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Draft Schemes of Work – Edexcel Lower Secondary Curriculum

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Dear Centre,

The Schemes of Work in this booklet have been prepared to provide teachers with an overview of the coverage provided by the Edexcel Lower Secondary Curriculum for Science. Centres which register for the Lower Secondary Curriculum will receive the final version of this document.

In addition to these Schemes of Work centres which register for the Edexcel Lower Secondary Curriculum will receive six completed units, including unit tests and mark schemes, for English and Mathematics for Years 7-9 and three completed units, including unit tests and mark schemes, for Science for Years 7-9 . They will also have the opportunity to purchase Achievement Tests for English, Mathematics and Science for Year 9 and Progress Tests for each of Years 7-9 for English, Mathematics and Science. The Achievement Tests will be externally marked by Edexcel. The Progress Tests will be internally assessed by centres. Further information about the availability of Achievement Tests and Progress Tests will be provided to centres as soon as it is available.

Draft sample units for Science for Year 6 and draft sample units for Science for Year 9 are available on the Edexcel web site for the Edexcel Primary Curriculum and the Edexcel Lower Secondary Curriculum.

Further information about the Edexcel Primary Curriculum and the Edexcel Lower Secondary Curriculum is available from the Edexcel Regional Development Manager for your region. Details of international Regional Development Managers are available on the Edexcel website: www.edexcel.com

Science Scheme of Work – Year 7 Overview

Term One	Objectives
Unit 1 (Tissues and transplants)	• Describe a range of organ transplants, and how they can save lives • Explain why some people may not want to have an organ transplant • Describe how evidence from microscopes has changed theories about what organisms are made from, and identify some jobs that require a knowledge of cells and organs • Be able to use a microscope to see cells clearly, and prepare a slide safely • Calculate microscope magnifications and draw observations to a scale • Be able to use a microscope to see cells clearly, and prepare a slide safely • Describe the differences between animal and plant cells, and explain the functions of the parts of cells • Describe all seven life processes • Explain how some cells are specialised to carry out certain functions • Describe what happens in, and the purpose of, cell division • Describe the functions of the main organs in plants and humans • Identify the variables in an investigation, and plan how to control them, but also recognise that some experiments do not involve fair tests • Be able to make predictions and present results as drawings, tables or charts
Unit 2 (Sex and science)	• Develop understanding of human reproduction and consider how offspring are protected and nurtured • Consider and compare reproductive patterns in other animals with those in humans • Develop knowledge about human reproduction, growth and the menstrual cycle • Consider sample size in biological investigations and present data in bar charts and graphs
Unit 3 (Ecology matters)	• Know how habitats can vary and how plants and animals are adapted to live in a particular habitat • Know how plants and animals interact with their environment and with each other, including feeding relationships • Consider the importance of sample size • Make measurements of environmental changes and interpret these

Term One	Objectives
Unit 4 (Classified)	• Explore variation within and between species and investigate patterns of variation in living things and ways of representing and explaining the occurrence of variations • Consider why classification is important • Make qualitative observations and record these in a variety of ways • Investigate variation between individuals of the same species using an appropriate sample size and draw conclusions using scientific language.

Term Two	Objectives
Unit 5 (Acids and alkalis)	• Recognise that different people will have different views on the development of an industrial site • Recognise hazard warning symbols and act accordingly (maybe using secondary sources to find out the dangers) • Describe how to lessen the risks of working with acids and alkalis • Link the pH of an acid or alkali to its hazards • Describe differences between acids and alkalis • List some common uses of acids and alkalis • Name something that is an acid • Use a knowledge of acids and alkalis to identify questions that can be investigated and suggest appropriate data to collect • Explain what happens to pH during neutralisation. • List some common uses of neutralisation • Recognise that the modern understanding of acids and alkalis is based on work from many scientists, including Arabic scientists • Use an indicator to work out if something is acidic, alkaline or neutral • Be able to classify solutions as acidic, alkaline or neutral using indicator colours and pH values • Identify relationships in data • Use a knowledge of acids and alkalis to identify questions that can be investigated and suggest appropriate data to collect • Explain what happens to pH during neutralisation. • List some common uses of neutralisation

Term Two	Objectives
Unit 6 (Bubbles, bangs and burning)	• Know that chemical change results in new substances that are different from the ones from which they were made, and explore some simple chemical reactions including those of acid and metal • Identify hydrogen and carbon dioxide as substances made during some of these reactions, and understand that gases are real materials • Use word equations as shorthand descriptions of some simple chemical reactions
Unit 7 (What a waste!)	• Understand how the particle model can be used to explain differences between solids, liquids and gases • Explore how experimental evidence relates to theories and models, and how the particle model can be used to the interplay between scientific theories and evidence • Evaluate whether evidence supports or refutes explanations of phenomena
Unit 8 (Materials from the Earth)	• Develop knowledge of dissolving and how the separation of the components of a solution is a revese process and relate this to particle theory • Begin to distinguish between a 'pure' substance and a mixture, and apply the particle model of solids, liquids and gases in a range of contexts • Make measurements of temperature and mass and describe and interpret patterns in graphs and chromatograms

Term Three	Objectives
Unit 9 (Energy and sustainable living)	• Explain how our personal use of fossil fuels affects others • Name some fuels used in homes and industry • Explain what a fuel is and what a fossil fuel is • Recall the units that energy is measured in • Explain that fuels transfer energy when they burn • Explain some ways in which our use of fossil fuels can affect other people in this country and around the world • Suggest how people can be persuaded to use less fossil fuels • State some ways in which burning fossil fuels affects the environment • Present data using tables and bar charts • Describe how a test is fair • Obtain reliable evidence by repeating readings • Evaluate the accuracy of results • State why it is good to reduce our use of fossil fuels • Suggest some ways to reduce our use of fossil fuels

Term Three	Objectives
Unit 9 (Energy and sustainable living) *continued*	• Describe how some renewable energy resources can be used to generate electricity and provide heat • Describe some of the advantages and disadvantages of renewable energy resources • Explain why different people need different amounts of food • Compare the amounts of energy different foods contain • Calculate the amount of energy transferred using data • Describe the links between the Sun, energy resources and yourself • Suggest how technology could change the way we use energy resources • Describe how some renewable energy resources can be used to generate electricity and provide heat
Unit 10 (Electrical circuits)	• Explain the working of electrical circuits using concepts of electric current and energy transfer • Explain patterns in the measurements of current and voltage, and use the concept of resistance qualitatively • Construct circuits in which current flow is usefully controlled • Consider the hazards of electricity for humans, and plan safe procedures and recognise hazards
Unit 11 (Forces and their effects)	• Recognise the origin of friction, air resistance, upthrust and weight and describe situations in which these forces act • Distinguish between mass and weight • Use the concept of speed • Relate forces acting to changes in motion, and identify situations in which forces are balanced and unbalanced
Unit 12 (The Solar System and beyond)	• Explain phenomena such as eclipses and the seasons, using appropriate models. • Know that planets and satellites are seen by reflected light and that the Sun, as a star, emits light • Compare the Sun with other stars • Consider how evidence about the solar system has been collected and interpreted, and use data from secondary sources to answer questions about the solar system and the stars

Science Scheme of Work – Year 8 Overview

Term One	Objectives
Unit 1 (Food, glorious food!)	• Know that different foods can be combined to produce a balanced diet • Know how food is broken down by digestion so it can be used by the body, for energy, growth and repair • Use a model to explore digestion, and use chemical tests to identify food types
Unit 2 (Going for gold)	• Understand how cells are supplied with the materials they need for respiration • Know that cells in animals and plants release energy by the process of respiration • Consider how to deal with factors that cannot be controlled when working with living materials
Unit 3 (Doctors and diseases)	• Know that bacteria, some fungi and viruses are classified as micro-organisms • Identify some hazards when working with microbes, and explain how risks are controlled in practical work involving microbes • Describe how microbes are used in the production of some foods and drinks • Recall the names of some of the diseases caused by certain microbes • Recall some ways in which microbes can be spread • Describe how our knowledge of disease transmission has increased with increasing knowledge about microbes, and how new scientific knowledge (eg about the causes of disease, hygiene) alters people's behaviour • Describe the body's main methods of defence against disease-causing microbes • Recognise how a theory is used to make predictions that are then tested • Draw conclusions from first-hand and secondary sources and link them to scientific facts • Explain how immunisation is a way of protecting us from infectious diseases • Recall that antibiotics are only effective against bacteria and not viruses
Unit 4 (The way of the dodo)	• Know how living things within a community influence each other and are affected by the environment • Model consequences of environmental changes within a habitat • Collect, present and interpret data and use this to make predictions • Undertake fieldwork to collect information about organisms within a habitat

Term Two	Objectives
Unit 5 (In the drink)	• Understand that a huge range of materials is made from a relatively small number of elements, and use the particle model to describe what happens when elements combine • Know that each element is only composed of one sort of atom • Explore the characteristics of some elements • Model differences between particles in elements and non-elements
Unit 6 (Materials and recycling)	• Recall the names of at least three materials that can be recycled • Sort materials into groups based on observable properties • Give a logical and coherent argument in a debate on the development of a recycling facility • Explain how the periodic table is organised • Represent elements using chemical symbols • Recall the names of some metals • Recall that there are only a small number of elements and state some of their names • Understand that the periodic table is used to classify elements • Identify some elements whose properties do not fit the general patterns of the periodic table • Know the difference between chemical symbols for elements and compounds • Explain that when atoms of different elements combine, compounds are made • Name a variety of common compounds using scientific terminology • Work out a chemical formula from a molecular diagram, and vice versa
Unit 7 (All that glitters)	• Know that rock texture is one of the key characteristics of different rock types • Understand the processes of weathering, erosion, transportation and sedimentation • Consider how evidence from sedimentary layers and from fossils has led to changes in ideas about the development of the Earth • Consider and frame questions to be investigated

Term Two	Objectives
Unit 8 (Explaining the Earth)	• Describe the major rock-forming processes, and how these are linked by the rock cycle • Use the concept of rock texture as one of the key characteristics of igneous, sedimentary and metamorphic rocks • Investigate a technique for comparing the composition of limestones, evaluating different approaches • Explore differences between igneous rocks using both first-hand and secondary data

Term Three	Objectives
Unit 9 (Heat transfers)	• Explain the difference between heat (as energy) and temperature • Understand the mechanisms of heat transfer: conduction, convection and radiation, and apply this to familiar contexts • Explain conduction, convection and change of state, using the particle model • Investigate the effectiveness of different forms of insulation, controlling relevant variables
Unit 10 (On the move)	• Describe the concepts of a magnetic field, a permanent magnet and an electromagnet, and a range of applications • Explore factors affecting the strength of an electromagnet, controlling relevant variables and evaluating the limitations of the data collected • Explain the working of a number of devices that use magnets and electromagnets
Unit 11 (Light fantastic)	• Recall that light travels at very high speed in straight lines • Explain how shadows are made • Explain some of the evidence to support the idea that light takes time to travel • Classify materials as opaque, transparent and translucent • Distinguish between reflectors and absorbers • Describe how the human eye works • Know how to draw ray diagrams • Measure angles of reflected light and identify patterns in the measurements • Use the law of reflection and knowledge of refraction to predict the formation of images • Describe how light is refracted at plane surfaces • Explain how light is refracted • Explain why a prism splits light into the colours of the spectrum

Term Two	Objectives
Unit 11 (Light fantastic) *continued*	• Explain how the appearance of coloured objects is affected by coloured lights and coloured filters • Explain how we can see colours
Unit 12 (Sound and hearing)	• Explain how sound travels through media • Explain how the ear works, find out about the harmful effects of loud noise and how loud noise can be reduced • Decide on a suitable question to investigate and on what type of data to collect • Investigate the loudness of sounds using an appropriate strategy, and identify relevant variables and consider how to control or take account of them

Science Scheme of Work – Year 9 Overview

Term One	Objectives
Unit 1 (Science and fiction)	• Describe the role of reproductive organs in sexual reproduction • Describe the role of the sex cells (gametes) in sexual reproduction • Describe how genetic information is passed on from parents to offspring in sexual reproduction • Explain what genetic information is and how it is stored. • Collect, use and store data in a clear way • Produce graphs using ICT and identify patterns in them • Identify and describe characteristics that are of benefit or harmful to an organism • Recall some inherited characteristics and some that are influenced by environmental conditions • Describe how inherited and environmental factors can affect characteristics • Recognise that animal breeding has gone on for hundreds of years • Explain how offspring with particular characteristics can be produced by selective breeding • Explain how mammals can be cloned • Explain why certain secondary sources of information have been chosen and use those sources to answer questions • Describe some ways in which plants can reproduce asexually to produce clones • Explain how organisms can be genetically modified • Describe some of the public reaction to introducing genetically modified organisms • Explain how dominant and recessive alleles cause their effects • Suggest arguments for and against selective breeding, cloning and genetic modification
Unit 2 (A model career)	• Know how the human respiratory, digestive and circulatory systems interact to maintain activity • Explain the ways in which diet, exercise, smoking and drugs affect health, and about the functions of the skeleton • Find out how scientists linked diseases to a lack of specific nutrients • Consider how the work of different scientists has contributed to a medical advance

Term One	Objectives
Unit 3 (On the farm)	• Know that photosynthesis is the key process producing new plant biomass, and that that chlorophyll enables a plant to utilise light in photosynthesis • Know that the carbon dioxide for photosynthesis comes from the air and that the water is absorbed through the roots • Understand the importance of photosynthesis to humans and other animals • Investigate some of the factors influencing the rate of photosynthesis
Unit 4 (Crime scene investigations)	• Understand how management of food production has many implications for other animal and plant populations in the environment • Develop understanding about factors affecting plant growth • Consider some of the issues involved in sustainable development of the countryside • Investigate the effects of fertiliser on plant growth

Term Two	Objectives
Unit 5 (Building for the future)	• Compare the properties of metals and non-metals • Know that different acids react in similar ways with metals, with metal carbonates and with metal oxides, and use word and symbol equations to describe these reactions • Represent elements by symbols and compounds by formulae • Devise and evaluate a method for preparing a sample of a specified salt
Unit 6 (Sculpture park)	• Use the particle model (including some ideas about sub-atomic particles) and ideas about bonding to explain a number of aspects of the reactivity of metals • Use the particle model to work out symbol equations • Explain the difference between elements, compounds and mixtures • Recall how some metals react with oxygen • Describe some simple ways of preventing corrosion • Identify patterns in the reactions of different metals, and in the reaction of a particular metal with water • Explain how some metals react with water • Use their scientific knowledge to explain some of their results • Suggest ways to remain safe when doing investigations

Term Two	Objectives
Unit 6 (Sculpture park) *continued*	• Identify many variables in an investigation and plan how to control them • Explain how some metals react with acids • Explain how different methods of corrosion protection work • Identify patterns in the reactions of different metals, and in the reaction of a particular metal with acids • Explain the need to collect valid and reliable results, being aware of the impact of human error, and the sensitivity and the accuracy of measuring instruments • Draw and use word equations as part of an explanation • Use the reactivity series and a particle model to predict and interpret displacement reactions of metals • Describe familiar uses of metals linked to their properties • Use evidence to develop ideas of reactivity • Explain how different pieces of evidence support the idea of the reactivity series • Link the observational evidence of displacement reaction to the energy transfer and rearrangements of bonds between atoms • Identify benefits and drawbacks in the use of particular metals
Unit 7 (Cleaning up)	• Know that rocks, soils and building materials have a variety of chemical characteristics • Understand how chemical weathering alters rocks and building materials over time • Know how the atmosphere and water resources are affected by natural processes and the activity of humans • Know how scientists work to monitor the environment • Understand how evidence for climate and environmental change needs careful interpretation
Unit 8 (Flying materials)	• Explore further ways in which chemical reactions can be used as an energy source, or as a process for making new materials. • Model chemical reactions as the rearrangement of atoms, and use the model to explain that matter is not lost • Consider how the particle model and the knowledge of gases helped change earlier ideas about burning

Term Three	Objectives
Unit 9 (Buying energy)	• Explore a range of useful energy transfers and transformations • Understand the concept of voltage with the transfer of energy in a circuit, and investigate the voltage of cells • Use the principle of conservation of energy to identify ways in which energy is dissipated during transfers • Measure voltage in circuits, and identify patterns in the measurements of voltage in series circuits and use these to draw conclusions
Unit 10 (Satellites and space)	• Recall some evidence for the shape of the Earth • State what an artificial satellite is and one use for a satellite. • Describe some uses of artificial satellites • Recall that planets and satellites are kept in their orbits by gravity • Recall that gravity always pulls things towards the centre of the Earth • Describe how artificial satellites can be used for scientific research • Explain that an object on Earth has weight because of gravity. • Recall that gravity is stronger if the objects have more mass • Recall that gravity is weaker if objects are further apart • Recall that gravity is not the same everywhere on the Earth and explain how gravity surveys can be used to investigate the structure of the Earth • Use data to work out the relationships between gravity, mass and distance • Calculate weights given the strength of gravity and the mass • Explain why it is important for spacecraft to have as small a mass as possible • Explain why astronauts appear to be weightless in space • Describe how gravity helped the formation of the Solar System • Describe the benefits of gravity-assist trajectories • Describe different types of orbit and how they are suited to different purposes • Recognise how forces affect the way in which objects move, and how the overall effects of forces can be calculated • Consider the advantages and the disadvantages of different ways of exploring the Solar System

Term Three	Objectives
Unit 10 (Satellites and space) *continued*	• Recall that light is part of the electromagnetic spectrum, and how different parts of the spectrum can provide information about the Solar System and the stars • Explain refraction and reflection using the wave model for light • Recall one example of an early model of the Solar System • Recognise some questions that science cannot yet answer • Describe some ways the Solar System can be explored • Describe some evidence showing that a particular theory is incorrect • Recall that there have been various models of the Solar System, and how and why these have changed • Explain why the acceptance or rejection of scientific theories may sometimes depend on technological developments • Describe how astronomy and space science provide evidence of the Solar System and our galaxy • Explain the role of prediction and testing in the acceptance of models of the Solar System
Unit 11 (Record breakers)	• Understand the relationship between forces (including balanced forces) on an object, and its movement • Explore the effects of water and air resistance on speed, and how streamlining reduces these effects • Measure and calculate, with appropriate precision, the speed of objects in a range of situations, and construct and interpret speed-time graphs, describing patterns or relationships
Unit 12 (Dam it!)	• Study pressure on solids and fluids and describe applications of this • Describe the operation of levers, including examples from the human body, which depend on the turning effect of a force • Understand the principle of moments • Investigate balance about a pivot, evaluating strengths and weaknesses in their methods