Holy Family Catholic School – Faculty of Science and Physiology

Science Autumn Half-Term 2 Year 8

Learning Intention	Vocab	Concept	Retrieval	Success Criteria	Hinge Questions for this lesson	Red Zone
Week 9 Lesson 1 What are waves and what are their properties?	amplitude, wavelength, energy, direction	Waves and Radiation	cause of sound, describing waves	1. Model transverse and longitudinal waves. 2. Compare longitudinal and transverse waves. 3. State the meaning of superposition and give examples.	Which of the following statements correctly compares transverse and longitudinal waves and explains superposition? 1. Transverse waves vibrate parallel to the direction of travel; longitudinal waves vibrate at right angles 2. Longitudinal waves vibrate parallel to the direction of travel; transverse waves vibrate at right angles 3. Superposition means waves stop when they meet 4. Transverse waves only occur in sound; longitudinal waves only occur in light	Compare transverse and longitudinal waves [6 marks]
Week 9 Lesson 2 How do we see objects?	ray, light, line, normal, angle of reflection	Waves and Radiation	light, shadows, sun, moon	1. State the meaning of: reflect, scatter, transmit, absorb. 2. Use the ray model of light	Which of the following statements correctly explains how we see non-	Draw a ray of light on each diagram to Predict where the light will go.

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				to explain how we see things that are not sources of light. 3. Describe some uses of plane mirrors. 4. Describe the difference between even reflection and scattering and recall the law of reflection.	luminous objects using the ray model of light? 1. Objects glow on their own, so we see them directly 2. Light is absorbed by objects and then re-emitted to our eyes 3. Light reflects off objects into our eyes, allowing us to see them 4. We see objects because they scatter light randomly in all directions	
Week 9 Lesson 3 How do mirrors work?	concave, convex, reflect, normal, angle of refleciton	Waves and Radiation	rays of light only travel in straight lines, waves can be absorbed, reflected and transmitted	1. State the meaning of: convex mirror, concave mirror. 2. Describe the characteristics of the image formed by a plane mirror. 3. Use ray diagrams to explain the formation of an image in a plane mirror. 4. Use ray diagrams to explain some of the features of images in periscopes.	Which of the following statements is correct about mirrors and image formation? 1. A convex mirror forms magnified images and is used in shaving mirrors 2. A concave mirror always forms smaller, upright images	Complete the periscope task where you have to draw the ray of light through the periscope and explain how it works.

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					3. A plane mirror forms virtual, upright images that appear behind the mirror 4. Periscopes use convex mirrors to bend light around corners	
Week 10 Lesson 1 PAZ Revision of Key Content						
Week 10 Lesson 2 PAZ Assessment						
Week 10 Lesson 3 PAZ Review						
Week 11 Lesson 1 Reflection Investigation: What is the law of reflection?	concave, convex, reflect, normal, angle of refleciton	Thinking Like a Scientist Experimental and Investigative Skills Analysis and Evaluation SI units and Calculating	Variables Fair test Evaluations Graphs Energy stores	1. To plan an investigation into the factors affecting the output from a solar panel. 2. Draw a results table 3. Record results.		Evaluate data and practical.

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Week 11 Lesson 2 Reflection Investigation: What is the law of reflection?	concave, convex, reflect, normal, angle of refleciton	Thinking Like a Scientist Experimental and Investigative Skills Analysis and Evaluation SI units and Calculating	Variables Fair test Evaluations Graphs Energy stores	Draw a graph. Evaluate data and practical.		Evaluate data and practical.
Week 11 Lesson 3 What is refraction?	reflect, refract, normal, speed	Waves and Radiation	rays of light only travel in straight lines, waves can be absorbed, reflected and transmitted	1. State the meaning of: refraction, angle of refraction, refracted ray, convex lens, converging lens. 2. Describe how light and sound move differently in different materials 3. Draw ray diagrams to describe the refraction of light as it passes into and out of different media. 4. State the meaning of: total internal reflection, critical angle. 5. Describe some uses of total internal reflection such as in optical fibres and in binoculars.	**Which of the following statements is correct about refraction and total internal reflection?** 1. Refraction only happens when light hits a mirror 2. A convex lens causes light rays to diverge 3. Total internal reflection occurs when light hits a boundary at an angle greater than the critical angle 4. Sound travels faster in air than in solids	Why do swimming pools need to state the depth? Why can't we just look in and see?

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Week 12 Lesson 1 Refraction Investigation: What is the law of refraction?	reflect, refract, normal, speed	Thinking Like a Scientist Experimental and Investigative Skills Analysis and Evaluation SI units and Calculating	Variables Fair test Evaluations Graphs Energy stores	1. To plan an investigation into the factors affecting the output from a solar panel. 2. Draw a results table 3. Record results.		Evaluate data and practical.
Week 12 Lesson 2 Refraction Investigation: What is the law of refraction?	reflect, refract, normal, speed	Thinking Like a Scientist Experimental and Investigative Skills Analysis and Evaluation SI units and Calculating	Variables Fair test Evaluations Graphs Energy stores	Draw a graph. Evaluate data and practical.		Evaluate data and practical.
Week 12 Lesson 3 How do lenses affect light rays?	Refraction, Converge, Diverge, Focus	Waves and Radiation	- Light travels in straight lines – Understanding this helps explain how lenses bend or redirect light.	1. Describe some uses of lenses. 2. Describe the effects of convex lenses on parallel beams of light. 3. Describe the effects of	**Which statement correctly describes how convex and concave lenses affect parallel beams of light?**	Design an experiment to investigate how convex and concave lenses affect parallel light rays. Predict the outcomes and explain how the shape of each lens influences the direction of light.

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			- Refraction – Knowing that light changes direction when it passes through different materials is essential for grasping how lenses work.	concave lenses on parallel beams of light. 4. Describe the causes and effects of long-sight and short-sight and how different types of lens are used to correct these defects. (5. Explain how different types of lens are used to correct long-sight and short-sight .)	1. Convex lenses spread out light rays; concave lenses bring them together 2. Convex lenses focus light rays to a point; concave lenses cause them to diverge 3. Both convex and concave lenses focus light rays to a single point 4. Convex lenses bend light away from the optical axis; concave lenses bend light toward it	
Week 13 Lesson 1 How are cameras and eyes similar?	Lens, Aperture, Retina/Sensor, Image Formation	Waves and Radiation	- Basic parts of the human eye – Familiarity with the cornea, lens, retina, and pupil helps in comparing them to camera components. - Light enters the eye to form images – Knowing that vision depends on light forming an image	1. State the primary colours for light. 2. Identify the parts of the eye (including rods and cones) and state their functions. 3. Identify the parts of a camera and state their functions. 4. Compare the parts of the eye and a camera.	**Which of the following correctly matches parts of the eye with parts of a camera?** 1. Retina is like the lens; pupil is like the shutter 2. Cornea is like the sensor; iris is like the battery 3. Lens in the eye focuses light like the lens in a camera	Compare the structure and function of a human eye and a digital camera. Create a labelled diagram and explain how each part contributes to image formation. Evaluate which system is more efficient in low-light conditions and justify your reasoning

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			on the retina sets the stage for understanding camera function.		4. Optic nerve is like the flash; retina is like the viewfinder	
Week 13 Lesson 2 How do we see colour?	Light, Retina, Cones, Perception	Waves and Radiation	- White light is made of many colours – This helps explain how different colours are perceived. - The eye has cone cells for colour detection – Knowing about cone cells and their sensitivity to red, green, and blue light is crucial.	1. Describe how to split light into different colours using a prism. 2. Correctly use the terms: spectrum, dispersion. 3. Recall the colours of the visible spectrum, in order. 4. Recall the structure of the eye and how it helps us see colour.	**Which of the following statements correctly explains how we see colours and how light is split?** 1. A prism absorbs light and releases colours from inside 2. Dispersion causes white light to split into a spectrum of colours 3. The eye sees colour because the lens filters out certain wavelengths 4. The visible spectrum includes only red, green, and blue	Explain how colour blindness affects the way people perceive colour. Use your understanding of cone cells and light wavelengths to describe the biological cause and suggest how technology can help people with colour vision deficiencies
Week 13 Lesson 3 How does colour light behave?	Reflection, Absorption, Refraction, Wavelength	Waves and Radiation	- Light can be reflected, absorbed, or transmitted – This explains how objects appear coloured. - Different colours have different	1. Describe how the colour of light affects the appearance of an object. 2. Describe how filters can be used to make coloured light. (3. Explain how paints of different colours can be	**Which statement best explains how coloured filters and light affect the appearance of objects?** 1. A red object looks red under any colour of light	Investigate how coloured filters affect the appearance of objects under different light sources. Predict what happens when you view a red object through a blue filter and explain your reasoning using the concepts of absorption and reflection

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			wavelengths – Understanding this helps explain phenomena like rainbows or colour mixing.	made by colour subtraction.)	2. A blue filter allows only blue light to pass through 3. Paints create colour by adding light to objects 4. Colour subtraction means removing all colours from white light	
Week 14 Lesson 1 What is combustion?	Fuel, Energy, Combustion, Joules	Energy and Rates	- Understanding that fuels are substances that burn to release energy - Basic idea of chemical reactions and energy transfer	1. State the meaning of fuel and combustion 2. Describe what is meant by exothermic changes 3. Describe the products of the combustion of hydrocarbons 4. Describe the tests for carbon dioxide and water 5. Evaluate data on burning fuels to deduce the best energy per gram of fuel	**Which of the following statements is correct about combustion and evaluating fuels?** 1. Combustion is an endothermic process that absorbs heat 2. Hydrocarbon combustion produces only oxygen and nitrogen 3. The best fuel releases the most energy per gram and produces fewer harmful products 4. Water is detected using limewater, which turns cloudy	A student investigates three different fuels by burning each to heat water. They record the mass of fuel burned and the temperature rise of the water. a) Define the terms fuel and combustion. b) Explain what is meant by an exothermic change and give one example. c) State the products of complete combustion of a hydrocarbon. d) Describe how you would test for the presence of: i) Carbon dioxide ii) Water e) Suggest how the student could decide which fuel releases the most energy per gram.

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Week 14 Lesson 2 Fuels investigation: How much energy can be released from fuels?	Fuel, Energy, Combustion, Joules	Energy and Rates Thinking Like a Scientist Experimental and Investigative Skills Analysis and Evaluation SI units and Calculating	Variables Fair test Evaluations Graphs Energy stores	1. To plan an investigation into the factors affecting the output from a solar panel. 2. Draw a results table 3. Record results.		Evaluate data and practical.
Week 14 Lesson 3 Fuels investigation: How much energy can be released from fuels?	Fuel, Energy, Combustion, Joules	Energy and Rates Thinking Like a Scientist Experimental and Investigative Skills Analysis and Evaluation	Variables Fair test Evaluations Graphs Energy stores	Draw a graph. Evaluate data and practical.		Evaluate data and practical.

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		SI units and Calculating				
Week 15 Lesson 1 What is oxidation?	Oxygen, Electrons, Reaction, Loss	Chemical Reactions	- Familiarity with atoms and how they form compounds - Awareness that some reactions involve gaining or losing oxygen	1.State what happens to mass in a chemical reaction 2. State the meaning of: oxidation 3. Describe the reactions of metals with oxygen 4. Identify and explain the products formed by the oxidation of metals	**Which statement best describes what happens during the oxidation of metals in a chemical reaction?** 1. Mass is lost because oxygen disappears during the reaction 2. Oxidation involves metals gaining electrons and becoming lighter 3. Metals react with oxygen to form metal oxides, and total mass remains the same 4. Oxidation causes metals to evaporate and lose mass	You are working as a materials scientist for a company that designs protective coatings for metal structures. Your team needs to understand how metals react with oxygen and how this affects mass and product formation. Prepare a short scientific briefing that addresses the following: - Explain what happens to the total mass during a chemical reaction, using the reaction of a metal with oxygen as an example. -- Define oxidation. - Metal + Oxygen Reactions - Describe how metals like magnesium, iron, and copper react with oxygen. - Write word equations for at least one reaction. - Explain how these products affect the metal (e.g. rusting, corrosion, protection). Challenge Extension (Optional): Suggest one method to prevent metal oxidation and explain how it works scientifically.

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Week 15 Lesson 2 How do we stay safe around fires?	Flammable, Extinguisher, Hazard, Prevention		- Knowing that fire needs fuel, heat, and oxygen (fire triangle) - Understanding that some materials are flammable and can cause harm	1. Use the idea of the 'fire triangle' to explain how to extinguish a fire. 2. Explain why different types of fire need to be put out in different ways.	**Which of the following best explains how to extinguish a fire using the fire triangle?** 1. You must add more oxygen to cool the fire down 2. Removing heat, fuel, or oxygen will stop the fire 3. Fires can only be put out by adding water 4. All fires should be extinguished using the same method	You are training new firefighters. They must understand how to safely extinguish different types of fires using the fire triangle. Explain how removing one part of the fire triangle can stop a fire. Choose two types of fire (e.g. oil fire, electrical fire, paper fire) and explain: - Why they must be extinguished differently - What method should be used for each and why it works
Week 15 Lesson 3 How does combustion cause pollution?	Carbon dioxide, Soot, Incomplete, Emissions	The Earth and Environment	- Awareness that burning fuels produces gases - Understanding that some gases (like carbon dioxide or sulfur dioxide) can be harmful	1. Explain how sulfur dioxide and nitrogen oxides are produced in some combustion reactions. 2. Explain how sulfur dioxide and nitrogen oxides help to cause acid rain. 3. Explain how neutralisation can be used to reduce pollution from fossil fuel combustion. 4. Explain the effects of acid rain on organisms, bodies of water.	**Which of the following statements correctly explains how acid rain is formed and its effects?** 1. Acid rain is caused by carbon dioxide dissolving in rainwater 2. Sulfur dioxide and nitrogen oxides dissolve in water to form acids, which damage ecosystems 3. Acid rain only affects cities and has no impact on wildlife 4. Neutralisation increases pollution by	A local forest ecosystem is showing signs of damage—trees are dying, fish populations are falling, and the soil is becoming acidic. You've been asked to explain the science behind what's happening and propose a solution. Write a scientific explanation that includes: - Pollutant Origins -How sulfur dioxide and nitrogen oxides are produced during combustion. - Acid Rain Formation - How these gases lead to acid rain. - Neutralisation Strategy - How neutralisation can help reduce pollution from fossil fuel

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					adding more acid to the environment	combustion. - Environmental Impact - Describe two effects of acid rain on living organisms or bodies of water