BioComm Correlation to the South Carolina Science Academic Standards, Grades 9-12

BIOLOGY

Note: The page citations below are typically in clusters of pagers because coverage of biology concepts by textual narrative is often immediately preceded by engaging inquiry investigations.

Scientific Inquiry

Standard B-1:	The student will demonstrate an understanding of how scientific inquiry and technological design, including mathematical analysis, can be used appropriately to pose questions, seek answers, and develop solutions.

Indicators		**Location/Page where Standard is found**
B-1.1	Generate hypotheses based on credible, accurate, and relevant sources of scientific information.	13, 15 #7; 30 #5; 50 #3; 55 #3; 78; 115; 124-125; 203; 207; 211-215; 225-227; 232-235; 243-244; 253-255; 257-259; 267-269; 378-380; 386-389; 392-396;
B-1.2	Use appropriate laboratory apparatuses, technology, and techniques safely and accurately when conducting a scientific investigation.	7-8; 29; 41-54; 115-116; 124-125; 203-205; 211-215; 225-227; 232-235; 257-265; 267-269; 353-355; 261-264; 326-329; 378-380; 386-389; 392-396;
B-1.3	Use scientific instruments to record measurement data in appropriate metric units that reflect the precision and accuracy of each particular instrument.	6 #3 & 4; 24; 49-54; 79; 115-116; 124-125; 203-205; 211-215; 225-227; 232-235; 253-269; 376-380; 386-389; 392-396;
B-1.4	Design a scientific investigation with appropriate methods of control to test a hypothesis (including independent and dependent variables), and evaluate the designs of sample investigations.	29-30; 51; 54-55; 78-80; 115-116; 124-125; 203-205; 211-215; 225-227; 232-235; 243-244; 253-255; 257-269; 378-380; 386-398; 392-396;

B-1.5 Organize and interpret the data from a controlled scientific investigation by using mathematics, graphs, models, and/or technology.	31; 49; 50 #4; 51; 54-55; 80; 115-116; 124-125; 203-205; 211-215; 225-227; 232-235; 243-244; 253-255; 257-269; 378-380; 386-398; 392-396;
B-1.6 Evaluate the results of a controlled scientific investigation in terms of whether they refute or verify the hypothesis.	31; 49; 50 #4; 51; 54-55; 80; 115-116; 124-125; 203-205; 211-215; 225-227; 232-235; 243-244; 253-255; 257-269; 378-380; 386-398; 392-396;
B-1.7 Evaluate a technological design or product on the basis of designated criteria (including cost, time, and materials).	56-57; 58-61; 66-67; 269; 511-513; 581-585; 754-758;
B-1.8 Compare the processes of scientific investigation and technological design.	63 #4-12; 61; 511-513;
B-1.9 Use appropriate safety procedures when conducting investigations.	8 #7; 14; 24; 41; 51; 54; 122; 124; 138; 203-205; 211-215; 225-227; 229; 232-235; 260; 262; 386-389; 393-394;

Standard B-2:	The student will demonstrate an understanding of the structure and function of cells and their organelles.

Indicators	**Location/Page where Standard is found**
B-2.1 Recall the three major tenets of cell theory (all living things are composed of one or more cells; cells are the basic units of structure and function in living things; and all presently existing cells arose from previously existing cells).	29; 91-93; 120-121; 206-207;
B-2.2 Summarize the structures and functions of organelles found in a eukaryotic cell (including the nucleus, mitochondria, chloroplasts, lysosomes, vacuoles, ribosomes, endoplasmic reticulum [ER], Golgi apparatus, cilia, flagella, cell membrane, nuclear membrane, cell wall, and cytoplasm).	120; 206-211; 214-216;
B-2.3 Compare the structures and organelles of prokaryotic and eukaryotic cells.	208-209

B-2.4	Explain the process of cell differentiation as the basis for the hierarchical organization of organisms (including cells, tissues, organs, and organ systems).	297; 301; 307;
B-2.5	Explain how active, passive, and facilitated transport serve to maintain the homeostasis of the cell.	201; 203-206; 211-220; 261;
B-2.6	Summarize the characteristics of the cell cycle: interphase (called G1, S, G2); the phases of mitosis (called prophase, metaphase, anaphase, and telophase); and plant and animal cytokinesis.	294-297; 301-303
B-2.7	Summarize how cell regulation controls and coordinates cell growth and division and allows cells to respond to the environment, and recognize the consequences of uncontrolled cell division.	38-40; 200; 233-234; 240-241; 273-275; 340-351; 349-351; 643-651; 700-702;
B-2.8	Explain the factors that affect the rates of biochemical reactions (including pH, temperature, and the role of enzymes as catalysts).	28-34; 49-53; 232-234; 257-259; 262-267; 573; 577; 588; 605; 757;

Standard B-3:	The student will demonstrate an understanding of the flow of energy within and between living systems.

Indicators		**Location/Page where Standard is found**
B-3.1	Summarize the overall process by which photosynthesis converts solar energy into chemical energy and interpret the chemical equation for the process.	38-40; 43; 81-84; 86-88; 102; 106; 129; 431; 447;
B-3.2	Summarize the basic aerobic and anaerobic processes of cellular respiration and interpret the chemical equation for cellular respiration	39; 88; 54-55; 200-201; 209; 437;
B-3.3	Recognize the overall structure of adenosine triphosphate (ATP)—namely, adenine, the sugar ribose, and three phosphate groups—and summarize its function (including the ATP-ADP [adenosine diphosphate] cycle).	38-40; 206; 209; 237-238; 437;
B-3.4	Summarize how the structures of organic molecules (including proteins, carbohydrates, and fats) are related to their relative caloric values.	35-38; 1-6-110; 112; 128-129;

B-3.5	Summarize the functions of proteins, carbohydrates, and fats in the human body.	79-81; 107; 128; 207; 225-226; 335; 502-504;
B-3.6	Illustrate the flow of energy through ecosystems (including food chains, food webs, energy pyramids, number pyramids, and biomass pyramids).	26; 32-39; 40; 43; 86-88; 98-104; 103; 107-111; 502

Standard B-4: The student will demonstrate an understanding of the molecular basis of heredity.

Indicators		**Location/Page where Standard is found**
B-4.1	Compare DNA and RNA in terms of structure, nucleotides, and base pairs.	290; 329-337; 347-349;
B-4.2	Summarize the relationship among DNA, genes, and chromosomes.	285-291; 310-316; 331-335;
B-4.3	Explain how DNA functions as the code of life and the blueprint for proteins.	307; 329-331; 344-346;
B-4.4	Summarize the basic processes involved in protein synthesis (including transcription and translation).	335-338;
B-4.5	Summarize the characteristics of the phases of meiosis I and II.	299-303;
B-4.6	Predict inherited traits by using the principles of Mendelian genetics (including segregation, independent assortment, and dominance).	290-292; 312-316; 339;
B-4.7	Summarize the chromosome theory of inheritance and relate that theory to Gregor Mendel's principles of genetics.	316-323; 669-671; 678-681;
B-4.8	Compare the consequences of mutations in body cells with those in gametes.	310-312; 318-321; 338; 344-346; 354;
B-4.9	Exemplify ways that introduce new genetic characteristics into an organism or a population by applying the principles of modern genetics.	282-285; 350-352; 682-685;

Standard B-5:	The student will demonstrate an understanding of biological evolution and the diversity of life.

Indicators		**Location/Page where Standard is found**
B-5.1	Summarize the process of natural selection.	162-168; 428-433; 452-459; 462-464; 666-668;
B-5.2	Explain how genetic processes result in the continuity of life-forms over time.	430-433; 437;
B-5.3	Explain how diversity within a species increases the chances of its survival.	426-427; 436-437; 468; 477-479;
B-5.4	Explain how genetic variability and environmental factors lead to biological evolution.	440; 452-458; 464-464;
B-5.5	Exemplify scientific evidence in the fields of anatomy, embryology, biochemistry, and paleontology that underlies the theory of biological evolution.	428-433; 451; 456-459;
B-5.6	Summarize ways that scientists use data from a variety of sources to investigate and critically analyze aspects of evolutionary theory.	439-442; 459-461; 660-668;
B-5.7	Use a phylogenetic tree to identify the evolutionary relationships among different groups of organisms.	13-25; 40-43; 428-430; 439-450; 471; 506-507; 536;

Standard B-6:	The student will demonstrate an understanding of the interrelationships among organisms and the biotic and abiotic components of their environments.

Indicators		**Location/Page where Standard is found**
B-6.1	Explain how the interrelationships among organisms (including predation, competition, parasitism, mutualism, and commensalism) generate stability within ecosystems.	43; 94-96; 99-105; 162-165;
B-6.2	Explain how populations are affected by limiting factors (including density-dependent, density-independent, abiotic, and biotic factors).	143-150; 165-168; 174-178; 183-185;
B-6.3	Illustrate the processes of succession in ecosystems.	104-105;

B-6.4	Exemplify the role of organisms in the geochemical cycles (including the cycles of carbon, nitrogen, and water).	40; 91-92;
B-6.5	Explain how ecosystems maintain themselves through naturally occurring processes (including maintaining the quality of the atmosphere, generating soils, controlling the hydrologic cycle, disposing of wastes, and recycling nutrients).	40-43; 75; 91-92; 102-104;
B-6.6	Explain how human activities (including population growth, technology, and consumption of resources) affect the physical and chemical cycles and processes of Earth.	2-10; 13; 16-22; 56-60; 72-77; 1-5; 117-118; 126; 140-141; 156; 183-185; 188; 426-427; 468-471; 452; 472; 492-496; 586-589; 593-597; 608-617; 623-626; 636-639; 641-645; 707-711; 716-729; 736-742; 746-753;