



## Course Outline

### Science Year 7

*Inspiring excellence, empowering global minds*

#### Overview

The Science Syllabus at GEMS Wesgreen International Secondary School aims to support students to develop their ability to explore the world, to reason and solve problems through application of knowledge and transferable skills. Throughout the year we cover and extend objectives as the focus is on providing a foundation for understanding the world, the ability to reason scientifically, an appreciation of the beauty and power of science, and a sense of enjoyment and curiosity about the subject.

#### Learning Outcomes

The sciences at Wesgreen are taught in ways that ensure that the students have the knowledge to enable them to develop curiosity about the natural world, insight into working scientifically, and appreciation of the relevance of science to their everyday lives, so that they develop:

- Scientific knowledge and conceptual understanding in the areas of biology, chemistry and physics
- Understanding of the nature, processes and methods of science through scientific enquiry, which helps them to answer scientific questions on the world around them
- Learning of how to apply observational, practical and enquiry-based skills to the world around them
- Their ability to evaluate claims based on science through critical analysis of methods, evidence and conclusions, both qualitative and quantitative.

Scientific enquiry is set out separately but must always be taught through, and be clearly related to, the Pearson Edexcel International Award in Lower Secondary Science learning objectives.

#### Chapter Overviews

##### Term 1

##### **7A – Cells, tissues, organs and organ systems**

**Approximate length: 7 lessons**

This chapter starts by reminding students about the features of organisms, and then looks at organs, tissues and cells. These ideas are then built back up in order to look at organs once again, in the context of organ systems. Throughout the unit, students are encouraged to compare what we know now about the structure of organisms with what people believed in the past

Specific Objectives Covered:

- Describe the 7 life processes and use these to justify whether something is alive or not.
- Identify plants and animal cells and state the functions of the different cell components.
- Describe the link between organs and tissues and describe functions of different tissues found in some animal and plant organs.
- Identify and describe the function of major organs in human and plants.
- Describe how cells, tissues, organs and organ systems are linked.
- Describe the use of microscope and how to calculate magnifications.
- Observe and interpret cell structures through the use of a light microscope
- Describe the different forms of transport, specifically looking at diffusion, osmosis and active transport

**7E – Mixtures and separation****Approximate length: 10 lessons**

This unit revises and builds on work in primary on materials, specifically on mixtures, solutions and separation techniques using the context of providing clean drinking water. This provides opportunities to introduce the methods of working in a science lab, which will differ from the science learning experience that most students will have had previously.

Specific Objectives Covered:

- Describe the structure of the atom
- Use a periodic table to determine the number of protons, neutrons and electrons in elemental atoms
- Distinguish the differences between an atom, element, compound and mixture
- Describe, identify and classify mixtures.
- Describe how solids can be used to form a solution and what is known by saturated solution.
- Investigate the solubility of different solutes with a variety of solvents
- Investigate how to separate soluble and insoluble substances using filtration and evaporation techniques
- Explain how distillation works
- Explain how chromatography works and interpret a chromatogram.

**7I – Energy****Approximate length: 8 lessons**

This unit uses a theme park to introduce the idea that stores of energy are needed to make most things happen. It looks at food, energy stores and transfers, and energy resources in terms of non-renewable fuels and renewable resources. Energy stores and transfers are revisited briefly in the Year 9 materials.

Specific Objectives Covered:

- Explain why different people need different amounts of food and how the body uses this energy
- Investigate the energy contents of different food samples
- Name some ways in which energy is stored and transferred.

- Describe some advantages and disadvantages of different energy resources.
- Explain how the Sun is the original source of energy resources.
- Describe some advantages and disadvantages of different renewable and non-renewable energy resources.
- Explain how the Sun is the original source of energy for fossil fuels, biofuels and food.
- Explain how certain gases cause the greenhouse effect.
- Calculate the efficiency of energy transfers

**7F – Acids and alkalis****Approximate length: 5 lessons**

This unit looks at acids and alkalis and how they are described using a pH number. It looks at neutralisation reactions and some of their uses, and also introduces standard hazard symbols.

Specific Objectives Covered:

- Recognize common hazards and hazard symbols and explain why some chemicals have hazard symbols.
- Explain the safety precautions that need to be taken when carrying out an investigation.
- Describe how indicators can be used to identify acids and alkalis.
- Describe the pH scale and how to measure the pH of a solution.
- Investigate the pH of a range of household substances
- Identify the reactants and products in a word equation and write a word equation for a reaction between metals and acids as well as between acids and alkalis
- Explain some uses of neutralisation in daily life.

**Term 2****7J – Electricity****Approximate length: 8 lessons**

This unit looks at the measurement of current and how it behaves in series and parallel circuits, and at voltage and resistance. Various models for thinking about what is happening in circuits are explored, and the unit concludes by looking at how we use electricity safely.

Specific Objectives Covered:

- Identify the electrical symbols of a circuit and be able to draw series and parallel circuits
- State what is meant by current, potential differences and resistance, and describe how to measure them
- Describe the effect of adding more bulbs to a series and parallel circuit.
- Model circuits using circuit diagrams and standard symbols and construct simple electrical circuits.
- Describe the strengths and weaknesses of some of the models used to explain electricity.
- Investigate the effects of different insulators and conductors in an electrical circuit

- Compare series and parallel circuits.
- Use models to help to explain the idea of voltage and how it is divided between components in series and parallel circuits.
- Describe some uses and dangers of electricity.
- Explain how electricity can be used safely at home and at school.

### **7C – Muscles and bones**

**Approximate length: 9 lessons**

This unit uses a ‘fitness’ theme to cover three important organ systems: the gas exchange system, the circulatory system and the musculoskeletal system. The various effects of drugs on these systems are also considered, together with their effects on the nervous system.

#### Specific Objectives Covered:

- Identify the main organs in the human gas exchange system.
- Describe how breathing movements occur.
- State what the pulse rate measures and where it is measured
- Identify the major components of the heart
- Explain how the human double circulatory system gets blood around the body.
- Explain how blood vessels are adapted to their functions.
- Explain what components make up blood and their function
- Identify and recall the functions of some bones in the skeleton.
- Describe the basic parts of joints and the different types of joint.
- Describe how muscles and bones work together in the musculoskeletal system to allow movement.
- Describe how muscle action is controlled by the nervous system.
- Explain the short- and long-term effects of some drugs

### **7G – Particle model**

**Approximate length: 7 lessons**

This unit develops an understanding of the different properties of solids, liquids and gases within the context of waste management and disposal. Scientific method and ideas on experiments, observation, hypotheses and theories are discussed, leading to an understanding of the particle theory of matter. Further applications of the particle theory are investigated using the context of waste and waste disposal.

#### Specific Objectives Covered:

- Classify materials as solid, liquid or gas and describe the properties of the three states of matter.
- Describe how evidence and observations are used to develop a hypothesis into a theory.
- Describe, draw and recognize the arrangement of particles in solids, liquids and gases.
- Use particle theory to explain the basic properties of solids, liquids and gases.
- Describe Brownian motion.
- Use particle theory to explain how Brownian motion occurs.
- State what is meant by diffusion and use particle theory to explain how diffusion occurs.

- State what density is and compare its properties between solids, liquids and gases
- State what is meant by gas pressure.
- Recognize some effects of gas pressure.
- Use particle theory to explain gas pressure, its effects and how it can be changed.

**7K – Forces****Approximate length: 6 lessons**

This unit revises the concepts of forces and their effects and extends students' knowledge of friction, gravity and springs. These ideas are presented using a theme of outdoor sports, such as climbing and mountain biking, to link to ideas about forces, friction and pressure.

Specific Objectives Covered:

- Name and identify some different forces and state their effects on objects.
- Compare forces based on whether they are contact or non-contact
- Represent the size and direction of forces using arrows
- Explain the effects of balanced and unbalanced forces in simple situations.
- Describe how the extension of a spring depends on the force applied.
- Explain what is meant by elastic limit and limit of proportionality.
- Describe some effects of friction, and explain how friction forces can be changed.
- Calculate pressure and recall its units.
- Describe the effects of high and low pressure in simple situations, and how the pressure can be changed.
- Explain why scientists use SI units.

**7D – Ecosystems****Approximate length: 9 lessons**

This unit looks at ecosystems and the factors that affect ecosystems. This includes the impact of human activity and the importance of biodiversity.

Specific Objectives Covered:

- Correctly use the terms 'habitat' and 'species'.
- Identify variation between organisms of the same and different species.
- Identify and give examples of inherited variation and explain how inherited variation is caused.
- Identify and give examples of environmental variation and explain how environmental variation is caused.
- Present and interpret bar charts and scatter graphs to show variation
- List some physical environmental (abiotic) factors in an environment.
- Describe how organisms are adapted to their habitats.
- Explain how adaptations increase the chances of survival for organisms.
- Describe daily and seasonal changes and how organisms respond.
- Use food chains to make food webs and spot food chains in food webs.
- Explain how energy is lost in food chains.

- Interpret and draw pyramids of numbers.
- Explain the effects of persistent pesticides on ecosystems.
- Explain why organisms are in competition in a habitat.
- Explain how changes in a population or community in an ecosystem affect other populations, and use food webs to predict these changes.
- Interpret and explain predator-prey cycles

### Term 3

#### **7Ge – Waste Project**

**Approximate length: 4 lessons**

Students will be provided with the opportunity to investigate the problems associated with waste and the impact the human population is having on the planet. During lesson times, students will be able to extend upon their skills to be able to research and interpret information which they will be able to present to their classmates.

#### Specific Objectives Covered:

- Understand the problem of a rising population and that waste produced is increasing
- Understand the current methods of dealing with waste, namely landfill and incineration and their pros and cons
- Understand the concept of reduce, reuse, recycle and recover and the pros and cons of initiatives
- Develop a campaign to promote sustainable practice or practices within Wesgreen and present to the class

#### **7H- Atoms, elements, and some molecules**

**Approximate length: 6 lessons**

This unit uses the context of resources from the Earth and atmosphere to introduce ideas about the make-up of matter. It expands on particle theory and explains the differences between atoms, and molecules, elements, and compounds. It looks at the symbols and formulae for elements and compounds. The involvement of chemical reactions in the formation and decomposition of compounds is also covered. It links these with the more abstract ideas of particle models, naming compounds and word equations.

#### Specific Objectives Covered:

- Describe the mixture of gases in the air (including their percentages).
- Describe differences between elements and compounds, between mixtures and pure substances, and between atoms and molecules.

- Use particle diagrams to identify and represent elements, compounds, mixtures, pure substances, atoms and molecules.
- Describe the properties of elements and link them to their uses.
- Represent elements using chemical symbols
- Write word equations to describe chemical reactions and identify the products and reactants in the reactions.
- Write symbol equations for chemical reactions and balance them
- Identify and describe what happens in thermal decomposition reactions (including metal carbonates).
- Name compounds that contain two elements plus oxygen.
- Identify different metal and non-metal elements.
- Relate the uses of different elements to their properties.
- State what happens in all chemical reactions.
- Describe how elements can be changed into compounds and how this changes the properties.
- Explain the differences between atoms, molecules, elements and compounds (including interpreting and drawing particle models).
- Describe how metals are extracted from minerals found in ores.
- Recall some observations that indicate a chemical reaction and describe differences between chemical reactions and physical changes.

## 7L- Sound

**Approximate length: 8 lessons**

This unit looks at how sounds are made, transmitted and detected, some uses of sound and compares sound waves with waves on the surface of water.

### Specific Objectives Covered:

- Compare transverse and longitudinal waves
- State the meaning of: pitch, volume, frequency and amplitude.
- Demonstrate properties of waves using a ripple tank
- Describe how to make different sources of sound louder or quieter.
- Describe how to use different objects to make sounds with different pitches.
- Relate the volume (intensity) of a sound to the size of the vibrations producing it.
- Describe the connections between amplitude and loudness, and between frequency and pitch.
- Compare how sounds travel through different materials.
- Describe how a sound changes as you get further from the source.
- Describe how sound gets from a source to our ears.
- Explain how the speed of sound varies in solids, liquids and gases.
- Explain why the intensity of a sound decreases with increasing distance from a source.
- Describe the role of the eardrum in human hearing.
- State what is meant by: ultrasound, infrasound.
- Describe the functions of different parts of the ear.
- Explain how sound can be detected by microphones and sound meters.
- Describe how microphones convert sound into electrical signals.

**Textbooks Exploring Science – 7 (Pearson)**

### *Assessment*

**Formative:** Throughout the chapters, the students will complete end of chapter assessments, quizzes and problem-solving activities which will allow the teacher to assess the students' progress and inform their planning.

**Summative:** Students will be assessed on their understanding of each chapter with end of topic assessments. At the end of each term, we will complete internal assessments which will be based on certain chapters. Students will also complete standardized tests such as the GL. This allows us to measure the students' attainment throughout the term and year.