Holy Family Catholic School – Faculty of Science and Physiology

Science Spring Term 1 Year 7

Learning Intention	Vocab	Concept	Retrieval	Success Criteria	Hinge Questions for this lesson	Red Zone
Week 16 Lesson 1 What makes a good fuel?	Energy density, Availability, Pollution, Cost	Energy in Action	Knowledge of combustion and energy release, Understanding of environmental impact and efficiency		1. Describe the factors that make up a good fuel. 2. Compare the temperature rise of water when some fuels are burnt.	Write a conclusion and evaluation for practical carried out.
Week 16 Lesson 2 What are energy resources and how do they work?	Solar, Wind, Geothermal, Hydroelectric	Energy in Action	Familiarity with renewable and non-renewable resources, Basic understanding of how electricity is generated		1. State the meaning of: hydroelectricity, geothermal, solar energy, wind energy, tidal power. 2. Describe advantages and disadvantages of different renewable, energy resources. 3. Explain how the Sun is the ultimate source of the energy used in renewable resources.	Joule island: joule island is a remote island in the Pacific Ocean. You are part of a team of 30 scientists who will be staying on the island for 3 years to study it. As the resident energy specialist, you will need to provide all the energy that the team will require. There are no fossil fuels on the island and it is 500 km to the mainland. The island has sunny days but cold nights. The wind blows most days, but not in summer. The hot springs are at a temperature of 80 °C. Evaluate the energy sources available and explain how you will provide the team with Hot water for washing, Energy to cook food, Electricity to keep the refrigerator working (to keep medicines cold),

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						computers, and equipment for analysis
Week 16 Lesson 3 How is energy transferred?	Conduction, Convection, Radiation, Medium	Energy in Action Waves and Radiation	Awareness of different energy forms, understanding of how energy moves from one object to another		1. Recall the energy stores. 2. Recall the energy transfers. 3. Describe how energy is being transferred between different stores.	You've been recruited by a science museum to design an interactive exhibit called "Energy in Motion." The goal is to help visitors understand how energy is stored and transferred in everyday situations. Create a concept for an interactive display that shows energy being stored and transferred. You must include: - A description of the system or device - Labels for each energy store and transfer - A short explanation of how the law of conservation of energy applies
Week 17 Lesson 1 What factors affect temperature; how can temperature change?	Heat energy, Mass, Specific heat capacity, Insulation	Energy in Action Waves and Radiation	Knowledge of heat and temperature as related but distinct concepts, understanding of how materials respond to		1. Explain how internal energy and temperature are different. 2. Describe the factors that determine the temperature of an object. 3. Describe the factors that affect the rate of transfer of energy by heating. 4. Use the particle model of	Aim : To find out if sweat can help to cool you down Prediction: Do you think the water in a test tube with or without the damp paper towel will cool down fastest? Explain your answer Design an experiment to test for your prediction.

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			heating and cooling		matter to explain energy transfer by evaporation from a surface.	
Week 17 Lesson 2 How is heat transferred when there are no particles?	Radiation, Infrared, Vacuum, Electromagnetic waves	Energy in Action Waves and Radiation	Understanding of electromagnetic waves, Awareness that space is a vacuum with no particles		1. Recall that energy can be transferred by heating by radiation 2. Describe how energy is transferred by radiation. 3. Apply the idea of different colours being good or poor emitters or absorbers.	A student says: "Radiation only happens in solids because particles vibrate." - Explain why this statement is incorrect - Use scientific reasoning to support your answer
Week 17 Lesson 3 How is heat transferred using particles?	Conduction, Convection, Particle movement, Density	Energy in Action	Knowledge of particle theory (solids, liquids, gases), Understanding of conduction and convection		1. Describe how energy is transferred in conduction. 2. Use the particle model of matter to explain energy transfers by conduction 3. Compare the effects of different rates of conduction in different materials. 4. Describe how energy is transferred in convection. 5. Use the particle model of matter to explain energy transfers by convection.	A student writes: "In conduction, particles move from hot areas to cold areas carrying energy." - Identify the mistake in this statement. - Rewrite it correctly using the particle model. A metal spoon is placed in a hot cup of tea. After a few minutes, the handle feels warm. - Explain how energy was transferred to the handle. - Why would a plastic spoon behave differently.
Week 18 Lesson 1 What are conductors and insulators?	Metal, Plastic, Thermal	Energy in Action	Familiarity with materials and their properties,		1. Recall examples of common thermal conductors and insulators. 2. Explain why particular	

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	conductivity, Barrier		understanding of how heat moves through different substances		materials are used for given purposes. 3. Compare conduction in thermal conductors and thermal insulators. 4. Compare the effects of different rates of conduction in different materials.	
Week 18 Lesson 2 How do we control energy transfers?	Insulation, Reflective surfaces, Trapped air, Design	Energy in Action Waves and Radiation	Awareness of insulation and its uses, understanding of how energy loss can be minimized		1. Evaluate ways of increasing or decreasing energy transfer by conduction, convection, radiation and evaporation.	Why are some of the science labs really hot in the summer but really cold in the winter? What could be done to the school building to change this? What questions could you ask to help you answer this?
Week 18 Lesson 3 How do we calculate how efficient energy transfers are?	Useful energy, Total energy, Efficiency formula, Percentage	Energy in Action	Basic math skills (percentages, ratios), Understanding of useful vs wasted energy		1. State the meaning of efficiency and recall some advantages of efficient appliances. 2. Recall how to identify useful and wasted energies. 3. Match Sankey diagrams to simple situations. 4. Use Sankey diagrams to compare appliances or processes. 5. Calculate energy efficiencies.	A lot of money has been spent making this home more energy efficient. How will the homeowners know if it was worth it?

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Week 19 Lesson 1 What is power? How do we pay for energy?	Watts, Kilowatt-hour, Electricity meter, Cost	Energy in Action	Familiarity with units of energy and power (e.g., watts, kilowatt-hours), Awareness of how energy is billed and measured in homes		1. Describe what power means, and the relationship between watts and joules/second. 2. Use the formula relating power, energy and time (in W, J and s). 3. Use data to consider cost efficiency by calculating payback times. 4. Recall that electricity and mains gas are charged for on the basis of the energy transferred. 5. Explain why power companies use the kWh as a measure of energy.	You've just been hired by a local council to advise on energy use in public buildings. They're deciding between installing electric heaters or gas-powered systems in a new community centre. They also want to add solar panels to reduce long-term costs. Use your understanding of power, energy, and cost efficiency to help them make informed decisions.
Week 19 Lesson 2 What are the states of matter?	Solid, Liquid, Gas, Properties, volume, compressed	**Particles and Matter**	Understanding that materials can exist in different forms - Basic awareness of temperature changes (e.g., heating and cooling)	1. Describe the properties of the three states of matter in terms of shape, volume and compressibility. 2. Record observations and describe simple properties of the three states of matter.	Which option correctly lists the three main states of matter? A. Solid, gas, plasma B. Liquid, plasma, vapour C. *Solid, liquid, gas* D. Gas, vapour, steam	Describe the properties of a solid, liquid and gas. (6 Marks)
Week 19 Lesson 3 What is particle theory?	Particles, Arrangement, Movement,	**Particles and Matter**	- Knowing that substances are made of tiny	1.State that all materials are made from particles 2. Describe, draw and	Which statement best describes particle theory? A. All substances are made	Describe the arrangement and movement of particles in each of the three states of matter. Explain

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	Forces, theory, particle model		particles - Recognising that particles behave differently in solids, liquids, and gases	recognise the arrangement of particles in solids, liquids and gases 3. Use the particle model to explain other observations about matter	of continuous material with no gaps between parts B. *All substances are made of tiny particles that are always moving and have spaces between them* C. Only gases are made of particles; solids and liquids are not D. Particles in solids, liquids and gases are all arranged and move in exactly the same way	what happens to the particles in a liquid during boiling. [6 marks]
Week 20 Lesson 1 What makes particles move?	Energy, Temperature, Kinetic, Heat, Brownian motion, particle theory	**Particles and Matter**	- awareness that heat affects particle movement - Understanding of energy transfer	1.Describe Brownian motion 2. State where Brownian motion can be observed 3. Explain how Brownian motion occurs, using particle theory. 4. Convert metres to nanometres and vice versa. (WS)	Which statement best explains why particles in solids, liquids and gases move? A. They are pushed around by other particles touching them B. *They move because they have energy, and heating gives them more kinetic energy* C. They start moving only when they change state D. They move because forces pull them around randomly	Explain Brownian motion using the particle theory.

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Week 20 Lesson 2 How do we describe how fluid particles move around?	Flow, Viscosity, Diffusion, Collision	**Particles and Matter**	- Knowing the properties of liquids and gases - Familiarity with the concept of flow and diffusion	1. Explain how diffusion occurs in terms of movement of particles. 2. Explain why the speed of diffusion in gases is faster than in liquids. 3. Recognise examples of diffusion causing problems.	Which statement best describes how particles move in fluids (liquids and gases)? A. Particles are fixed in place and only vibrate *B. Particles slide past each other or move freely in all directions* C. Particles move in neat, organised lines D. Particles cannot move unless heat is added	Why does diffusion happen faster in gases than in liquids?
Week 20 Lesson 3 What is gas pressure and what can it do?	Pressure, Volume, Collisions, Container	**Particles and Matter**	- Understanding that gas particles move freely and collide - Awareness that pressure can change with volume and temperature	1. Explain the ways in which gas pressure can be increased. 2. Describe what a vacuum is. 3. Explain some of the effects of air pressure (e.g. using a straw, collapsing can).	Which statement best explains what gas pressure is and what it can do? A. Gas pressure is the weight of the gas, and it only acts downwards *B. Gas pressure is caused by gas particles hitting the walls of a container, and it can make containers expand or even burst* C. Gas pressure is the force of gravity pulling gas particles together, so it makes containers collapse D. Gas pressure happens only when gas is heated and	Use the particle theory to explain why a tyre gets bigger as you pump air into it. Why a tyre gets smaller as you let air out. Why it is possible to crush a can in your hand.

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					cannot change at other temperatures	
Week 21 Lesson 1 What are elements and why do we use them?	Atom, Symbol, Periodic, Pure	Particles and Matter	- Knowing that elements are pure substances made of one type of atom - Familiarity with the periodic table as a way to organise elements	1. Explain the advantages of recycling metals. 2. Describe how some elements are found in their native states. 3. Explain why some elements have been known for much longer than others.	Which statement best describes what an element is and why elements are useful in science? A. An element is a substance made of different types of atoms, and we use them because they react in the same way *B. An element is a pure substance made of one type of atom, and we use them to build all other substances* C. An element is a mixture of atoms and molecules, and we use them because they are easy to separate D. An element is any substance that can be melted, and we use them to make compounds dissolve	Explain the advantages of recycling metals.
Week 21 Lesson 2 What is the difference between metals and non-metals?	Conductivity, Malleability, Brittle, Lustre	Particles and Matter Bonding and Properties	- Recognising basic physical properties (e.g., shiny, brittle) - Understanding	1. Relate the uses of different elements to their properties (includes magnetism) 2. Use ideas about the periodic table to identify the positions of metal and non-	Which statement best describes the main difference between metals and non-metals? A. Metals are dull and brittle, while non-metals are shiny and conduct	Describe the properties of metals and non-metals? 6 Marks

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			that different materials have different uses	metal elements. 3. Use evidence to classify unfamiliar materials as being metal elements, metallic, non-metal elements, non-metallic.	electricity B. *Metals conduct heat and electricity, while non-metals usually do not* C. Metals exist only as gases, while non-metals are always solids D. Metals have low melting points, while non-metals always have high melting points	
Week 21 Lesson 3 How do we know if a chemical reaction has occurred and how do we record information about them?	Reactants, Products, Observations, Equation	Chemical Reactions	- Awareness of signs of change (e.g., colour, temperature, gas production) - Familiarity with writing simple word equations	1. Recall examples of chemical reactions in everyday life 2. Recall some observations that indicate a chemical reaction 3. Identify the products and reactants using a word equation 4. Supply missing reactants or products to complete a word equation.	Which of the following is the best evidence that a chemical reaction has taken place? A. The substance has changed size or shape *B. A new substance is formed, often shown by colour change, gas production, temperature change or a precipitate* C. The reactants have simply mixed together D. The substance has dissolved in water	Compare chemical changes with physical changes.