ELEMENTS OF BIOLOGY

Organization and Development of Living Organisms	Student Text	Practice Book	Teacher Resource Edition Activities & Projects
SC.912.L.14.1 Describe the scientific theory of cells (cell theory) and relate the history of its discovery to the process of science.	33	33	Ch7
SC.912.L.14.2 Relate structure to function for the components of plant and animal cells. Explain the role of cell membranes as a highly selective barrier (passive and active transport).	34, 35, 36, 37, 38, 39, 40, 41, 42, 43	34, 35, 36, 37, 38, 39, 40, 41, 42, 43	Ch7, Ch8, Ch10, Ch20
SC.912.L.14.3 Compare and contrast the general structures of plant and animal cells. Compare and contrast the general structures of prokaryotic and eukaryotic cells.	34, 35, 36, 37, 38, 39, 40, 41, 42, 43	34, 35, 36, 37, 38, 39, 40, 41, 42, 43	Ch7, Ch8, Ch10, Ch20
SC.912.L.14.4 Compare and contrast structure and function of various types of microscopes.	33, 36	33, 36	
SC.912.L.14.5 Explain the evidence supporting the scientific theory of the origin of eukaryotic cells (endosymbiosis).			
SC.912.L.14.6 Explain the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspectives of both individual and public health.	183, 184, 185, 186	183, 184, 185, 186	Ch36
SC.912.L.14.7			

Relate the structure of each of the major plant organs and tissues to physiological processes.	125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155	125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155	Ch25, Ch26, Ch27, Ch28, Ch29, Ch30
SC.912.L.14.8 Explain alternation of generations in plants.	126, 149, 150	126, 149, 150	Ch29
SC.912.L.14.9 Relate the major structure of fungi to their functions.	97, 101, 102, 103	97, 101, 102, 103	
SC.912.L.14.10 Discuss the relationship between the evolution of land plants and their anatomy.	153	153	
SC.912.L.14.11 Classify and state the defining characteristics of epithelial tissue, connective tissue, muscle tissue, and nervous tissue.	36, 167, 168, 169	36, 167, 168, 169	Ch11, Ch33
SC.912.L.14.12 Describe the anatomy and histology of bone tissue.	36, 169	36, 169	Ch31, Ch33
SC.912.L.14.13 Distinguish between bones of the axial skeleton and the appendicular skeleton.			Ch31
SC.912.L.14.14 Identify the major bones of the axial and appendicular skeleton.	169	169	
SC.912.L.14.15			

Identify major markings (such as foramina, fossae, tubercles, etc.) on a skeleton. Explain why these markings are important.			
SC.912.L.14.16 Describe the anatomy and histology, including ultrastructure, of muscle tissue.	167, 169	167, 169	Ch33
SC.912.L.14.17 List the steps involved in the sliding filament of muscle contraction.	169	169	
SC.912.L.14.18 Describe signal transmission across a myoneural junction.	174	174	Ch34
SC.912.L.14.19 Explain the physiology of skeletal muscle.	169	169	Ch33
SC.912.L.14.20 Identify the major muscles of the human on a model or diagram.	169	169	Ch33
SC.912.L.14.21 Describe the anatomy, histology, and physiology of the central and peripheral nervous systems and name the major divisions of the nervous system.	174	174	Ch34
SC.912.L.14.22 Describe the physiology of nerve conduction, including the generator potential, action potential, and the synapse.	174	174	Ch34
SC.912.L.14.23			

Identify the parts of a reflex arc.	180	180	
SC.912.L.14.24 Identify the general parts of a synapse and describe the physiology of signal transmission across a synapse.	174	174	Ch34
SC.912.L.14.25 Identify the major parts of a cross section through the spinal cord.	175, 176	175, 176	Ch31
SC.912.L.14.26 Identify the major parts of the brain on diagrams or models.	175, 176	175, 176	
SC.912.L.14.27 Identify the functions of the major parts of the brain, including the meninges, medulla, pons, midbrain, hypothalamus, thalamus, cerebellum and cerebrum.	174, 175, 176	174, 175, 176	
SC.912.L.14.28 Identify the major functions of the spinal cord.	174	174	Ch31
SC.912.L.14.29 Define the terms endocrine and exocrine.	173	173	
SC.912.L.14.30 Compare endocrine and neural controls of physiology.	173	173	
SC.912.L.14.31 Describe the physiology of hormones including the different types and the mechanisms of their action.	173	173	

SC.912.L.14.32 Describe the anatomy and physiology of the endocrine system.	173	173	
SC.912.L.14.33 Describe the basic anatomy and physiology of the reproductive system.	179, 180, 181	179, 180, 181	
SC.912.L.14.34 Describe the composition and physiology of blood, including that of the plasma and the formed elements.	177, 178	177, 178	
SC.912.L.14.35 Describe the steps in hemostasis, including the mechanism of coagulation. Include the basis for blood typing and transfusion reactions.			Ch35
SC.912.L.14.36 Describe the factors affecting blood flow through the cardiovascular system.	178	178	Ch35
SC.912.L.14.37 Explain the components of an electrocardiogram.			
SC.912.L.14.38 Describe normal heart sounds and what they mean.	178	178	Ch35
SC.912.L.14.39 Describe hypertension and some of the factors that produce it.	178	178	Ch35
SC.912.L.14.40			

Describe the histology of the major arteries and veins of systemic, pulmonary, hepatic portal, and coronary circulation.	177, 178	177, 178	Ch35
SC.912.L.14.41 Describe fetal circulation and changes that occur to the circulatory system at birth.			
SC.912.L.14.42 Describe the anatomy and the physiology of the lymph system.	177	177	
SC.912.L.14.43 Describe the histology of the respiratory system.	172	172	
SC.912.L.14.44 Describe the physiology of the respiratory system including the mechanisms of ventilation, gas exchange, gas transport and the mechanisms that control the rate of ventilation.	172	172	Ch34
SC.912.L.14.45 Describe the histology of the alimentary canal and its associated accessory organs.	170	170	
SC.912.L.14.46 Describe the physiology of the digestive system, including mechanical digestion, chemical digestion, absorption and the neural and hormonal mechanisms of control.	170	170	Ch33
SC.912.L.14.47 Describe the physiology of urine formation by the kidney.	171	171	

SC.912.L.14.48 Describe the anatomy, histology, and physiology of the ureters, the urinary bladder and the urethra.	171	171	
SC.912.L.14.49 Identify the major functions associated with the sympathetic and parasympathetic nervous systems.	174	174	
SC.912.L.14.50 Describe the structure of vertebrate sensory organs. Relate structure to function in vertebrate sensory systems.	174	174	
SC.912.L.14.51 Describe the function of the vertebrate integumentary system.	168	168	
SC.912.L.14.52 Explain the basic functions of the human immune system, including specific and nonspecific immune response, vaccines, and antibiotics.	184, 185	184, 185	Ch36
SC.912.L.14.53 Discuss basic classification and characteristics of plants. Identify bryophytes, pteridophytes, gymnosperms, and angiosperms.	126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155	126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155	Ch25, Ch26, Ch27, Ch28, Ch29, Ch30

Diversity and Evolution of Living Organisms	Student Text	Practice Book	Teacher Resource Edition Activities & Projects
SC.912.L.15.1 Explain how the scientific theory of evolution is supported by the fossil record, comparative anatomy, comparative embryology, biogeography, molecular biology, and observed evolutionary change.	92, 106, 107, 108, 109	92, 106, 107, 108, 109	Ch21
SC.912.L.15.2 Discuss the use of molecular clocks to estimate how long ago various groups of organisms diverged evolutionarily from one another.			
SC.912.L.15.3 Describe how biological diversity is increased by the origin of new species and how it is decreased by the natural process of extinction.	92, 109	92, 109	Ch21, Ch22
SC.912.L.15.4 Describe how and why organisms are hierarchically classified and based on evolutionary relationships.	95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109	95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109	Ch19
SC.912.L.15.5 Explain the reasons for changes in how organisms are classified.			
SC.912.L.15.6 Discuss distinguishing characteristics of the domains and kingdoms of living organisms.	95, 96, 97, 98, 99, 100, 101, 102, 103, 104	95, 96, 97, 98, 99, 100, 101, 102, 103, 104	Ch19
SC.912.L.15.7			

Discuss distinguishing characteristics of vertebrate and representative invertebrate phyla, and chordate classes using typical examples.	158, 159, 160, 161, 162, 163, 164, 165, 166	158, 159, 160, 161, 162, 163, 164, 165, 166	Ch19, Ch31
SC.912.L.15.8 Describe the scientific explanations of the origin of life on Earth.	106	106	Ch21
SC.912.L.15.9 Explain the role of reproductive isolation in the process of speciation.	92, 107, 151	92, 107, 151	Ch21
SC.912.L.15.10 Identify basic trends in hominid evolution from early ancestors six million years ago to modern humans, including brain size, jaw size, language, and manufacture of tools.	109	109	Ch21
SC.912.L.15.11 Discuss specific fossil hominids and what they show about human evolution.	109	109	Ch21
SC.912.L.15.12 List the conditions for Hardy-Weinberg equilibrium in a population and why these conditions are not likely to appear in nature. Use the Hardy-Weinberg equation to predict genotypes in a population from observed phenotypes.			
SC.912.L.15.13			

Describe the conditions required for natural selection, including: overproduction of offspring, inherited variation, and the struggle to survive, which result in differential reproductive success.	105, 106, 107, 108, 109, 114, 151	105, 106, 107, 108, 109, 114, 151	Ch21, Ch22
SC.912.L.15.14 Discuss mechanisms of evolutionary change other than natural selection such as genetic drift and gene flow.	82, 83	82, 83	Ch18, Ch19, Ch21
SC.912.L.15.15 Describe how mutation and genetic recombination increase genetic variation.	82, 83	82, 83	Ch19
Heredity and Reproduction	**Student Text**	**Practice Book**	**Teacher Resource Edition Activities & Projects**
SC.912.L.16.1 Use Mendel's laws of segregation and independent assortment to analyze patterns of inheritance.	69, 70, 71, 72, 73	69, 70, 71, 72, 73	Ch13, Ch14
SC.912.L.16.2 Discuss observed inheritance patterns caused by various modes of inheritance, including dominant, recessive, codominant, sex-linked, polygenic, and multiple alleles.	69, 70, 71, 72, 73	69, 70, 71, 72, 73	Ch14
SC.912.L.16.3 Describe the basic process of DNA replication and how it relates to the transmission and conservation of the genetic information.	74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93	74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93	Ch15, Ch16
SC.912.L.16.4			

Explain how mutations in the DNA sequence may or may not result in phenotypic change. Explain how mutations in gametes may result in phenotypic changes in offspring.	72, 73	72, 73	Ch14
SC.912.L.16.5 Explain the basic processes of transcription and translation, and how they result in the expression of genes.	86, 87, 88	86, 87, 88	Ch17
SC.912.L.16.6 Discuss the mechanisms for regulation of gene expression in prokaryotes and eukaryotes at transcription and translation level.	87, 100	87, 100	Ch18
SC.912.L.16.7 Describe how viruses and bacteria transfer genetic material between cells and the role of this process in biotechnology.	100	100	
SC.912.L.16.8 Explain the relationship between mutation, cell cycle, and uncontrolled cell growth potentially resulting in cancer.			
SC.912.L.16.9 Explain how and why the genetic code is universal and is common to almost all organisms.	66	66	Ch13, Ch14, Ch15, Ch16, Ch17
SC.912.L.16.10 Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.			

SC.912.L.16.11 Discuss the technologies associated with forensic medicine and DNA identification, including restriction fragment length polymorphism (RFLP) analysis.			
SC.912.L.16.12 Describe how basic DNA technology (restriction digestion by endonucleases, gel electrophoresis, polymerase chain reaction, ligation, and transformation) is used to construct recombinant DNA molecules (DNA cloning).	86, 87, 88	86, 87, 88	Ch14, Ch18
SC.912.L.16.13 Describe the basic anatomy and physiology of the human reproductive system. Describe the process of human development from fertilization to birth and major changes that occur in each trimester of pregnancy.	179, 180, 181	179, 180, 181	Ch20
SC.912.L.16.14 Describe the cell cycle, including the process of mitosis. Explain the role of mitosis in the formation of new cells and its importance in maintaining chromosome number during asexual reproduction.	59, 60, 61, 62, 149	59, 60, 61, 62, 149	Ch20
SC.912.L.16.15 Compare and contrast binary fission and mitotic cell division.	59, 60	59, 60	Ch20
SC.912.L.16.16			

Describe the process of meiosis, including independent assortment and crossing over. Explain how reduction division results in the formation of haploid gametes or spores.	60, 61, 62, 149	60, 61, 62, 149	Ch20
SC.912.L.16.17 Compare and contrast mitosis and meiosis and relate to the processes of sexual and asexual reproduction and their consequences for genetic variation.	60, 61, 62	60, 61, 62	Ch20
Interdependence	**Student Text**	**Practice Book**	**Teacher Resource Edition Activities & Projects**
SC.912.L.17.1 Discuss the characteristics of populations, such as number of individuals, age structure, density, and pattern of distribution.	110, 111, 112, 113, 114, 115, 116, 117, 118, 119	110, 111, 112, 113, 114, 115, 116, 117, 118, 119	Ch22, Ch23
SC.912.L.17.2 Explain the general distribution of life in aquatic systems as a function of chemistry, geography, light, depth, salinity, and temperature.	117	117	Ch23
SC.912.L.17.3 Discuss how various oceanic and freshwater processes, such as currents, tides, and waves, affect the abundance of aquatic organisms.	117, 119	117, 119	Ch23
SC.912.L.17.4 Describe changes in ecosystems resulting from seasonal variations, climate change and succession.	110, 111, 112, 113, 114	110, 111, 112, 113, 114	Ch22, Ch23

SC.912.L.17.5 Analyze how population size is determined by births, deaths, immigration, emigration, and limiting factors (biotic and abiotic) that determine carrying capacity.	110	110	Ch22, Ch23
SC.912.L.17.6 Compare and contrast the relationships among organisms, including predation, parasitism, competition, commensalism, and mutualism.	111, 112	111, 112	
SC.912.L.17.7 Characterize the biotic and abiotic components that define freshwater systems, marine systems and terrestrial systems.	115, 116, 117	115, 116, 117	Ch22, Ch23
SC.912.L.17.8 Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of invasive, non-native species.	110, 119	110, 119	Ch22, Ch23
SC.912.L.17.9 Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels.	49	49	Ch10
SC.912.L.17.10 Diagram and explain the biogeochemical cycles of an ecosystem, including water, carbon, and nitrogen cycle.	120, 121, 122, 123, 124	120, 121, 122, 123, 124	Ch24
SC.912.L.17.11			

Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.	118	118
SC.912.L.17.12 Discuss the political, social, and environmental consequences of sustainable use of land.	118, 119, 135	118, 119, 135
SC.912.L.17.13 Discuss the need for adequate monitoring of environmental parameters when making policy decisions.	118, 119	118, 119
SC.912.L.17.14 Assess the need for adequate waste management strategies.	119	119
SC.912.L.17.15 Discuss the effects of technology on environmental quality.	118, 119, 184	118, 119, 184
SC.912.L.17.16 Discuss the large-scale environmental impacts resulting from human activity, including waste spills, oil spills, runoff, greenhouse gases, ozone depletion, and surface and groundwater pollution.	118, 119	118, 119
SC.912.L.17.17 Assess the effectiveness of innovative methods of protecting the environment.	118, 119, 135	118, 119, 135
SC.912.L.17.18 Describe how human population size and resource use relate to environmental quality.	118, 119	118, 119

SC.912.L.17.19 Describe how different natural are produced and how their rates of use and renewal limit availability.	118, 119	118, 119	
SC.912.L.17.20 Predict the impact of individuals on environmental systems and examine how human lifestyles affect sustainability.	118, 119, 184	118, 119, 184	Ch22
Matter and Energy Transformations	**Student Text**	**Practice Book**	**Teacher Resource Edition Activities & Projects**
SC.912.L.18.1 Describe the basic molecular structures and primary functions of the four major categories of biological macromolecules.	101, 102, 103, 104, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186	101, 102, 103, 104, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186	Ch25, Ch26, Ch27, Ch28, Ch29, Ch30, Ch31, Ch32, Ch33, Ch34, Ch35, Ch36
SC.912.L.18.2			

Describe the important structural characteristics of monosaccharides, disaccharides, and polysaccharides and explain the functions of carbohydrates in living things.	28, 29, 43, 44, 46, 57, 167	28, 29, 43, 44, 46, 57, 167	Ch9
SC.912.L.18.3 Describe the structures of fatty acids, triglycerides, phospholipids, and steroids. Explain the functions of lipids in living organisms. Identify some reactions that fatty acids undergo. Relate the structure and function of cell membranes.	28, 29, 43, 45, 167	28, 29, 43, 45, 167	Ch9
SC.912.L.18.4 Describe the structures of proteins and amino acids. Explain the functions of proteins in living organisms. Identify some reactions that amino acids undergo. Relate the structure and function of enzymes.	26, 28, 29, 31, 38, 39, 40, 43, 46, 47, 52, 54, 61, 68, 74, 80, 84, 85, 86, 87, 88, 99, 120, 123, 124, 161, 167	26, 28, 29, 31, 38, 39, 40, 43, 46, 47, 52, 54, 61, 68, 74, 80, 84, 85, 86, 87, 88, 99, 120, 123, 124, 161, 167	Ch9, Ch10
SC.912.L.18.5 Discuss the use of chemiosmotic gradients for ATP production in chloroplasts and mitochondria.	31, 48, 52, 54, 55, 57	31, 48, 52, 54, 55, 57	Ch11
SC.912.L.18.6 Discuss the role of anaerobic respiration in living things and in human society.	52, 57, 120, 143	52, 57, 120, 143	Ch11
SC.912.L.18.7 Identify the reactants, products, and basic functions of photosynthesis.	53, 54, 55, 56, 57, 102, 120, 126, 129, 136, 140, 143, 151, 153	53, 54, 55, 56, 57, 102, 120, 126, 129, 136, 140, 143, 151, 153	Ch11, Ch25, Ch26, Ch27, Ch28, Ch29, Ch30
SC.912.L.18.8			

Identify the reactants, products, and basic functions of aerobic and anaerobic cellular respiration.	52, 57, 120, 143	52, 57, 120, 143	Ch11
SC.912.L.18.9 Explain the interrelated nature of photosynthesis and cellular respiration.	57, 120	57, 120	Ch11
SC.912.L.18.10 Connect the role of adenosine triphosphate (ATP) to energy transfers within a cell.	31, 48, 52, 54, 55, 57	31, 48, 52, 54, 55, 57	Ch11
SC.912.L.18.11 Explain the role of enzymes as catalysts that lower the activation energy of biochemical reactions. Identify factors, such as pH and temperature, and their effect on enzyme activity.	28, 31, 38, 39, 41, 52, 85, 170, 185	28, 31, 38, 39, 41, 52, 85, 170, 185	
SC.912.L.18.12 Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.	14, 15, 16, 17, 18, 19, 20, 21, 26, 35, 117, 120, 121, 127, 143	14, 15, 16, 17, 18, 19, 20, 21, 26, 35, 117, 120, 121, 127, 143	Ch24