Ontario Science Curriculum

Grade 9 Academic

Reference	Expectations	The Wetlands	The Rainforest	The Desert
	By the end of this course, students will:	Use this title as a reference tool.		
SCIENCE **Biology:** **Reproduction**	describe cell division, including mitosis, as part of the cell cycle, including the roles of the nucleus, cell membrane, and organelles	(see the Digital Frog for correlation to Cell Division)		
	describe and give examples of types of sexual reproduction that occur in plants and in animals, including hermaphrodites (e.g., conjugation, cross-fertilization, internal and external fertilization)	A comparison of sexual and asexual reproduction is not covered in our titles, but examples of reproduction strategies can be found in the Organism screens of each of the three field trips, as well as the Animal Adaptations section in the Digital Field Trip to the Desert. The Botany section in the Digital Field Trip to the Rainforest covers seed, flower, and fruit structure.		

Ontario Science Curriculum

Grade 9 Applied

Reference	Expectations	The Wetlands	The Rainforest	The Desert
	By the end of this course, students will:	Use this title as a reference tool.		
SCIENCE **Biology:** **Reproduction** **Processes and Applications**	describe the basic process of cell division, including what happens to the cell membrane and the contents of the nucleus (e.g., stages of mitosis – prophase, metaphase, anaphase, and telophase)	(see the Digital Frog for correlation to Cell Division)		
	describe the various types of sexual reproduction that occur in plants and in animals, and identify some plants and animals, including hermaphrodites, that exhibit this type of reproduction	A comparison of sexual and asexual reproduction is not covered in our titles, but examples of reproduction strategies can be found in the Organism screens of each of the three fieldtrips, as well as the Animal Adaptations section in the Digital Field Trip to the Desert. The Botany section in the Digital Field Trip to the Rainforest covers seed, flower, and fruit structure.		

Ontario Science Curriculum

Grade 10 Academic

Reference	Expectations	The Wetlands	The Rainforest	The Desert
	By the end of this course, students will:			
Biology: The Sustainability of Ecosystems	demonstrate an understanding of the dynamic nature of ecosystems, including the relationship between ecological balance and the sustainability of life	Web Game	Web Game	Build-a-Desert
	investigate factors that affect ecological systems and the consequences of changes in these factors	Web Game, Productivity, Nutrient Cycles,	Web Game, Succession, Tree Fall Gaps, Soils & Decomposition, Forest Strata, Seasonality, Water Cycle	Build-a-Desert Game, Climatic Influences screens, Water Availability, What is a Desert?, Aridity Types
	analyze issues related to environmental sustainability and the impact of technology on ecosystems	Conservation, Pollution, Endangered Wetlands	Human Impact, Impact screens, Succession	Human Impact, Impact screens, Desertification
	describe the processes of photosynthesis and cellular respiration as they relate to the cycling of energy, carbon, and oxygen through abiotic and biotic components of an ecosystem	Photosynthesis, Nutrient Cycles		
	illustrate the cycling of matter through biotic and abiotic components of an ecosystem by tracking nitrogen	Nutrient Cycles (Nitrogen)		
	explain the process of bioaccumulation and assess its potential impact on the viability and diversity of consumers at all trophic levels	Decomposer, Producer, Consumer, Food Chains	Soils and Decomposition, Productivity	
	examine the factors (natural & external) that affect the survival and equilibrium of populations in an ecosystem (e.g., resource limits of an ecosystem, competing populations, bioaccumulation, selective decline)	Web Game, Conservation, Pollution	Web Game, Climate, Human Impact, Impact screens	Build-a-Desert, Human Impact, Desertification, Impact on the Desert
	examine how abiotic factors affect the survival & geographical location of biotic communities (e.g., explain why deserts exist in different parts of the world)	Plant Adaptations, Nutrient Cycles, Mechanisms	Tropical Types screens, Tropical vs. Temperate, Mechanisms screens,	What is a Desert, World Desert screens, Climatic Influences screens

Grade 10 Academic cont'd				
Reference	**Expectations**	**The Wetlands**	**The Rainforest**	**The Desert**
	By the end of this course, students will:			
Biology: The Sustainability of Ecosystems	explain why different ecosystems respond differently to short-term stresses and long-term changes	Wetlands Mechanisms, Adaptations (Plant & Animal)	Human Impact, Impact screens	Impact screens, Desertification
	explain how soil composition and fertility can be altered in an ecosystem and identify the possible consequences of such changes.		Soils and Decomposition	Weathering, Impact on the Desert
Earth and Space Science: Weather Dynamics	demonstrate an understanding of the factors affecting the fundamental processes of weather systems		Climate	Climatic Influences screens
	describe and explain heat transfer in the hydrosphere and atmosphere and its effects on air and water currents			High Pressure Zones, Cold Ocean Currents, Rain Shadows
	investigate factors which affect the development, severity, and movement of global and local weather systems (e.g., the ozone layer, El Niño, bodies of water, glaciers, smog, rain forests		Climate	Climatic Influences screens

Ontario Science Curriculum

Grade 10 Applied

Reference	Expectations	The Wetlands	The Rainforest	The Desert
	By the end of this course, students will:			
Biology: Ecosystems and Human Activity	demonstrate an understanding of ecosystems, including the relationship between ecological balance and the sustainability of life	Web Game	Web Game	Build-a-Desert
	analyze natural and human threats to a local ecosystem and propose viable solutions to restore ecological balance	Web Game, Productivity, Nutrient Cycles, Conservation, Pollution	Web Game, Succession, Soils & Decomposition, Seasonality, Water Cycle, Human Impact, Impact screens	Build-a-Desert, Climatic Influences screens, What is a Desert?, Aridity Types, Water Availability, Impact screens, Desertification
	relate issues to environmental sustainability with a particular focus on issues in Ontario and Canada	Conservation, Pollution, Adopt-A-Pond		
	describe the processes of photosynthesis and cellular respiration as they relate to the cycling of energy, carbon, and oxygen through abiotic and biotic components of an ecosystem	Photosynthesis, Nutrient Cycles		
	illustrate the cycling of matter through biotic and abiotic components of an ecosystem by tracking nitrogen	Nutrient Cycles (N)		
	illustrate the process of bioaccumulation and assess its potential impact on the viability and diversity of consumers at all trophic levels	Decomposer, Producer, Consumer, Food Chains	Soils and Decomposition, Productivity	
	explain why ecosystems with similar characteristics can exist in different geographical locations (e.g., explain why deserts exist in different parts of the world);	link to Wetland Types screens	Climate, Rainforest of the World, Tropical Rainforests, Temperate Rainforest, Tropical Types	Deserts of the World, Climatic Influences screens
	describe how different ecosystems respond differently to short-term stresses and long-term changes	Plant & Animal Adaptations (seasonal stress), Conservation, Pollution, Migration	Mechanisms screens, Biodiversity Screens, Human Impact, Impact screens	Impact screens, Desertification

Grade 10 Applied cont'd				
Reference	**Expectations**	**The Wetlands**	**The Rainforest**	**The Desert**
	By the end of this course, students will:			
Biology: **Ecosystems and Human Activity**	explain how soil composition and fertility can be altered in an ecosystem and identify the possible consequences of such changes		Soils and Decomposition, Impact screens	Weathering, Impact on the Desert
Earth and Space Science: **Weather Systems**	demonstrate an understanding of the factors affecting the fundamental processes of weather systems		Climate	Climatic Influences screens
	describe and illustrate the factors affecting heat transfer within the water cycle in the atmosphere (e.g., temperature, pressure, humidity, winds)		Climate, Water Cycle	High Pressure Zones, Rain Shadows
	describe the factors relating to the rotation of the Earth that cause the movement of air masses and variations in the Earth's temperature			High Pressure Zones
	describe and explain heat transfer in the hydrosphere and atmosphere and its effects on air and water currents			High Pressure Zones, Rain Shadows, Cold Ocean Currents

Ontario Science Curriculum

Grade 11 University Preparation

Reference	Expectations	The Wetlands	The Rainforest	The Desert
	By the end of this course, students will:			
Biology: Internal Systems and Regulation	describe and explain the major processes, mechanisms, and systems, by which plants and animals maintain their internal environment;	Plant and Animal Adaptations, Organism screens	Organism screens	Plant and Animal Adaptations, Organism screens
	describe the process of ventilation and gas exchange from the environment to the cell (e.g., describe the pathway of oxygen from the atmosphere to the cell)	Photosynthesis	stomata	
	explain the role of transport or circulatory systems in the transport of substances in an organism			Botany: Roots, Stems
	describe the importance of nutrients and digestion in providing substances needed for energy and growth (e.g. describe how plants use nutrients)	Photosynthesis, Web Game	Web Game	Build-a-Desert
	design and carry out, in a safe and accurate manner, an experiment on feedback mechanisms, identifying specific variables			use Feedback Systems as model
Biology: Diversity of Living Things	demonstrate an understanding of the diversity of living organisms through applying the concepts of phylogeny and taxonomy to the kingdoms of life (including Eubacteria and Archeabacteria) and viruses;	Organism screens	Organism screens	Organism screens
	relate the role of common characteristics and diversity within the kingdoms of life (including Eubacteria and Archeabacteria) to the importance of maintaining biodiversity within natural ecosystems		Biodiversity, Biodiversity screens	
	define the fundamental principles of taxonomy & phylogeny (e.g., provide definitions of concepts such as genus, species, & taxon, & explain how species are categorized and named according to structure and/or evolutionary history);	use Organism screens for comparison	use Organism screens for comparison	use Organism screens for comparison

Ontario Science Curriculum

Grade 11 University Preparation cont'd

Reference	Expectations	The Wetlands	The Rainforest	The Desert
	By the end of this course, students will:			
Biology: Internal Systems and Regulation	classify representative organisms from each of the kingdoms	use Organism screens for comparison	use Organism screens for comparison	use Organism screens for comparison
	use appropriate sampling procedures to collect various organisms in a marsh, pond, or other ecosystem, and classify them following the principles of taxonomy	use Organism screens for comparison	use Organism screens for comparison	use Organism screens and Plant and Animal Adaptations screens for comparison
	demonstrate an understanding of the connection between biodiversity and species survival (e.g., state the advantages to a population of having genetic variations		Biodiversity, Biodiversity screens	
	demonstrate an understanding, based in part on their own investigations, of the connections among the factors that affect the growth of plants, the uses of plants, and the ways in which plants adapt to their environment	Plant adaptations, Plant Organisms screens	Rainforest Riches, Plants section, Plant Organism screens	Plant Adaptations, Plant Organism screens
Biology: Plants, Anatomy, Growth, and Functions	illustrate the process of succession and the role of plants in the maintenance of diversity and the survival of organisms	view Bog Formation animation	Succession	
	describe the structure and function of the components of each of the leaf, the stem, and the root of a representative vascular plant		Botany screens, Trees screens, Vines screens,	
	differentiate between monocot and dicot plants by observing and comparing the structure of their seeds and identifying vascular differences between plants		Botany screens	
	identify, using a microscope and models, the plant tissues in roots, stems, and leaves (e.g., use a microscope to identify tissues such as xylem and phloem throughout the plant)		refer to Botany screens (especially Stems)	

Ontario Science Curriculum

Grade 11 College Preparation

Reference	Expectations	The Wetlands	The Rainforest	The Desert
	By the end of this course, students will:			
Biology: Plant Structure & Physiology	demonstrate an understanding of the diversity of plants, and of their internal transport systems, reproduction, and growth	compare Plant Organism screens	compare Plant Organism screens, entire Plant section	compare Plant Organism screens, Plant Adaptations screens
	evaluate the roles of plants in the urban community, in various technologies and industries, and in natural ecosystems	natural environment - Food Chains, Food Web, Web Game, Plant Organism screens	Rainforest Riches, Impact screens, Web Game, Plant Organism screens	Plant Organism screens, Impact on the Desert (agriculture, etc.)
	illustrate how plants are classified by identifying similar and different characteristics of different types of plants	compare Plant Organism screens	compare Plant Organism screens, Plants section, Botany screens, Vines screens, Epiphytes screens	compare Plant Organism screens
	describe the structure and physiology of plant tissues		Botany screens	
	distinguish between monocot and dicot plants, using appropriate instruments and sources		Botany screens	
	outline the use of plants in the food, textile, pharmaceutical, and fresh produce industries	examples in Plant Organism screens	examples in Plant Organism screens, Rainforest Riches	examples in Plant Organism screens
Biology: Environ-mental Science	demonstrate an understanding of factors that influence the sustainability of the natural environment and evaluate their importance	Endangered Wetlands screens	Human Impact, Impact screens	Impact on the Desert, Desertification
	explain why it is important to be aware of the impact of human activities on the natural environment	Endangered Wetlands screens	Human Impact, Impact screens	Impact on the Desert, Desertification
	demonstrate an understanding of the fun-damental principles of taxonomy by classi-fying organisms from a local ecosystem	examples in Organism screens	examples in Organism screens	examples in Organism screens
	assess the impact of agriculture on the natural environment	Conservation, Pollution	Impact screens: Slash & burn Agriculture, Sustainable Slash & Burn, Large-Scale Agriculture, Plantations,	Impact on the Desert

Ontario Science Curriculum

Grade 11 College Preparation cont'd

Reference	Expectations	The Wetlands	The Rainforest	The Desert
	By the end of this course, students will:			
Biology: Environ-mental Science	describe and explain examples of symbiotic relationships		Ant Symbiosis, Dependency Types	
	describe the flow of matter through the biogeochemical cycles (e.g., describe and illustrate the carbon, nitrogen, phosphorus, and water cycles)	Nutrient Cycles, Carbon, Water, Nitrogen, Phosphorus	Water Cycle	
	collect specimens in a local environment, and classify the specimens by applying the principles of taxonomy	use Organisms screens for examples	use Organisms screens for examples	use Organisms screens for examples
	investigate and explain how a change in one population can affect the entire food web	Web Game	Web Game	Build-a-Desert Game
	investigate, independently or collaboratively, the effect that human population growth has on the environment and the quality of life (e.g., examine effects, such as the movement or elimination of wildlife and plants, that are caused by the encroachment of human populations on ecosystems)	Endangered Wetlands, Conservation, Pollution	Human Impact, Impact screens	Impact on the Desert

Ontario Science Curriculum

Grade 11 Workplace Preparation

Reference	Expectations	The Wetlands	The Rainforest	The Desert
	By the end of this course, students will:			
Science: **Human Impact on the Environment**	demonstrate an understanding of the impact of humans on the environment, and assess alternative courses of action to protect the environment	refer to: Endangered Wetlands, Conservation, Pollution, Habitat, Migration	refer to: Human Impact, Impact screens	refer to: Impact on the Desert
	evaluate, using data obtained from experiments and from print and electronic sources, the costs and benefits to society and the environment of introducing a particular technology or of protecting or not protecting a specific environment	refer to: Endangered Wetlands, Conservation, Pollution, Habitat, Migration	Human Impact, refer to: Impact screens	refer to: Impact on the Desert

Ontario Science Curriculum

Grade 12 University Preparation

Reference	Expectations	The Wetlands	The Rainforest	The Desert
	By the end of this course, students will:			
Biology: Homeostasis	describe and explain the physiological and biochemical mechanisms involved in the maintenance of homeostasis			Homeostasis, Compare Homeostasis
	analyse, through experiments and the use of models, the feedback mechanisms that maintain chemical and physical homeostasis in animal systems			see model in Feedback Systems
Biology: Evolution	analyse evolutionary mechanisms, and the processes and products of evolution		Biodiversity, Biodiversity screens	Plant and Animal Adaptations screens
	define the concept of speciation and explain the mechanisms of speciation		Biodiversity, Biodiversity screens	
	explain, using examples, the process of adaptation of individual organisms to their environment	see Plant and Animal Adaptations for examples of adaptations		see Plant and Animal Adaptations for examples of adaptations
Biology: Population Dynamics	**e**xplain the concepts of interaction (e.g., competition, predation, defence mechanisms, symbiotic relationships, parasitic relationships) among different species of animals and plants		Dependency Types	
	investigate, individually or collaboratively, the effects of human population growth on the environment and the quality of life (e.g., effects on ecosystems, such as the elimination of wildlife, plants, and farm-land; causes and effects of ozone depletion or acid rain)	Endangered Wetlands screens: Conservation, Habitat, Pollution, Migration	Human Impact, all Impact screens	Human Impact, Impact on the Desert, Desertification
Earth & Space Science: Introduction to Earth Sciences	assess the impact of natural forces and systems on the Earth's physical and human environments, as well as the impact of human activities on natural systems	Wetlands Mechanism screens, Endangered Wetlands screens: Conservation, Habitat, Pollution, Migration	Mechanisms screens, Human Impact, all Impact screens	Mechanisms screens, Human Impact, Impact on the Desert, Desertification
	explain the interactions of the atmosphere & hydrosphere in the water cycle, & the impact of these interactions on humans		Water Cycle	

Ontario Science Curriculum

Grade 12 University Preparation cont'd

Reference	Expectations	The Wetlands	The Rainforest	The Desert
	By the end of this course, students will:			
Earth & Space Science: Earth Materials	distinguish between minerals and rocks, and describe the formation and characteristics of both			Rocks and Minerals
	demonstrate an understanding of society's dependence on Earth materials, of the effects of developments in technology on the exploration and mining of Earth materials, and of the ways in which the use and extraction of Earth materials have affected natural and human-made environments		Impact screens: Mining	Impact on the Desert
	explain (e.g., by interpreting a rock cycle diagram) how rocks and their constituent minerals are continuously being recycled			Rocks and Minerals (workbook), Landscape Formation screens
Earth & Space Science: Internal & Surficial Earth Processes	identify the processes at work within the Earth (e.g., plate tectonics, earthquakes, volcanism) and on its surface (e.g., running water, weathering and erosion, mass wasting, glaciation), and describe the role of both types of processes in shaping the Earth's surface			Landscape Formation, Landforms Quiz, Weathering, Water screens, Wind screens
	distinguish between erosion and weathering, and describe the processes and effects of physical, chemical, and biological weathering			Weathering, Landscape Formation, Wind screens, Water screens
	identify types of sediment transport (e.g., wind, water, glacial), & compare the particle size & shape, degree of sorting, & sedimentary structures resulting from each			Wind transportation
	demonstrate an understanding of the importance of aquifers and of their fragility in terms of contamination and depletion.			Water Availability