Education Perfect

UK Key Stage 3 Science

EP Curriculum Map

Working Scientifically

Specific Expectations	Lessons
WS.1.1. Pay attention to objectivity and concern for accuracy, precision, repeatability and reproducibility	Accuracy Accuracy and Precision Validity Repeatability and Reliability
WS.1.2. Understand that scientific methods and theories develop as earlier explanations are modified to take account of new evidence and ideas, together with the importance of publishing results and peer review	**Communicating in Science** Writing a Scientific Report (KS3) Scientific Report Outline PDF
WS.1.3. Evaluate risks	*Resources under development*
WS.2.1. Ask questions and develop a line of enquiry based on observations of the real world, alongside prior knowledge and experience	**Planning a Scientific Investigation** Research Questions Writing an Aim Types of Variables Variables and Control Groups Questioning and Hypothesising Writing a Hypothesis Fair Tests Sample Size Method Validity Repeatability and Reliability
WS.2.2. Make predictions using scientific knowledge and understanding	
WS.2.3. Select, plan and carry out the most appropriate types of scientific enquiries to test predictions, including identifying independent, dependent and control variables	
WS.2.4. Use appropriate techniques, apparatus, and materials during fieldwork and laboratory work, paying attention to health and safety	**Materials and Equipment** Accuracy Materials and Equipment Bunsen Burner Equipment Types Separating Substances and Other Equipment Equipment Quiz Topic Test: Bunsen Burner Quiz Topic Test: Equipment Quiz **Using a Microscope** Magnification Parts and Function of a Microscope Using a Microscope **Working Safely** Safety Equipment Safety Guidelines

WS.2.5. Make and record observations and measurements using a range of methods for different investigations; and evaluate the reliability of methods and suggest possible improvements	**Measurement** Measuring in Science Reading the Meniscus Measuring Electricity **Converting & Understanding Units** Choosing Appropriate Units Units of Distance Units of Volume Units of Speed Units of Energy Accuracy Method Validity Repeatability and Reliability **Evaluating the Data** Accuracy and Precision Human Errors Measurement Errors Evaluating in Science
WS.2.6. Apply sampling techniques	Sample Size *Resources under development*
WS.3.1. Apply mathematical concepts and calculate results	Rearranging Equations Units of Speed **Rounding and Scientific Notation** Rounding: Decimal Places/ Sig Figs Scientific Notation *Additional resources in subjects*
WS.3.2. Present observations and data using appropriate methods, including tables and graphs	**Presenting Data** Classifying Data Organising Data into a Data Table Matching Tables to Graphs Graphs in Science Graphing Variables and Graphing **Making Graphs in Excel** Making Graphs in Excel (Mac) Making Graphs in Excel (Windows)
WS.3.3. Interpret observations and data, including identifying patterns and using observations, measurements and data to draw conclusions	**Interpreting the Results** Interpreting Data Tables Interpreting Graphs in Science **Recognising Relationships in Graphs** Bar Graphs Line Graphs Scatter Graphs Reading Scatter Graphs
WS.3.4. Present reasoned explanations, including explaining data in relation to predictions and hypotheses	Writing Conclusions Writing a Discussion

WS.3.5. Evaluate data, showing awareness of potential sources of random and systematic error	**Evaluating the Data** Accuracy and Precision Human Errors Measurement Errors Evaluating in Science
WS.3.6. Identify further questions arising from their results	*Resources under development*
WS.4.1. Understand and use SI units and IUPAC (International Union of Pure and Applied Chemistry) chemical nomenclature	**Converting & Understanding Units** Choosing Appropriate Units Units of Distance Units of Volume Units of Speed Units of Energy *Additional resources in subjects*
WS.4.2. Use and derive simple equations and carry out appropriate calculations	Rearranging Equations *Additional resources in subjects*
WS.4.3. Undertake basic data analysis including simple statistical techniques	**Data Analysis: Mean, Median & Mode** Mean Median Mode Comparing Measures of Centre The Range Calculating Measures of Centre Extension: Statistics

Biology

1. Structure and function of living organisms

Specific Expectations	Lessons
B.1.1.1. Cells as the fundamental unit of living organisms, including how to observe, interpret and record cell structure using a light microscope	**Microscopes and Magnification** Parts and Function of a Microscope Magnification and Resolution How to Use a Microscope **Investigation: Using a Microscope** Investigation - Using a Microscope Student Worksheet PDF Teacher Guide PDF Laboratory Technician Guide PDF Editable Documents - Word (.docx) Risk Assessment (in RiskAssess) **Investigation: Preparing and Observing Cells** Preparing and Observing Cells Student Worksheet PDF Teacher Guide PDF Laboratory Technician Guide PDF Editable Documents - Word (.docx) Risk Assessment (in RiskAssess)
B.1.1.2. The functions of the cell wall, cell membrane, cytoplasm, nucleus, vacuole, mitochondria and chloroplasts	**Animal and Plant Cells** Characteristics of Living Things: MRS GREN Animal Cell Structure Plant Cell Structure Animal vs. Plant Cells Making an Infographic of Cells Scientific Writing: Comparing Plant and Animal Cells **Specialised Cells** Specialised Animal Cells - Muscle and Nerve Cells Specialised Animal Cells - Blood and Fat Cells Specialised Plant Cells - Photosynthetic and Guard Cells Specialised Plant Cells - Root Hairs and Conducting Cells
B.1.1.3. The similarities and differences between plant and animal cells	
B.1.1.4. The role of diffusion in the movement of materials in and between cells	**Transport Into and Out of Cells** Introduction to Diffusion Diffusion and Cell Size Diffusion Experiments Extension: Passive Transport-Diffusion

B.1.1.5. The structural adaptations of some unicellular organisms	**Unicellular Organisms** Extension: Bacterial Cell Structure Extension: Prokaryotic vs. Eukaryotic **Investigation: Pond Critters** Pond Critters Species Identification Guide PDF Student Worksheet PDF Teacher Guide PDF Laboratory Technician Guide PDF Editable Documents - Word (.docx)
B.1.1.6. The hierarchical organisation of multicellular organisms: from cells to tissues to organs to systems to organisms	**Levels of Organisation** Levels of Organisation Introduction to Body Systems Organ Systems Extension: Types of Tissue Extension: Stem Cells Extension: Stem Cell Therapy **Body Systems** Circulatory System Respiratory System Digestive System Excretory System Plant Systems **Investigation: Heart Dissection** Heart Dissection Student Worksheet PDF Teacher Guide PDF Laboratory Technician Guide PDF Editable Documents - Word (.docx)
B.1.2.1. The structure and functions of the human skeleton, to include support, protection, movement and making blood cells	**Movement & Musculoskeletal System** Intro to the Musculoskeletal System Bones & Joints Muscles
B.1.2.2. Biomechanics – the interaction between skeleton and muscles, including the measurement of force exerted by different muscles	
B.1.2.3. The function of muscles and examples of antagonistic muscles	
B.1.3.1. The content of a healthy human diet: carbohydrates, lipids (fats and oils), proteins, vitamins, minerals, dietary fibre and water, and why each is needed	**Nutrition & Digestive System** Digestive System As A Whole Mouth and Oesophagus Stomach and Small Intestine Large Intestine and Rectum Extension: Digestion in Other Animals **Nutrition** Food Groups Diet and Nutrients What's on the Label? An Apple a Day Keeps the Doctor Away Improving Nutritional Value of Meals
B.1.3.2. Calculations of energy requirements in a healthy daily diet	
B.1.3.3. The consequences of imbalances in the diet, including obesity, starvation and deficiency diseases	
B.1.3.4. The tissues and organs of the human digestive system, including adaptations to function and how the digestive system digests food (enzymes simply as biological catalysts)	
B.1.3.5. The importance of bacteria in the human digestive system	
B.1.3.6. Plants making carbohydrates in their leaves by photosynthesis and gaining mineral nutrients and water from the soil via their roots	*Covered in Photosynthesis lessons*

B.1.4.1. The structure and functions of the gas exchange system in humans, including adaptations to function	**Gas Exchange & Respiratory System** Introduction to the Respiratory System Breathing Gas Exchange Extension: Respiration: Insects & Fish
B.1.4.2. The mechanism of breathing to move air in and out of the lungs, using a pressure model to explain the movement of gases, including simple measurements of lung volume	
B.1.4.3. The impact of exercise, asthma and smoking on the human gas exchange system	
B.1.4.4. The role of leaf stomata in gas exchange in plants	*Covered in Photosynthesis lessons*
B.1.5.1. Reproduction in humans (as an example of a mammal), including the structure and function of the male and female reproductive systems, menstrual cycle (without details of hormones), gametes, fertilisation, gestation and birth, to include the effect of maternal lifestyle on the foetus through the placenta	**Reproduction** Asexual Reproduction Sexual Reproduction **Reproduction in Humans** Male Reproduction Female Reproduction Hormonal Control of Reproduction Fertilisation and Pregnancy Contraception Infertility Extension: Artificial Womb
B.1.5.2. Reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms	**Reproduction in Plants** Pollination Seed Dispersal & Germination Asexual Reproduction in Plants Plant Cloning **Investigation: Cross Pollination** Cross Pollination Student Worksheet PDF Teacher Guide PDF Editable Documents - Word (.docx) Risk Assessment (in RiskAssess) **Investigation: Flower Dissection** Flower Dissection Student Worksheet PDF Teacher Guide PDF Laboratory Technician Guide PDF Editable Documents - Word (.docx) Risk Assessment (in RiskAssess) Revision: Using a Microscope
B.1.6.1. The effects of recreational drugs (including substance misuse) on behaviour, health and life processes	*Resources under development*

2. Material Cycles and Energy

Specific Expectations	Lessons
B.2.1.1. The reactants in, and products of, photosynthesis, and a word summary for photosynthesis	**Photosynthesis** Photosynthesis Leaf Structure and Photosynthesis Gas Exchange in Plants The Carbon Cycle **Investigation: Photosynthesis and Starch** Photosynthesis and Starch Student Worksheet PDF Lab Report Material PDF Teacher Worksheet PDF Laboratory Technician Guide PDF Editable Documents - Word (.docx) Risk Assessment (in RiskAssess)
B.2.1.2. 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 that are an essential energy store and to maintain levels of oxygen and carbon dioxide in the atmosphere	
B.2.1.3. The adaptations of leaves for photosynthesis	
B.2.2.1. Aerobic and anaerobic respiration in living organisms, including the breakdown of organic molecules to enable all the other chemical processes necessary for life	
B.2.2.2. A word summary for aerobic respiration	**Respiration** Respiration *Resources under development*
B.2.2.3. The process of anaerobic respiration in humans and micro-organisms, including fermentation, and a word summary for anaerobic respiration	
B.2.2.4. The differences between aerobic and anaerobic respiration in terms of the reactants, the products formed and the implications for the organism	

3. Interactions and interdependencies

Specific Expectations	Lessons
B.3.1.1. The interdependence of organisms in an ecosystem, including food webs and insect pollinated crops	**Ecosystems** Environments Ecosystems Aquatic and Terrestrial Ecosystems Interdependence within Ecosystems **Biotic and Abiotic Factors and Their Effects** Biotic and Abiotic Elements Abiotic Factors Affecting Plants Abiotic Factors Affecting Animals Abiotic Factors Affecting Fungi Biotic Factors Affecting Plants Biotic Factors Affecting Animals Biotic Factors Affecting Fungi **Investigation: Measuring Abiotic Factors in Water** Measuring Abiotic Factors in Water Student Worksheet PDF Lab Report Material PDF Teacher Guide PDF Laboratory Technician Guide PDF Editable Documents - Word (.docx) Risk Assessment (in RiskAssess)
B.3.1.2. The importance of plant reproduction through insect pollination in human food security	
B.3.1.3. How organisms affect, and are affected by, their environment, including the accumulation of toxic materials	

	Life in Different Environments Extreme Environments Rock Pool Environments Life in a Rock Pool Desert Environments Life in the Desert Polar Environments Life at the Poles **Food Chains and Food Webs** Food Chains Food Webs Producers Consumers Decomposers Transfer of Energy and Matter Extension: Ecological Energy Efficiency Extension: Trophic Levels **Investigation: Build a Food Web** Build a Food Web Student Worksheet PDF Teacher Guide PDF Laboratory Technician Guide PDF Editable Documents - Word (.docx) **How Organisms Affect and are Affected by the Environment** Symbiosis Introduced and Invasive Species Oil Spills Explaining how Climate Change Decreases Biodiversity Pesticides Describing the Importance of Biodiversity in Agriculture

4. Genetics and evolution

Specific Expectations	Lessons
B.4.1.1. Heredity as the process by which genetic information is transmitted from one generation to the next	**DNA and Heredity** Basics of DNA Discovering the Double Helix Extension: Structure of DNA Extension: Genes and Genetic Information Extension: Genetically Modified Organisms (GMOs) Extension: The Ethics of Genetics **Investigation: Extracting DNA** Extracting DNA
B.4.1.2. A simple model of chromosomes, genes and DNA in heredity, including the part played by Watson, Crick, Wilkins and Franklin in the development of the DNA model	

	Student Worksheet PDF Lab Report Material PDF Teacher Guide PDF Laboratory Technician Guide PDF Editable Documents - Word (.docx) Risk Assessment (in RiskAssess)
B.4.1.3. Differences between species	**Distinguishing between Groups of Organisms** Introduction to Classification The Six Kingdoms Researching Phyla Extension: Classifying Animals Extension: Classifying Plants **Investigation: Classifying Leaves** Classifying Leaves Student Worksheet PDF Teacher Guide PDF Laboratory Technician Guide PDF Editable Documents - Word (.docx) **Investigation: Dichotomous Keys** Building Dichotomous Keys Dragons in the Deep Using Dichotomous Keys Editable Documents - Word (.docx)
B.4.1.4. The variation between individuals within a species being continuous or discontinuous, to include measurement and graphical representation of variation	**Variation within Species** Lab Activity: Investigating Variation Species and Genetic Diversity
B.4.1.5. The variation between species and between individuals of the same species meaning some organisms compete more successfully, which can drive natural selection	**Adaptations** Introduction to Adaptations Adaptations in Shape or Form Adaptations Inside the Body Adaptations in Behaviour Nocturnal Activity Dune Plants Camouflage Bacterial Resistance Superbugs are the Real Super Villains
B.4.1.6. Changes in the environment which may leave individuals within a species, and some entire species, less well adapted to compete successfully and reproduce, which in turn may lead to extinction	**Changes in the Environment** Predators, Prey and Competition Human Impacts Effects of Drought Troubled Waters Introduced Species Investigating Invasive Species Cane Toads as an Introduced Species
B.4.1.7. The importance of maintaining biodiversity and the use of gene banks to preserve hereditary material	**Biodiversity** Biodiversity Humans and Biodiversity The Human Impact: Biodiversity Decline

	Agriculture and Biodiversity Scientific Methods of Conservation **Investigation: Assessing Biodiversity** Assessing Biodiversity Invertebrate Guide PDF Student Worksheet PDF Lab Report Material PDF Teacher Guide PDF Laboratory Technician Guide PDF Editable Documents - Word (.docx) Risk Assessment (in RiskAssess) **Investigation: Collecting Invertebrates in Quadrats** Collecting Invertebrates in Quadrats Student Worksheet PDF Lab Report Material PDF Teacher Guide PDF Laboratory Technician Guide PDF Editable Documents - Word (.docx) Risk Assessment (in RiskAssess) **Investigation: Sampling a Leaf Litter Ecosystem** Sampling a Leaf Litter Ecosystem Student Worksheet PDF Lab Report Material PDF Teacher Guide PDF Laboratory Technician Guide PDF Editable Documents - Word (.docx) Risk Assessment (in RiskAssess)

Chemistry

1. States of Matter

Specific Expectations	Lessons
C.1.1. The properties of the different states of matter (solid, liquid and gas) in terms of the particle model, including gas pressure	**The Particle Model of Matter** Introduction to States of Matter Comparing States of Water Introduction to Particles States of Matter Particle Model of Matter Solids Liquids Gases Gases have Masses? Heating and Cooling Effects on Volume
C.1.2. Changes of state in terms of the particle model	**Changing State** Changing States Changing States Through Heating Changing States Through Cooling Melting Freezing Boiling and Evaporation

2. Atoms, Elements, Compounds and Mixtures

Specific Expectations	Lessons
C.2.1. A simple (Dalton) atomic model	**Atoms, Elements & Compounds** Introduction to Elements, Compounds and Mixtures Elements Compounds Molecules First 10 Elements Quiz-1st 10 Elements (Name->Symbol) Quiz- 1st 10 Elements (Symbol->Name) Extension: Atoms
C.2.2. Differences between atoms, elements and compounds	
C.2.3. Chemical symbols and formulae for elements and compounds	
C.2.4. Conservation of mass changes of state and chemical reactions	
C.3.1. The concept of a pure substance	**Pure and Impure Substances** Pure and Impure Substances Pure Substances and Mixtures Mixtures Solubility Solvents and Solutes Temperature and Dissolving
C.3.2. Mixtures, including dissolving	
C.3.3. Diffusion in terms of the particle model	Diffusion
C.3.4. Simple techniques for separating mixtures: filtration, evaporation, distillation and chromatography	**Separation Techniques** Filtration Extension: Magnetic & Electrostatic Separation
C.3.5. The identification of pure substances	

	Evaporation Distillation Chromatography Crystallisation Condensation Investigation: Separating Substances Extension: Adsorption Extension: Centrifuging **Investigation: Chromatography & Separating Colours** Pre Lab: Chromatography Post Lab: Chromatography: Separating Colours Student Worksheet PDF Teacher Guide PDF Laboratory Technician Guide PDF Editable Documents - Word (.docx) **Investigation: Filtration** 1a. Pre Lab: Filtration 1b. Post Lab: Filtration Student Worksheet PDF Lab Report Material PDF Teacher Guide PDF Editable Documents - Word (.docx) Laboratory Technician Guide PDF **Investigation: Growing Sugar Crystals** Growing Sugar Crystals Student Worksheet Teacher Guide **Investigation: Purifying Saltwater** Purifying Saltwater Student Worksheet PDF Teacher Guide PDF Editable Documents - Word (.docx) Laboratory Technician Guide PDF **Investigation: Separating a Basic Mixture** Separating a Basic Mixture Student Worksheet PDF Lab Report Material PDF Teacher Guide PDF Editable Documents - Word (.docx) Laboratory Technician Guide PDF

3. Chemical Reactions

Specific Expectations	Lessons
C.4.1. Chemical reactions as the rearrangement of atoms	**Introduction to Chemical Reactions** Introduction to Chemical Reactions Reactants and Products Writing Word Equations Constructing Molecular Models Conservation of Mass Investigate Conservation of Mass in Chemical Reactions Data Interpretation: Breaking the Law (of Conservation of Mass)? Data Interpretation: Identifying Chemical Reactions **Investigation: Conservation of Mass** Conservation of Mass Student Worksheet PDF Lab Report Material PDF Teacher Guide PDF Laboratory Technician Guide PDF Editable Docs - Word (.docx) Risk Assessment (in RiskAssess) **Investigation: Identifying Chemical Reactions** Identifying Chemical Reactions Student Worksheet PDF Teacher Guide PDF Laboratory Technician Guide PDF Editable Docs - Word (.docx) Risk Assessment (in RiskAssess)
C.4.2. Representing chemical reactions using formulae and using equations	
C.4.3. Combustion, thermal decomposition, oxidation and displacement reactions	**Types of Chemical Reactions** Combustion Reactions Decomposition Reactions Oxidation Reactions Displacement Reactions
C.4.4. Defining acids and alkalis in terms of neutralisation reactions	**Acids and Alkali** Acids Bases pH and Indicators Neutralisation Reactions Acid-Metal Reactions
C.4.5. The pH scale for measuring acidity/alkalinity; and indicators	
C.4.6. Reactions of acids with metals to produce a salt plus hydrogen	
C.4.7. Reactions of acids with alkalis to produce a salt plus water	
C.4.8. What catalysts do	Catalysts and Reaction Rate
C.5.1. Energy changes on changes of state (qualitative)	Covered in Changing State lessons
C.5.2. Exothermic and endothermic chemical reactions (qualitative)	Endothermic and Exothermic Reactions

5. The Periodic Table

Specific Expectations	Lessons
C.6.1. The varying physical and chemical properties of different elements	**The Periodic Table** The Periodic Table Designing the Periodic Table Group 1 (The Alkali Metals) & Group 2 (The Alkaline Earth Metals) Group 17 (or 7) —The Halogens Noble Gases
C.6.2. The principles underpinning the Mendeleev periodic table	
C.6.3. The periodic table: periods and groups; metals and non-metals	
C.6.4. How patterns in reactions can be predicted with reference to the periodic table	

6. Metals

Specific Expectations	Lessons
C.6.5. The properties of metals and non-metals	**Metals** Extracting Iron Types of Oxides Rusting Relative Reactivity of Metals Metals, Non-Metals and Metalloids
C.6.6. The chemical properties of metal and non-metal oxides with respect to acidity	
C.7.1. The order of metals and carbon in the reactivity series	
C.7.2. The use of carbon in obtaining metals from metal oxides	

7. Ceramics, Polymers and Composites

Specific Expectations	Lessons
C.7.3. Properties of ceramics, polymers and composites (qualitative)	**Ceramics, Polymers and Composites** Polymers **Investigation: Milk Plastic** Milk Plastic Student Worksheet PDF Teacher Guide PDF Laboratory Technician Guide PDF Editable Documents - Word (.docx) Risk Assessment (in RiskAssess) *Resources under development*

8. The Earth

Specific Expectations	Lessons
C.8.1. The composition of the Earth	**Structure of the Earth** Earth's Structure Layers of the Earth Plate Tectonics The Rock Cycle Investigation: Classifying Rocks
C.8.2. The structure of the Earth	
C.8.3. The rock cycle and the formation of igneous, sedimentary and metamorphic rocks	

	Investigation: Rock Density Extension: Igneous Rocks Extension: Sedimentary Rocks Extension: Metamorphic Rocks **Investigation: Cooling Crystals** Student Worksheet PDF Lab Report Material PDF Teacher Guide PDF Editable Documents - Word (.docx) Laboratory Technician Guide PDF Cooling Crystals **Investigation: Simulating Erosion** Simulating Erosion Student Worksheet PDF Lab Report Material PDF Teacher Guide PDF Editable Documents - Word (.docx) Laboratory Technician Guide PDF
C.8.4. Earth as a source of limited resources and the efficacy of recycling C.8.5. The composition of the atmosphere C.8.6. The production of carbon dioxide by human activity and the impact on climate	**The Atmosphere** Introduction to Air The Greenhouse Effect The Enhanced Greenhouse Effect Human Influences on Climate Combustion and the Environment **Resources and Recycling** Recycling Metal Recycling Plastic Recycling Glass Recycling Sewage Living Things as a Resource Renewable and Non-Renewable Energy Sources Recycling **Investigation: Making Recycled Paper** Making Recycled Paper Student Worksheet PDF Teacher Guide PDF Laboratory Technician Guide PDF Editable Documents - Word (.docx)

Physics

1. Energy

Specific Expectations	Lessons
P.1.1.1. Comparing energy values of different foods (from labels) (kJ)	*Resources under development*
P.1.1.2. Comparing power ratings of appliances in watts (W, kW) P.1.1.3. Comparing amounts of energy transferred (J, kJ, kW hour) P.1.1.4. Domestic fuel bills, fuel use and costs P.1.1.5. Fuels and energy resources	**Generating Electricity, Fuels and Energy Resources** Electricity Generation Where Electricity Comes From Use of Fuels in Society Fossil Fuels as a Resource Nuclear Fuel as a Resource Hydroelectricity Solar Energy Water Power Renewable and Non-Renewable Energy Sources Impacts of Renewable and Non-renewable Energy Sources Assessing Implications of Producing Energy Planning to Reduce Electricity Consumption at Home Ways in which the Use of Electricity by Society has Changed Over Time
P.1.2.1. Simple machines give bigger force but at the expense of smaller movement (and vice versa): product of force and displacement unchanged	**Simple Machines** Levers Inclined Planes Wheels, Axles and Pulleys Gears **Investigation: A Ramp as a Simple Machine** Pre Lab: A Ramp as a Simple Machine Post Lab: A Ramp as a Simple Machine Student Worksheet PDF Lab Report Material PDF Teacher Guide PDF Editable Documents (.docx) Laboratory Technician Guide PDF
P.1.2.2. Heating and thermal equilibrium: temperature difference between 2 objects leading to energy transfer from the hotter to the cooler one, through contact (conduction) or radiation; such transfers tending to reduce the temperature difference; use of insulators	**Heating and Cooling** Energy Conservation Radiation Conduction Convection Energy Efficiency **Investigation: Heat Transfer** Heat Conduction Student Worksheet PDF

	Lab Report Material PDF Teacher Guide PDF Laboratory Technician Guide PDF Editable Documents - Word (.docx) **Investigation: Convection** Convection Currents Student Worksheet PDF Lab Report Material PDF Teacher Guide PDF Laboratory Technician Guide PDF Editable Documents - Word (.docx) **Investigation: Conduction** Heat Conduction Student Worksheet PDF Lab Report Material PDF Teacher Guide PDF Laboratory Technician Guide PDF Editable Documents - Word (.docx) **Investigation: Minimising Heat Loss** Insulators Student Worksheet PDF Lab Report Material PDF Teacher Guide PDF Laboratory Technician Guide PDF Editable Documents - Word (.docx) **Investigation: Building a Solar Oven** Building a Solar Oven Student Worksheet PDF Teacher Guide PDF Laboratory Technician Guide PDF Editable Documents - Word (.docx)
P.1.2.3. Other processes that involve energy transfer: changing motion, dropping an object, completing an electrical circuit, stretching a spring, metabolism of food, burning fuels	**Stores and Transfers** Types of Energy **Investigation: Energy Transformations** Energy Transformations Student Worksheet PDF Teacher Guide PDF Laboratory Technician Guide PDF Editable Documents - Word (.docx) **Investigation: Energy in Food** Energy in Food Student Worksheet PDF Lab Report Material PDF Teacher Guide PDF Laboratory Technician Guide PDF Editable Documents - Word (.docx) **Investigation: Energy in Skate Parks**
P.1.3.1. Energy as a quantity that can be quantified and calculated; the total energy has the same value before and after a change	
P.1.3.2. Comparing the starting with the final conditions of a system and describing increases and decreases in the amounts of energy associated with movements, temperatures, changes in positions in a field, in elastic distortions and in chemical compositions	
P.1.3.3. Using physical processes and mechanisms, rather than energy, to explain the intermediate steps that bring about such changes	

	Energy in Skate Parks Student Worksheet PDF Lab Report Material PDF Teacher Guide PDF Editable Documents - Word (.docx) **Investigation: Roller Coasters** Roller Coasters Student Worksheet PDF Lab Report Material PDF Teacher Guide PDF Laboratory Technician Guide PDF Editable Documents - Word (.docx) Risk Assessment (in RiskAssess) **Investigation: Bouncy Balls and Energy Efficiency** Bouncy Balls and Energy Efficiency Student Worksheet PDF Lab Report Material PDF Teacher Guide PDF Laboratory Technician Guide PDF Editable Documents - Word (.docx) Risk Assessment (in RiskAssess) *Resources under development*

2. Motion and forces

Specific Expectations	Lessons
P.2.1.1. Speed and the quantitative relationship between average speed, distance and time (speed = distance ÷ time)	**Motion** Distance and Time Speed Distance-Time Graphs **Forces** Introduction to Forces Balanced and Unbalanced Forces Contact and Non-Contact Forces Measuring Force Drawing Forces Pressure in Solids and Liquids Hooke's Law Lab Activity Newton's Laws of Motion Friction **Investigation: Build a Marshmallow Blaster** Build a Marshmallow Blaster Student Worksheet PDF Lab Report Material PDF Teacher Guide PDF Laboratory Technician Guide PDF Editable Documents - Word (.docx)
P.2.1.2. The representation of a journey on a distance-time graph	
P.2.1.3. Relative motion: trains and cars passing one another	
P.2.2.1. Forces as pushes or pulls, arising from the interaction between 2 objects	
P.2.2.2. Using force arrows in diagrams, adding forces in 1 dimension, balanced and unbalanced forces	
P.2.2.3. Moment as the turning effect of a force	
P.2.2.4. Forces: associated with deforming objects; stretching and squashing – springs; with rubbing and friction between surfaces, with pushing things out of the way; resistance to motion of air and water	
P.2.2.5. Forces measured in newtons, measurements of stretch or compression as force is changed	
P.2.2.6. Force-extension linear relation; Hooke's Law as a special case	
P.2.2.7. Work done and energy changes on deformation	
P.2.2.8. Non-contact forces: gravity forces acting at a distance on Earth and in space, forces between magnets, and forces due to static electricity	
P.2.3.1. Atmospheric pressure, decreases with increase of height as weight of air above decreases with height	
P.2.3.2. Pressure in liquids, increasing with depth; upthrust effects, floating	

and sinking	**Investigation: Friction and Mass** Investigating Friction and Mass Student Worksheet PDF Lab Report Material PDF Teacher Guide PDF Laboratory Technician Guide PDF Editable Documents - Word (.docx) Risk Assessment (in RiskAssess) **Investigation: Friction and Surfaces** Investigating Friction and Surfaces Student Worksheet PDF Lab Report Material PDF Teacher Guide PDF Laboratory Technician Guide PDF Editable Documents - Word (.docx) Risk Assessment (in RiskAssess)
P.2.3.3. Pressure measured by ratio of force over area – acting normal to any surface	
P.2.4.1. Opposing forces and equilibrium: weight held by stretched spring or supported on a compressed surface	
P.2.5.1. Forces being needed to cause objects to stop or start moving, or to change their speed or direction of motion (qualitative only)	
P.2.5.2. Change depending on direction of force and its size	

3. Waves

Specific Expectations	Lessons
P.3.1.1. Waves on water as undulations which travel through water with transverse motion; these waves can be reflected, and add or cancel – superposition	**Types of Waves** Transfer of Energy Through Waves Transverse and Longitudinal Waves **Investigation: Slinky Waves** Slinky Waves Student Worksheet PDF Teacher Guide PDF Laboratory Technician Guide PDF Editable Documents - Word (.docx) Risk Assessment (in RiskAssess) **Sound** Sound Waves Sound Formation Pitch and Loudness Hearing Sound Ultrasound **Investigation: Musical Bottles** Musical Bottles Student Worksheet PDF Lab Report Material PDF Teacher Guide PDF Laboratory Technician Guide PDF Editable Documents - Word (.docx) Risk Assessment (in RiskAssess) **Investigation: Speed of Sound** Speed of Sound
P.3.2.1. Frequencies of sound waves, measured in hertz (Hz); echoes, reflection and absorption of sound	
P.3.2.2. Sound needs a medium to travel, the speed of sound in air, in water, in solids	
P.3.2.3. Sound produced by vibrations of objects, in loudspeakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal	
P.3.2.4. The auditory range of humans and animals	
P.3.3.1. Pressure waves transferring energy; use for cleaning and physiotherapy by ultrasound; waves transferring information for conversion to electrical signals by microphone	

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P.3.4.1. The similarities and differences between light waves and waves in matter P.3.4.2. Light waves travelling through a vacuum; speed of light P.3.4.3. The transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface P.3.4.4. Use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative); the human eye P.3.4.5. Light transferring energy from source to absorber, leading to chemical and electrical effects; photosensitive material in the retina and in cameras	**Light** Light as a Wave Types of Objects The Movement of Light The Speed of Light **The Ray Model** **Investigation: Making a Pinhole Camera** Making a Pinhole Camera Student Worksheet PDF Teacher Guide PDF Laboratory Technician Guide PDF Editable Documents - Word (.docx) **Investigation: Using a Pinhole Camera** Using a Pinhole Camera to Calculate Diameter of the Sun Student Worksheet PDF Teacher Guide PDF Laboratory Technician Guide PDF Editable Documents - Word (.docx) **Reflection** Plane Mirrors and Reflection **Investigation: Build a Periscope** Build a Periscope Student Worksheet PDF Teacher Guide PDF Laboratory Technician Guide PDF Editable Documents - Word (.docx) **Investigation: Law of Reflection** Law of Reflection Student Worksheet PDF Lab Report Material PDF Teacher Guide PDF

	Laboratory Technician Guide PDF Editable Documents - Word (.docx) **Refraction** Refraction **Investigation: Refraction** Refraction Student Worksheet PDF Lab Report Material PDF Teacher Guide PDF Laboratory Technician Guide PDF Editable Documents - Word (.docx) Risk Assessment (in RiskAssess) **Lenses** Lenses Drawing Ray Diagrams The Eye Telescopes **Investigation: Lenses** Lenses Student Worksheet PDF Teacher Guide PDF Laboratory Technician Guide PDF Editable Documents - Word (.docx) Risk Assessment (in RiskAssess) **Investigation: Eye Dissection** Eye Dissection Student Worksheet PDF Teacher Guide PDF Laboratory Technician Guide PDF Editable Documents - Word (.docx)
P.3.4.6. Colours and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflection	**Colour** The Colour of Light Colour Absorption **Investigation: Colourful Candy** Colourful Candy Student Worksheet PDF Lab Report Material PDF Teacher Guide PDF Laboratory Technician Guide PDF Editable Documents - Word (.docx)

4. Electricity and Electromagnetism

Specific Expectations	Lessons
P.4.1.1. Electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge P.4.1.2. Potential difference, measured in volts, battery and bulb ratings; resistance, measured in ohms, as the ratio of potential difference (p.d.) to current	**Electricity** Electricity What is Electricity? **Current and Potential Difference** Current Voltage **Investigation: Battery Voltages** Battery Voltages Student Worksheet PDF Teacher Guide PDF Editable Documents - Word (.docx) Laboratory Technician Guide PDF **Circuit Basics** Circuits Circuitry Open and Closed Circuits Circuit Diagrams Circuits in Series Circuits in Parallel Comparing Circuits Household Circuits and Electrical Safety **Investigation: Building Circuits** Building Circuits Student Worksheet PDF Teacher Guide PDF Laboratory Technician Guide PDF Editable Documents - Word (.docx)
P.4.1.3. Differences in resistance between conducting and insulating components (quantitative)	**Resistance** Conductors and Insulators Conductors Insulators Resistance Introduction to Ohm's Law Calculating Using Ohm's Law **Investigation: Ohm's Law** Ohm's Law Student Worksheet PDF Lab Report Material PDF Teacher Guide PDF Laboratory Technician Guide PDF Editable Documents - Word (.docx) **Investigation: Resistance** Resistance

	Student Worksheet PDF Lab Report Material PDF Teacher Guide PDF Laboratory Technician Guide PDF Editable Documents - Word (.docx)
P.4.2.1. Separation of positive or negative charges when objects are rubbed together: transfer of electrons, forces between charged objects	**Static Electricity** Static Charge Static Electricity **Investigation: Static Electricity** Static Electricity Student Worksheet PDF Teacher Guide PDF Laboratory Technician Guide PDF
P.4.3.1. Magnetic poles, attraction and repulsion	**Magnetism** Magnetism Magnetic Fields **Investigation: Mapping Magnetic Fields** Mapping Magnetic Fields Student Worksheet Teacher Guide Laboratory Technician Guide **Investigation: Building an Electromagnet** Building an Electromagnet Student Worksheet PDF Lab Report Material PDF Teacher Guide PDF Laboratory Technician Guide PDF Editable Documents - Word (.docx) *Resources under development*
P.4.3.2. Magnetic fields by plotting with compass, representation by field lines	
P.4.3.3. Earth's magnetism, compass and navigation	
P.4.3.4. The magnetic effect of a current, electromagnets, DC motors (principles only)	

5. Matter

Specific Expectations	Lessons
P.5.1.1. Conservation of material and of mass, and reversibility, in melting, freezing, evaporation, sublimation, condensation, dissolving	**The Particle Model of Matter** Introduction to Particles Particle Model of Matter Solids Liquids Gases Properties of Gases What is the Matter? Water at Different Temperatures **Changing State** Changing States Melting and Freezing Boiling, Evaporation and Condensation Sublimation and Deposition
P.5.1.2. Similarities and differences, including density differences, between solids, liquids and gases	
P.5.1.3. Brownian motion in gases	
P.5.1.4. Diffusion in liquids and gases driven by differences in concentration	
P.5.1.5. The difference between chemical and physical changes	
P.5.2.1. The differences in arrangements, in motion and in closeness of particles explaining changes of state, shape and density; the anomaly of ice-water transition	
P.5.2.2. Atoms and molecules as particles	
P.5.3.1. Changes with temperature in motion and spacing of particles	

	Temperature and States of Matter Changing States Through Heating Changing States Through Cooling Heating and Cooling Curves When Water Freezes **Investigation: Building a Steam Engine** Building a Steam Engine Student Worksheet PDF Teacher Guide PDF Laboratory Technician Guide PDF Editable Documents - Word (.docx) Risk Assessment (in RiskAssess) **Investigation: Making Ice Cream** Making Ice Cream Student Worksheet PDF Teacher Guide PDF Laboratory Technician Guide PDF Editable Documents - Word (.docx) Risk Assessment (in RiskAssess) **Properties of Matter** Mass and Volume Gases have Masses? Density Density and Buoyancy Pressure, Compression and Temperature Heating and Cooling Effects on Volume Diffusion Viscosity **Investigation: Building a Density Tower** Building a Density Tower Student Worksheet PDF Lab Report Material PDF Teacher Guide PDF Laboratory Technician Guide PDF Editable Documents - Word (.docx) Risk Assessment (in RiskAssess)
P.5.3.2. Internal energy stored in materials	*Resources under development*

6. Space Physics

Specific Expectations	Lessons
P.6.1. Gravity force, weight = mass x gravitational field strength (g), on Earth g=10 N/kg, different on other planets and stars; gravity forces between Earth and Moon, and between Earth and sun (qualitative only)	**Gravity** Weight and Mass Mass, Weight, and Gravity in Space Data Interpretation: Weights in Space! Planetary Motion
P.6.2. Our sun as a star, other stars in our galaxy, other galaxies	
P.6.3. The seasons and the Earth's tilt, day length at different times of year, in	

different hemispheres	Satellites
P.6.4. The light year as a unit of astronomical distance	**Our Solar System and Beyond** Introduction to the Solar System The Sun Planet Earth The Inner Planets The Outer Planets Asteroids and Meteoroids Comets Sizes in Space Distances in Space **Investigation: Fruity Solar System** A Fruity Solar System Student Worksheet Teacher Guide **Seasons, Days and Years** Calendars and the Solar Year Seasons and the Angle of the Sun Tides Phases of the Moon Lunar Eclipse Solar Eclipse Earth, Moon and Sun Days Day and Night Time Zones Days, Months and Years Years Seasons Effects of Seasonal Change **Investigation: Making a Sundial** Making a Sundial Student Worksheet PDF Teacher Guide PDF Laboratory Technician Guide PDF Editable Documents - Word (.docx) **Investigation: Earth, Moon & Sun** Modelling The Earth, Moon and Sun Student Worksheet PDF Teacher Guide PDF Laboratory Technician Guide PDF Editable Documents - Word (.docx)