YEAR 8 SCIENCE: Biological Science

Year 8 Australian Curriculum Achievement Standard:

By the end of Year 8, students compare physical and chemical changes and use the particle model to explain and predict the properties and behaviours of substances. They identify different forms of energy and describe how energy transfers and transformations cause change in simple systems. They compare processes of rock formation, including the timescales involved. They will analyse the relationship between structure and function at cell, organ and body system levels. Students examine the different science knowledge used in occupations. They explain how evidence has led to an improved understanding of a scientific idea and describe situations in which scientists collaborated to generate solutions to contemporary problems. They reflect on implications of these solutions for different groups in society.

Students identify and construct questions and problems that they can investigate scientifically. They consider safety and ethics when planning investigations, including designing field or experimental methods. They identify variables to be changed, measured and controlled. Students construct representations of their data to reveal and analyse patterns and trends, and use these when justifying their conclusions. They explain how modifications to methods could improve the quality of their data and apply their own scientific knowledge and investigation findings to evaluate claims made by others. They use appropriate language and representations to communicate science ideas, methods and findings in a range of text types.

Unit Specific Information

In this unit students will identify cells as the basic units of living things and their specialised structures. They will use microscopes and digital images to distinguish between multicellular and unicellular organisms. Students will correctly draw scientific specimen diagrams from microscopic observations. They will compare similarities and differences between plant and animal cell structure.

Students will examine scientific work about cell formation and the processes of cell division via mitosis in organisms. They will analyse the development of the cell theory as a result of historical scientific work and use the findings to validate the tenets of the theory.

Assessment Details:

Mode	Assignment 1 (SHE Investigation)	Assignment 2 (Exam)
Duration	1 x 70 min lesson	1 x 70 min lessons
Conditions	Individual 400 words maximum Stimulus provided	Individual 1500 words maximum Access to library resources Multi-modal, oral/ video presentation
Dates	Term 1, Week 5	Term 1, Week 10

READING / VIEWING/ LISTENING:	COMPREHENSION SKILL FOCUS:	THINKING (cognitive words):	WRITTEN / SPOKEN / MULTI-MODAL TEXT	HIGHLY VALUED LANGUAGE FEATURE FOCUS:
• Core Text: OBI 8 • Science Ways textbook • Jacaranda Textbook • Buehl, Comprehension strategies • New ASOT	• Different Perspectives for Reading (Buehl, p 91-93) • Power Notes (Buehl, p155-157) • Text Coding (Buehl, p210 -213) • Magnet summary/ words	• Analyse • Explain • Describe • Identify • Construct	• Extended response (IA3-like), multi-modal assignments	• Assessing validity of scientific information (data & sources) • Reading & interpreting graphs • Explaining and evaluating concepts using scientific evidence

PRIORITY STANDARDS (Do, know, think proficiency scales)		
	Thinking Routines : Comprehension and Cognitive	**Communication**
4	Justify	
3	Explain Analyse	
2	Construct Describe Partial skills of Level 3	

Guaranteed Vocabulary:			**Design Question Three Strategy**	**Design Question Four Strategy**	**21st Century Skill:**
Cell Cell membrane Cell theory Chloroplast Cytoplasm Microscope Mitochondrion Mitosis Nucleus Organelle	Function Organism Asexual reproduction Sexual reproduction Fertilisation Foetus Gamete	In vitro fertilisation Pollination Reproduction Zygote Structure Photosynthesis Protein Respiration Ribosome	Science by Doing resources Homework sheets to review Concept mapping Venn diagrams to compare	Science by Doing resources Mind mapping Short and long term effects Practical Experimentation of plant growth	Use of ICT for learning Collaboration *Knowledge construction*
Guaranteed Skills/Language Features:			**Reading Comprehension Skill and Strategy**	**CCEs and Key Terms:**	**ICT to Enhance Learning:**
Factorial explanation Sequential explanation Consequential explanation			Connecting to prior knowledge Creating mental images *(Buehl, D. page 53)*	*Comparing* *Classifying* *Analysing* *Inferring* *Identifying* *Synthesising*	Digital simulations Science by doing OBI8 resources Education perfect resources (some classes)

Possible Habit of Mind:				
Exploring Meaning of the HOM By the end of this unit students will be able to:	**Expanding Capacity for using the HOM** By the end of this unit students will be able to:	**Increasing Alertness for the HOM** By the end of this unit students will be able to:	**Extending Values of the HOM** By the end of this unit students will be able to:	**Building Commitment towards the HOM** By the end of this unit students will be able to:

General Capabilities: This unit provides opportunities for students to engage in following capabilities:

Literacy
- ✓ Comprehending texts through listening, reading and viewing
- ✓ Composing texts through speaking, writing and creating
- ✓ Text knowledge
- ✓ Grammar knowledge
- ✓ Word knowledge
- ✓ Visual knowledge

Numeracy
- ✓ Estimating and calculating with whole numbers
- ☐ Recognising and using patterns and relationships
- ☐ Using fractions, decimals, percentages, ratios and rates
- ☐ Using spatial reasoning
- ✓ Interpreting statistical information
- ☐ Using measurement

ICT
- ☐ Applying social and ethical protocols and practices when using ICT
- ☐ Investigating with ICT
- ☐ Creating with ICT
- ☐ Communicating with ICT
- ✓ Managing and operating ICT

Critical and creative thinking
- ✓ Inquiring - identifying, exploring and organising information and ideas
- ✓ Generating ideas, possibilities and actions
- ✓ Reflecting on thinking and processes
- ✓ Analysing, synthesising and evaluating reasoning and procedures

Personal and social capability
- ✓ Self-awareness
- ✓ Self-management
- ✓ Social awareness
- • Social management

Ethical understanding
- ☐ Understanding ethical concepts and issues
- ☐ Reasoning in decision making and actions
- ☐ Exploring values, rights and responsibilities

Intercultural understanding
- ☐ Recognising culture and developing respect
- ☐ Interacting and empathising with others
- ☐ Reflecting on intercultural experiences and taking responsibility

Cross Curriculum Priorities:

- ☐ Aboriginal and Torres Strait Islander histories and cultures
- ☐ Asia and Australia's engagement with Asia
- ☐ Sustainability

Differentiation [for small groups or individuals]:

- Increased scaffolding around assessment task for students with low literacy
- Plan open-ended lesson tasks that required higher order thinking skills from more capable students
- Include academic rigour to content of lessons
- Use formative assessment to monitor student progress and plan accordingly

Learning Goals:

Strands and Sub-Strands	Australian Curriculum Content Descriptors	Kirwan High Learning Goals
Science understanding		
Biological sciences	• Cells are the basic units of living things and have specialised structures and functions (ACSSU149) • Multi-cellular organisms contain systems of organs that carry out specialised functions that enable them to survive and reproduce (ACSSU150)	• Identify structures within cells and describe their function • Distinguish plant cells from animal cells or fungal cells • Examine a variety of cells using a light microscope • Compare the digestive system in herbivores and carnivores • Describe the structure of the mouth, esophagus, stomach and large intestine in the digestive system and relate its function to the overall function of the digestive system • Compare similar systems on different organisms
Science as human endeavour		
Nature and development of science	• Scientific knowledge has changed peoples' understanding of the world and is refined as new evidence becomes available (ACSHE134)	• Investigate the development of the microscope and the impact it has had on the understanding of cell functions and division
• **Science Inquiry Skills**		
Communicating	Communicate ideas, findings and solutions to problems using scientific language and representations using digital technologies as appropriate (ACSIS148)	• Use appropriate scientific vocabulary to communicate ideas related to biological systems to a scientific audience • Use labelled diagrams and flowcharts to represent biological systems

Week	Lesson 1	Lesson 2	Lesson 3
1 27/01	**Australia Day Public Holiday**		**Year 8 Science Overview/Introduction Lesson** • Establish routines and procedures- including KSHS entry and exit procedure, seating plans, attention signal • Establish science expectations- phone policy, equipment, bookwork, homework • Establish classroom identity. Suggestions include class contract, class mascot, class artefact, etc. • Students develop personal effort and behaviour goals for term 1- these should be revisited throughout the term. • Diagnostic testing- where are your kids? • Overview of Year 8 topics and timeline • Develop interest in term 1 topic • Students develop personal unit learning goals- this should be revisited throughout the year • Students develop personal achievement goals- these should be revisited throughout the term • Learning to Learn concept introduction
2 03/02	**Learning Sequence 1: Living Organisms** **Accessing prior knowledge** **Identifying misconceptions** **RETRIEVAL LEARNING** • Review from year 7, the characteristics of a living organism: moves, reproduces, nutrients, grows, responds to stimuli, exchanges gases, produces waste, and requires water. • Review from Year 7, the necessary elements for life: oxygen, nutrients, water, and the removal of waste for life and their role in supporting life. **VOCABULARY** Oxygen, waste, stimuli, gases, nutrients, organism, living, non-living	**Learning Sequence 1: Living Organisms** **Accessing prior knowledge** **Interacting with prior knowledge** **RETRIEVAL LEARNING** • Review from year 7 that all living things are made up of cells which contain DNA **LEARNING BY DOING** • Investigate the differences and similarities between different types of cells using a light microscope. **VOCABULARY** living organism, similarity, difference, cell, multicellular, unicellular, cell wall, nucleus, DNA,	**Learning Sequence 2: Animal Cells** **Interacting with new knowledge** **COMPREHENSION LEARNING** • Describe the main features of animal cells and understand why some are multicellular vs. unicellular (surface area to volume ratios as an extension topic) • Identify structures within animal cells **VOCABULARY** Animal, cell, multicellular, unicellular, organelle, cell membrane, nucleus, DNA, mitochondria, vacuole,

	PEDAGOGICAL STRATEGIES **Learning to Learn** Facilitate heterogeneous groups with well-defined group roles **RESOURCES** • OBI7 page 50-52 • Education Perfect • T-Drive/Year 8 • Science by doing Chapter 1-2 • OBI8 page 3-5	observable evidence **PEDAGOGICAL STRATEGIES** **Learning to Learn** Facilitate heterogeneous groups with well-defined group roles **RESOURCES** • Light microscopes • OBI8 pp. 9-13 • Prepared slides of various cell types	cytoplasm, ribosome, lysosome **PEDAGOGICAL STRATEGIES** **LEARNING THROUGH COGNITIVE VERBS:** Describe, identify **Learning to Learn**: using diagrams to identify phenomena **RESOURCES** • Education Perfect • OBI8 • T-Drive/Year 8 • Science ways 1 chapter 8.1
3 10/02	**Learning Sequence 2: Animal Cells** **Interacting with new knowledge** **Practicing and deepening** **RETRIEVAL LEARNING** • Review from previous lesson: Identify the structures of an animal cell by constructing a cell diagram **COMPREHENSION LEARNING** • Describe the functions of different structures within animal cells • Explain why each organelle has its own specific "job" within the cell and how they contribute to the overall function of the cell **VOCABULARY** Animal, cell, multicellular, unicellular, organelle, cell membrane, nucleus, DNA, mitochondria, vacuole, cytoplasm, ribosome, lysosome **PEDAGOGICAL STRATEGIES** **LEARNING THROUGH COGNITIVE VERBS:** Describe, explain **Learning to Learn:** Facilitate the use of a Jigsaw type activity with heterogeneous groups with well-defined group roles.	**JUNIOR SWIMMING CARNIVAL**	**Learning Sequence 2: Plant Cells** **Interacting with new knowledge** **Practicing and deepening** **COMPREHENSION LEARNING** • Describe the main features of plant cells and understand why some are multicellular vs. unicellular (surface area to volume ratios as an extension topic) • Identify the main structures of plant cells • Describe the functions of organelles within a plant cell **VOCABULARY** Chloroplast, cell wall, plant cell, animal, cell, multicellular, unicellular, organelle, cell membrane, nucleus, DNA, mitochondria, vacuole, cytoplasm, ribosome, lysosome **PEDAGOGICAL STRATEGIES** **LEARNING THROUGH COGNITIVE VERBS:** Describe, identify **Learning to Learn:** Facilitate the use of a Jigsaw type activity with heterogeneous groups with well-defined group roles. **RESOURCES**

	RESOURCES • Education Perfect • OBI8 • T-Drive/Year 8		• Education Perfect • OBI8 • T-Drive/Year 8
4 17/02	**Learning Sequence 3: Plant and Animal cells** **Comprehension Segment** **Practicing and deepening** **COMPREHENSION LEARNING** • Examine a variety of cells using a light microscope • Distinguish plant cells from animal or fungal cells • Construct scientific diagrams of a plant and animal cells **VOCABULARY** Microscope, magnification, focus, eyepiece, lens, chloroplast, cell wall, plant cell, animal, cell, multicellular, unicellular, organelle, cell membrane, nucleus, DNA, mitochondria, vacuole, cytoplasm, ribosome, lysosome **PEDAGOGICAL STRATEGIES** **LEARNING THROUGH COGNITIVE VERBS:** Examine, identify, construct **Learning to Learn:** Use diagrams to describe phenomena **RESOURCES** • Light microscopes • Prepared plant and animal cell slides • OBI8 T-Drive/Year 8	**Learning Sequence 3: Plant and Animal cells** **Comprehension Segment** **Practicing and deepening** **COMPREHENSION LEARNING** • Distinguish plant cells from animal or fungal cells • Explain, using a factorial explanation that includes a graphic organiser, why plant cells have organelles that animal cells do not (larger vacuole, chloroplast, cell wall) **VOCABULARY** Chloroplast, cell wall, plant cell, animal, cell, multicellular, unicellular, organelle, cell membrane, nucleus, DNA, mitochondria, vacuole, cytoplasm, ribosome, lysosome **PEDAGOGICAL STRATEGIES** **LEARNING THROUGH COGNITIVE VERBS:** Examine, identify, construct **Learning through writing:** Practice writing explanations **RESOURCES** • Light microscopes • Prepared plant and animal cell slides • OBI8 T-Drive/Year 8	**CATCH UP/EXTENSION 40 min.** **FORMATIVE ASSESSMENT #1 on Learning Sequences 1-3** **MC AND SHORT RESPONSE (20min.)**

5 24/02	**SUMMATIVE ASSESSMENT #1- SHE investigation: the development of the light microscope (60min.)**	**Learning Sequence 4: Cellular Reproduction** **Interacting with new knowledge** **Practicing and deepening** **COMPREHENSION LEARNING** • Recognise that cells reproduce via cell division • Describe the purpose of cellular reproduction (mitosis vs. meiosis) **ANALYSIS LEARNING** • Analyse how the human body is able to repair itself when injured through the use of cell division **VOCABULARY** Cell, division, mitosis, meiosis, reproduction, DNA, function, survival, growth, repair, genes, traits **Extension vocabulary** Interphase, prophase, metaphase, anaphase, telophase, cytokinesis **PEDAGOGICAL STRATEGIES** **LEARNING THROUGH COGNITIVE VERBS:** recognise, describe **Learning through writing:** practice writing explanations using the topic: why it is important for cells to reproduce **RESOURCES** • Education Perfect • OBI8 • T-Drive/Year 8	**Learning Sequence 4: Cells reproducing to form tissues, organs and body systems** **Interacting with new knowledge** **Practicing and deepening** **COMPREHENSION LEARNING** • Describe how cells reproduce to form tissues, organs, and body systems • Explain the function and importance of the major body systems that enable an organism to survive and reproduce. **VOCABULARY** Cell, division, reproduction, DNA, function, survival, growth, repair, genes, traits, tissue, organ, organelle, body system, digestion, respiratory, nervous, skeletal, circulatory, muscular **PEDAGOGICAL STRATEGIES** **LEARNING THROUGH COGNITIVE VERBS:** recognise, describe **Learning to learn:** Facilitate the use of a Jigsaw type activity with heterogeneous groups with well-defined group roles. **RESOURCES** • Education Perfect • OBI8 • T-Drive/Year 8

6 02/03	**Learning Sequence 5: Human Reproduction** **Interacting with new knowledge** **Practicing and deepening** **RETRIEVAL LEARNING** • Review from previous learning sequence: cells reproduce via meiosis and mitosis **COMPREHENSION LEARNING** • Understand that organisms can reproduce via sexual or asexual reproduction. • Describe the main processes involved in human reproduction (intercourse, joining of gametes via fertilisation, foetal development/pregnancy, birth, young) • Explain the function and importance of the human reproductive system in supporting life processes (passing on of genes from one generation to the next) **VOCABULARY** Cell, division, reproduction, DNA, function, survival, growth, repair, genes, traits, tissue, organ, organelle, body system, sexual, asexual, meiosis, mitosis, intercourse, gametes, sperm, egg, fertilisation, foetus, pregnancy, young **PEDAGOGICAL STRATEGIES** **LEARNING THROUGH COGNITIVE VERBS:** Understand, review, describe, explain **Learning to learn:** Facilitate the use of a Jigsaw type activity with heterogeneous groups with well-defined group roles. **RESOURCES** • Education Perfect • OBI8 • T-Drive/Year 8	**Learning Sequence 5: Male Reproductive System** **Interacting with new knowledge** **Practicing and deepening** **RETRIEVAL LEARNING** • Recall the purpose of the male reproductive system **COMPREHENSION LEARNING** • Identify the organs of the male reproductive system • Describe how the structure and function of the organs of the male reproductive system relate to its overall function **VOCABULARY** Cell, division, reproduction, DNA, function, survival, growth, repair, genes, traits, tissue, organ, organelle, body system, sexual, asexual, meiosis, mitosis, intercourse, gametes, sperm, egg, fertilisation, foetus, pregnancy, young, testes, penis, scrotum, urethra, prostate, epididymis, vas deferens, testosterone, puberty, semen, ejaculation **PEDAGOGICAL STRATEGIES** **LEARNING THROUGH COGNITIVE VERBS:** identify describe, **Learning to learn:** Use diagrams to describe phenomena, describing concepts using own words **RESOURCES** • Education Perfect • OBI8 • T-Drive/Year 8	**Learning Sequence 5: Female Reproductive System** **Interacting with new knowledge** **Practicing and deepening** **RETRIEVAL LEARNING** • Recall the purpose of the female reproductive system **COMPREHENSION LEARNING** • Identify the organs of the female reproductive system • Describe how the structure and function of the organs of the female reproductive system relate to its overall function **VOCABULARY** Cell, division, reproduction, DNA, function, survival, growth, repair, genes, traits, tissue, organ, organelle, body system, sexual, asexual, meiosis, mitosis, intercourse, gametes, sperm, egg, fertilisation, foetus, pregnancy, young, testes, penis, scrotum, urethra, prostate, epididymis, vas deferens, testosterone, puberty, semen, ejaculation, vagina, uterus, ovaries, oestrogen, progesterone, fallopian tube, cervix **PEDAGOGICAL STRATEGIES** **LEARNING THROUGH COGNITIVE VERBS:** identify describe, **Learning to learn:** Use diagrams to describe phenomena, describing concepts using own words **RESOURCES** • Education Perfect • OBI8 • T-Drive/Year 8

7 09/03	**Learning Sequence 5: Influencing Reproduction** **Practicing and deepening: Case study** **RETRIEVAL LEARNING** • Recall the purpose of the human reproductive system • Recall that many organisms reproduce asexually **COMPREHENSION LEARNING** • #1: Compare the different ways that humans influence reproduction (IVF, selective breeding, desexing, contraception, etc.) **OR** • #2: Compare sexual and asexual reproduction: which would result in healthier offspring? **VOCABULARY** Cell, division, reproduction, DNA, function, survival, growth, repair, genes, traits, tissue, organ, organelle, body system, sexual, asexual, meiosis, mitosis, intercourse, gametes, sperm, egg, fertilisation, foetus, pregnancy, young, testes, penis, scrotum, urethra, prostate, epididymis, vas deferens, testosterone, puberty, semen, ejaculation, vagina, uterus, ovaries, oestrogen, progesterone, fallopian tube, cervix **PEDAGOGICAL STRATEGIES** **LEARNING THROUGH COGNITIVE VERBS:** compare, explain **Learning through writing:** #1: Compare and explain which of the methods of influencing reproduction would be most ethical **OR** #2: Compare and explain why humans reproducing sexually results in healthier offspring than if we reproduced asexually. **RESOURCES** • Education Perfect • OBI8 • T-Drive/Year 8	**CATCH UP/REVIEW OF LEARNING SEQUENCES 1-5/EXTENSION**	**FORMATIVE ASSESSMENT #2 on learning sequences 4-5** **MC AND SHORT RESPONSE (40 min.)**

8 16/03	**Learning Sequence 6: The Digestive System** **Interacting with new knowledge** **Practicing and deepening:** **RETRIEVAL LEARNING** • Recall the purpose of the human digestive system **COMPREHENSION LEARNING** • Describe mechanical and chemical digestion • Identify the main organs of the digestive system (teeth, stomach, small intestine, large intestine,) • Explain how food passes through the digestive system **VOCABULARY** Digestion, mechanical, chemical, teeth, stomach, oesophagus, small intestine, large intestine, rectum, anus, **Extension vocabulary**: ingested, egested, peristalsis, villi, bile, chyme, pancreas, gall bladder, cellulose, etc. **PEDAGOGICAL STRATEGIES** **LEARNING THROUGH COGNITIVE VERBS:** Describe, identify, explain **Learning to learn:** Facilitate the use of a Jigsaw type activity with heterogeneous groups with well-defined group roles. **RESOURCES** • Education Perfect • OBI8 • T-Drive/Year 8	**Learning Sequence 6: The Digestive System** **Interacting with new knowledge** **Practicing and deepening:** **RETRIEVAL LEARNING** • Recall the purpose of the human digestive system • Recall the main organs of the digestive system **COMPREHENSION LEARNING** • Identify the main types of food eaten by carnivores, herbivores, and omnivores • Describe the differences and similarities between the digestive systems of carnivores, herbivores, and omnivores **VOCABULARY** Digestion, mechanical, chemical, teeth, stomach, oesophagus, small intestine, large intestine, rectum, anus, **Extension vocabulary**: peristalsis, villi, bile, chyme, pancreas, gall bladder, cellulose, etc. **PEDAGOGICAL STRATEGIES** **LEARNING THROUGH COGNITIVE VERBS:** Describe, identify, **Learning to learn:** Facilitate the use of a Jigsaw type activity with heterogeneous groups with well-defined group roles. **RESOURCES** • Education Perfect • OBI8 • T-Drive/Year 8	**Learning Sequence 7: Consolidation of Body Systems** **Practicing and deepening:** **COMPREHENSION LEARNING** • Explain how the organ systems (digestive and reproductive) of the human body contribute to its ability to survive and reproduce. **VOCABULARY** Digestion, mechanical, chemical, teeth, stomach, oesophagus, small intestine, large intestine, rectum, anus, **Extension vocabulary**: peristalsis, villi, bile, chyme, pancreas, gall bladder, cellulose, etc. **PEDAGOGICAL STRATEGIES** **LEARNING THROUGH COGNITIVE VERBS:** Explain **Learning through writing:** Write a factorial explanation of how the digestive and reproductive systems of the human body allow it to survive and reproduce. **RESOURCES** • Education Perfect • OBI8 • T-Drive/Year 8
9 23/03	**Revision**	**Revision**	**Revision**
10 30/03	**SUMMATIVE ASSESSMENT #2- SU and SIS (60 min.)**	**Extension** **Learning through Data**	**Extension** **Learning through Data**