

Holy Family Catholic School – Faculty of Science and Physiology
Science Autumn Half-Term 2 Year 11

Learning Intention	Vocab	Concept	Retrieval	Success Criteria	Hinge Questions for this lesson	Red Zone
Week 9 Lesson 1 How do we stay safe with electricity?	Insulation, Fuse, Earth Wire, Hazard	Electricity and Electromagnetism	Water and metal conduct electricity and can cause electric shocks. Safety devices like fuses and circuit breakers prevent damage and injury.	1. Explain the difference in function between the live and the neutral mains input wires. 2. Explain the function of an earth wire and of fuses or circuit breakers in ensuring safety. 3. Explain why switches and fuses should be connected in the live wire of a domestic circuit. 4. Recall the potential differences between the live, neutral and earth mains wires. 5. Explain the dangers of providing any connection between the live wire and earth	Which safety feature in a plug prevents overheating and fires? A. Earth wire B. Fuse C. Neutral wire D. Plastic casing	Compare and contrast circuit breakers and fuses as safety devices. (4 marks)
Week 9 Lesson 2 What are magnets and what do their forces look like?	Poles, Field lines, Attraction, Repulsion	Electricity and Electromagnetism	Understanding that some materials (like iron) are magnetic, Knowing that	1. Recall when magnets attract and repel. 2. Explain the difference between permanent and induced magnets 3. Describe the uses of	Which statement is true about magnetic fields? 1. Magnetic fields are strongest at the centre	Describe how a student could show that the paper clips are induced magnets. A student wants to determine the shape of the magnetic field for a

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			forces can act at a distance (e.g., gravity, electrostatic)	permanent and temporary magnets. 4. Describe the shape and direction and strength of the magnetic field around bar magnets and for a uniform field. 5. Use plotting compasses to show the shape and direction of the field of a magnet and the Earth's magnetic field 6. Explain how the behaviour of a magnetic compass is related to evidence that the core of the Earth must be magnetic	2. Magnetic field lines go from south to north 3. Magnetic fields are invisible but can be shown using iron filings 4. Only plastic objects can be magnetised	large area around a magnet. Describe how the student should carry out an investigation using just one plotting compass.									
Week 9 Lesson 3 What are electromagnets and how do we change their strength?	Current, Coil, Iron core, Turns	Electricity and Electromagnetism	Basic idea of electric current and circuits, Familiarity with the concept of coils and how they carry current	1. Describe how current can be used to make an electromagnet. 2. Describe the effect of altering the size and direction of the current. 3. Recall the effect of the size of the current and the distance from the conductor. 4. Explain how the fields interact in a solenoid and	How can you increase the strength of an electromagnet? 1. Use a plastic core 2. Decrease the current 3. Add more coils of wire 4. Use thinner wire	 Red Zone Task: <table><tr><th>Task 1</th><th>Task 2</th><th>Task 3</th></tr><tr><td>Describe what you can conclude from your results.</td><td>Evaluate how effective your method of measuring the strength of the electromagnet was.</td><td>Evaluate how reliable your results were.</td></tr><tr><td colspan="3">Extending: Suggest how an electromagnet can be used as an ammeter, and explain how your idea works.</td></tr></table>	Task 1	Task 2	Task 3	Describe what you can conclude from your results.	Evaluate how effective your method of measuring the strength of the electromagnet was.	Evaluate how reliable your results were.	Extending: Suggest how an electromagnet can be used as an ammeter, and explain how your idea works.		
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				the effect of this on the field.		
Week 9 Lesson 4 How do magnetic forces work? (H)	Interaction, Field strength, Direction, Force	Electricity and Electromagnetism	Knowledge of vector quantities (direction and magnitude), Understanding of magnetic field diagrams and how field lines behave	1. Describe how currents and magnetic fields interact. 2. Explain how magnetic forces occur. 3. Use Flemming's left hand rule. 4. Use the equation: $\mathbf{F} = \mathbf{B} \times \mathbf{I} \times \mathbf{l}$	What causes magnetic attraction or repulsion? 1. Gravity between poles 2. Electric charge in the air 3. Interaction of magnetic fields 4. Friction between materials	The apparatus shown here is placed on a balance. The wire is held so that it cannot move. Explain how the reading on the balance changes when the current is switched on.
Week 10 Lesson 1 Why are transformers used in the national grid?	Efficiency, Voltage, Transmission, Power loss	Electricity and Electromagnetism	Awareness of energy loss in transmission over long distances, Understanding of alternating current (AC) and its role in power systems	1. Describe and explain how electrical energy is transferred in the national grid. 2. Explain where and why step-up and step-down transformers are used.	Why does the national grid use transformers? 1. To store electricity 2. To reduce energy loss during transmission 3. To increase pollution 4. To make electricity safer for power stations	The first public power station was built in the centre of New York. It used generators to supply direct current at 110 V. The cables had to go underground, and they could only supply nearby shops and offices. The electricity was mainly used for electric light. The development of alternating current generators led to major changes in the way electricity is transmitted and used. Compare the modern National Grid system with the early system in New York.

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Week 10 Lesson 2 How do transformers work?	Coils, Induction, Primary, Secondary	Electricity and Electromagnetism	Knowing how electromagnetic induction works, Understanding the structure of coils and how voltage changes with turns	Use the power equation (for transformers with 100% efficiency): $V_p \times I_p = V_s \times I_s$	What is the main principle behind how transformers work? 1. Chemical reactions 2. Magnetic induction between coils 3. Static electricity 4. Friction between wires	YOU DO! Red Zone: Calculate the missing values. <table><thead><tr><th></th><th>V_p (V)</th><th>I_p (A)</th><th>V_s (V)</th><th>I_s (A)</th></tr></thead><tbody><tr><td>a</td><td>12</td><td>3</td><td></td><td>0.75</td></tr><tr><td>b</td><td>12</td><td>4</td><td>6</td><td></td></tr><tr><td>c</td><td>120</td><td></td><td>60</td><td>4</td></tr><tr><td>d</td><td></td><td>5</td><td>20</td><td>30</td></tr><tr><td>e</td><td>50</td><td></td><td>200</td><td>0.75</td></tr><tr><td>f</td><td>60</td><td>8</td><td></td><td>32</td></tr><tr><td>g</td><td>80</td><td>20</td><td></td><td>5</td></tr><tr><td>h</td><td>4000</td><td>5</td><td>200</td><td></td></tr></tbody></table> Extending: A step-up transformer is used to increase the potential difference of an electrical supply. Explain why the current decreases at the same time.		V_p (V)	I_p (A)	V_s (V)	I_s (A)	a	12	3		0.75	b	12	4	6		c	120		60	4	d		5	20	30	e	50		200	0.75	f	60	8		32	g	80	20		5	h	4000	5	200	
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Week 10 Lesson 3 What is photosynthesis?	Chlorophyll, Glucose, Sunlight, Carbon dioxide	Biological Molecules and Processes	- Plants make their own food - Sunlight provides energy for life processes	1. Describe photosynthetic organisms as the main producers of food and therefore biomass. 2. Describe photosynthesis in plants and algae as an endothermic reaction that uses light energy to react carbon dioxide and water to produce glucose and oxygen 3. Describe the structure and function of the stomata.	Which word equation describes photosynthesis? 1. Oxygen + glucose → carbon dioxide + water 2. Carbon dioxide + water → glucose + oxygen 3. Glucose + oxygen → energy + water 4. Water + sunlight → carbon dioxide	6 MQ: Explain how the adaptations of the stomata help its function.																																													
Week 10 Lesson 4 What are the factors that affect photosynthesis?	Light, Temperature, Carbon dioxide, Rate	Biological Molecules and Processes	- Photosynthesis needs light, carbon dioxide, and water - Temperature influences	1. Explain the effect of temperature, light intensity and carbon dioxide concentration on the rate of photosynthesis. 2. Explain the interactions	Which factor becomes limiting when light intensity is high but temperature is low? 1. Water availability	6 MQ: A farmer wants to increase his crop yield in the greenhouse. How would you advise him to do this?																																													

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			biological reaction	of temperature, light intensity and carbon dioxide concentration in limiting the rate of photosynthesis. (HT) 3. Explain how the rate of photosynthesis is directly proportional to light intensity and inversely proportional to the distance from a light source, including the use of the inverse square law calculation. (HT)	2. Carbon dioxide concentration 3. Temperature 4. Chlorophyll content	
Week 10 Lesson RC1 Sets 4-7 Review selective breeding and evidence of human evolution	Selective breeding, fossil record, carbon dating, disease	Inheritance and Evolution	Process of selective breeding. Comparison of human fossil record.	- Recall stages of selective breeding - Explain the impact of selective breeding. - Describe and explain evidence for human evolution (focus on stone tools and early human fossils – <i>Ardipithecus</i> and	Which of the following best illustrates artificial selection? - Fossil evidence of bipedalism - Breeding crops for drought resistance - Natural selection in finches - Genetic drift in isolated populations	Practise exam questions provided in the lesson resources

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				<i>Australopithecus</i>		
Week 11 Lesson 1 TRIAL EXAMS						
Week 11 Lesson 2 TRIAL EXAMS						
Week 11 Lesson 3 TRIAL EXAMS						
Week 11 Lesson 4 TRIAL EXAMS						
Week 12 Lesson 1 TRIAL EXAMS						
Week 12 Lesson 2 TRIAL EXAMS						
Week 12 Lesson 3 TRIAL EXAMS						
Week 12 Lesson 4 TRIAL EXAMS						
Week 13 Lesson 1 Core practical: Investigating the effect of light intensity on the rate of photosynthesis.		Biological Molecules and Processes	- Photosynthesis produces oxygen - Practical experiments require control of variables	Core practical: Investigating the effect of light intensity on the rate of photosynthesis.	What is the dependent variable in the light intensity photosynthesis practical? 1. Distance from the lamp 2. Number of bubbles produced 3. Type of plant 4. Temperature of water	Evaluation

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Week 13 Lesson 2 How do plants absorb water and minerals?	Roots, Osmosis, Active transport, Soil	Biological Molecules and Processes Cells and Systems	- Roots take in substances from soil - Water moves through osmosis; minerals by active transport	1. Explain how substances are transported into and out of cells, including by diffusion, osmosis and active transport. 2. Explain how the structure of the root hair cells is adapted to absorb water and mineral ions	Which process allows minerals to enter root hair cells against a concentration gradient? 1. Diffusion 2. Osmosis 3. Active transport 4. Facilitated diffusion	6MQ: Explain how the adaptations of the root hair cell help it to absorb water efficiently.
Week 13 Lesson 3 How do water and minerals move around plants?	Xylem, Transpiration , Vessels, Flow	Biological Molecules and Processes Cells and Systems	- Plants have transport systems (xylem and phloem) - Water evaporates from leaves (transpiration)	1. Explain how the structures of the xylem and phloem are adapted to their function in the plant. 2. Describe how water and mineral ions are transported through the plant by transpiration, including the structure and function of the stomata. 3. Describe how sucrose is transported around the plant by translocation. 4. Explain the effect of environmental factors on the rate of water uptake by a plant, to include light intensity, air movement and temperature. 5. Demonstrate an understanding of rate	Which force contributes most to the upward movement of water in the xylem? 1. Root pressure 2. Capillary action 3. Transpiration pull 4. Gravity	6MQ: Compare transpiration and translocation.

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				calculations for transpiration		
Week 13 Lesson 4 What is an ecosystem?	Community, Habitat, Interaction, Environment	Ecosystems and Environmental Interactions	- Living things interact with their environment - Organisms have roles (e.g., producers, consumers)	1. State what is meant by the ecological terms community, population and habitat. 2. Give examples of an ecosystem, a community, a population and a habitat. 3. Describe the organisation of the components of an ecosystem (including populations, communities, habitats and abiotic factors). 4. Describe how the interdependence of organisms in an ecosystem allows their survival. 5. Explain how to estimate population size, including the use of quadrats.	Which of the following best defines an ecosystem? 1. A group of organisms in a habitat 2. A community of organisms interacting with each other and their abiotic environment 3. A food chain 4. A population of one species	Make interdependence predictions based on the following scenarios: 1. 1. What would happen if all the herons died out? 2. What would happen if there was a sudden increase in the Mayfly larva population? 3. What would happen if the population of frogs increased? 4. What would happen if the pondweed and microscopic plants all died out?
Week 14 Lesson 1 How do abiotic and biotic factors affect ecosystems?	Temperature, Light, Water, Soil	Ecosystems and Environmental Interactions	- Non-living factors like light and temperature influence life - Organisms adapt to their surroundings	1. Gives examples of abiotic and biotic factors. 2. Explain how communities are affected by abiotic factors (temperature, light, water, pollutants).	Which abiotic change would most likely reduce biodiversity in a freshwater pond? 1. Increase in predator numbers	You have to design an animal thinking about all the adaptations that it has for its particular habitat.

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				3. Describe how competition, predation and predator prey cycles can affect communities. 4. Explain how to investigate the effect of abiotic factors on the distribution of organisms using belt transects.	2. Decrease in pH due to acid rain 3. Introduction of a new plant species 4. Migration of birds	
Week 14 Lesson 2 Core Practical: Quadrats and Transects (2 lessons)	Sampling, Distribution, Quadrat, Transect	Ecosystems and Environmental Interactions Experimental and Investigative Skills Analysis and Evaluation	- Sampling helps study populations - Organisms are distributed in patterns	Core Practical: Quadrats and Transects (2 lessons)	Why is it important to use random sampling when placing quadrats? 1. To avoid damaging plants 2. To ensure a fair test 3. To reduce bias and get representative data 4. To make the experiment faster	Evaluation
Week 14 Lesson 3 Core Practical: Quadrats and Transects (2 lessons)	Sampling, Distribution, Quadrat, Transect	Ecosystems and Environmental Interactions Experimental and Investigative Skills	- Sampling helps study populations - Organisms are distributed in patterns	Core Practical: Quadrats and Transects (2 lessons)	A transect shows daisies decrease from 20 per m² near the path to 2 per m² at 10 m away. Which factor most likely explains this pattern? 1. Increased light intensity away from the path	Evaluation

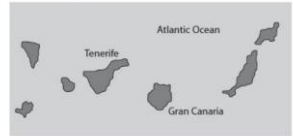
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		Analysis and Evaluation			2. Soil compaction near the path 3. Higher moisture near the path 4. Random distribution of seeds	
Week 14 Lesson 4 How are organisms dependant on each other?	Food chain, Mutualism, Predation, Parasitism	Ecosystems and Environmental Interactions	- Food chains show feeding relationships - Some species rely on others for survival	1. Define the term 'parasitism'. 2. Define the term 'mutualism'. 3. Describe how parasites are dependent on their hosts. 4. Describe how hosts are harmed by parasites. 5. Explain how mutualists benefit from their relationship. 6. Identify parasites and mutualists in examples.	Which of the following is an example of mutualism? 1. A lion hunting a zebra 2. A tapeworm in a human 3. Bees pollinating flowers while collecting nectar 4. A fox eating a rabbit	Mistletoe is a parasitic organism that grows on some trees. Figure 4 shows a tree with mistletoe growing on it. Describe the feeding relationship between the mistletoe and the tree. Explain what you would expect to happen to the tree over time.
Week 14 Lesson RC3 Sets 4-7 Review separation techniques, water treatment, calculate concentration	Chromatography, distillation, filtration, crystallisation	Particles and Matter	Types of mixtures, melting and boiling points, calculator skills	- Describe separation techniques and criteria for use - Describe and explain stages of water treatment in correct order	Which method would best separate a mixture of ethanol and water? 1. Filtration 2. Simple distillation 3. Chromatography 4. Evaporation	Practise exam questions provided in the lesson resources

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				Calculate concentrations in g dm^{-3}		
Week 15 Lesson 1 How do humans affect ecosystems?	Pollution, Deforestation, Climate change, Urbanisation	Ecosystems and Environmental Interactions	- Pollution and habitat destruction change environments - Human activity can reduce biodiversity	1. Define the term eutrophication. 2. Describe examples of the introduction of non-indigenous species. 3. Describe the advantages of fish farming. 4. Explain how fish farming can affect ecosystems and biodiversity. 5. Explain how the introduction of species can affect ecosystems and biodiversity	Which human activity most directly reduces biodiversity? - Organic farming - Reforestation - Deforestation - Ecotourism	Describe the process of eutrophication and explain the consequences.
Week 15 Lesson 2 How can biodiversity be preserved?	Conservation, Protection, Endangered, Sustainability	Ecosystems and Environmental Interactions	- Biodiversity means variety of life - Conservation protects species and habitats	1. List the different methods of conservation. 2. Describe the different conservation methods with examples. 3. Explain how conservation preserves biodiversity, including rainforest conservation. 4. Consider why conservation methods are not always successful.	Which strategy is most effective for preserving biodiversity long-term? - Building more roads - Captive breeding without reintroduction - Protecting habitats and enforcing conservation laws - Removing all predators	Complete exam questions on the worksheet CB9f.1

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Week 15 Lesson 3 How does water cycle through the environment?	Evaporation, Condensation, Precipitation, Collection	Ecosystems and Environmental Interactions	- Water changes state (evaporation, condensation) - Water moves through ecosystems	1. Describe the importance of recycling water. 2. Describe the water cycle and desalination. 3. Explain the movements of water through the water cycle including all process. 4. Consider the impacts of a drought on the water cycle.	Which statement best explains why evaporation from oceans is a major driver of the water cycle? 1. Oceans cover most of Earth's surface, providing a large source of water vapor 2. Ocean water evaporates faster than freshwater because of its salt content 3. Evaporation from oceans occurs only during storms 4. Oceans store energy that prevents condensation	Figure 2 shows the Canary Islands.  Figure 2 The Canary Islands do not have enough fresh water. Describe how seawater can be turned into drinking water.
Week 15 Lesson 4 How does carbon cycle through the environment?	Respiration, Photosynthesis, Combustion, Decomposition	Ecosystems and Environmental Interactions	- Carbon is part of living and non-living things - Processes like respiration and combustion release carbon	1. List different parts of the natural world which contain carbon atoms. 2. Describe the carbon cycle. 3. Explain the movements of carbon through the carbon cycle including all	Which scenario would cause a net increase of carbon in the atmosphere? 1. Photosynthesis exceeds respiration globally	6MQ: Carbon is present in a wide variety of compounds in the carbon cycle. Describe how carbon is cycled in the environment.

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				processes. 4. Evaluate the impact of deforestation on the carbon cycle.	2. Combustion of fossil fuels exceeds carbon absorption by oceans 3. Carbon stored in sediments remains locked away 4. Decomposition slows due to cold temperatures	