Landgate School Key Stage 3 Science Long Term Planning

Key Stage 3	**Key Stage 3 Intent:** At Landgate School we aim to create learning opportunities that inspire students to develop an enquiring mind about the world, while achieving their personal and aspiring targets. We enable learners to develop practical skills and an understanding of science knowledge, and process as well as stimulating curiosity about everyday life. Learners are assessed against Flight Paths which are a breakdown of P scales and National Curriculum year expectations. Learners are placed onto a pathway dependent on their science skills and knowledge; ensuring personalised learning. Primary Science is planned and delivered by the lead class teacher or HLTA. **Links** - Relationships Education, Relationships and Sex Education (RSE) and Health Education: Science - At key stage 3 and 4, it includes teaching about reproduction in humans; for example, the structure and function of the male and female reproductive systems, menstrual cycle, gametes, fertilisation, gestation, birth and HIV/AIDS.
	Key Stage Opportunities: In Key Stage Three Science is delivered through three sessions per week enabling them to acquire, develop and apply their learning in Science. The lessons include a range of strategies including teacher directed activities, group discussion, personal investigation, and independent study to: o encourage learners to predict the likely outcome of their investigations and practical activities. o use a planned range of investigations and practical activities to give learners a greater understanding of the concepts and knowledge of science. o provide learners with a range of specific investigations and practical work which gives them a worth-while experience to develop their understanding of science. o develop progressively learners' ability to plan, carry out and evaluate simple scientific investigations and to appreciate the meaning of a 'fair test'. o develop the ability to record results in an appropriate manner including the use of diagrams, graphs, tables and charts. o introduce learners to the language and vocabulary of science o give learners regular opportunities to use the scientific terms necessary to communicate ideas about science. o develop learners' basic practical skills and their ability to make accurate and appropriate measurements within practical activities give learners opportunities to use a range of simple scientific measuring instruments such as thermometers and force meters and develop their skill in being able to read them. o develop learners' use of ICT in their science studies. o give learners opportunities to use ICT (video, digital camera, data logger) to record their work and to store results for future retrieval throughout their science studies. o give learners the chance to obtain information using the internet. Key Stage Three learners are to be given opportunities to see how science effects our daily lives and the environment around us. Therefore they will access the outdoor provision and visits out of school to investigate extend their understanding and contextual breadth.

	Year A	Year B	Year C
1	**Key Focus:**	**The Particulate Nature of Matter**	**Reproduction**	**Cells and Organisation**
	Key Knowledge/ Vocabulary: **(Vocab highlighted in bold)**	**To observe, experience, investigate, identify, describe, and/or evaluate…** ➢ the **properties** of the different **states of matter** (**solid, liquid and gas**) in terms of the particle model, including **gas pressure** ➢ Effects of changes of state **Atoms, elements and compounds** ➢ **Chemical symbols** and **formulae** for **elements** and **compounds** ➢ **Conservation of mass** changes of state and **chemical reactions.**	**To observe, experience, investigate, identify, describe, and/or evaluate…** ➢ **reproduction in humans –** Naming and identifying reproductive **body parts. Testis, sperm, testes, scrotum, sperm duct, seminal vesicle, prostate gland, ureter, penis, ovary, eggs (ova), oviducts" fallopian tubes", uterus "womb", foetus "baby", cervix, vagina.** ➢ **reproduction in plants – Sepals, Petals, Stamens, filament, Anthers, Stigma, Ovary, Nectary.**	**To observe, experience, investigate, identify, describe, and/or evaluate…** ➢ **cell structure** and **functions.** ➢ Using a l**ight microscope** ➢ The **similarities** and **differences** of **cells** ➢ **Diffusion** in the **movement** of **materials** ➢ The **structural adaptations** of some **unicellular organisms** ➢ The **hierarchical organisation** of **multicellular organisms**: from **cells** to **tissues** to **organs** to **systems** to **organisms.**
	Key Skills:	**Focused skills:** ➢ Asking questions ➢ Planning and carrying out enquiries. ➢ Predicting, ➢ Using fair tests and controls. ➢ Selecting techniques and apparatus. ➢ Understanding Health and Safety. ➢ Making and recording observations. ➢ Taking measurements ➢ Interpreting observations and data. ➢ Presenting reasoned explanations.	**Focused skills:** ➢ Asking questions. ➢ Understanding health and safety. ➢ Present reasoned explanations. ➢ Identify further questions.	**Focused skills:** ➢ Making observations and recording ➢ Selecting, planning and carrying out enquiries. ➢ Use appropriate apparatus ➢ Interpret observations and data. ➢ Present reasoned explanations.
	Key Opportunities:	**Possible External Visits:** Local area/ states of matter at the supermarket **Activity ideas**: Water, Jelly, Chocolate, Periodic table song, atom models, **Outdoor Experiences**: Natural materials, chemical reactions, snow ice water.	**Possible External Visits:** Baby clinic **Activity ideas**: Planting, identifying parts, **Outdoor Experiences**: collecting seeds – conkers, sycamore seeds, safe berries, dandelions	**Possible External Visits:** Eureka, Professional Science labs **Activity ideas**: Food cell structures, Using a microscope, **Outdoor Experiences**: Bucket school - Using magnifying glasses and microscopes.

2	Key Focus:	Gas Exchange Systems	Nutrition and Digestion	Genetics and Evolution Inheritance
	Key Knowledge/ Vocabulary: **(Vocab highlighted in bold)**	**To observe, experience, investigate, identify, describe, and/or evaluate…** ➢ The **gas exchange** system in humans. ➢ The mechanism of **breathing** ➢ **Lung volume**. ➢ The **impact** of **exercise, asthma** and **smoking.** ➢ **Gas exchange** in **plants.** ➢ **Cellular respiration** ➢ **aerobic** and **anaerobic respiration**	**To observe, experience, investigate, identify, describe, and/or evaluate…** ➢ a **healthy human diet**: **carbohydrates, lipids (fats and oils), proteins, vitamins, minerals, dietary fibre** and **water,** and why each is needed. ➢ calculations of **energy requirements** ➢ the consequences of **imbalances** in the **diet,** including **obesity, starvation** and **deficiency diseases** ➢ the **digestive system** ➢ **bacteria** in the human **digestive system** ➢ **photosynthesis.** ➢ the effects of **recreational drugs.**	**To observe, experience, investigate, identify, describe, and/or evaluate…** ➢ **DNA** ➢ **heredity** ➢ differences between **species** ➢ the **variation** between **individuals** within a species – **natural selection** ➢ changes in the **environment** 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** ➢ **biodiversity** and **gene banks**
	Key Skills:	**Focused skills:** ➢ Asking questions based on observations. ➢ Selecting, planning and carrying out enquiry. ➢ Using fair tests and controls. ➢ Paying attention to health and safety. ➢ Make and record observations. ➢ Take measurements, calculate results.	**Focused skills:** ➢ Asking questions. ➢ Presenting reasoned explanations. ➢ Identifying further questions arising from their results. ➢ Identifying effects.	**Focused skills:** ➢ Asking questions based on observations. ➢ Making and recording observations. ➢ Comparing ➢ Classifying ➢ Interpreting data ➢ Presenting reasoned explanations.
	Key Opportunities:	**Possible External Visits:** Bodies at Eureka **Activity ideas**: Model of lungs, measuring lung capacity, role play gas exchange. **Outdoor Experiences**: Exercise breathing measurements.	**Possible External Visits:** Doctors, Visit a nutritionist. **Activity ideas**: Model of digestive system, tasting hea/ sorting healthy foods. **Outdoor Experiences**: activities related to photosynthesis.	**Possible External Visits:** Zoo - adaptations **Activity ideas**: Make DNA strands, create own animal from two others. Investigate adaptation such as tall giraffes, marsupial pouches. **Outdoor Experiences**: Bird watch, bug hunts looking at adaptation – snails and slugs. Move like different animals according to adaptation.

3	**Key Focus:**	**Photosynthesis**	**The Skeletal and Muscular Systems**	**Chemicals**
	Key Knowledge/ Vocabulary: **(Vocab highlighted in bold)**	**To observe, experience, investigate, identify, describe, and/or evaluate…** ➢ the **reactants** in, and **products** of, **photosynthesis,** and a word summary for **photosynthesis** ➢ the **dependence** of almost all life on **Earth** on **plants** and **algae.** ➢ the **adaptations** of **leaves** for **photosynthesis.** ➢ **Interactions and interdependencies** - **Relationships** in an **ecosystem** ➢ the **interdependence** of **organisms** in an **ecosystem**, including **food webs** and **insect pollinated crops** ➢ the importance of **plant reproduction**	**To observe, experience, investigate, identify, describe, and/or evaluate…** ➢ the **structure** and **functions** of the human body including the **human skeleton**, to include **support, protection, movement** and **making blood cells** ➢ **biomechanics** – the **movement** of the body developing towards the **interaction** between **skeleton** and **muscles,** including the **measurement** of **force** exerted by different **muscles** ➢ the **function** of **muscles** finally including examples of **antagonistic muscles.**	**To observe, experience, investigate, identify, describe, and/or evaluate…** ➢ **Pure** and **impure** substances. ➢ **Mixtures,** including **dissolving.** ➢ **Diffusion / separating mixtures.** ➢ **Chemical reactions** ➢ Representing **chemical reactions** using **formulae** and **equations.** ➢ the **pH scale for measuring** ➢ **reactions** of **acids** with **metals** and **alkalis** to produce a **salt** plus water, salt plus **hydrogen** ➢ **energy** changes on **changes of state** (qualitative) ➢ **exothermic** and **endothermic chemical reactions (qualitative).**
	Key Skills/:	**Focused skills:** ➢ Selecting, planning and carrying out enquiry ➢ Using fair tests and controls ➢ Using appropriate techniques, apparatus, and materials . ➢ Pay attention to health and safety. ➢ Take measurements, calculate results.	**Focused skills:** ➢ Using appropriate techniques, apparatus, and materials . ➢ Paying attention to health and safety. ➢ Make and record observations. ➢ Taking measurements ➢ Presenting reasoned explanations.	**Focused skills:** ➢ Using appropriate techniques, apparatus, and materials. ➢ Paying attention to health and safety. ➢ Making and recording observations. ➢ Taking measurements, calculating results. ➢ Presenting reasoned explanations. ➢ Identify further questions arising from their results. ➢ Use and derive simple equations.
	Key Opportunities:	**Possible External Visits:** Pond dipping, **Activity ideas**: comparing leaves, ecowebs, **Outdoor Experiences**: Local ecosystems, finding leaves	**Possible External Visits:** Manchester museum - dinosaurs **Activity ideas**: Schools skeleton, Them bones, **Outdoor Experiences**: Using equipment skeletons and muscles.	**Possible External Visits:** Oakfield Lab **Activity ideas**: Chemical reactions in food, compare reversible and non reversible. **Outdoor Experiences**: Outdoor sized reactions – coke and mentos

	Key Focus:	The Periodic Table	Materials	Earth and Atmosphere
4	**Key Knowledge/ Vocabulary:** **(Vocab highlighted in bold)**	**To observe, experience, investigate, identify, describe, and/or evaluate…** ➢ the varying **physical** and **chemical properties** of different **elements** ➢ the principles underpinning the **Mendeleev Periodic Table** ➢ the **Periodic Table**: **periods and groups**; **metals and non-metals** ➢ how **patterns** in **reactions** can be **predicted** ➢ the properties of **metals** and **non-metals** ➢ the **chemical properties** of **metal and non-metal oxides** with respect to **acidity**	**To observe, experience, investigate, identify, describe, and/or evaluate…** ➢ **Properties** of **materials** ➢ **metals** and **carbon** ➢ the use of **carbon** in **obtaining metals** from **metal oxides** ➢ properties of **ceramics, polymers** and **composites (qualitative).**	**To observe, experience, investigate, identify, describe, and/or evaluate…** ➢ the **composition** of the **Earth** ➢ the **structure** of the **Earth** ➢ the **rock cycle** and the formation of **igneous, sedimentary** and **metamorphic** rocks ➢ Earth as a source of **limited resources** ➢ the **carbon cycle** ➢ the composition of the **atmosphere** ➢ the production of **carbon dioxide** by human activity and the **impact** on **climate.**
	Key Skills:	**Focused skills**: ➢ Selecting, planning and carrying out enquiries. ➢ Predicting ➢ Use appropriate techniques, apparatus, and materials. ➢ Pay attention to health and safety. ➢ Make and record observations. ➢ Take measurements, calculate results. ➢ Use and derive simple equations.	**Focused skills** ➢ Predicting, using fair tests and controls. ➢ Using appropriate techniques, apparatus, and materials . ➢ Paying attention to health and safety. ➢ Making and recording observations. ➢ Identifying further questions arising from their results. ➢ Using and deriving simple equations.	**Focused skills** ➢ Asking questions based on observations. ➢ Making and recording observations. ➢ Interpreting observations and data. ➢ Presenting reasoned explanations. ➢ Identifying further questions arising from their results.
	Key Opportunities:	**Activity ideas**: periodic table song, investigating metals and reactions. **Outdoor Experiences**: Identifying materials in the environment.	**Possible External Visits:** **Activity ideas**: comparing metals properties **Outdoor Experiences**: Identifying materials in the environment.	**Possible External Visits:** Beach hunt **Activity ideas**: Identifying rocks, using microscopes, properties **Outdoor Experiences**: Rocks in the local area.

5	Key Focus:	Motion and Forces	Energy	Electricity and Electromagnetism
	Key Knowledge/ Vocabulary: **(Vocab highlighted in bold)**	**To observe, experience, investigate, identify, describe, and/or evaluate…** ➢ **Describing motion** ➢ **distance-time** graphs(**speed = distance** ÷ time) ➢ **relative motion forces** as **pushes** or **pulls,** ➢ **forces measured** in **newtons**, ➢ **non-contact** forces ➢ **pressure** in **liquids**, ➢ **pressure measured** by **ratio of force** over area ➢ **opposing forces** and **equilibrium** ➢ change depending on **direction of force** and its size.	**To observe, experience, investigate, identify, describe, and/or evaluate…** ➢ **Energy** in the domestic context ➢ comparing **energy values** of different **foods** ➢ comparing **power ratings** of **appliances** ➢ comparing amounts of **energy** ➢ **fuels** and energy resources. ➢ **heating** and **thermal equilibrium: insulators** ➢ **Energy transfer** ➢ Energy as a quantity that can be quantified and calculated ➢ describing **increases** and **decreases** in the amounts of **energy** ➢ using **physical processes** and **mechanisms,** rather than **energy**	**To observe, experience, investigate, identify, describe, and/or evaluate…** ➢ Current **electricity** ➢ potential difference, **measured in volts, battery** and **bulb** ratings; **resistance,** measured in **ohms**, as the ratio of potential difference (p.d.) to **current** ➢ differences in **resistance** between **conducting** and **insulating** components ➢ **separation** of **positive** or **negative** charges ➢ the idea of **electric field,** ➢ **magnetic poles**, **attraction** and **repulsion** ➢ **magnetic fields** by plotting with **compass,** ➢ the magnetic effect of a **current, electromagnets, D.C. motors**
	Key Skills:	**Focused skills** ➢ Predicting, using fair tests and controls. ➢ Using appropriate techniques, apparatus, and materials. ➢ Paying attention to health and safety. ➢ Recording using diagrams and tables. ➢ Taking measurements, calculating results. ➢ Using and deriving simple equations.	**Focused skills** ➢ Predicting, using fair tests and controls. ➢ Paying attention to health and safety. ➢ Taking measurements, calculating results. ➢ Interpreting observations and data. ➢ Presenting reasoned explanations. ➢ Identifying further questions arising from their results. ➢ Using and deriving simple equations.	**Focused skills** ➢ Ask questions based on observations. ➢ Selecting, planning and carrying out enquiries. ➢ Predict, use fair tests and controls. ➢ Using appropriate apparatus ➢ Paying attention to health and safety. ➢ Making and recording observations.
	Key Opportunities:	**Possible External Visits:** Playgrounds, Science and industry museum **Activity ideas**: Sports, identifying direction of forces in everyday life, experiencing the effects of forces **Outdoor Experiences**: Outdoor equipment.	**Possible External Visits:** Harnessing natural energy - wind farms **Activity ideas**: Sources of energy in schools, Creating insulators/ conductors for practical situations, safety **Outdoor Experiences**: Play games passin energy to each other.	**Possible External Visits:** Power station **Activity ideas**: Identify uses of electricity, circuits, insulators and conductors in practical investigations **Outdoor Experiences**: How does electricity reach houses and school.

9	Key Focus:	Waves	Electricity and Electromagnetism	Space Physics
	Key Knowledge/ Vocabulary: **(Vocab highlighted in bold)**	**To observe, experience, investigate, identify, describe, and/or evaluate…** ➢ **waves** on water ➢ **sound waves/ sound vibrations** ➢ **auditory** range of humans and **animals. Energy and waves** ➢ **pressure waves** ➢ **Light waves** ➢ the **transmission** of **light** through **materials: absorption, diffuse scattering** and **specular reflection** at a **surface** ➢ **light transferring energy** ➢ **colours** and the **different frequencies of light**, **white light** and **prisms**	**To observe, experience, investigate, identify, describe, and/or evaluate…** ➢ **Current electricity** ➢ **electric current**, **measured** in **amperes**, in **circuits, series** and **parallel circuits, currents** add where **branches** meet and current as **flow of charge** ➢ differences in **resistance** between **conducting** and **insulating components** (quantitative). **Static electricity** ➢ separation of **positive** or **negative** charges ➢ **Magnetism** ➢ **Earth's magnetism, compass** and **navigation**	**To observe, experience, investigate, identify, describe, and/or evaluate…** ➢ **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) ➢ our **Sun as a star**, other **stars** in our **galaxy,** other galaxies ➢ the **seasons** and the **Earth's tilt, day length** at different **times of year**, in different **hemispheres** ➢ the **light year** as a unit of **astronomical distance.**
	Key Skills:	**Focused skills** ➢ Asking questions based on observations. ➢ Making and recording observations. ➢ Taking measurements, calculating results. ➢ Interpreting observations and data.	**Focused skills** ➢ Ask questions based on observations. ➢ Selecting, planning and carrying out enquiries. ➢ Predict, use fair tests and controls. ➢ Using appropriate apparatus ➢ Paying attention to health and safety.	➢ Asking questions based on observations. ➢ Making and recording observations. ➢ Interpreting observations and data. ➢ Presenting reasoned explanations. ➢ Identifying further questions arising from their results.
	Key Opportunities:	**Possible External Visits:** Eureka **Activity ideas**: making telephones, exploring musical vibrations, prisms **Outdoor Experiences**: travelling light and sounds across outdoor environments.	**Possible External Visits:** Hydro electricity station **Activity ideas**: Identify uses of electricity, circuits, insulators and conductors in practical investigations **Outdoor Experiences**: How does electricity reach houses and school.	**Possible External Visits:** Planetarium **Activity ideas**: making a solar system, making a star **Outdoor Experiences**: human solar system in field, shadows, seasonal activities