Ormiston Horizon Academy

CURRICULUM MAP FOR Science

YEAR 11

P5 Forces • To recognise different types of force • To understand what speed is and how it can be calculated • To describe and calculate acceleration • To draw and interpret velocity–time graphs • To apply the equation for uniform motion for horizontal and vertical motion • To state the difference between mass and weight • To apply Newton's first law • To draw and use free-body diagrams • To apply Newton's second law • To investigate acceleration • To identify Newton's third law pairs of forces • To apply the principle of conservation of momentum to safety features in cars • To identify factors that affect thinking and braking distance • To state the meaning of the terms 'elastic' and 'inelastic' deformation • To investigate Hooke's law • To review ideas about forces and acceleration • To use estimates in calculations		Force Acceleration Velocity Mass Weight Momentum Elastic Deformation
		How is this unit being assessed? End of unit assessment Paper 1 Mock
		Knowledge Organiser
C3 Quantitative Chemistry • Explain the law of conservation of mass and apply it to balance symbol equations. • Calculate relative formula masses and use them in balanced equations to verify the law of conservation of mass. • Explain observed changes in mass during reactions in terms of loss or gain of gases from the atmosphere. • Use the range of a set of measurements and their mean to specify the degree of uncertainty in a set of measurements. • Describe the measurements of amounts of substances in moles; calculate the number of moles in a given mass and the mass of a given number of moles. • Calculate the masses of reactants and products from balanced symbol equations and the mass of a given reactant or product. • Use moles to balance an equation given the masses of the reactants and products. • Know that the concentration of a solution can be measured in g/dm3 and in mol/dm3. • Use formula masses to convert grams into moles and vice versa.		Conservation Moles Reactants Products uncertainty
		How is this unit being assessed? End of unit assessment Paper 1 Mock
		Knowledge Organiser

• Use balanced symbol equations to determine the masses of reactants needed or the masses of products expected.		
B6 Inheritance • Describe a gene as a small section of DNA that codes for a protein. • Explain the importance of understanding the human genome. • Discuss the use of the human genome in understanding human migration patterns. • Explain how meiosis halves the number of chromosomes to produce four gametes that are genetically different and explain how fertilisation restores the chromosome number. • Understand that asexual reproduction involves only one parent and results in identical offspring; and that sexual reproduction occurs by gametes fusing and results in variety in the offspring. • Understand and be able to use genetics terms, such as gamete, chromosome, gene, dominant, recessive, genotype, phenotype, homozygous and heterozygous. • Know that some human conditions, such as cystic fibrosis, are caused by a recessive allele and be able to complete or construct a Punnett square to predict the outcome of a genetic cross. • Know that some human conditions, such as polydactyly, are caused by a dominant allele and understand the use of a family tree to show the inheritance of a characteristic. Explain economic, social and ethical issues concerned with embryo screening. • Key concept: Genetics is simple – or is it? Understand that certain characteristics are controlled by a single gene but many characteristics are the result of multiple genes that interact, and describe the search for genes that are linked to diseases. • Maths skills: Fractions, ratio, proportion and probability Understand and use fractions, percentages, ratio and proportion, and probability when predicting the outcomes of genetic crosses.		Gene Genome Chromosome Heterozygous Homozygous Genotype Phenotype Gamete Zygote Asexual Dominant Recessive Allele
		How is this unit being assessed? End of unit Assessment Paper 2 Mock
		Knowledge Organiser
P2 Electricity • Define electric current • Distinguish between series and parallel circuits • Investigate current, potential difference and resistance in series circuits • Realise the link between current, potential difference and resistance		Current Potential Difference Resistance Series Parallel Thermistor Diode National Grid

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- Gather valid data and use graphs to analyse it and draw conclusions.
- Investigate the effect on its resistance of changing the length of a wire and the effect of connecting resistors in series and parallel
- Investigate the characteristics of a thermistor, a light-dependent resistor and a diode
- Describe the features of the mains electricity supply
- Describe the structure of the National Grid
- Investigate the energy transferred by and power ratings of a range of domestic appliances
- Understand how to calculate power
- Distinguish between current and potential difference
- Recognise how algebraic equations define the relationships between variables

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End of unit Assessment
Paper 2 Mock</td></tr>
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B7 Organic Chemistry

- Understand that crude oil is a source of alkanes and be able to describe the structure of the first four alkanes.
- Describe how and why crude oil can be separated into fractions by fractional distillation.
- Identify the properties of different hydrocarbons and know how they influence their use.
- Describe and write balanced chemical equations for the complete combustion of hydrocarbons.
- Know that cracking produces more useful hydrocarbons, and be able to write word and balanced chemical equations for the process.
- Understand the nature and effects of weak intermolecular forces.
- Understand how 3D models are used to represent molecules.

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Alkanes
Alkenes
Hydrocarbon
Combustion</td></tr>
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Paper 2 Mock</td></tr>
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P7 Magnets and Electromagnets

- Explain what is meant by the poles of a magnet. Plot the magnetic field around a bar magnet. Describe magnetic materials and induced magnetism.
- Describe the Earth's magnetic field. Describe the magnetic field of a current. Explain the link between current and magnetic field.
- Draw the magnetic field around a conducting wire and a solenoid. Describe the force on a wire in a magnetic field. Apply the left-hand rule to work out the direction of a magnetic field, a current or a force around a wire.
- Explain the meaning of magnetic flux density, B. Know the factors that make a more powerful motor. Calculate the force on a current-carrying conductor in a magnetic field.

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Current
Solenoid
Magnetic flux density</td></tr>
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• List equipment that uses motors. Describe how motors work. Describe how to change the speed and direction of rotation of a motor. • Explore how electricity and magnetism are connected. Describe how electromagnetic induction occurs. Describe the principle of the electric motor. • Know how to rearrange equations. Know how to calculate the force on a conductor. Know how to use the transformer equation.		
C5 Energy Changes • Identify exothermic and endothermic reactions and investigate the variables that affect temperature changes in reacting solutions. • Investigate the variables that affect temperature changes in reacting solutions such as acid plus metals, acid plus carbonates, neutralisations, displacement of metals. • Use reaction profiles to identify reactions as exothermic or endothermic and describe the activation energy of a reaction. • Use bond energies to describe the energy changes in bond breaking and bond making and explain how a reaction is endothermic or exothermic overall. • Measure temperature changes accurately and use them to compare the energy released by different fuels.		Exothermic Endothermic Neutralisation Displacement Activation energy
		How is this unit being assessed? End of unit assessment
		Knowledge Organiser
B5 Coordination and Control • Explain the importance of homeostasis in regulating internal conditions in the body. Recall that these control systems involve nervous or chemical responses. Describe how control systems involve receptors, coordination centres and effectors. • Explain how the nervous system is adapted to its functions. Describe the structure of the central nervous system and nerves. • Explain the importance of reflex actions. Describe the path of a reflex arc. Explain how the structures in the reflex arc relate to their function. • Required practical: Investigating reaction time Select appropriate apparatus and techniques for the measurement of biological processes. Carry out physiological experiments safely. Use appropriate techniques in problem-solving contexts. • Recall that the endocrine system is made up of glands that secrete hormones into the blood. Know the location of the major endocrine glands. Understand why the pituitary gland is the 'master gland'. • Recall that blood glucose is monitored and controlled by the pancreas. Understand how insulin controls blood		Homeostasis Receptor Effector Neurone Reflex arc Endocrine Hormone Insulin Glucagon Glycogen Pituitary gland Oestrogen Progesterone Thyroxine Diabetes
		How is this unit being assessed? End of unit assessment Y11 Paper 2 Mock
		Knowledge Organiser

glucose levels. Understand how insulin works with another hormone – glucagon – to control blood sugar levels. • Understand the causes of Type 1 and Type 2 diabetes. Compare Type 1 and Type 2 diabetes. Evaluate information on the relationship between obesity and diabetes, and make appropriate recommendations. • Understand the causes of Type 1 and Type 2 diabetes. Compare Type 1 and Type 2 diabetes. Evaluate information on the relationship between obesity and diabetes, and make appropriate recommendations. • (Higher Tier Only) Explain the role of thyroxine in the body. Understand the principles of negative feedback, as applied to thyroxine. • Describe the roles of hormones in sexual reproduction. Explain how hormones interact in the menstrual cycle. • (Higher Tier Only) Explain the use of hormones in technologies to treat infertility. Describe the technique of in-vitro fertilisation. Explain the scientific, emotional, social and ethical issues of in-vitro fertilisation. • (Higher Tier Only) Describe the technique of in-vitro fertilisation. Evaluate the scientific, emotional, social and ethical issues of in-vitro fertilisation. • (Higher Tier Only) Describe the effects of adrenaline. Understand that automatic control systems may involve nervous responses and chemical responses. Understand that combinations of hormones work to produce a response. • Understand that fertility can be controlled by different hormonal and non-hormonal methods of contraception. Evaluate the different methods of contraception. • Understand that fertility can be controlled by different hormonal and non-hormonal methods of contraception. Evaluate the different methods of contraception. • Maths skills: The spread of scientific data Be able to calculate means and ranges of data Understand how to estimate uncertainty from a set of measurements.		
P6 Waves • To describe the features of a wave such as frequency, wavelength, amplitude and time period • To distinguish between transverse and longitudinal waves and to give examples of each type of wave • To understand how waves can be used to carry information • To explain how the speeds of waves in air and water can be measured		Frequency Wavelength Amplitude Transverse Longitudinal Reflection Refraction Ultraviolet Infrared

• To develop techniques for making observations of waves • To describe reflection and refraction of light • To describe the main groupings and wavelength ranges of the electromagnetic spectrum • To explain reflection and refraction and how these may vary with wavelength • To compare gamma rays and X-rays • To describe the properties and uses of ultraviolet and infrared radiation • To plan and carry out a valid experiment • To list the properties and uses of microwaves • To describe how radio waves and microwaves are used in communications • To substitute numerical values into equations and to rearrange these equations		How is this unit being assessed? End of unit assessment Y11 Paper 2 Mock
		Knowledge Organiser
C8 Chemical Analysis • Use melting point and boiling point data to distinguish pure substances from impure substances. • Define a formulation and identify some common formulations and their properties. • Use chromatographic methods to distinguish pure substances from impure substances, and calculate Rf values. • Investigate how paper chromatography can be used in forensic science to identify an ink mixture used in a forgery. • Recall the tests for four common gases and use them to identify unknown samples. • Record Rf values to an appropriate number of significant figures.		Pure Impure Chromatography Formulation
		How is this unit being assessed? End of unit assessment Y11 Paper 2 Mock
		Knowledge Organiser
C6 Rate and extent of chemical change • Explain how to measure the rate of a reaction and interpret graphs showing the stages of a reaction. • Key concept: Limiting reactants and molar masses , Explain how limiting quantities of a reactant affect the amount of products produced. • Draw and interpret graphs showing product formed, or reactant used up, against time; calculate average reaction rates and use the gradients of tangents to measure of the reaction rates at specific times. • Identify factors which affect the rates of reactions and predict their affects. • Required Practical: Investigate how changes in concentration affect the rate of reactions by a method		Reactant Concentration Surface area Catalyst Equilibrium Collisions theory
		How is this unit being assessed? End of unit assessment GCSE Exam
		Knowledge Organiser

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<td>involving the production of a gas and a method involving a colour change
• Investigate how changes in concentration affect the rate of reactions by a method involving the production of a gas and a method involving a colour change
• Predict the effects of changing conditions on reaction rates and recognise proportional relationships.
• Use collision theory to explain activation energy and rate changes.
• Explain how catalysts work.
• Explain what a reversible reaction is and describe the energy changes involved.
• Describe how a dynamic equilibrium is reached and predict the effects of adding reactant or product.
• Apply Le Chatelier's principle to predict how changing reactant or product concentrations shifts the position of equilibrium.
• Predict the effect of temperature changes on the position of equilibrium for exothermic and endothermic reactions.
• Use Le Chatelier's principle to make predictions about changing pressures.
• Maths skills: Use the slope of a tangent as a measure of rate of change , Plot variables from experimental data; draw a tangent to a curve and use its gradient as a measure of the reaction rate.</td>
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<td>B8 Ecology

• Describe what an ecosystem is, explain the importance of high biodiversity, and what is meant by a self-supporting ecosystem.
• Explain changes in the distribution of species in an ecosystem, identify factors that affect ecosystems, and describe stable and unstable populations.
• Describe how changes in one population affect another, explain interdependent relationships and how predator–prey population cycles have cyclical changes.
• Describe how competition impacts on populations, explain why animals in the same habitat are in competition and explain interspecific and intraspecific competition.
• Required Practical: Measure the population size of a common species in a habitat Use scientific ideas to develop a hypothesis, plan experiments to test a hypothesis, explain the apparatus and techniques used to sample a population, explain how a representative sample was taken, and develop a reasoned explanation for some data.</td>
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<td>Ecosystem
Biodiversity
Distribution
Population
Habitat
Interdependent
Competition
Intraspecific
Interspecific
Quadrat
Adaptation
Deforestation
Conservation</td>
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• Recall why animals have adaptations, and use surface area to volume ratio to explain some adaptations. • Identify adaptations of plants and bacteria, explain the importance of adaptations, and explain a range of plant adaptations. • Recall that many materials are recycled in nature, explain the stages in the water and carbon cycles, and the importance of recycling materials. • Recall that plants take in carbon as carbon dioxide, explain how carbon is recycled, and interpret a diagram of the carbon cycle. • Identify why land use has changed, describe the effects of changing land use and evaluate a change in land use. • Identify the reasons for deforestation, describe the impact of peat bog destruction and deforestation, and evaluate the destruction of peat bogs and forests. • Recall what global warming is, describe the causes of global warming, and explain how global warming impacts on biodiversity. • Describe how waste production is linked to human population growth, the impact of waste on ecosystems, and how waste impacts on biodiversity. • Identify pollution levels using indicator species, explain how indicator species measure pollution, and compare different methods of measuring pollution. • Describe some conservation measures and the impact of breeding programmes, and explain how habitats are regenerated. • Maths skills: Using graphs to show relationships Recognise direct proportionality in a graph, calculate reaction rates in linear graphs, and use the gradient of a graph to calculate the rate.		