Holy Family Catholic School – Faculty of Science and Physiology

Science Spring Term 1 Year 9

Learning Intention	Vocab	Concept	Retrieval	Success Criteria	Hinge Questions for this lesson	Red Zone
Week 16 Lesson 1 How does a microscope work?	Magnification, resolution, micrometre, microscopy, objective lens, Focus lens,	Cells and systems	Name parts of an animal cell	1. Explain how changes in microscopes have increased our understanding of the role of sub-cellular structures. 2. Demonstrate an understanding of number, size and scale. 3. Demonstrate an understanding of milli, micro, nano, pico	A student uses a light microscope to view a cell. They switch from a low-power objective lens to a high-power objective lens. Which of the following correctly describes what happens to the image? A. The image becomes larger and brighter *B. The image becomes larger but dimmer* C. The image becomes smaller and brighter D. The image becomes smaller but dimmer	Write a method to describe how a student could view a specimen under a light microscope. In your answer, include the equation to calculate total magnification.
Week 16 Lesson 2 What is a cell?	Eukaryotic, prokaryotic, chloroplast, vacuole, mitochondria, ribosomes, cell membrane, cytoplasm, cell wall,	Cells and systems	Name parts of a plant cell, know the difference between plant and animal cells.	1. Identify the parts of plant and animal cells. 2. Make drawings of plant and animal cells using a light microscope and identify their parts. 3. Describe the functions of the sub-cellular structures commonly found in eukaryotic cells (nucleus, cell membrane, cell wall, chloroplasts, mitochondria and ribosomes). 4. Estimate sizes using	Which statement best describes what a cell is? A. A group of organs working together to perform a function *B. The smallest structural and functional unit of a living organism* C. A structure that only plants have to carry out photosynthesis D. A tissue made from many identical organ systems	Describe the differences and similarities between a plant cell and animal cell. Write down the function of each part of the animal cell.

Holy Family Catholic School – Faculty of Science and Physiology

Science Spring Term 1 Year 9

Learning Intention	Vocab	Concept	Retrieval	Success Criteria	Hinge Questions for this lesson	Red Zone
				microscope fields of view. 5. Estimate sizes using scale bars.		
Week 16 Lesson 3 What types of cells are there?	Ciliated epithelial cell, adaptation, function	Cells and systems	nucleus, cell membrane, cytoplasm functions	1. Describe how sperm cells are adapted to their function. 2. Describe how egg cells are adapted to their function. 3. Describe how ciliated epithelial cells are adapted to their function. 4. Draw conclusions about a cell's function from its adaptations.	Which of the following correctly identifies the two main types of cells? A. Plant cells and bacterial cells *B. Prokaryotic cells and eukaryotic cells* C. Animal cells and fungal cells D. Red blood cells and nerve cells	Explain how sperm cells are adapted to carry out their function.
Week 17 Lesson 1 How are bacteria different to plant and animal cells?	Prokaryotic cells, Eukaryotic cells	Cells and systems	DNA in a distinct nucleus	1. Identify the common parts of bacteria. 2. Describe the functions of common parts of bacteria. 3. Describe why bacteria are classified as being prokaryotic. 4. Change numbers to and from standard form. 5. Compare eukaryotic and prokaryotic cells.	Which statement correctly describes a key difference between bacterial cells and plant/animal cells? A. Bacterial cells have a nucleus, but plant and animal cells do not *B. Bacterial cells are prokaryotic and do not contain membrane-bound organelles* C. Bacterial cells contain chloroplasts just like plant cells D. Bacterial cells are always	Describe the difference and similarities between prokaryotic and Eukaryotic cells.

Holy Family Catholic School – Faculty of Science and Physiology

Science Spring Term 1 Year 9

Learning Intention	Vocab	Concept	Retrieval	Success Criteria	Hinge Questions for this lesson	Red Zone
					much larger than plant and animal cells	
Week 17 Lesson 2 Core Practical 1: Looking at Cells pt 1	iodine solution, microscope slides,	Cells and systems	Parts of microscope	1. Make and observe onion skin slides under a microscope. 2. Make a biological drawing of your observations	Which of the following is the correct order for preparing an onion epidermis slide for viewing under a light microscope? A. Add iodine → Place onion epidermis on slide → Add coverslip B. Remove onion epidermis → Add iodine → Place coverslip *C. Remove onion epidermis → Place it on the slide → Add iodine → Lower coverslip* D. Place coverslip → Add iodine → Put onion epidermis on top	Write a method to describe how a student could view onion cells under a light microscope.
Week 17 Lesson 3 Core Practical 1: Looking at Cells pt 2	cover slips, observation lens	Cells and systems	Parts of microscope	1. Make and observe onion skin slides under a microscope. 2. Make a biological drawing of your observations	Which of the following is the correct order for preparing an onion epidermis slide for viewing under a light microscope? A. Add iodine → Place onion epidermis on slide → Add coverslip B. Remove onion epidermis → Add iodine → Place coverslip	Write a method to describe how a student could view onion cells under a light microscope.

Holy Family Catholic School – Faculty of Science and Physiology

Science Spring Term 1 Year 9

Learning Intention	Vocab	Concept	Retrieval	Success Criteria	Hinge Questions for this lesson	Red Zone
					C. Remove onion epidermis → Place it on the slide → Add iodine → Lower coverslip D. Place coverslip → Add iodine → Put onion epidermis on top	
Week 18 Lesson 1 How are enzymes linked to food?	Enzymes, proteins, amino acids, fatty acids, glycerol, synthesis, catalyse	Chemical Reactions	Nutrients, carbohydrates, protein, fats, vitamins and minerals, fibre and water	1. State that enzymes are proteins. 2. Give examples of enzymes and where they are found in the human body and in other species. 3. Recall the subunits from which carbohydrates, proteins and lipids are formed sugars, amino acids, fatty acids and glycerol). 4. Describe what enzymes do (catalyse the synthesis and breakdown of substances, such as carbohydrates, proteins and lipids, by speeding up the rate of reaction). 5. Define an enzyme as a biological catalyst	Which statement best explains how enzymes are linked to digestion of food? A. Enzymes are a type of carbohydrate that the body digests for energy *B. Enzymes speed up the breakdown of large food molecules into smaller, soluble ones* C. Enzymes store food in cells until it is needed D. Enzymes stop chemical reactions so food lasts longer in the body	Why do enzymes have different shapes?
Week 18 Lesson 2 How do enzymes work?	Active site, substrate,	Chemical Reactions	Enzymes involved in digestion	1. State what enzyme specificity means. 2. State that an enzyme's	Which statement best describes how enzymes work?	Explain how enzymes become denatured.

Holy Family Catholic School – Faculty of Science and Physiology

Science Spring Term 1 Year 9

Learning Intention	Vocab	Concept	Retrieval	Success Criteria	Hinge Questions for this lesson	Red Zone
	denatured, lock and key			action is due to its active site. 3. Describe the role of the active site in enzyme function (including specificity). 4. Use the lock-and-key model to develop explanations for enzyme activity. 5. Explain why enzymes have a particular shape, as a result of the sequence of amino acids in the chain. 6. Explain how enzymes become denatured.	A. Enzymes are used up during reactions and cannot be reused *B. Enzymes speed up reactions by lowering the activation energy* C. Enzymes work on any molecule because they have a flexible active site D. Enzymes break down only fats and do not affect other food molecules	
Week 18 Lesson 3 What affects how enzymes work?	pH, optimum, substrate, concentratio n	Chemical Reactions	location of digestive enzymes protease, stomach, pancreas, small intestine.	1. Describe the effect of temperature on enzyme activity. 2. Describe the effect of substrate concentration on enzyme activity. 3. Describe the effect of pH on enzyme activity. 4. Explain what is meant by the optimum pH/temperature of an enzyme. 5. Calculate the rate of enzyme activity from	Which factor will most directly affect the rate at which an enzyme works? A. The colour of the enzyme *B. The temperature and pH of the environment* C. The amount of light hitting the enzyme D. The mass of the organism using the enzyme	Explain what would happen to enzymes if the pH was too low.

Holy Family Catholic School – Faculty of Science and Physiology

Science Spring Term 1 Year 9

Learning Intention	Vocab	Concept	Retrieval	Success Criteria	Hinge Questions for this lesson	Red Zone
				experimental data. 6. Explain why temperature, substrate concentration and pH affect enzyme activity.		
Week 19 Lesson 1 Core Practical 2: pH and Enzymes pt 1	Enzymes, pH, enzyme activity	Chemical Reactions		1. Investigate how pH affects enzyme activity.	Which statement best explains how pH affects enzyme activity? A. Enzymes work fastest at any pH as long as the temperature is high B. Changing the pH can change the shape of the enzyme's active site, reducing activity C. Enzymes always work better in acidic conditions D. pH only affects enzymes found in plant cells	
Week 19 Lesson 2 Core Practical 2: pH and Enzymes pt 2	Enzymes, pH, enzyme activity	Chemical Reactions	enzymes are protein molecules			Explain what would happen to enzymes if the pH was too high.
Week 19 Lesson 3 How are substances transported around living organisms? (diffusion)	diffusion, active transport, osmosis	Chemical Reactions	how does the smell of perfume reach our nose.	1. State that substances are transported by diffusion, osmosis and active transport. 2. Describe how substances are transported by active transport (including the need for energy).	Which statement best describes how diffusion helps substances move around living organisms? A. Substances move from a low concentration to a high concentration using energy *B. Substances move from a*	Explain the similarities and differences between osmosis and active transport. Use examples for each.

Holy Family Catholic School – Faculty of Science and Physiology

Science Spring Term 1 Year 9

Learning Intention	Vocab	Concept	Retrieval	Success Criteria	Hinge Questions for this lesson	Red Zone
				3. Explain how substances are transported by diffusion.	*high concentration to a low concentration without using energy* C. Substances are pumped around the body by specialised cells using ATP D. Substances move randomly but always end up evenly spread because cells push them around	
Week 20 Lesson 1 How are substances transported around living organisms? (Osmosis)	osmosis, partially permeable membrane	Chemical Reactions	why osmosis is important in living cells.	1. Explain how substances are transported by osmosis. 2. Explain the effects of osmosis on cells and tissues.	Which statement best describes osmosis in living organisms? A. Water moves from a low concentration of water to a high concentration of water using energy *B. Water moves from a dilute solution to a concentrated solution through a partially permeable membrane* C. Water moves from a concentrated solution to a dilute solution using carrier proteins D. Water moves in and out of cells randomly without following any concentration gradient	Describe what osmosis is.

Holy Family Catholic School – Faculty of Science and Physiology

Science Spring Term 1 Year 9

Learning Intention	Vocab	Concept	Retrieval	Success Criteria	Hinge Questions for this lesson	Red Zone
Week 20 Lesson 2 Core Practical 4: Osmosis in potato slices pt 1	Concentration, osmosis, mass gain, mass loss	Chemical Reactions	partially permeable membranes	1. Investigate osmosis in potatoes. 2. Calculate percentage gain and loss of mass in osmosis.		Describe how you would investigate the effect of a range of concentrations of sugar solutions on the mass of plant tissue.
Week 20 Lesson 3 What are the states of matter?	solid, liquid, gas, energy	Particles and Matter	Particle arrangement and movement for states of matter	1. Describe the arrangement of particles in each of the three states of matter. 2. Describe the movement of particles in each of the three states of matter. 3. Describe the relative energy of particles in each of the three states of matter.	Which statement correctly describes the arrangement of particles in a solid? A: particles move freely and spread out. B: Particles are close together and vibrate in fixed positions. C: particles are far apart and move randomly. D: particles slide past each other easily	In your books, write a paragraph explaining the properties below for each state of matter. Solid and liquids cannot be compressed, whereas gases can. Solids cannot flow, whereas liquids can. Gases have the lowest density.
Week 21 Lesson 1 What happens when substances change state?	condensation, evaporation, melting, energy, force	Particles and Matter	What are the state changes? What are the states of matter?	1. Recall the names used for the interconversions between the three states of matter. 2. Explain the changes in arrangement, movement and energy of particles during these interconversions 3. Predict the physical state of a substance under specified conditions, given suitable data	What happens to the particles when a liquid freezes? A: they stop moving completely. B: they lose energy and slow down. C: they gain energy and move faster. D: they spread further apart	"A block of ice is heated until it becomes steam. Explain, in detail, what happens to the particles and energy during each change of state (solid → liquid → gas). Include: How particle arrangement and movement change. What happens to the forces between particles. Why energy is needed for these changes." Success Criteria:

Holy Family Catholic School – Faculty of Science and Physiology

Science Spring Term 1 Year 9

Learning Intention	Vocab	Concept	Retrieval	Success Criteria	Hinge Questions for this lesson	Red Zone
						Describe particle arrangement in each state. Explain energy transfer and its effect on particle movement. Mention breaking or weakening of forces between particles. Use scientific vocabulary: kinetic energy, forces, melting, boiling.
Week 21 Lesson 2 What is purity?	pure, impure, boiling point, mixture	Particles and Matter	What is a mixture? What is melting point and boiling point?	1. Explain the difference between the use of 'pure' in chemistry compared with its everyday use and the differences in chemistry between a pure substance and a mixture. 2. Interpret melting point data to distinguish between pure substances which have a sharp melting point and mixtures which melt over a range of temperatures. (WS)	Which of these is a pure substance? A: tap water. B: oxygen. C: fizzy drink. D: seawater	Using the data above: Which sample is pure? Explain why the other samples are not pure. Describe why impurities affect boiling point and melting point using particle theory.
Week 21 Lesson 3 How do we separate suspensions?	filtration, residue, filtrate, insoluble	Particles and Matter	What is the definition of insoluble? What is a mixture?	1. Explain the experimental techniques for separation of mixtures by filtration. 2. Evaluate the risks in a practical procedure and suggest suitable precautions (WS)	Which mixture is best separated using filtration? A: sand and water. B: salt and water. C: Coca cola. D: magnesium oxide into magnesium and oxygen	"You have a mixture of sand and water. Design and explain a method to separate them completely. Include: What equipment you would use and why. How filtration works at the particle

Holy Family Catholic School – Faculty of Science and Physiology

Science Spring Term 1 Year 9

Learning Intention	Vocab	Concept	Retrieval	Success Criteria	Hinge Questions for this lesson	Red Zone
				3. Draw a diagram to show filtration. (WS)		level. Draw a clear diagram of the setup."