Ormiston Meridian Academy

[OAT] Ormiston Academies Trust AN OAT ACADEMY

Sandon Road, Meir, Stoke-on-Trent, ST3 7DF **Telephone:** 01782 377100 **Fax:** 01782 377101
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Principal: Mrs C Stanyer

Subject Science (Trilogy) **Year 10**

Curriculum Map

2022 -2023

Week Commencing	Topic (including links to additional resources)	Assessment Window
STAFF INSET 05/09 Y7 DAY 06/09 ALL STUDENT IN 07/09	**Cells and Organs 4 (B1)** ✓ recall the structure of eukaryotic cells ✓ compare eukaryotivc and prokaryotic cells. ✓ Compare the sizes of different cells and subcellular structures.	
12/09/2022	✓ Recall the main sub cellular structures in animal cells ✓ Recall the additional sub cellular structures in plant cells ✓ Describe how cells become specialised and give examples of specialised cells. ✓ Describe how cells differentiate, and uses of undifferentiated cells. ✓ Describe how microscopy techniques have developed over time. ✓ Explain how electron microscopy has increased our understanding of sub cellular structures. ✓ Calculate magnification, using data about real size and image size. ✓ Describe how cell division occurs by mitosis ✓ Describe how stem cells from embryos can be cloned. ✓ Describe how meristem cells in plants can differentiate into any type of plant cell. ✓ Compare the positive and negative aspects of therapeutic cloning.	
19/09/2022	✓ Describe how particles are transported by diffusion. ✓ Explain how different factors affect the rate of diffusion. ✓ Calculate surface area to volume ratio ✓ Describe how water can move via osmosis. ✓ Describe the process of active transport ✓ Compare the processes of osmosis, active transport and diffusion.	
26/09/2022	**Health and Reproduction 3 (B2)** ✓ Explain the terms cell, tissue, organ, organ system and organism, and be able to give examples of each. ✓ Have an understanding of the size and scale of cells, tissues, organs, organ systems and organisms. Describe the main systems in the human body and their functions ✓ Describe the functions of the digestive system to digest and absorb foods.	

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	✓ Identify the positions of the main organs on a diagram of the digestive system. ✓ Know that food molecules must be small and soluble in order to be absorbed into the blood. ✓ Describe the functions of the organs in the system	
03/10/2022	✓ Explain how the small intestine is adapted for its function ✓ Define the terms 'catalyst' and 'enzyme'. ✓ Describe the properties of enzymes. ✓ Explain why enzymes are specific and are denatured by high temperatures and extremes of pH. ✓ Use the lock and key theory and collision theory to explain enzyme action ✓ Carry out a safe, controlled investigation to measure the rate of the catalase under different conditions. ✓ Draw a diagram of the apparatus and write a method. Identify variables. Present and analyse the results: calculate rates of reaction using raw data and graphs. ✓ Draw conclusions and give explanations for the results ✓ Explain why foods need to be digested into small, soluble molecules.	
10/10/2022	✓ Describe the three types of enzymes involved in digestion, including the names of the substrates, products and where the enzymes are produced. ✓ Explain how bile helps in the digestion of fats. ✓ Interpret graphs to determine the optimum temperature or pH for an enzyme ✓ Calculate the rate of enzyme controlled reactions. ✓ Interpret the results from enzyme controlled reactions ✓ Describe the functions of the heart and circulatory system ✓ Describe and label a diagram of the heart showing four chambers, vena cava, pulmonary artery, pulmonary vein and aorta. ✓ Describe the flow of blood from the body, through the heart and lungs and back to the body. ✓ Explain how the heart is adapted for its function. ✓ Describe the heart as a double pump and explain why this is efficient. ✓ Describe the function of the pacemaker cells and coronary arteries. ✓ Label the main structures in the gas exchange system – trachea, bronchi, alveoli and capillary network around alveoli. ✓ Explain how the alveoli are adapted for efficient gas exchange ✓ Explain how the blood vessels are adapted for their function.	

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17/10/2022		AR1
October Half Term		
31/10/2022		AR1
7/11/2022	✓ Describe problems associated with the heart and explain how they can be treated. ✓ Evaluate the use of drugs, mechanical devices and transplants to treat heart problems, including religious and ethical issues. ✓ Describe the four main components of blood. ✓ Explain how each component is adapted for its function. ✓ Identify pictures of the different blood cells. ✓ Explain how diet, stress and life situations can affect physical and mental health. ✓ Give examples of communicable and non-communicable diseases. ✓ Describe examples of how diseases may interact. ✓ Describe the effects of diet, smoking, alcohol and exercise on health. ✓ Explain how and why the Government encourages people to lead a healthy lifestyle. ✓ Give risk factors associated with cardiovascular disease, Type 2 diabetes, lung diseases and cancers ✓ Describe some causes of cancer, eg viruses, smoking, alcohol, carcinogens and ionising radiation. ✓ Describe the difference between benign and malignant tumours. ✓ Explain how cancer may spread from one site in the body to form a secondary tumour in another part of the body. ✓ Label the main organs of a plant and describe their functions. ✓ Identify the tissues in a leaf and describe their functions. Relate the structure of each tissue to its function in photosynthesis. ✓ Explain why there are more stomata on the lower surface of a leaf. ✓ Describe the role of stomata and guard cells to control water loss and gas exchange.	
14/11/2022	✓ Describe the organs that make up the plant transport system. ✓ Describe the role of xylem, phloem and root hair cells and explain how they are adapted for their functions.	

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	✓ Define the terms 'transpiration' and 'translocation'. ✓ Define the term 'active transport'. ✓ Describe where active transport occurs in humans and plants and what is transported. ✓ Explain why active transport requires energy. ✓ Explain how active transport enables cells to absorb ions from very dilute solutions. ✓ Explain the relationship between active transport and oxygen supply and numbers of mitochondria in cells. **Matter 5 (C2)** ✓ What is meant by bonding, and why do bonds form? ✓ What is ionic bonding? ✓ What is a giant ionic substance, and what are their properties? ✓ What is covalent bonding? ✓ What is a simple covalent substance, and what properties do they (generally) have? ✓ What is a giant covalent substance, and what properties do they have?	
21/11/2022	✓ What is metallic bonding? ✓ How does the structure of a metal link to the properties of a metal? ✓ Investigation (optional) into different metals. ✓ What are the properties of metals? ✓ What are common uses of metals and how do their properties link to these uses? ✓ How do you determine the type of bonding in a substance? ✓ Investigation into different substances. ✓ What are nanoparticles/ what is nanoscience? ✓ How do nanoparticles differ in size to atoms? ✓ What are some potential uses of nanoscience? ✓ What are nanoparticles/ what is nanoscience? ✓ How do nanoparticles differ in size to atoms? ✓ What are some potential uses of nanoscience? ✓ What is the structure of diamond? ✓ What is the structure of graphite? ✓ What is the structure of a fullerene?	
28/11/2022	**WAVES 2 (AQA P6)** ✓ Identify the direction of energy of the wave and the direction of oscillations ✓ Describe examples of the different wave types ✓ Explain rarefaction and compressions ✓ Define wavelength, amplitude, frequency, peak trough and period ✓ Calculate wavelength, frequency and speed of a wave when given two values to find the unknown ✓ Required practical - Finding the speed of sound	

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	✓ State the names of the 7 types of EM wave (Longest to shortest wavelength) ✓ Describe the properties of the waves in the EM spectrum (compare and contrast the properties) ✓ Recall refraction of a wave at the boundary between 2 different media ✓ Draw ray diagrams accurately using the normal line ✓ Explain refraction of different waves due to velocity ✓ Investigate how the colour/type of a surface affects how quickly it cools ✓ Describe how EM waves are generated ✓ Explain the dangers of some EM waves ✓ Recall the order of the EM spectrum ✓ Describe the use of each wave in the EM spectrum ✓ Explain the suitability of each waves for its use	
5/12/2022	**Health and reproduction 4 (AQA B3)** ✓ Define the term pathogen and state the four main groups of pathogen. ✓ Explain how pathogens can be spread to plants or animals and cause infection. ✓ Describe the main differences between bacteria and viruses. ✓ Explain how the spread of disease can be reduced or prevented. ✓ Describe the symptoms, mode of transmission, prevention and treatment for measles, HIV and AIDS, salmonella and gonorrhoea. ✓ Describe colds and flu as viral diseases. ✓ Describe athlete's foot as a fungal disease. ✓ Describe the life cycle of the malarial protist. ✓ Describe the symptoms, mode of transmission, prevention and treatment for malaria ✓ Describe the body's first line defences ✓ Explain how microbes make us feel ill and how viruses damage cells. ✓ Explain how the immune system defends against disease ✓ Describe what white blood cells do. ✓ Explain why antibodies are specific for one pathogen/ antigen. ✓ Describe what a vaccine contains. ✓ Explain how vaccines prevent disease. ✓ Explain the idea of 'herd immunity'. ✓ Explain how antibiotics treat only bacterial diseases and how this has saved lives. ✓ Describe the problems associated with antibiotic resistance ✓ Explain the difficulty in developing drugs that kill viruses without damaging body tissues.	

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12/12/2022	✓ Explain how the immune system defends against disease ✓ Describe what white blood cells do. ✓ Explain why antibodies are specific for one pathogen/ antigen. ✓ Describe what a vaccine contains. ✓ Explain how vaccines prevent disease. ✓ Explain the idea of 'herd immunity'. ✓ Explain how antibiotics treat only bacterial diseases and how this has saved lives. ✓ Describe the problems associated with antibiotic resistance ✓ Explain the difficulty in developing drugs that kill viruses without damaging body tissues.	
Christmas Break		
02/01/2023	✓ Explain how the immune system defends against disease ✓ Describe what white blood cells do. ✓ Explain why antibodies are specific for one pathogen/ antigen ✓ Describe what a vaccine contains. ✓ Explain how vaccines prevent disease. ✓ Explain the idea of 'herd immunity'. ✓ Explain how antibiotics treat only bacterial diseases and how this has saved lives. ✓ Describe the problems associated with antibiotic resistance ✓ Explain the difficulty in developing drugs that kill viruses without damaging body tissues.	
9/01/2023	**Photosynthesis and Respiration 3 (B4)** ✓ describe photosynthesis as an endothermic reaction in which energy is transferred from the environment to the chloroplasts by light. ✓ describe photosynthesis as an endothermic ✓ reaction in which energy is transferred from the environment to the chloroplasts by light. ✓ describe cellular respiration as an ✓ exothermic reaction which is continuously occurring in living cells. ✓ compare the processes of aerobic and ✓ anaerobic respiration with regard to the need for oxygen, the differing ✓ products and the relative amounts of energy transferred. ✓ Describe how exercise causes the human body to react due to the increased demand for energy. ✓ explain the importance of sugars, amino ✓ acids, fatty acids and glycerol in the synthesis and breakdown of carbohydrates, proteins and lipids.	

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16/01/2023	**Photosynthesis and Respiration 3 (B4)** ✓ describe photosynthesis as an endothermic reaction in which energy is transferred from the environment to the chloroplasts by light. ✓ describe photosynthesis as an endothermic ✓ reaction in which energy is transferred from the environment to the chloroplasts by light. ✓ describe cellular respiration as an ✓ exothermic reaction which is continuously occurring in living cells. ✓ compare the processes of aerobic and ✓ anaerobic respiration with regard to the need for oxygen, the differing ✓ products and the relative amounts of energy transferred. ✓ Describe how exercise causes the human body to react due to the increased demand for energy. ✓ explain the importance of sugars, amino ✓ acids, fatty acids and glycerol in the synthesis and breakdown of ✓ carbohydrates, proteins and lipids.	
23/01/2023	Buffer	
30/01/2023		AR2
6/02/2023		AR2
13/02/2023	Buffer	
February Half Term		
27/02/2023	✓ explain that homeostasis is the regulation of the internal conditions of a cell or organism to maintain optimum conditions for function in response to internal and external changes. ✓ explain how the structure of the nervous system is adapted to its functions. ✓ extract and interpret data from graphs, charts and tables, about the functioning of the nervous system. ✓ translate information about reaction times ✓ between numerical and graphical forms. **Forces and Space 4 (P5)**	

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	✓ recall that scalar quantities have magnitude only, whereas vector quantities have magnitude and direction. ✓ describe the interaction between pairs ✓ of objects which produce a force on each object. The forces to be represented as vectors. ✓ Students should be able to recall and apply this equation: ✓ weight = mass × gravitational field strength ✓ W = m g ✓ d recognise and be able to use the symbol for proportionality, ∝ ✓ calculate the resultant of two forces that act in a straight line. ✓ use free body diagrams to describe qualitatively examples where several forces lead to a resultant force on an object, including balanced forces when the resultant force is zero. ✓ recall and apply this equation: ✓ work done = force × distance ✓ W = F s ✓ describe the energy transfer involved when work is done. ✓ convert between newton-metres and joules.	
6/03/2023	✓ give examples of the forces involved in stretching, bending or compressing an object ✓ explain why, to change the shape of an object (by stretching, bending or compressing), more than one force has to be applied – this is limited to stationary objects only ✓ describe the difference between elastic deformation and inelastic deformation caused by stretching forces.	
13/03/2023	✓ Students should be able to recall and apply this equation: ✓ force = spring constant × extension ✓ F = k e ✓ describe the difference between a linear and non-linear ✓ relationship between force and extension ✓ calculate a spring constant in linear cases ✓ interpret data from an investigation of the relationship between force and extension calculate work done in stretching (or compressing) a spring ✓ (up to the limit of proportionality) using the equation: ✓ elastic potential energy = 0.5 × spring constant × extension 2 ✓ calculate relevant values of stored energy and energy transfers. ✓ express a displacement in terms of both the magnitude and direction. ✓ recall typical values of speed for a person walking, running and cycling as well as the typical values of speed for different types of transportation systems. ✓ make measurements of distance and time and then calculate speeds of objects using the equation: ✓ distance travelled = speed x time ✓ calculate average speed for non-uniform motion.	

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	✓ explain the vector–scalar distinction as it applies to displacement, distance, velocity and speed. ✓ draw distance–time graphs from measurements and extract and interpret lines and slopes of distance–time graphs, translating information between graphical and numerical form. ✓ estimate the magnitude of everyday accelerations. ✓ draw velocity–time graphs from measurements and interpret lines and slopes to determine acceleration	
20/03/2023	✓ apply Newton's First Law to explain the motion of objects moving with a uniform velocity and objects where the speed and/or direction changes. ✓ explain that: inertial mass is a measure of how difficult it is to change the velocity of an object ✓ inertial mass is defined as the ratio of force over acceleration. ✓ estimate the speed, accelerations and forces involved in large accelerations for everyday road transport. ✓ estimate the speed, accelerations and forces involved in large accelerations for everyday road transport. ✓ Apply Newton's Third Law to examples of equilibrium situations. ✓ explain methods used to measure human reaction times and recall typical results ✓ interpret and evaluate measurements from simple methods to measure the different reaction times of students ✓ evaluate the effect of various factors on thinking distance based on given data. ✓ explain the factors which affect the distance required for road transport vehicles to come to rest in emergencies, and the implications for safety ✓ estimate how the distance required for road vehicles to stop in an emergency varies over a range of typical speeds. ✓ explain the dangers caused by large decelerations ✓ use the concept of momentum as a model to describe and explain examples of momentum in an event, such as a collision.	
27/03/2023	**Matter 6 (C3)** ✓ understand the use of the multipliers in equations in normal script before a formula and in subscript within a formula. ✓ calculate the percentage by mass in a compound given the relative formula mass and the relative atomic masses. ✓ explain any observed changes in mass ✓ in non-enclosed systems during a chemical reaction given the balanced symbol equation for the reaction and explain these changes in terms of the particle model. ✓ represent the distribution of results and make estimations of uncertainty ✓ use the range of a set of measurements about the mean as a measure of uncertainty	

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	✓ calculate the mass of solute in a given volume of solution of known concentration in terms of mass per given volume of solution	
Easter		
17/04/2023	**Energy 4 (P1)** ✓ describe all the changes involved in the way energy is stored when a system changes, for common situations ✓ calculate the changes in energy involved when a system is changed by: • heating • work done by forces • work done when a current flows ✓ use calculations to show on a common scale how the overall energy in a system is redistributed when the system is changed. ✓ calculate the amount of energy associated with a moving object, a stretched spring and an object raised above ground level. ✓ give examples that illustrate the definition of power eg comparing two electric motors that both lift the same weight through the same height but one does it faster than the other. ✓ describe with examples where there are energy transfers in a closed system, that there is no net change to the total energy. ✓ describe, with examples, how in all system changes energy is dissipated, so that it is stored in less useful ways. This energy is often described as being 'wasted'. ✓ explain ways of reducing unwanted energy transfers, for example through lubrication and the use of thermal insulation.	
24/04/23	✓ consider the environmental issues that may arise from the use of different energy resources ✓ show that science has the ability to identify environmental issues arising from the use of energy resources but not always the power to deal with the issues because of political, social, ethical or economic considerations.	
1/05/2023	**Health and Reproduction 4 (B5)** ✓ explain how the structure of the nervous system is adapted to its functions ✓ explain how the various structures in a reflex arc – including the sensory neurone, synapse relay neurone and motor neurone – relate to their function. ✓ extract and interpret data from graphs,charts and tables, about the functioning of the nervous system ✓ describe the principles of hormonal coordination and control by the human endocrine system	

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	✓ identify the position of the following on a diagram of the human body: • pituitary gland • pancreas • thyroid • adrenal gland • ovary • testes. ✓ explain how insulin controls blood glucose (sugar) levels in the body. ✓ compare Type 1 and Type 2 diabetes and explain how they can be treated. describe the roles of hormones in human reproduction, including the menstrual cycle. ✓ evaluate the different hormonal and non-hormonal methods of contraception.	
8/05/2023	**Reactions 4 (C4)** ✓ explain reduction and oxidation in terms of loss or gain of oxygen. ✓ recall and describe the reactions, if any, of potassium, sodium, lithium, calcium, magnesium, zinc, iron and copper with water or dilute acids and where appropriate, to place these metals in order of reactivity ✓ explain how the reactivity of metals with water or dilute acids is related to the tendency of the metal to form its positive ion ✓ deduce an order of reactivity of metals based on experimental results ✓ interpret or evaluate specific metal extraction processes when given appropriate information ✓ identify the substances which are oxidised or reduced in terms of gain or loss of oxygen. ✓ predict products from given reactants ✓ use the formulae of common ions to deduce the formulae of salts. ✓ describe how to make pure, dry samples of named soluble salts from information provided. ✓ describe the use of universal indicator or a wide range ✓ indicator to measure the approximate pH of a solution ✓ use the pH scale to identify acidic or alkaline solutions. ✓ predict the products of the electrolysis of binary ionic compounds in the molten state. ✓ explain why a mixture is used as the electrolyte ✓ explain why the positive electrode must be continually ✓ replaced. ✓ predict the products of the electrolysis of aqueous solutions containing a single ionic compound.	
15/05/23	**Matter 7 (P3a)** ✓ recognise/draw simple diagrams to model the difference between solids, liquids and gases.	

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	✓ explain the differences in density between the different states of matter in terms of the arrangement of atoms or molecules. energy for a change of state = mass × specific latent heat ✓ apply this equation, which is given on the Physics equation sheet, to calculate the energy change involved in a change of state. ✓ explain how the motion of the molecules in a gas is related to both its temperature and its pressure ✓ explain qualitatively the relation between the temperature of a gas and its pressure at constant volume.	
22/05/23	**Reactions 5 (C5)** ✓ distinguish between exothermic and endothermic reactions on the basis of the temperature change of the surroundings ✓ evaluate uses and applications of exothermic and endothermic reactions given appropriate information. ✓ draw simple reaction profiles (energy level diagrams) for exothermic and endothermic reactions showing the relative energies of reactants and products, the activation energy and the overall energy change, with a curved line to show the energy as the reaction proceeds ✓ use reaction profiles to identify reactions as exothermic or endothermic ✓ explain that the activation energy is the energy needed for a reaction to occur.	
May Half Term		
05/06/2023	✓ **Electricity 3 (P2)** ✓ draw and interpret circuit diagrams ✓ recall and apply this equation: charge f low = current × time ✓ recall and apply this equation: potential difference = current × resistance ✓ explain the design and use of a circuit to measure the resistance of a component by measuring the current through, and potential difference across, the component ✓ draw an appropriate circuit diagram using correct circuit symbols. ✓ use graphs to explore whether circuit elements are linear or non-linear and relate the curves produced to their function and properties. ✓ use circuit diagrams to construct and check series and parallel circuits that include a variety of common circuit components ✓ describe the difference between series and parallel circuits ✓ explain qualitatively why adding resistors in series increases the total resistance whilst adding	

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	✓ explain how the power transfer in any circuit device is related to the potential difference across it and the current through it, and to the energy changes over time: power = potential difference × current ✓ describe how different domestic appliances transfer energy from batteries or ac mains to the kinetic energy of electric motors or the energy of heating devices ✓ explain why the National Grid system is an efficient way to transfer energy	
12/06/2023	**Reactions 6 (C6)** ✓ calculate the mean rate of a reaction from given information ✓ about the quantity of a reactant used or the quantity of a ✓ product formed and the time taken ✓ draw, and interpret, graphs showing the quantity of product ✓ formed or quantity of reactant used up against time ✓ draw tangents to the curves on these graphs and use the ✓ slope of the tangent as a measure of the rate of reaction	
19/06/2023	✓ recall how changing factors affects the rate of chemical reactions ✓ predict and explain using collision theory the effects of changing conditions of concentration, pressure and temperature on the rate of a reaction ✓ predict and explain the effects of changes in the size of pieces of a reacting solid in terms of surface area to volume ratio ✓ use simple ideas about proportionality when using collision theory to explain the effect of a factor on the rate of a reaction. ✓ identify catalysts in reactions from their effect on the rate of reaction and because they are not included in the chemical equation for the reaction.	
26/06/2023		AR3
3/07/2023		AR3
10/07/2023	✓ **The Earth 3 (C7)** ✓ to recognise substances as alkanes given their formulae in these forms. ✓ explain how fractional distillation works in terms of evaporation and condensation ✓ write balanced equations for the complete combustion of hydrocarbons with a given formula. ✓ describe in general terms the conditions used for catalytic cracking and steam cracking.	

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	✓ describe in general terms the conditions used for catalytic cracking and steam cracking. ✓ balance chemical equations as examples of cracking given the formulae of the reactants and products. ✓ give examples to illustrate the usefulness of cracking.	
17/07/2023	Buffer	
24/07/2023	Buffer	

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