



Manitoba Rural Learning Consortium Biology 11/Biology 12 Essential Learning Document

1. Acknowledgements
2. Introduction
3. Biology 11
 - a. Biology 11 Course Enduring Understandings, Cluster Zero, Skills Set
 - b. Unit 1: Wellness and Homeostasis
 - c. Unit 2: Digestion and Nutrition
 - d. Unit 3: Transportation and Respiration
 - e. Unit 4: Excretion and Waste Management
 - f. Unit 5: Protection and Control
 - g. Unit 6: Wellness and Homeostatic Changes

4. Biology 12

- a. Biology 12 Course Enduring Understandings, Cluster Zero, Skills Set
- b. Unit 1: Understanding Biological Inheritance
- c. Unit 2: Mechanisms of Inheritance
- d. Unit 3: Evolutionary Theory and Biodiversity
- e. Unit 4: Organizing Biodiversity
- f. Unit 5: Conservation of Biodiversity

Appendix

- a. Sample Grade Book Biology 11
- b. Sample Grade Book Biology 12

Acknowledgements

This document has been developed by Senior Years teachers from across rural Manitoba. The Manitoba Rural Learning Consortium (mRLC) Biology 30S and 40S Essential Learning Cohort was made up of the following members:

Julie Brunel	Fort la Bosse School Division
Chris Fisher	Mountain View School Division
Tim Frykoda	Park West School Division
Marc Hazlewood	Turtle River School Division
Cherylene Kentner	Turtle Mountain School Division
Rick Korman	Turtle Mountain School Division
Paula Shevernoha	Swan Valley School Division
Lynda Matchullis	mRLC Facilitator, Prairie Spirit School Division

Introduction

What does it mean to be biologically literate?

Biology students utilize a scientific perspective when thinking critically, making informed decisions, and applying their understandings to the world around them. Students demonstrate the following:

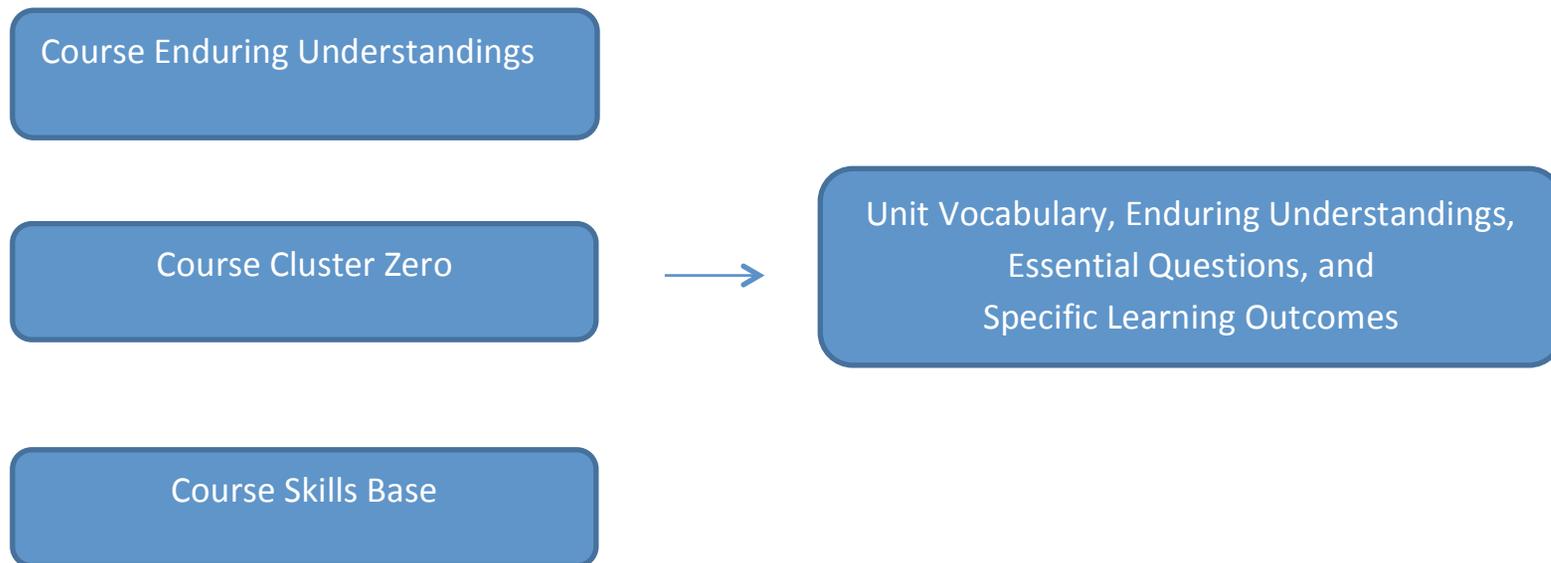
- demonstrate, appreciate and respect organisms and cultural perspectives related to biological topics that it has on life-long personal health and wellness in a changing world.
- use the process of scientific inquiry to think creatively about real-world issues that have a biological component
- apply knowledge and understanding of the “Big Ideas” in biology to help with personal interpretation and evaluation when making informed decisions
- understanding structure, function, and evolution of living organisms and systems
- the ability to use biologically specific tools as presented in your classroom

Examples: microscopes, incubators, dissection tools, biotechnology equipment, water quality kits, etc.

- understand that scientific theories are based on the best evidence of our time

How to read this document

Whether you like to see the big picture or prefer to go right to the detail, just follow this map.



Enduring Understandings for the Biology 11 Course

These enduring understandings exist for the entire Biology 11 course. They are addressed in each unit, along with a few additional enduring understandings that are specific to those units.

Categories	Enduring Understandings
Knowledge and Understanding	<ol style="list-style-type: none"> 1. Body systems must interact in order to work effectively. 2. Humans maintain homeostasis in order to support a variety of life processes. 3. Achieving a balanced state of homeostasis requires constant regulation. 4. Humans affect their personal wellness according to their individual and informed choices.
Scientific Inquiry	<ol style="list-style-type: none"> 1. Scientific inquiry requires use of specific skills developed along a continuum. 2. The scientific inquiry process is and is always open to improvement. 3. Biological inquiry demonstrates a sensitivity toward and respect for living and non-living tissues, specimens, and organisms utilized for biological research. 4. Lab and field safety is essential.
Decision-Making/ STSE	<ol style="list-style-type: none"> 1. Scientific research should consider STSE in any situation. 2. Effective decision-making requires careful consideration of a number of factors. 3. Scientific literacy is necessary to understand local and global issues. 4. Advances in medicine and biotechnology raise ethical considerations.

Cluster Zero is Embedded in Biology 11

Cluster Zero in Knowledge and Understanding	<p>Demonstrate Understanding (B11-0-U1 to B11-0-U2) (B12-0-U1 to B12-0-U2)</p> <p>Information Management and Communication (B11-0-I1 to B11-0-I4) (B12-0-I1 to B12-0-I4)</p> <p>Group Work (B11-0-G1 to B11-0-G3) (B12-0-G1 to B12-0-G3)</p>	<p>Working in Science (B11-0-W1 to B11-0-W2)</p> <p>Nature of Science (B12-0-N1 to B12-0-N3)</p>
Cluster Zero in Scientific Inquiry	<p>Personal perspectives/reflection (B11-0-P1 to B11-0-P4) (B12-0-P1 to B12-0-P5)</p> <p>Scientific Inquiry (B11-0-S1 to B11-0-S8) (B12-0-S1 to B12-0-S5)</p> <p>Information Management and Communication (B11-0-I1 to B11-0-I4) (B12-0-I1 to B12-0-I4)</p>	<p>Group Work (B11-0-G1 to B11-0-G3) (B12-0-G1 to B12-0-G3)</p> <p>Working in Science (B11-0-W1 to B11-0-W2)</p> <p>Nature of Science (B12-0-N1 to B12-0-N3)</p>
Cluster Zero in Decision-making	<p>Decision-Making (S11-0-D1 to S11-0-D6) (S12-0-D1 to S12-0-D6)</p> <p>Information Management and Communication (B11-0-I1 to B11-0-I4) (B12-0-I1 to B12-0-I4)</p>	<p>Group Work (B11-0-G1 to B11-0-G3) (B12-0-G1 to B12-0-G3)</p> <p>Working in Science (B11-0-W1 to B11-0-W2)</p> <p>Nature of Science (B12-0-N1 to B12-0-N3)</p>

Skills Base for Biology 11 Students

CRITICAL THINKING SKILLS	Demonstrate Identify Evaluate Apply	Plan Use Analyze Clarify	Select Appreciate Communicate Differentiate	State Record Propose Recommend	Document Recognize Illustrate Explain	Investigate Discuss Interpret Synthesize	Develop Describe
SCIENTIFIC INQUIRY SKILLS	1. Initiate Ask testable questions Justify methods		5. Implement a plan Conduct a fair test Use safe work habits Work cooperatively with others		8. Conclude and apply Draw conclusions Reflect on original hypothesis		
	2. Research Select, integrate, evaluate and summarize information		6. Observe, measure, and record Use proper tools and methods Estimate and measure using SI units Record observations effectively		9. Summarize learning		
	3. Plan Make a hypothesis and rationale Identify variable relationships		7. Analyze and interpret Interpret trends Explain discrepancies Suggest plan improvements		10. Reflect on Science and Technology		
	4. Make a plan				11. Demonstrate a Positive Attitude		
					12. Demonstrate sensitivity and respect for biological materials		
DECISION-MAKING SKILLS	1. Initiate Ask STSE questions Identify stakeholders		4. Implement a plan Test out options with a sample		7. Conclude and apply Decide on the best option Implement option		
	2. Research Review past history		5. Observe, Measure and Record Evaluate options using criteria		8. Reflect on decision-making process		
	3. Plan Summarize arguments Determine decision criteria Present options		6. Analyze and interpret Adjust options as needed		9. Reflect on science and technology		
					10. Demonstrate positive attitude		

Essential Vocabulary: wellness, homeostasis, negative feedback, thermoregulation, osmoregulation, waste management, adenosine triphosphate (ATP), passive transport, active transport, endocytosis, exocytosis, osmosis, diffusion, cell membrane

Knowledge and Understanding	Knowledge and Understanding	Scientific Inquiry	Scientific Inquiry	Decision-Making/ STSE	Decision-Making/ STSE
Enduring Understandings	Essential Questions	Enduring Understandings	Essential Questions	Enduring Understandings	Essential Questions
Body systems must interact to work effectively.	Why do human body systems need to interact? 1-04 homeostasis 1-06 life processes 1-09 ATP	<i>Note for planning to teach scientific inquiry skills:</i> There are different levels of inquiry, each of which either are more teacher-directed or student-directed (confirmatory, structured, guided and open). All should be utilized.			
Humans maintain homeostasis in order to support a variety of life processes.	How can you detect if your internal body is imbalanced? How would your growth be affected if your internal body was imbalanced? 1-04 homeostasis 1-05 negative feedback 1-06 life processes 1-07 cell membranes 1-08 cell transport 1-09 ATP	Scientific inquiry requires use of specific skills developed along a continuum. The scientific process is cyclic with certain steps that can be revisited and is always open to improvement. Biological inquiry demonstrates a sensitivity toward and respect for living and non-living tissues, specimens, and organisms utilized for biological research.	Use these questions any time you do a variety of labs or inquiries. How would you use scientific inquiry skills in everyday life? How do you know that you have conducted a fair test? How do you know when to move onto the next step in the inquiry? What have you learned from this inquiry?	Scientific research should consider the STSE in any situation. Effective decision-making requires careful consideration of a number of factors. Scientific literacy is necessary to understand local and global issues. Advances in medicine and biotechnology raise ethical considerations.	How do you conduct appropriate and valid research? How do you use scientific research to make an informed decision? How does scientific literacy affect your everyday life? How does the use of medicine and biotechnology challenge society's ethics? 1-01 personal wellness 1-01 wellness plan 1-02 Wellness Choices - wellness portfolio (p. 4) - wellness checkup (p. 5) - "Once Upon a Time" (p. 5) - my lifestyle choices 1-03 Personal Wellness Reflection (p. 7) - euthanasia
Achieving a balanced state of homeostasis requires constant regulation.	What is the role of energy in maintaining homeostasis in the cell? What would happen if a person was missing a negative feedback mechanism? 1-04 homeostasis 1-05 negative feedback 1-09 ATP	Lab and field safety is essential.	When working with specimens, what is respectful behaviour? How do you demonstrate appropriate work habits and consideration for the		

<p>Humans affect their personal wellness according to their individual and Informed choices.</p>	<p>How do personal choices affect wellness? What do you need to know about yourself, in order to make an informed wellness choice?</p> <p>1-01 personal wellness 1-02 wellness plan 1-03 wellness choices</p>		<p>environment?</p> <p>1-01 Personal Wellness - family history - wellness checkup</p> <p>1-02 Wellness Plan - wellness checkup</p>		<p>1-04 negative feedback - Case Study: Swim Race (Appendix 1.7) - use medical interventions</p> <p>1-09 ATP - Case Study: “How Do We Get Our Power?” (p. 25)</p>
<p>Life processes and energy transfer occur at the cellular level.</p>	<p>Why does the cell need more than one way to transport substances in and out?</p> <p>What homeostatic mechanisms would be disrupted by the absence of a cell membrane?</p> <p>1-06 life processes 1-07 cell membranes 1-08 cell transport 1-09 ATP</p>		<p>1-05 Negative Feedback - research inquiry - cold walk analysis</p> <p>1-06, 1-07 & 1-08 Cell Membranes and Transport - Investigating the Movement of Starch, Iodine, and Glucose (Appendix 1.9) - Cell size and Diffusion (Appendix 1.10) - Effects of Osmosis on Living Tissue (Appendix 1.11) - Concentration and Diffusion (Appendix 1.12) - Endocytosis Investigation (p.21)</p>		

Essential Vocabulary: tongue, teeth, salivary glands, epiglottis, esophagus, pharynx, sphincter, small intestine, large intestine, rectum, anus, appendix, liver, gall bladder, pancreas, uvula, mechanical digestion, chemical digestion, peristalsis, emulsification, carbohydrates, proteins, lipids, enzymes, absorption, alimentary canal, metabolism, vitamins, minerals, villi, nutrients

Knowledge and Understanding	Knowledge and Understanding	Scientific Inquiry	Scientific Inquiry	Decision-Making/ STSE	Decision-Making/ STSE
Enduring Understandings	Essential Questions	Enduring Understandings	Essential Questions	Enduring Understandings	Essential Questions
Humans maintain homeostasis in order to support a variety of life processes.	What happens to a body's regulation of homeostasis if its liver fails? What processes are in place to aid digestion, absorption, reabsorption, and elimination? 2-06 absorption 2-07 liver	<p><i>Note for planning to teach scientific inquiry skills:</i> There are different levels of inquiry, each of which either are more teacher-directed or student-directed (confirmatory, structured, guided and open). All should be utilized.</p> Scientific inquiry requires use of specific skills developed along a continuum. The scientific process is cyclic with certain steps that can be revisited and is always open to improvement.	How would you use scientific inquiry skills in everyday life? How do you know that you have conducted a fair test? How do you know that you have conducted a fair test? How do you know when to move onto the next step in the inquiry? What have you learned from this inquiry? When working with specimens, what is respectful behaviour?	Scientific research should consider STSE in any situation. Effective decision-making requires careful consideration of a number of factors. Scientific literacy is necessary to understand local and global issues. Advances in medicine and biotechnology raise ethical considerations.	How do you conduct appropriate and valid research? How do you use scientific research to make an informed decision? How does scientific literacy affect your everyday life? How does the use of medicine and biotechnology challenge society's ethics? 2-06 Microvillus Inclusion (p. 17) 2-07 Liver Resume (p. 19) 2-09 Cooking Class – cook healthy meals 2-11 What's My Diagnosis? (p. 21) 2-12 Decision Making Supersize Me
Achieving a balanced state of homeostasis requires constant regulation.	How does the liver regulate blood glucose levels? What are the implications to homeostasis when someone is diagnosed with diabetes? 2-07 liver	Biological inquiry demonstrates a sensitivity toward and respect for living and non-living tissues, specimens, and organisms utilized for biological research. Biological inquiry demonstrates a sensitivity toward and respect for living and non-living tissues, specimens, and organisms utilized for biological research.	How do you demonstrate appropriate work habits and consideration for the environment? 2-01 Dissecting Lab 2-02, 2-04 Mixing It Up (p. 24) Soda Cracker Lab 2-05 Enzyme Reaction		
Body systems must interact in order to work effectively.	What other body systems work with the digestive system to aid in nutrient acquisition? 2-01 structures and functions 2-07 liver 2-12 issues	Lab and field safety is essential.			
Humans affect their personal wellness	How do poor personal dietary choices intensify				

according to their individual and Informed choices.	digestive conditions, disorders and issues? 2-08 nutrients 2-09 dietary sources 2-10 nutritional decisions		Pineapple Enzyme Reaction (p. 24) Lipid Digestion		Hungry for Change Food Inc. Life is a Gift
The structures, functions and processes of the digestive system supply the body with the necessary nutrients required for life processes.	How do mechanical and chemical digestion work together to supply the body with the essential nutrients? 2-01 structures and functions 2-02 mechanical digestion 2-03 secretions 2-04 chemical digestion 2-05 enzymes 2-06 absorption 2-07 liver 2-08 nutrients		2-08, 2-09 Testing for Nutrients – What's In It? (p. 22) Nutrient Lunches (p. 23) 2-11 Investigate Food Labels (p. 24)		

Essential Vocabulary: blood, ABO blood groups, Rh factor, blood transfusions, blood pressure, cellular respiration, internal respiration, external respiration, blood vessels, systole, diastole, plasma, erythrocytes, leukocytes, platelets/thrombocytes, lungs, bronchi, bronchioles, alveoli, diaphragm, pleura, nasal cavity, epiglottis, pharynx, larynx, trachea, uvula, ribs, intercostal muscles, heart, ventricle, atrium, valves, chemoreceptor, medulla, oblongata, cardiovascular

Knowledge and Understanding	Knowledge and Understanding	Scientific Inquiry	Scientific Inquiry	Decision-Making/ STSE	Decision-Making/ STSE
Enduring Understandings	Essential Questions	Enduring Understandings	Essential Questions	Enduring Understandings	Essential Questions
Body systems must interact to work effectively.	<p>How do the circulatory and respiratory systems interact with other body systems to maintain homeostasis? (Consider tracing the path of an oxygen atom from inhalation to cellular respiration to exhalation as CO₂.)</p> <p>What components of the respiratory and circulatory system could you remove and still be able to survive?</p> <p>3-07 Materials transport 3-12 Transport Control of Homeostasis 3-14 Respiratory Structures and Functions</p>	<p><i>Note for planning to teach scientific inquiry skills:</i> There are different levels of inquiry, each of which either are more teacher-directed or student-directed (confirmatory, structured, guided and open). All should be utilized.</p> <p>Scientific inquiry requires use of specific skills developed along a continuum.</p> <p>The scientific process is cyclic with certain steps that can be revisited and is always open to improvement.</p> <p>Biological inquiry demonstrates a sensitivity toward and respect for living and non-living tissues, specimens, and organisms utilized for biological research.</p> <p>Lab and field safety is essential.</p>	<p>Use these questions any time you do a variety of labs or inquiries.</p> <p>How would you use scientific inquiry skills in everyday life?</p> <p>How do you know that you have conducted a fair test?</p> <p>How do you know when to move onto the next step in the inquiry?</p> <p>What have you learned from this inquiry?</p> <p>When working with specimens, what is respectful behaviour?</p> <p>How do you demonstrate appropriate work habits and consideration for the environment?</p> <p>3-01 Design own experiment</p>	<p>Scientific research should consider the STSE in any situation.</p> <p>Effective decision-making requires careful consideration of a number of factors.</p> <p>Scientific literacy is necessary to understand local and global issues.</p> <p>Advances in medicine and biotechnology raise ethical considerations.</p>	<p>How do you conduct appropriate and valid research?</p> <p>How do you use scientific research to make an informed decision?</p> <p>How does scientific literacy affect your everyday life?</p> <p>How does the use of medicine and biotechnology challenge society's ethics?</p> <p>3-01 Design own experiment 3-16 Disorders 3-17 Personal choices - investigate tobacco, pesticides, etc.</p>
Humans maintain homeostasis in order to support a variety of life processes.	<p>How do blood, blood vessels and the heart work together to maintain homeostasis in the body?</p> <p>How are materials exchanged during circulation and respiration?</p> <p>What would inadequate</p>				

	<p>oxygen levels in a building do to respiration and circulation rates of the workers?</p> <p>How are oxygen and carbon dioxide levels regulated throughout the body?</p> <p>3-12 Transport Control of Homeostasis 3-15 Respiration Control of Homeostasis</p>		<p>3-03,3-04, 3-05 Blood typing lab, "blood typing game" by Nobelprize.org</p> <p>3-02 Blood histology, microscope slides</p> <p>3-08 heart cells microscope slides</p> <p>3-06, 3-14 Heart & lung dissections</p> <p>3-09 ECG lab or application</p>		
<p>Achieving a balanced state of homeostasis requires constant regulation.</p>	<p>How do factors such as nicotine, beta-blockers, diuretics, hormones, etc. affect blood pressure and heart rate?</p> <p>How are blood pressure and cardiac function affected by lifestyle choices and genetic factors?</p> <p>What lifestyle choices affect cardiovascular and respiratory wellness?</p> <p>3-10 Blood Pressure 3-11 Factors Affecting Blood Pressure 3-16 Disorders 3-17 Lifestyle Choices</p>		<p>3-11 Factors affecting blood pressure and heart rates labs</p> <p>3-14, 3-15 Lung capacity lab</p>		
<p>Blood is a diverse tissue that regulates and maintains life processes.</p>	<p>How do the components of blood maintain homeostasis in the body?</p> <p>Where are the components of blood produced?</p> <p>Why is blood typing important for blood donation and transfusions?</p> <p>How are blood donors determined?</p>				

	<p>3-02 Blood components 3-03 Blood Groups 3-04 Transfusions 3-05 Blood Donation 3-12 Transport Control of Homeostasis</p>				
<p>Structure and function of circulatory and respiratory systems help maintain dynamic equilibrium in the human body.</p>	<p>How are the structures of the various blood vessels related to their role in the circulatory system?</p> <p>What characteristics of capillaries and cells enable the transport of materials (CO₂, O₂, hormones, nutrients, nitrogenous wastes)?</p> <p>How are breathing and heartbeat regulated?</p> <p>How is a blood pressure reading related to movement of blood through the heart and blood vessels?</p> <p>What are the differences between cellular respiration, internal respiration, and external respiration?</p> <p>3-06 Blood Vessels 3-07 Nutrient Transport 3-08 Cardiac Cycle 3-09 Heartbeat 3-10 Blood Pressure 3-11 Factors Affecting Blood pressure 3-13 Types of respiration 3-14 Respiratory Structures and Functions 3-15 Respiration</p>				

Essential Vocabulary: personal wellness, homeostasis, excretion, metabolic wastes, ammonia, urea, mineral salts, carbon dioxide, water, excretory structures, lungs, skin, liver, intestines, kidney, renal cortex, medulla, pelvis, renal artery, renal vein, ureters, urinary bladder, urethra, urinary sphincter, filtration, reabsorption, anti-diuretic

Knowledge and Understanding	Knowledge and Understanding	Scientific Inquiry	Scientific Inquiry	Decision-Making/STSE	Decision-Making/STSE
Enduring Understandings	Essential Questions	Enduring Understandings	Essential Questions	Enduring Understandings	Essential Questions
Body systems must interact in order to work effectively.	How is excretion different than the elimination of wastes from the digestive system? How does the excretory system interact with other body systems to maintain homeostasis? 4-01 Metabolic waste 4-02 Excretory structures 4-03 Liver 4-04 Urinary system 4-05 Nephron 4-06 Feedback 4-08 Renal failure	<i>Note for planning to teach scientific inquiry skills:</i> There are different levels of inquiry, each of which either are more teacher-directed or student-directed (confirmatory, structured, guided and open). All should be utilized. Scientific inquiry requires use of specific skills developed along a continuum. The scientific process is cyclic with certain steps that can be revisited and is always open to improvement. Biological inquiry demonstrates a sensitivity toward and respect for living and non-living tissues, specimens, and organisms utilized for biological research.	How would you use scientific inquiry skills in everyday life? How do you know that you have conducted a fair test? How do you know when to move onto the next step in the inquiry? What have you learned from this inquiry? When working with specimens, what is respectful behaviour?	Scientific research should consider the STSE in any situation. Effective decision-making requires careful consideration of a number of factors. Scientific literacy is necessary to understand local and global issues. Advances in medicine and biotechnology raise ethical considerations.	How do you conduct appropriate and valid research? How do you use scientific research to make an informed decision? How does scientific literacy affect your everyday life? How does the use of medicine and biotechnology challenge society's ethics? 4-08 Renal Failure - kidney dilemma lesson plan (curriculum p. 20) - Wellness Portfolio: Organ donation reflection (p.24) - You Are a Doctor (Appendix 4.3, p. 22); You Are the Patient (p. 23)
		Lab and field safety is essential.	How do you demonstrate appropriate work habits and consideration for the environment? 4-02 Excretory structures 4-05 Nephron - kidney dissection 4-07 Urinalysis		
Humans maintain homeostasis in order to support a variety of life processes.	As part of the excretory system, how are the liver, lungs, skin, and kidneys well-suited to maintaining homeostasis? Why is it important to stay hydrated? 4-01 Metabolic waste 4-02 Excretory structures				

	<p>4-03 Liver 4-04 Urinary system 4-06 Feedback</p>		<p>- urinalysis lab (Appendix 4.1) - research urine tests (p. 17) (ex. pregnancy tests, drug testing)</p>		
<p>Achieving a balanced state of homeostasis requires constant regulation.</p>	<p>What are the sources of primary metabolic wastes?</p> <p>How does each part of the nephron affect the composition of blood and urine (include water and solutes)?</p> <p>How do anti-diuretic hormone (ADH) and aldosterone regulate blood-water levels?</p> <p>4-01 Metabolic waste 4-02 Excretory structures 4-03 Liver 4-04 Urinary system 4-05 Nephron 4-06 Feedback</p>				
<p>Humans affect their personal wellness according to their individual and informed choices.</p>	<p>How can information gained through urinalysis be used to affect lifestyle choices? (consider diagnostic results, performance enhancing drugs etc.)</p> <p>What are the implications of living with kidney disease?</p> <p>4-06 Feedback 4-07 Urinalysis 4-08 Renal failure</p>				

Essential Vocabulary: skin, cilia, inflammatory, response, immune response, lymph vessels, lymph nodes, lymph, brain, concussion, synapse, action potential, drugs, automatic nervous system, somatic nervous system, allergen, vaccine, microbes, virus, bacteria, hormones

Knowledge and Understanding	Knowledge and Understanding	Scientific Inquiry	Scientific Inquiry	Decision-Making/ STSE	Decision-Making/ STSE
Enduring Understandings	Essential Questions	Enduring Understandings	Essential Questions	Enduring Understandings	Essential Questions
<p>Body systems must interact in order to work effectively.</p>	<p>How does the immune system provide protection to other body systems?</p> <p>Why is it important that the nervous system control other body systems?</p> <p>5-01 Protection 5-02 Barriers 5-03 Inflammatory & Immune Response 5-04 Protection & Control 5-06 Nervous System 5-07 The Brain 5-09 Nerve Impulse 5-10 Nervous & Hormonal Controls</p>	<p><i>Note for planning to teach scientific inquiry skills:</i> There are different levels of inquiry, each of which either are more teacher-directed or student-directed (confirmatory, structured, guided and open). All should be utilized.</p> <p>Scientific inquiry requires use of specific skills developed along a continuum.</p> <p>The scientific process is cyclic with certain steps that can be revisited and is always open to improvement.</p> <p>Biological inquiry demonstrates a sensitivity toward and respect for living and non-living tissues, specimens, and organisms utilized for biological research.</p> <p>Lab and field safety is essential.</p>	<p>How would you use scientific inquiry skills in everyday life?</p> <p>How do you know that you have conducted a fair test?</p> <p>How do you know when to move onto the next step in the inquiry?</p> <p>What have you learned from this inquiry?</p> <p>When working with specimens, what is respectful behaviour?</p> <p>How do you demonstrate appropriate work habits and consideration for the environment?</p> <p>5-03 Body's Response - Personal Records (p. 7)</p> <p>5-04 Public Health - Outbreak Scenario (p. 10)</p> <p>5-05, 5-06, 5-07 - Fooling Your Senses activity (p. 14)</p> <p>- "Split My Brain" Case</p>	<p>Scientific research should consider the STSE in any situation.</p> <p>Effective decision-making requires careful consideration of a number of factors.</p> <p>Scientific literacy is necessary to understand local and global issues.</p> <p>Advances in medicine and biotechnology raise ethical considerations.</p>	<p>How do you conduct appropriate and valid research?</p> <p>How do you use scientific research to make an informed decision?</p> <p>How does scientific literacy affect your everyday life?</p> <p>How does the use of medicine and biotechnology challenge society's ethics?</p> <p>5-03 Body's Response - personal choice for vaccinations</p> <p>5-04 Public Health - Outbreak Scenario - Vaccinate or Not... Case Study (p. 6)</p> <p>5-09 Concussions</p>
<p>Humans maintain homeostasis in order to support a variety of life processes.</p>	<p>How does a lack of sleep affect the protection and control of the human body?</p> <p>5-10 Nervous & Hormonal Controls</p>				
<p>Achieving a balanced state of homeostasis requires constant regulation.</p>	<p>What regulatory mechanisms accomplish dynamic equilibrium in the body?</p>				

	<p>5-01 Protection 5-09 Nerve Impulse 5-10 Nervous & Hormonal Controls</p>		<p>Study (p. 16) - neuro-chemical research (p. 18)</p> <p>5-08 Hormonal Controls - Negative Feedback activity (p. 21) - Fight or Flight activity (p. 22)</p> <p>5-12 Conditions & Disorders (p. 28)</p>		
<p>Humans affect their personal wellness according to their individual and informed choices.</p>	<p>What variety of factors compromise the human body's immune response and nervous system controls?</p> <p>Why do environmental factors compromise the human body's immune response and nervous system controls?</p> <p>5-8 Concussions 5-11 Lifestyle Choices & Environmental Factors 5-12 Disorders</p>				
<p>The human body utilizes a variety of defenses and barriers to maintain homeostasis.</p> <p>The central and peripheral nervous systems provides coordination and control to maintain dynamic equilibrium in the body.</p>	<p>What mechanisms provide defenses for the human body?</p> <p>How is homeostasis protected using the immune system in the human body?</p> <p>What are the implications to homeostasis when the body is invaded by allergens (vaccines/viruses/bacteria)?</p> <p>How can concussions impair our motor coordination?</p> <p>5-02 Barriers 5-03 Inflammatory & Immune Response 5-04 Protection & Control 5-06 Nervous System 5-07 The Brain 5-08 Concussions</p>				

	5-09 Nerve Impulse				
--	--------------------	--	--	--	--

Essential Vocabulary: homeostasis, aging, death, dying, euthanasia, palliative care, ethics, advanced directive, stem cells, anaesthetics, pharmaceuticals, autoimmune diseases

Knowledge and Understanding	Knowledge and Understanding	Scientific Inquiry	Scientific Inquiry	Decision-Making/ STSE	Decision-Making/ STSE
Enduring Understandings	Essential Questions	Enduring Understandings	Essential Questions	Enduring Understandings	Essential Questions
Body systems must interact in order to work effectively.	How do all body systems work together in order to maintain homeostasis? 6-01 Body systems	<p><i>Note for planning to teach scientific inquiry skills:</i> There are different levels of inquiry, each of which either are more teacher-directed or student-directed (confirmatory, structured, guided and open). All should be utilized.</p> <p>Scientific inquiry requires use of specific skills developed along a continuum.</p>	How would you use scientific inquiry skills in everyday life?	Scientific research should consider the STSE in any situation.	How do you conduct appropriate and valid research?
	Humans maintain homeostasis in order to support a variety of life processes.	<p>In what ways has technology created ethical dilemmas with respect to sustaining life? 6-03 Death</p> <p>Does homeostasis include using technology and pharmaceuticals to sustain life? 6-04 Dying</p> <p>Should an individual have the option to make end of life decisions? 6-05 Technology</p>	<p>The scientific process is cyclic with certain steps that can be revisited and is always open to improvement.</p> <p>Biological inquiry demonstrates a sensitivity toward and respect for living and non-living tissues, specimens, and organisms utilized for biological research.</p> <p>Lab and field safety is essential</p>		
Achieving a balanced state of homeostasis requires constant regulation.	<p>What effects does aging have on the different body systems?</p> <p>How does aging lead to the</p>		6-02 Aging simulation (yellow filter or black paper circles on eyes, ear plugs in, rubber gloves on,)		

	progressive failure of the interaction between the body systems? 6-02 Aging		http://fcs.tamu.edu/families/aging/aging_simulation/		
Death occurs as a result of disruption of homeostasis.	What is death? 6-03 Death How does the definition of death vary amongst cultures? 6-04 Dying				

Enduring Understandings for the Biology 12 Course

These enduring understandings exist for the entire Biology 12 course. They are addressed in most units, along with a few additional enduring understandings that are specific to those units.

Categories	Enduring Understandings
Knowledge and Understanding	<ol style="list-style-type: none"> 1. Principles of Inheritance provide an understanding of biodiversity. 2. Genetic testing is used to describe the results of meiosis and sexual reproduction. 3. Scientific discovery involves experimental research and collaboration. 4. Inheritance at the molecular level leads to genetic variability. 5. Evolution has led to biodiversity. 6. Genetic variation underlies observable evolutionary change. 7. Classification systems illustrate similarity and diversity amongst organisms resulting from evolutionary change. 8. Classification systems can change as we acquire new evidence. 9. Biodiversity requires monitoring and conservation.
Scientific Inquiry	<ol style="list-style-type: none"> 1. Scientific inquiry requires use of specific skills developed along a continuum. 2. The scientific inquiry process is and is always open to improvement. 3. Biological inquiry demonstrates a sensitivity toward and respect for living and non-living tissues, specimens, and organisms utilized for biological research. 4. Lab and field safety is essential.
Decision-Making/STSE	<ol style="list-style-type: none"> 1. Scientific research should consider STSE in any situation. 2. Effective decision-making requires careful consideration of a number of factors. 3. Scientific literacy is necessary to understand local and global issues. 4. Advances in medicine and biotechnology raise ethical considerations.

Cluster Zero is Embedded in Biology 12

Cluster Zero in Knowledge and Understanding	<p>Demonstrate Understanding (B11-0-U1 to B11-0-U2) (B12-0-U1 to B12-0-U2)</p> <p>Information Management and Communication (B11-0-I1 to B11-0-I4) (B12-0-I1 to B12-0-I4)</p> <p>Group Work (B11-0-G1 to B11-0-G3) (B12-0-G1 to B12-0-G3)</p>	<p>Working in Science (B11-0-W1 to B11-0-W2)</p> <p>Nature of Science (B12-0-N1 to B12-0-N3)</p>
Cluster Zero in Scientific Inquiry	<p>Personal perspectives/reflection (B11-0-P1 to B11-0-P4) (B12-0-P1 to B12-0-P5)</p> <p>Scientific Inquiry (B11-0-S1 to B11-0-S8) (B12-0-S1 to B12-0-S5)</p> <p>Information Management and Communication (B11-0-I1 to B11-0-I4) (B12-0-I1 to B12-0-I4)</p>	<p>Group Work (B11-0-G1 to B11-0-G3) (B12-0-G1 to B12-0-G3)</p> <p>Working in Science (B11-0-W1 to B11-0-W2)</p> <p>Nature of Science (B12-0-N1 to B12-0-N3)</p>
Cluster Zero in Decision-making	<p>Decision-Making (S11-0-D1 to S11-0-D6) (S12-0-D1 to S12-0-D6)</p> <p>Information Management and Communication (B11-0-I1 to B11-0-I4) (B12-0-I1 to B12-0-I4)</p>	<p>Group Work (B11-0-G1 to B11-0-G3) (B12-0-G1 to B12-0-G3)</p> <p>Working in Science (B11-0-W1 to B11-0-W2)</p> <p>Nature of Science (B12-0-N1 to B12-0-N3)</p>

Skills Base for Biology 12 Students

CRITICAL THINKING SKILLS	Demonstrate Identify Evaluate Apply	Plan Use Analyze Clarify	Select Appreciate Communicate Differentiate	State Record Propose Recommend	Document Recognize Illustrate Explain	Investigate Discuss Interpret Synthesize	Develop Describe
SCIENTIFIC INQUIRY SKILLS	1. Initiate Ask testable questions Justify methods		5. Implement a plan Conduct a fair test Use safe work habits Work cooperatively with others		8. Conclude and apply Draw conclusions Reflect on original hypothesis		
	2. Research Select, integrate, evaluate and summarize information		6. Observe, measure, and record Use proper tools and methods Estimate and measure using SI units Record observations effectively		9. Summarize learning		
	3. Plan Make a hypothesis and rationale Identify variable relationships		7. Analyze and interpret Interpret trends Explain discrepancies Suggest plan improvements		10. Reflect on Science and Technology		
	4. Make a plan				11. Demonstrate a Positive Attitude		
					12. Demonstrate sensitivity and respect for biological materials		
DECISION-MAKING SKILLS	11. Initiate Ask STSE questions Identify stakeholders		14. Implement a plan Test out options with a sample		17. Conclude and apply Decide on the best option Implement option		
	12. Research Review past history		15. Observe, Measure and Record Evaluate options using criteria		18. Reflect on decision-making process		
	13. Plan Summarize arguments Determine decision criteria Present options		16. Analyze and interpret Adjust options as needed		19. Reflect on science and technology		
					20. Demonstrate positive attitude		

Essential Vocabulary: inheritance, heredity, genetic segregation, dominance, independent-assortment, heterozygous, homozygous, genotype, phenotype, genetic cross, Punnett square, autosomal, monohybrid cross, dihybrid cross, test cross, P generation, F₁ generation, F₂ generation, phenotypic ratio, genotypic ratio, allele, dominant allele, recessive allele, purebred, hybrid, carrier, co-dominant, incomplete- dominance, multiple alleles, lethal genes, chromosomes, sex-linked, pedigree chart, trait, meiosis, genetic variability, offspring mutations, karyotype, crossing-over, randomness, nondisjunction

Knowledge and Understanding	Knowledge and Understanding	Scientific Inquiry	Scientific Inquiry	Decision-Making/ STSE	Decision-Making/ STSE
Enduring Understandings	Essential Questions	Enduring Understandings	Essential Questions	Enduring Understandings	Essential Questions
Principles of Inheritance provide an understanding of inheritance.	<p>How do Mendel's principles of inheritance explain heredity?</p> <p>How have Mendel's principles of inheritance informed current understanding of heredity?</p> <p>How can Punnett squares be used to predict the outcome of various crosses? (mono/di/test crosses, co/incomplete dominance, sex-linked lethal genes?)</p> <p>How can pedigrees be used to determine the mode of inheritance of genetic traits?</p> <p>1-01 Mendel's Principles 1-02 Heterozygous/ Homozygous 1-03 Genotype/ Phenotype 1-04 Autosomal Inheritance 1-05 Atypical Inheritance 1-06 Sex-determination</p>	<p><i>Note for planning to teach scientific inquiry skills:</i> There are different levels of inquiry, each of which either are more teacher-directed or student-directed (confirmatory, structured, guided and open). All should be utilized.</p>		<p>Scientific research should consider the STSE in any situation.</p> <p>Effective decision-making requires careful consideration of a number of factors.</p> <p>Scientific literacy is necessary to understand local and global issues.</p> <p>Advances in medicine and biotechnology raise ethical considerations.</p> <p>Testing involving genetics may cause ethical issues to arise.</p>	<p>How do you conduct appropriate and valid research?</p> <p>How do you use scientific research to make an informed decision?</p> <p>How does scientific literacy affect your everyday life?</p> <p>How does the use of medicine and biotechnology challenge society's ethics?</p> <p>How does the outcome of genetic testing result in ethical debate?</p> <p>What kind of genetic future are we planning?</p> <p>1-06 Genetic Testing - class discussions, guest speakers, role-play bioethical dilemma, letter to editor</p>
		<p>Scientific inquiry requires use of specific skills developed along a continuum.</p> <p>The scientific process is cyclic with certain steps that can be revisited and is always open to improvement.</p> <p>Biological inquiry demonstrates a sensitivity toward and respect for living and non-living tissues, specimens, and organisms utilized for biological research.</p> <p>Lab and field safety is essential.</p>	<p>How do you conduct appropriate and valid research?</p> <p>How do you use scientific research to make an informed decision?</p> <p>How does scientific literacy affect your everyday life?</p> <p>How does the use of medicine and biotechnology challenge society's ethics?</p> <p>How does the outcome of genetic testing result in ethical debate?</p> <p>What kind of genetic future are we planning?</p> <p>1-02 - Heterozygous/ Homozygous - examine family traits</p> <p>1-01 Autosomal Inheritance</p>		

	<p>1-07 Sex-linked Inheritance 1-08 Pedigrees</p>		<p>- Probability investigation - Inheritance pattern of a trait</p>		<p>Bioethical Dilemmas (Appendix 1.11)</p>
<p>Genetic testing is used to describe the results of meiosis and sexual reproduction.</p>	<p>How do meiosis and sexual reproduction contribute to genetic variability?</p> <p>How can karyotypes be used to identify genetic abnormalities?</p> <p>What is the purpose of taking a particular genetic test?</p> <p>1-02 - Heterozygous/ Homozygous - examine family traits</p> <p>1-01 Autosomal Inheritance - Probability investigation</p>		<p>1-02 Autosomal Inheritance - Punnett Squares - single trait inheritance</p> <p>1-03 Atypical Inheritance - Inheritance Problems</p> <p>Genetics Problems (Appendix 1.7, 1.8, 1.9)</p> <p>1-04 Sex-linked Inheritance - inheritance problems</p> <p>1-05 Pegigree (Appendix 1.10) - pedigree charts -pedigree analysis case study</p> <p>1-12 Mutations - Karyotype analysis</p> <p>Student lab skills (Appendix 1.3)</p> <p>Lab Skills Checklist General (Appendix 1.4A) Lab Skills Checklist Thinking (Appendix 1.4B) Scientific Inquiry (Appendix 1.5) Inquiry Feedback Form /Rating Scale (Appendix 1.6)</p>		<p>Decision Making (Appendix 1.12)</p> <p>Collaborative Process (Appendix 1.13)</p> <p>Listening Skills (Appendix 1.14)</p> <p>Letter to Editor (Appendix 1.15)</p> <p>Concept Frame (Appendix 1.16)</p>

Essential vocabulary: deoxyribonucleic acid (DNA), nucleotide, deoxyribose sugar, phosphate group, nitrogen base, double helix, base pairing, semi-conservative replication of DNA, template, ribonucleic acid (RNA), protein synthesis, m-RNA, codon, amino acid transcription, t-RNA, translation, anticodon, ribosome, mutation, frameshift

Knowledge and Understanding	Knowledge and Understanding	Scientific Inquiry	Scientific Inquiry	Decision-Making/ STSE	Decision-Making/ STSE
Enduring Understandings	Essential Questions	Enduring Understandings	Essential Questions	Enduring Understandings	Essential Questions
<p>Scientific discovery involves experimental research and collaboration.</p>	<p>What evidence was used to determine the structure of DNA?</p> <p>Is it fair to credit Watson and Crick alone for the discovery of the structure of DNA? 2-01 Contributors</p>	<p><i>Note for planning to teach scientific inquiry skills:</i> There are different levels of inquiry, each of which either are more teacher-directed or student-directed (confirmatory, structured, guided and open). All should be utilized.</p>		<p>Scientific research should consider the STSE in any situation.</p> <p>Effective decision-making requires careful consideration of a number of factors.</p> <p>Scientific literacy is necessary to understand local and global issues.</p> <p>Advances in medicine and biotechnology raise ethical considerations.</p>	<p>How do you conduct appropriate and valid research?</p> <p>How do you use scientific research to make an informed decision?</p> <p>How does scientific literacy affect your everyday life?</p> <p>How does the use of medicine and biotechnology challenge society's ethics?</p>
		<p>Scientific inquiry requires use of specific skills developed along a continuum.</p> <p>The scientific process is cyclic with certain steps that can be revisited and is always open to improvement.</p>	<p>How would you use scientific inquiry skills in everyday life?</p> <p>How do you know that you have conducted a fair test?</p> <p>How do you know when to move onto the next step in the inquiry?</p>		
<p>Inheritance at the molecular level leads to genetic variability.</p>	<p>How are proteins synthesized from a nucleotide sequence in DNA?</p> <p>How does the change of one base in a strand of DNA affect the intended protein?</p> <p>2-02 DNA nucleotide 2-03 DNA structure 2-04 DNA replication 2-05 DNA vs RNA 2-06 Protein Synthesis 2-07 Consequences of mutation 2-08 Mutation for genetic variation</p>	<p>Biological inquiry demonstrates a sensitivity toward and respect for living and non-living tissues, specimens, and organisms utilized for biological research.</p> <p>Lab and field safety is essential.</p>	<p>What have you learned from this inquiry?</p> <p>When working with specimens, what is respectful behaviour?</p> <p>How do you demonstrate appropriate work habits and consideration for the environment?</p> <p>2-01 DNA extraction p.8 2-01 DNA timeline p.10 2-09 Inner-city Science Center field trip p.38 2-10 Human Cloning research and debate p.46</p>	<p>2-01 The structure of DNA; cooperation and competition case study p.7</p> <p>2-08 Frame shift mutation questions p.30</p> <p>2-08 Mutations: Good or Bad Class discussion</p> <p>2-10 Role Play p.44</p> <p>2-10 Selecting the perfect baby (P. 48)</p>	

Essential vocabulary: evolution, Charles Darwin, Jean-Baptiste de Lamarck, Charles Lyell, Thomas Malthus, Alfred Russell, Wallace, fossils, natural selection, artificial selection, competition, adaptation, population, gene pool, variation, Hardy-Weinberg principle, alleles, gene flow, genetic-drift, Founder effect, Bottleneck effect, non-random mating, stabilizing selection, directional selection, disruptive/diversify selection, mutation, speciation, isolation, niche, differentiation, altered behaviour, altered physiology, convergent/divergent evolution, analogous/homologous structures, punctuated equilibrium, gradualism

Knowledge and Understanding	Knowledge and Understanding	Scientific Inquiry	Scientific Inquiry	Decision-Making/ STSE	Decision-Making/ STSE
Enduring Understandings	Essential Questions	Enduring Understandings	Essential Questions	Enduring Understandings	Essential Questions
Evolution has led to biodiversity.	How does natural selection contribute to evolution on a population basis?	<p><i>Note for planning to teach scientific inquiry skills:</i> There are different levels of inquiry, each of which either are more teacher-directed or student-directed (confirmatory, structured, guided and open). All should be utilized.</p> <p>Scientific inquiry requires use of specific skills developed along a continuum.</p> <p>The scientific process is cyclic with certain steps that can be revisited and is always open to improvement.</p> <p>Biological inquiry demonstrates a sensitivity toward and respect for living and non-living tissues, specimens, and organisms utilized for biological research.</p> <p>Lab and field safety is essential.</p>	<p>How would you use scientific inquiry skills in everyday life?</p> <p>How do you know that you have conducted a fair test?</p> <p>How do you know when to move onto the next step in the inquiry?</p> <p>What have you learned from this inquiry?</p> <p>When working with specimens, what is respectful behaviour?</p> <p>How do you demonstrate appropriate work habits and consideration for the environment?</p> <p>3-01 Evolution of a Style or Product (p. 5)</p> <p>3-02 Natural Selection Simulation (p. 16)</p>	<p>Scientific research should consider the STSE in any situation.</p> <p>Effective decision-making requires careful consideration of a number of factors.</p> <p>Scientific literacy is necessary to understand local and global issues.</p> <p>Advances in medicine and biotechnology raise ethical considerations.</p>	<p>How do you conduct appropriate and valid research?</p> <p>How do you use scientific research to make an informed decision?</p> <p>How does scientific literacy affect your everyday life?</p> <p>How does the use of medicine and biotechnology challenge society's ethics?</p> <p>1-01, 1-02 Personal wellness plan revisited</p>
	<p>In what ways did the Beagle Voyage contribute to Charles Darwin's Theory of Evolution?</p> <p>3-01 – Defining Evolution 3-05 – Natural Selection 3-06 – Effects of Natural Selection 3-07 – Artificial Selection 3-02 – Historical Context 3-03 - Natural Selection 3-04 - Adaptation</p>				
Genetic variation underlies observable evolutionary change.					

	<p>of evolutionary change?</p> <p>3-08 – Population Genetics 3-09 – Mechanisms for Genetic Variation 3-10 – Speciation 3-11 – Convergent and Divergent Evolution 3-12 – Pace of Evolutionary Change</p>		<p>3-04 What is an Adaptation? Adaptation Poster</p> <p>3-05 Howard Hughes Medical Institute "Rock Pocket Mouse"</p> <p>3-06 Investigating variation (p. 30)</p> <p>3-07 Artificial Selection Activity - U Berkley</p> <p>3-08 3-09 Hardy Weinberg (p. 36)</p> <p>PBS Online activities</p>		
--	---	--	---	--	--

Essential vocabulary: biodiversity, ecosystems, species, hybrids, classification, phenotypes, embryology, morphology, domain, kingdoms, gene pool, taxonomy

Knowledge and Understanding	Knowledge and Understanding	Scientific Inquiry	Scientific Inquiry	Decision-Making/STSE	Decision-Making/STSE
Enduring Understandings	Essential Questions	Enduring Understandings	Essential Questions	Enduring Understandings	Essential Questions
<p>Classification systems illustrate similarity and diversity amongst organisms resulting from evolutionary change.</p> <p>Classification systems can change as we acquire new evidence.</p>	<p>Why is it difficult to determine a definition of species?</p> <p>How is an organism classified?</p> <p>Why are classification systems continually being adjusted?</p> <p>What type of evidence is used to classify organisms and determine evolutionary relationships?</p> <p>What evidence is there to support the idea that pigeons are just rats with wings?</p> <p>What are the defining characteristics used to classify domains and kingdoms?</p> <p>4-02 defining species 4-03 nature of classification 4-04 evidence of classification 4-02 defining species</p>	<p><i>Note for planning to teach scientific inquiry skills:</i> There are different levels of inquiry, each of which either are more teacher-directed or student-directed (confirmatory, structured, guided and open). All should be utilized.</p> <p>Scientific inquiry requires use of specific skills developed along a continuum.</p> <p>The scientific process is cyclic with certain steps that can be revisited and is always open to improvement.</p> <p>Biological inquiry demonstrates a sensitivity toward and respect for living and non-living tissues, specimens, and organisms utilized for biological research.</p> <p>Lab and field safety is essential.</p>	<p>How would you use scientific inquiry skills in everyday life?</p> <p>How do you know that you have conducted a fair test?</p> <p>How do you know when to move onto the next step in the inquiry?</p> <p>What have you learned from this inquiry?</p> <p>When working with specimens, what is respectful behaviour?</p> <p>How do you demonstrate appropriate work habits and consideration for the environment?</p> <p>4-04 Archeological dig</p> <p>Animal diversity webquest</p> <p>4-07 How to Build a Cladogram</p> <p>4-07 dissections</p>	<p>Scientific research should consider the STSE in any situation.</p> <p>Effective decision-making requires careful consideration of a number of factors.</p> <p>Scientific literacy is necessary to understand local and global issues.</p> <p>Advances in medicine and biotechnology raise ethical considerations.</p>	<p>How do you conduct appropriate and valid research?</p> <p>How do you use scientific research to make an informed decision?</p> <p>How does scientific literacy affect your everyday life?</p> <p>How does the use of medicine and biotechnology challenge society's ethics?</p> <p>4-01 4-02 Something's fishy in Paxton Lake case study p. 8</p>

	4-03 nature of classification 4-04 evidence of classification 4-05 domains 4-06 kingdoms 4-07 evolutionary trend				
--	--	--	--	--	--

Essential vocabulary: stewardship, conservation, preservation, biodiversity, gene pool, economic value, sustainability, conservation, habitat preservation, wildlife corridors, species preservation programs, public education, field guides, dichotomous keys, quadrants, transects, mark and recapture, heritage seeds, water quality, land-use designations, hydroelectric development

Knowledge and Understanding	Knowledge and Understanding	Scientific Inquiry	Scientific Inquiry	Decision-Making/ STSE	Decision-Making/ STSE
Enduring Understandings	Essential Questions	Enduring Understandings	Essential Questions	Enduring Understandings	Essential Questions
Biodiversity requires monitoring and conservation.	How does sustainable development impact biodiversity? How have preservation strategies led to the conservation of biodiversity? 5-01 – maintain biodiversity 5-02- conservation strategies	<i>Note for planning to teach scientific inquiry skills:</i> There are different levels of inquiry, each of which either are more teacher-directed or student-directed (confirmatory, structured, guided and open). All should be utilized.			
		Scientific inquiry requires use of specific skills developed along a continuum. The scientific process is cyclic with certain steps that can be revisited and is always open to improvement. Biological inquiry demonstrates a sensitivity toward and respect for living and non-living tissues, specimens, and organisms utilized for biological research. Lab and field safety is essential.	How would you use scientific inquiry skills in everyday life? How do you know that you have conducted a fair test? How do you know when to move onto the next step in the inquiry? What have you learned from this inquiry? When working with specimens, what is respectful behaviour? How do you demonstrate appropriate work habits and consideration for the environment? 5-03- Select and use tools/ procedures to determine/monitor biodiversity (p. 22) - field guides	Scientific research should consider the STSE in any situation. Effective decision-making requires careful consideration of a number of factors. Scientific literacy is necessary to understand local and global issues. Advances in medicine and biotechnology raise ethical considerations.	How do you conduct appropriate and valid research? How do you use scientific research to make an informed decision? How does scientific literacy affect your everyday life? How does the use of medicine and biotechnology challenge society's ethics? 5-03- Select and use tools/ procedures to determine/ monitor biodiversity How can humans reduce their ecological footprint? (carbon footprint calculator) Caring for Our watersheds competition Lake Winnipeg - Save Our

			<ul style="list-style-type: none"> - quadrants - mark & recapture - hoop-nets - critter-dipping - drift-traps - dichotomous keys - transects - gill-nets - electrofishing - acoustic telemetry - didson sonar <p>5-04- Investigate an issue related to the conservation of biodiversity (p. 28)</p> <ul style="list-style-type: none"> - heritage seeds - water quality - land use designations - hydroelectric development - River Watch <p>Appendix 5.3 Riparian Zone Assessment</p>		<p>Lake video</p> <p>5-01 Values clarification</p> <p>Appendix 5.2</p>
--	--	--	--	--	--

Sample Grade Book **Biology 11**

Unit 3: Excretion and Waste Management *This is a sample of how a grade book could be organized by class.*

Students	Knowledge & Understanding					Scientific Inquiry Processes					STSE and Decision-making Processes				
	<ul style="list-style-type: none"> Body systems must interact in order to work effectively. Humans maintain homeostasis in order to support a variety of life processes. Achieving a balanced state of homeostasis requires constant regulation. Humans affect their personal wellness according to their individual and informed choices. Life process and energy transfers happen at the cellular level. 					<ul style="list-style-type: none"> Scientific inquiry requires use of specific skills developed along a continuum. The scientific inquiry process is and is always open to improvement. Biological inquiry demonstrates a sensitivity toward and respect for living and non-living tissues, specimens, and organisms utilized for biological research. Lab and field safety is essential. 					<ul style="list-style-type: none"> Scientific research should consider STSE in any situation. Effective decision-making requires careful consideration of a number of factors. Scientific literacy is necessary to understand local and global issues. Advances in medicine and biotechnology raise ethical considerations. 				
	Evidence of Learning					Evidence of Learning					Evidence of Learning				
	Assess 1	Assess 2	Assess 3	Assess 4	Overall (mode)	Assess 1	Assess 2	Assess 3	Assess 4	Overall (mode)	Assess 1	Assess 2	Assess 3	Assess 4	Overall (mode)

Sample Grade Book Biology 11

*This is a sample of how a **grade book** could be organized by individual student.*

Student Name (see specific enduring understandings for each cluster)	Knowledge & Understanding					Scientific Inquiry					Decision-making and STSE				
	Evidence of Learning					Evidence of Learning					Evidence of Learning				
	Assess 1	Assess 2	Assess 3	Assess 4	Overall (Mode)	Assess 1	Assess 2	Assess 3	Assess 4	Overall (mode)	Assess 1	Assess 2	Assess 3	Assess 4	Overall (mode)
Unit 1 Wellness and Homeostasis															
Unit 2 Digestion and Nutrition															
Unit 3 Transportation and Respiration															
Unit 4 Excretion and Waste Control															
Unit 5 Protection and Control															
Unit 6 Wellness and Homeostatic Changes															

Sample Grade Book Biology 12

Unit 3: Evolutionary Theory and Biodiversity

This is a sample of how a grade book could be organized by class.

Students	Knowledge & Understanding					Scientific Inquiry Processes					STSE and Decision-making Processes				
	<ul style="list-style-type: none"> Evolution has led to biodiversity. Genetic variation underlies observable evolutionary change. 					<ul style="list-style-type: none"> Scientific inquiry requires use of specific skills developed along a continuum. The scientific inquiry process is and is always open to improvement. Biological inquiry demonstrates a sensitivity toward and respect for living and non-living tissues, specimens, and organisms utilized for biological research. Lab and field safety is essential. 					<ul style="list-style-type: none"> Scientific research should consider STSE in any situation. Effective decision-making requires careful consideration of a number of factors. Scientific literacy is necessary to understand local and global issues. Advances in medicine and biotechnology raise ethical considerations. 				
	Evidence of Learning					Evidence of Learning					Evidence of Learning				
	Assess 1	Assess 2	Assess 3	Assess 4	Overall (mode)	Assess 1	Assess 2	Assess 3	Assess 4	Overall (mode)	Assess 1	Assess 2	Assess 3	Assess 4	Overall (mode)

Sample Grade Book Biology 12

*This is a sample of how a **grade book** could be organized by individual student.*

Student Name (see specific enduring understandings for each cluster)	Knowledge & Understanding					Scientific Inquiry					Decision-making and STSE				
	Evidence of Learning					Evidence of Learning					Evidence of Learning				
	Assess 1	Assess 2	Assess 3	Assess 4	Overall (Mode)	Assess 1	Assess 2	Assess 3	Assess 4	Overall (mode)	Assess 1	Assess 2	Assess 3	Assess 4	Overall (mode)
Unit 1 Understanding Biological Inheritance															
Unit 2 Mechanisms of Inheritance															
Unit 3 Evolutionary Change and Biodiversity															
Unit 4 Organizing Biodiversity															
Unit 5 Conservation of Biodiversity															