cells and why these are important • Explain diffusion in terms of the particle model and how this links to cells • Describe the different organ systems, their functions and how they work together • Name the different parts of the heart and the functions of these including the different blood vessels • Name the different parts of the skeleton and the function of this • Describe how joints work • Explain how muscles work in antagonistic pairs	Cell Nucleus Cytoplasm Cell membrane Chloroplast chlorophyll mitochondria Cell wall Vacuole Root hair cell Sperm cell Palisade Egg cell Red blood cell Diffusion Particles Circulatory Respiratory Reproductive Digestive	From the KS2 national curriculum: • 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 • describe the simple functions of the basic	Self aware Problem solving

Term and unit	Core knowledge	Core vocabulary	Revisiting prior knowledge	Links to Walney Ways & Employability Careers
	Disciplinary knowledge ● Model diffusion in terms of the particle model ● Modelling joints ● Modelling antagonistic muscles ● Analyse model giving strengths and areas for development ● suggest ways in which models fit scientific theories ● Suggest reasons why they do not fit the scientific theory and suggest improvements and developments	Skeletal Muscular Excretory Nervous Heart Bones Joints Hinge Ball and socket Antagonistic muscles ligaments tendons Contract Relax	parts of the digestive system in humans ● identify the different types of teeth in humans and their simple functions ● identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood From KS3: ● Describe the structure and function of both plant and animal cells ● Describe the reproductive system and the gametes involved in fertilisation ● Describe the structure and function of specialised cells	
Autumn term 1-	Substantive knowledge:	proton neutron electron	From KS3: ● Describe the structure of the	curious wider thinking

Term and unit	Core knowledge	Core vocabulary	Revisiting prior knowledge	Links to Walney Ways & Employability Careers
The periodic table	• Know the different parts of the atom, their structure and the charges and masses for each of the subatomic particles • Know how to draw the electronic structure of the atom and how to find out how many electrons are in each element • Know what the parts of the periodic table are; where metals and non- metals are, groups and periodic and the different names of some groups • Describe how the periodic table was developed • Know what atoms, elements and compounds are and the properties of each Disciplinary knowledge • suggest ways in which models fit scientific theories • Suggest reasons why they do not fit the scientific theory and suggest improvements and developments	nucleus energy levels/shells subatomic particle charge mass electron structure atomic number mass number periodic table group period alkali metals halogens noble gases metals Newlands Mendeleev atoms elements compounds mixture separate non metals	atom including the charges and masses of the sub-atomic particles • Describe the particle model and properties of solids, liquids and gases	
Autumn term 1- Forces and motion	Substantive knowledge: • Names of all forces • Describe how to calculate the speed using the equation that links speed, distance and time • Know what happens at each part of the distance time graph • calculating the speed at different parts of a distance time graph	speed average speed relative motion stationary acceleration deformation newton extension compression stopping distance	From KS3: • Know the names of the forces and descriptions and examples of each • Describe and draw accurate free body diagrams	resilient wider thinking

Term and unit	Core knowledge	Core vocabulary	Revisiting prior knowledge	Links to Walney Ways & Employability Careers
	• Explain what happens when an object does and does not obey Hooke's Law • Explain the elastic limit of an object • Give the definition of stopping distance, the equation and the factors that are effect thinking and braking distance • Describe what a moment is and use the equation that links moment, force and distance • Know the different variables • Know what accuracy, precision, repeatability and reproducibility • Disciplinary knowledge • Use and rearrange the equations: • speed= distance/ time • Force = spring constant x extension • moment = force x distance • Draw distance time and hooke's law graphs • Explain and complete investigation for Hooke's law • Investigating speed and the factors that affect the speed of a ball moving down a ramp • Choose a suitable range for the dependent and independent variables • Gather sufficient data for the investigation • Remove outliers and calculate means. • Identify patterns in data and suggest relationships between variable	thinking distance braking distance spring constant limit of proportionality distance time moment force distance independent dependent control variable	• Describe and calculate resultant forces	

Term and unit	Core knowledge	Core vocabulary	Revisiting prior knowledge	Links to Walney Ways & Employability Careers
	• Identify variables that could(were not) not be controlled correctly • Suggest reasons for differences in repeat readings • Suggest better ways to control the variables • Suggest ways to improve the method • Describe what type of graph to draw based on the given data • Label the x and y axis with the correct variables • add units onto axis labels • decide which numbers to start and finish each axis • Mark out an equal scale showing what each square on graph paper represents • Describe and identify independent, dependent and control variable for different investigations • Choose a suitable range for the dependent and independent variables • Gather sufficient data for the investigation • Remove outliers and calculate means. • Identify patterns in data and suggest relationships between variable • Construct an accurate method which includes the correct scientific terminology, showing that the meaning of the words are understood, using correct units and correct chemical nomenclature •			

CURRICULUM CORE KNOWLEDGE PLAN

SUBJECT: Science YEAR GROUP: 8 DATE: Spring term

Term and unit	Core knowledge	Core vocabulary	Revisiting prior knowledge	Links to Walney Ways & Employability Careers
Spring term 2- Plant structure and photosynthesis	Substantive knowledge: ● Know the reactants in, and products of, photosynthesis ● Know the word equation for photosynthesis ● Know that plants maintain the levels of oxygen and carbon dioxide in the atmosphere ● Describe the dependence of almost all life on Earth on the ability of photosynthetic organisms, such as plants and algae, to use sunlight in photosynthesis to build organic molecules (such as proteins) for growth and repair. ● Know that starch (from glucose) is an essential energy store ● Describe the adaptations of leaves for photosynthesis. ● Describe the role of leaf stomata in gas exchange in plants.	Reactants Products Photosynthesis Chlorophyll Chloroplast Light energy Carbon Dioxide Water Oxygen Glucose Starch Protein Energy Iodine Atmosphere Leaves Stomata Gas exchange	KS2 curriculum: ● 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 ● investigate the way in which water is transported within plants From KS3:	Curious Resilient Communicative Self-aware

Term and unit	Core knowledge	Core vocabulary	Revisiting prior knowledge	Links to Walney Ways & Employability Careers
	● Know that plants carry out aerobic respiration to enable all the other chemical processes necessary for life ● Know the different types of errors Disciplinary knowledge ● plan and carry out a scientific enquiry. ● identify independent, dependent and control variables ● Construct an accurate method which includes the correct scientific terminology, showing that the meaning of the words are understood, using correct units and correct chemical nomenclature ● Choose a suitable range for the dependent and independent variables	Diffusion Veins Root hair cells Surface area Aerobic respiration Independent Dependent Control Variables Reliability Conclusion random systematic experimental	● Describe the structure and function of both a plant and animals cell ● Describe the structure and function for the parts of a flower ● Describe the process of diffusion ● Describe the adaptations of plants ● Describe classification and biodiversity	
Spring term 2- Chemical energy and reaction types	Substantive knowledge: ● Know the difference between a chemical and physical reaction (change) ● Know what happens during oxidation ● Write word and symbol equations for oxidation reactions ● Describe what happens during a metal and acid reaction and the products that are produced from these reactions ● Describe the process of combustion ● Know that all mass is conserved during a reaction and explain this ● Describe the process of thermal decomposition and how to test for this	Chemical reaction Physical change Observation Metal Non-metal Oxidation Oxygen Acid Word equation effervescing temperature Balanced (symbol) equation	From the KS2 national curriculum: ● 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) ● know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution	Team work Curious Wider thinker

Term and unit	Core knowledge	Core vocabulary	Revisiting prior knowledge	Links to Walney Ways & Employability Careers
	• Know the properties of metals and non-metals and how to test of these Disciplinary knowledge • Setting up and lighting a Bunsen burner accurately • Writing work and balanced symbol equations • Measuring mass accurately using an appropriate piece of equipment • Identify the relevant hazards and risks that are involved in an investigation and explain how to prevent these • Create predictions and hypothesis for different investigations	Combustion (burning) Fuel Carbon dioxide Water Conservation of mass Particles Thermal decomposition sonorous conductor insulator ductile shiny matt hazard risk prediction hypothesis	• 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 From KS3: • Describe the particle model and the properties of solids, liquids and gases • Describe the structure of the atom including the charges and masses of the of each sub atomic particle • Describe the properties of acids and alkalis including their pH. • Describe the parts and properties of the periodic table	
Spring term 3-	Substantive knowledge: • Know the names of and be able to draw all the different circuit symbols	voltage (potential difference) resistance	from KS2 National curriculum	resilient curious self motivated

Term and unit	Core knowledge	Core vocabulary	Revisiting prior knowledge	Links to Walney Ways & Employability Careers
Voltage, current and resistance	● Know how to draw and construct working series and parallel circuits ● know what voltage and current are ● Know how to measure current in a series and parallel circuit and describe how it changes in both circuits ● Know how to measure voltage in a series and parallel circuit and describe how it changes in both circuits ● current in series and parallel circuits ● Know the definition of resistance ● Describe the different things that can cause resistance to change ● Describe how static electricity occurs Disciplinary knowledge ● Using the following equation: voltage = current x resistance ● Construct accurate series and parallel circuits that include voltmeters and ammeters ● Describe what type of graph to draw based on the given data ● Label the x and y axis with the correct variables ● add units onto axis labels ● decide which numbers to start and finish each axis ● Mark out an equal scale showing what each square on graph paper represents ● Remove outliers and calculate means. ● Identify patterns in data and suggest relationships between variable ● Identify variables that could(were not) not be controlled correctly ● Suggest reasons for differences in repeat readings ● Suggest better ways to control the variables ● Suggest ways to improve the method	conductor insulator electrical charges current in series in parallel circuit filament lamp battery cell voltmeter ammeter fixed resistor variable resistor thermistor diode light emitting diode light dependent resistor fuse wires	● associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit ● ● 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. ● identify common appliances that run on electricity ● 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	

Term and unit	Core knowledge	Core vocabulary	Revisiting prior knowledge	Links to Walney Ways & Employability Careers
			complete loop with a battery ● recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit ● recognise some common conductors and insulators, and associate metals with being good conductors. NB: at ks2 students will have used the word bulb, we will start to use the more scientific work of filament lamp with students.	

CURRICULUM CORE KNOWLEDGE PLAN

SUBJECT: Science YEAR GROUP: 8 DATE: Summer term

Term and unit	Core knowledge	Core vocabulary	Revisiting prior knowledge	Links to Walney Ways & Employability Careers
Summer term 3- Nutrition and digestion	Substantive knowledge: ● Know the content of a healthy human diet: carbohydrates, lipids (fats and oils), proteins, vitamins, minerals, dietary fibre and water ● Know why each of the above groups is needed ● Know what the different food tests are and the results that are expected for a positive result ● calculations of energy requirements in a healthy daily diet ● know the consequences of imbalances in the diet, including obesity, starvation and deficiency diseases ● Name the tissues and organs of the human digestive system and describe the adaptations to function and how the digestive system digests food (enzymes simply as biological catalysts) ● Absorption of food, the role of diffusion in the movement of materials in and between cells	Digestive system carbohydrates lipids (fats and oils) Proteins Vitamins Minerals dietary fibre water Energy Growth Repair Benedict's reagent Biuret solution Iodine solution Sudan III Water bath	links back to organ systems from year 8 term 1 From the national curriculum ● describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene ● 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	Curious Resilient Communicative Self-aware Wider thinking

Term and unit	Core knowledge	Core vocabulary	Revisiting prior knowledge	Links to Walney Ways & Employability Careers
	● know the importance of bacteria in the human digestive system ● Understand what peer review and bias are Disciplinary knowledge ● ask questions and develop a line of enquiry based on observations of the real world, alongside prior knowledge and experience ● use appropriate techniques, apparatus, and materials during fieldwork and laboratory work, paying attention to health and safety	Indicator Obesity Starvation deficiency diseases Enzymes Salivary Glands Mouth Teeth Oesophagus Stomach Pancreas Liver Small intestine Large intestine Rectum Anus Digestion Absorption Diffusion malnutrition bacteria	● describe the simple functions of the basic parts of the digestive system in humans ● identify the different types of teeth in humans and their simple functions From KS3: ● Describe the different organ systems within the body. ● Describe the structure and function of animal cells ● Describe the structure and function of specialised cells	
Summer term 3- Climate and Earth's resources	Substantive knowledge: ● Know the composition of the atmosphere ● Know what the greenhouse effect is and the factors that will affect it ● Explain the impact on increasing carbon dioxide emissions	Composition Percentage Oxygen Carbon dioxide Nitrogen Methane Argon	From KS3: ● Describe the structure of the Earth ● Describe the particle model	Entrepreneurial

Term and unit	Core knowledge	Core vocabulary	Revisiting prior knowledge	Links to Walney Ways & Employability Careers
	• Explain how we can reduce carbon dioxide emissions and our carbon footprint • Know the process of recycling, the advantages and disadvantages of this and the impact that it has on the environment Disciplinary knowledge • Explain logically how each piece of evidence supports opinions • Explain why evidence does not support opinions	Atmosphere Carbon footprint Emissions Electricity Fossil Fuels	• Describe the properties of solids, liquids and gases,	
Summer term 3- Energy resources	Substantive knowledge: • Know the different stores of energy and give an example for each • Know what the fossil fuels are and describe the impact that burning these has on the environment • Describe how we are able to generate electricity using fossil fuels Know the different types of renewable energy resources Describe the advantages and disadvantages of each renewable energy resource • Compare the advantages and disadvantages of renewable energy resources • Describe the advantages and disadvantages of nuclear power and compare to both renewable energy and fossil fuels • Know how to use the equation to calculate power and the cost of electricity	fossil fuels renewable non renewable coal oil natural gas wind wave tidal solar geothermal hydroelectric biomass turbine generator nuclear steam high pressure power energy	From KS3: • Describe the energy store, examples of each and how these form energy transfers • Describe the Earth's structure • Describe the impact of fossil fuels and green house gases	self aware communicative curious

Term and unit	Core knowledge	Core vocabulary	Revisiting prior knowledge	Links to Walney Ways & Employability Careers
	● Disciplinary knowledge ● Using the equations ● Power = energy / time ● cost of electricity = power x time x cost per unit ●	time cost		

CURRICULUM CORE KNOWLEDGE PLAN

SUBJECT: Science YEAR GROUP: 9 DATE: Autumn term

Term and unit	Core knowledge	Core vocabulary	Revisiting prior knowledge	Links to Walney Ways & Employability Careers
Autumn term 1- Gas exchange and respiration	Substantive knowledge: ● Name the different parts of the lungs, the structure of these parts and their functions ● Explain how each of the different parts are adapted to their functions ● Describe how gas exchange takes place within the body ● Know what lung capacity is and describe the different factors that can affect lung capacity ● know what asthma is, what causes this, what happens during an asthma attack and the treatment and prevention of this	trachea bronchi bronchioles alveoli ribs diaphragm lung capacity capillaries breathing gas exchange asthma smoking tar carbon monoxide	From KS3: ● Describe the structure and function of both plant and animal cells ● Describe the structure and function of specialised cells ● Describe different organ systems within the body ● Describe the process of aerobic respiration	curious wider thinking self aware

Term and unit	Core knowledge	Core vocabulary	Revisiting prior knowledge	Links to Walney Ways & Employability Careers
	● know the different things that are contained in a cigarette, explain the effects of smoking on health and the lungs Disciplinary knowledge ● Describe and investigate lung capacity and the factors that affect this. analyse the results that are obtained. ● Gather sufficient data for the investigation ● Remove outliers and calculate means. ● Identify patterns in data and suggest relationships between variable ● Identify variables that could(were not) not be controlled correctly ● Suggest reasons for differences in repeat readings ● Suggest better ways to control the variables ● Suggest ways to improve the method ● Describe and apply the meaning of, accuracy, precision, repeatability and reproducibility			
Autumn term 1- Separating mixtures	Substantive knowledge: ● Identify pure and impure substances and the differences between the two ● know what happens when soluble and insoluble substances are dissolved in solutions ● Describe the process of filtration in terms of particles, explain which substances can and cannot be filtered and why ● Describe the process of evaporation in terms of particles ● Describe the different parts of distillation apparatus, explain the process that take place and give examples of when this process is used	particles pure substances impure substances soluble insoluble solvent solute solution dissolve solubility mixture filtration distillation	From KS3: ● Describe the particle model ● Describe the properties of solids, liquids and gases ● Describe the periodic table and its properties ● Describe some chemical reactions and reaction profiles ● Describe physical and chemical reactions	resilient self motivated curious

Term and unit	Core knowledge	Core vocabulary	Revisiting prior knowledge	Links to Walney Ways & Employability Careers
	● Know what chromatography is, when it is used and how the process takes place. Describe why a pencil line is used when creating a chromatogram Disciplinary knowledge ● know and filter different substances, identify which substances can and cannot be filtered ● completed evaporating of substances safely ● identifying substances to be filtered or evaporated or distilled ● Completing chromatography accurately ● set up and use a Bunsen burner accurately ● Construct an accurate method which includes the correct scientific terminology, showing that the meaning of the words are understood, using correct units and correct chemical nomenclature ● Choose a suitable range for the dependent and independent variables ● Identify and control hazards within investigations	evaporation chromatography funnel base line chromatogram boiling point		
Autumn term 1- Wave effects	Substantive knowledge: ● Draw and label the different parts of a wave, amplitude, frequency and wavelength ● know the 2 types of waves (longitudinal and transverse) and the properties for each of these 2 different types of waves ● Describe the process of reflection and refraction and label accurate ray diagrams for each one	amplitude wavelength frequency transverse longitudinal perpendicular parallel oscillation energy transfer reflection	From KS3: ● Describe the properties of light and sound ● Know how to calculate the speed of sound ● Know the speed of sound in air ● Know what a vacuum is, in terms of particles	curious resilient communicative

Term and unit	Core knowledge	Core vocabulary	Revisiting prior knowledge	Links to Walney Ways & Employability Careers
	● know the different types of lenses (converging and diverging), label the focal length and focal point for each lens ● Describe how ultrasound is used for detection and exploration ● Explain how filters work and why we see different colours of light ● Disciplinary knowledge ● Measuring angles using a protractor ● using a ray box to describe what happens to light as it is reflected and refracted ● Use a ray box to find what happens to light as it travels through a converging and diverging lens to find the focal length and point of the lens	incident ray reflected ray normal mirror angle of incidence angle of reflection refracted ray angle of refraction converging diverging focal length focal point ultrasound filters transmission absorption ray box protractor transparent translucent opaque scattering	● Describe the particle model ● Describe the properties of solids, liquids and gases	

CURRICULUM CORE KNOWLEDGE PLAN

SUBJECT: Science YEAR GROUP: 9 DATE: Spring term

Term and unit	Core knowledge	Core vocabulary	Revisiting prior knowledge	Links to Walney Ways & Employability Careers
Spring term 2- Magnetism and electromagnetism	Substantive knowledge: ● know that magnets have different poles and that they attract and repel depending on the poles ● know the magnetic field of a permanent magnet, including direction of the magnetic field ● Know what the Earth's magnetic field looks like and where this comes from ● knowing how to create an electromagnet and the magnetic field that it produces, including solenoid	Bar magnet iron fillings plotting compass magnetic field north south magnetic pole magnetic field line direction electromagnet iron core	From KS3: ● Know how to create a circuit and the definition of voltage current and resistance	resilient curious wider thinking

Term and unit	Core knowledge	Core vocabulary	Revisiting prior knowledge	Links to Walney Ways & Employability Careers
	• Knowing the magnetic field of a wire and a solenoid Disciplinary knowledge • Finding magnetic fields using iron filings and a plotting compass • creating an electromagnet and increasing the strength • Describe what type of graph to draw based on the given data • Label the x and y axis with the correct variables • add units onto axis labels • decide which numbers to start and finish each axis • Mark out an equal scale showing what each square on graph paper represents	solenoid attraction repulsion permanent magnet		
Spring term 2- Evolution and inheritance	Substantive knowledge: • Know the difference between continuous and discontinuous variation • Know how features can be inherited or environmental and what causes each of these • Know what genetic material is made up of and link this to the human genome project • Name some genetic disorders and explain how these are caused • Know the process of natural selection • Know what antibiotic resistance is and how this can be prevented • Explain what evolution is	continuous discontinuous variation evolution inheritance environmental species population natural selection extinct biodiversity DNA Chromosomes gene competition	From KS3: • Describe the structure of the reproductive system • Know the structure and function of both male and female gametes • Describe the interdependence of plants • Describe how plants are adapted to their habitats	self aware communicative

Term and unit	Core knowledge	Core vocabulary	Revisiting prior knowledge	Links to Walney Ways & Employability Careers
	● Know what extinction is and how this can be prevented Disciplinary knowledge ● selecting the correct graph to draw using data given ● graph drawing ● Explain logically how each piece of evidence supports opinions ● Explain why evidence does not support opinions			
Spring term 1- Reactions	Substantive knowledge: ● Know what the reactivity series is, the order that the elements go in and why they are placed in this order ● Use the reactivity series to explain if a displacement reaction will take place ● know what happens in the blast furnace and why it is used ● know what happens during an exothermic and endothermic reaction and its reaction profile ● Know why catalysts are used and what changes this makes to reaction profiles ● Know examples of polymers, ceramics and plastics, including there uses and their properties Disciplinary knowledge ● Using reaction rates to order metals reactivity ● predicting and completing displacement reactions	metals non-metals displacement reactivity catalyst exothermic reaction endothermic reaction chemical bond products reactants reaction profile polymers ceramics plastics properties	From KS3: ● Describe the properties of solids, liquids and gases ● Describe the properties of acids and alkalis and their pH ● Describe metal and acids reactions ● Write word and symbols equations ● Describe some chemical reactions ● Know and describe physical and chemical reactions	curious resilient wider thinking

Term and unit	Core knowledge	Core vocabulary	Revisiting prior knowledge	Links to Walney Ways & Employability Careers
	● completing exo and endothermic reactions ● identifying from reaction rates when catalyst is most accurate ● Drawing reaction profiles ● writing word and symbol equations ● Identifying an observation that could be recorded or measured over time			

CURRICULUM CORE KNOWLEDGE PLAN

SUBJECT: Science YEAR GROUP: 9 DATE: Summer term

Term and unit	Core knowledge	Core vocabulary	Revisiting prior knowledge	Links to Walney Ways & Employability Careers
The digestive system	Substantive knowledge: ● Describe how organisms are organised (cell>organism). ● Describe the structures and functions of the digestive system. ● Describe adaptations of the digestive system (e.g. villi, and tissues – muscular, glandular, epithelial). ● Describe how to test for different food groups – starch, glucose, protein and lipids.	Organisation Cell Tissue Organ Organ system Organism Digestion Mouth Oesophagus Stomach Small intestine	From KS3: ● Describe the structure and function of both plant and animal cells ● Describe the structure and function of specialised cells ● Describe different organ systems within the body	

Term and unit	Core knowledge	Core vocabulary	Revisiting prior knowledge	Links to Walney Ways & Employability Careers
	• Describe the role of enzymes of the digestive system (amylase, protease/pepsin and lipase. • Describe the role of bile in the digestive system. • Describe how enzyme function works (lock and key theory) and the effect of factors on the rate of enzyme action (temperature and pH). Disciplinary knowledge • Required practical 4: Use qualitative reagents to test for a range of carbohydrates, lipids and proteins. To include: Benedict's test for sugars; iodine test for starch; and Biuret reagent for protein. • Carry out experiments appropriately having due regard for the correct manipulation of apparatus, and health and safety considerations. • Draw and interpret enzyme graphs varying the temperature and pH. • Required practical 5: Investigate the effect of pH on the rate of reaction of amylase enzymes. Students should use a continuous sampling technique to determine the time taken to completely digest a starch solution at a range of pH values. Iodine reagent is to be used to test for starch every 30 seconds. Temperature must be controlled by use of a water bath or electric heater. • Use scientific theories and explanations and hypotheses on how pH affects amylase activity. • Carry out experiments appropriately having due regard for the correct manipulation of	Large intestine Anus Liver Gall bladder Pancreas Villi Enzyme Amylase (carbohydrase) Protease (pepsin) Lipase	• Describe the process of aerobic and anaerobic respiration	

Term and unit	Core knowledge	Core vocabulary	Revisiting prior knowledge	Links to Walney Ways & Employability Careers
	apparatus, the accuracy of measurements, and health and safety. ● Describe the appropriate sampling technique to ensure samples are representative. ● Make and record observations and measurements of time. ● Present a graph of amylase activity against pH. ● Translate numeric data into graphical form.			
Summer term 3- Atoms and the periodic table	Substantive knowledge: ● Know the names and symbols for the first 20 elements ● Name compounds using the above elements and the elements in group 1 and 7 ● Explain and give examples of the listed separation processes and use techniques to suggest separation and purification techniques (filtration, crystallisation, distillation, fractional distillation and chromatography) ● Know about the development of the atom and the different models each scientist suggests along with the results from the alpha scattering experiment and the differences between the nuclear and plum pudding models ● Know the composition of the nuclear model of the atom including the charges and mass of each sub atomic particle	Alkali metals Halogens Noble gases Filtration crystallisation distillation fractions distillation chromatography liebig condenser round bottomed flask filter paper funnel proton neutron electron nucleus energy levels/shells plum pudding model	From KS3: ● Describe the structure of the atom ● Describe the charges and masses of the sub-atomic particles ● Know the names of the different groups in the periodic table ● Describe the different processes of separation.	curious wider thinking

Term and unit	Core knowledge	Core vocabulary	Revisiting prior knowledge	Links to Walney Ways & Employability Careers
	• know the atomic numbers and mass numbers of elements and what they represent • Know how to calculate the relative atomic mass of an element, including what an isotope is. • Use the atomic and mass numbers to construct electron configurations • Know the names of the different groups in the periodic table and how positions of elements relate to atomic number and mass number • Describe the steps in the development of the periodic table and why some theories are more accepted than others • For groups 1,7 and 0 explain the properties and trends in these groups and how they link to the number of electrons and shells • Describe the differences between group 1 metals and the transition metals with regards to their properties and the ions formed for the following transition metals: Cr, Mn, Fe, Co, Ni and Cu Disciplinary knowledge • Represent the electronic structures of the first 20 elements in both written and diagram form • Visualise and represent 2D and 3D forms including 2D representations of 3D objects • Recognise and use expressions in standard form • Use SI units and the prefix nano.	alpha scattering boiling point melting point reactivating electrostatic attraction		

Term and unit	Core knowledge	Core vocabulary	Revisiting prior knowledge	Links to Walney Ways & Employability Careers
Summer term 3- Forces	Substantive knowledge: ● know the difference between Vector and Scalar quantities ● know the difference between contact and non contact forces, examples for each and the interaction between forces ● Describe the difference between weight mass and gravity and the equation that links them ● Describe examples of the forces acting on an isolated body or system ● Use free body diagrams to qualitatively describe examples where several forces lead to a resultant force on an object. ● Describe the energy transfer involved when work is done and link to a rise in temperature of objects when work is done against friction ● Give examples of forces involved in stretching, bending or compressing an object ● Explain why changing or compressing an object more than one force has to be applied (stationary objects only) ● Know the differences between elastic and inelastic deformation. ● Describe Hooke's Law including the limit of proportionality	vector scalar contact non contact thrust air resistant weight friction reaction upthrust mass gravitational field strength forces resultant force work done energy transfer stretching compressing stationary elastic inelastic deformation elastic limit limit of proportionality Hooke's Law moments levers gears rotational clockwise anticlockwise balanced	From KS3: ● Describe the forces and their examples ● Draw simple free body diagrams ● Describe motion in different stages	resilient curious

Term and unit	Core knowledge	Core vocabulary	Revisiting prior knowledge	Links to Walney Ways & Employability Careers
	• Describe examples which causes forces to rotate • know that if a system is balanced the both the clockwise moment and anticlockwise moment are balanced • Simple levers and gears can be used to transmit rotational forces and explain how these transmit those forces • Pressure in liquids, know why pressure changes with height • Atmospheric pressure, describe a simple model of the Earth's atmosphere and of atmospheric pressure and explain why atmospheric pressure varies with height above a surface. Disciplinary knowledge • Recall and apply the equation w = m x g • translate information between graphical and numeric form • use angular measure in degrees • visualise and represent 2D and 3D forms including two dimensional representations of 3D objects • students should be able to use and recognise the symbol for proportionality linking to weight and mass • Draw free body diagrams • Calculate the resultant force acting on a object • Calculate work done • Change the subject of an equation • use, ratios, fractions and percentages	unbalanced pressure surface area increase decrease height atmospheric pressure spring constant angle extension		

Term and unit	Core knowledge	Core vocabulary	Revisiting prior knowledge	Links to Walney Ways & Employability Careers
	● substitute numerical values into algebraic equations using appropriate units for physical quantities ● Use the equation F=K X e ● Use the equation M = F x d ● calculate the spring constant of a spring in linear cases ● Investigate the relationship between force and extension for a spring (Required practical activity) ● use scientific theories and explanations to develop hypotheses. ● plan experiments or devise procedures to make observations, produce or characterise a substance, test hypotheses, check data or explore phenomena. ● apply a knowledge of a range of techniques, instruments, apparatus, and materials to select those appropriate to the experiment. ● carry out experiments appropriately having due regard for the correct manipulation of apparatus, the accuracy of measurements and health and safety considerations. ● make and record observations and measurements using a range of apparatus and methods. ● present observations and other data using appropriate methods. ● translate data from one form to another. ● carry out and represent mathematical and statistical analysis. ● interpret observations and other data (presented in verbal, diagrammatic, graphical, symbolic or numerical form), including			

Term and unit	Core knowledge	Core vocabulary	Revisiting prior knowledge	Links to Walney Ways & Employability Careers
	identifying patterns and trends, making inferences and drawing conclusions. ● communicate the scientific rationale for investigations, methods used, findings and reasoned conclusions through written and electronic reports and presentations using verbal, diagrammatic, graphical, numerical and symbolic forms. ● use an appropriate number of significant figures in calculation. ● use an appropriate number of significant figures. ● find arithmetic means. ● translate information between graphical and numeric form. ● understand that y = mx + c represents a linear relationship. ● plot two variables from experimental or other data. ● Calculate the pressure using the equation p = F/A ●			