Biology Core

Process and Application		
Students will:		
1.	Select appropriate laboratory glassware, balances, time measuring equipment, and optical instruments to conduct an experiment.	58, 164, 236, 274, 522, 683, 910–911, 981, 988–989
	• Describing the steps of the scientific method	11–18, 30, 1104–1105
	• Comparing controls, dependent variables, and independent variables	14, 22, 29, 31, 58–59, 165, 331, 497, 523, 735, 757, 965, 1028
	• Identifying safe laboratory procedures when handling chemicals and using Bunsen burners and laboratory glassware	14–15, 28, 54, 58, 84, 151, 164, 182, 188, 198, 209, 214, 254, 371, 490, 511, 522, 530, 544, 586, 589, 608, 626, 658, 675, 683, 702, 712, 714, 756, 764, 795, 934, 936, 964, 987, 1006, 1107–1109
	• Using appropriate SI units for measuring length, volume, and mass	20–21, 24–25, 154, 155, 173, 198, 203, 376, 433, 407, 476, 544–545, 522–523, 626–627, 712, 735, 757, 834–835, 907, 910–911, 988–989, 1010, 1097–1098
2.	Describe cell processes necessary for achieving homeostasis, including active and passive transport, osmosis, diffusion, exocytosis, and endocytosis.	9, 30, 175–176, 193, 195–200, 247
	• Identifying functions of carbohydrates, lipids, proteins, and nucleic acids in cellular activities	157–166, 168, 281–287, 288–295, 306–307
	• Comparing the reaction of plant and animal cells in isotonic, hypotonic, and hypertonic solutions	196–197, 200, 218–219
	• Explaining how surface area, cell size, temperature, light, and pH affect cellular activities	155, 161, 201–203, 218, 238–239
	• Applying the concept of fluid pressure to biological systems Examples: blood pressure, turgor pressure, bends, strokes	155–156, 196–198, 218–219, 655, 984, 992, 933
3.	Identify the reactants and products associated with photosynthesis and cellular respiration and the purposes of these two processes.	221–224, 225–230, 231–237, 242–243, 247
4.	Describe similarities and differences of cell organelles, using diagrams and tables.	179–187, 188, 246
	• Identifying scientists who contributed to the cell theory Examples: Hooke, Schleiden, Schwann, Virchow, van Leeuwenhoek	17, 138, 172, 174, 244, 1064
	• Distinguishing between prokaryotic and eukaryotic cells	173–174, 187

	• Identifying various technologies used to observe cells Examples: light microscope, scanning electron microscope, transmission electron microscope	14–15, 138–139, 171–173, 304, 1064–1065, 1106
5.	Identify cells, tissues, organs, organ systems, organisms, populations, communities, and ecosystems as levels of organization in the biosphere.	6–7, 30, 38–41, 210, 1048
	• Recognizing that cells differentiate to perform specific functions Examples: ciliated cells to produce movement, nerve cells to conduct electrical charges	6–7, 30, 210, 675–679, 691, 1048
6.	Describe the roles of mitotic and meiotic divisions during reproduction, growth, and repair of cells.	203–210, 214–215, 218–219, 361
	• Comparing sperm and egg formation in terms of ploidy Example:ploidy—haploid, diploid	263–266, 273
	• Comparing sexual and asexual reproduction	7, 30, 203–210, 263–270, 505
7.	Apply Mendel's law to determine phenotypic and genotypic probabilities of offspring.	253–262, 263, 270, 276, 360
	• Defining important genetic terms, including *monohybrid cross*, *phenotype*, *genotype*, *homozygous*, *heterozygous*, *dominant trait*, *recessive trait*, *incomplete dominance*, *codominance*, and *allele*	253–262, 263–273, 274–275, 278–279, 315–322, 334–335, 360–361, 363
	• Interpreting inheritance patterns shown in graphs and charts	261, 262, 270, 276, 279, 309–314, 316, 318, 319, 320, 326, 328, 363
	• Calculating genotypic and phenotypic percentages and ratios using a Punnett square	260, 261, 262, 270, 279, 316, 318, 319, 363, 365
8.	Identify the structure and function of DNA, RNA, and protein.	281–287, 288–295, 302–303, 304, 306–307, 361–362, 365
	• Explaining relationships among DNA, genes, and chromosomes	163, 203–205, 211, 288
	• Listing significant contributions of biotechnology to society, including agricultural and medical practices Examples: DNA fingerprinting, insulin, growth hormone	336–340, 341–348, 349–353, 356, 358–359, 363
	• Relating normal patterns of genetic inheritance to genetic variation Example: crossing-over	266–273
	• Relating ways chance, mutagens, and genetic engineering increase diversity Examples: insertion, deletion, translocation, inversion, recombinant DNA	272–273, 296–301, 306–307, 337–338, 341–345, 363
	• Relating genetic disorders and disease to patterns of genetic inheritance Examples: hemophilia, sickle cell anemia, Down's syndrome, Tay-Sachs disease, cystic fibrosis, color blindness, phenylketonuria (PKU)	168, 271, 278, 311–314, 335, 1010–1011

9.	Differentiate between the previous five-kingdom and current six-kingdom classification systems.	1070–1073
	• Sequencing taxa from most inclusive to least inclusive in the classification of living things	447–449, 464–465, 1070–1073
	• Identifying organisms using a dichotomous key	446, 460–461, 465, 570–571, 726, 810–811
	• Identifying ways in which organisms from the Monera, Protista, and Fungi kingdoms are beneficial and harmful Examples: beneficial—decomposers, harmful—diseases	456–458, 473, 493–495, 500–501, 503, 531, 534, 546, 548–549, 550–551, 555, 1023–1024
	• Justifying the grouping of viruses in a category separate from living things	474–475, 483, 550, 555, 1074–1075
	• Writing scientific names accurately by using binomial nomenclature	444–445, 464–465, 469
10.	Distinguish between monocots and dicots, angiosperms and gymnosperms, and vascular and nonvascular plants.	562, 564–569, 589, 595
	• Describing the histology of roots, stems, leaves, and flowers	607–611, 612–621, 626–627, 630–631
	• Recognizing chemical and physical adaptations of plants Examples: chemical—foul odor, bitter taste, toxicity; physical—cactus spines, needles, broad leaves	560–563, 564–565, 574–575, 578–580, 582–584, 590–592, 594, 621
11.	Classify animals according to type of skeletal structure, method of fertilization and reproduction, body symmetry, body coverings, and locomotion. Examples: skeletal structure—vertebrates, invertebrates; fertilization—external, internal; reproduction—sexual, asexual; body symmetry—bilateral, radial, asymmetrical; body coverings—feathers, scales, fur; locomotion—cilia, flagella, pseudopodia	185–187, 246, 506–508, 526–527, 676, 680–685 708
12.	Describe protective adaptations of animals, including mimicry, camouflage, beak type, migration, and hibernation	397–399, 468–469, 830–833, 865–867, 882–887
	• Identifying ways in which the theory of evolution explains the nature and diversity of organisms	404–413, 414–415, 416, 418–419
	• Describing natural selection, survival of the fittest, geographic isolation, and fossil record.	370–379, 393–396, 397–403, 404–410, 414–415, 468, 860–861

13.	Trace the flow of energy as it decreases through the trophic levels from producers to the quaternary level in food chains, food webs, and energy pyramids.	48–52, 62–63, 133–134
	• Describing the interdependence of biotic and abiotic factors in an ecosystem Examples: effects of humidity on stomata size, effects of dissolved oxygen on fish respiration	36–38, 41, 45, 62, 132–133, 136–137
	• Contrasting autotrophs and heterotrophs	46–47, 133
	• Describing the niche of decomposers	47, 55–57, 61, 62, 504, 531
	• Using the ten percent law to explain the decreasing availability of energy through the trophic levels	50–52, 63, 134
14.	Trace biogeochemical cycles through the environment, including water, carbon, oxygen, and nitrogen.	52–57, 62–63
	• Relating natural disasters, climate changes, nonnative species, and human activity to the dynamic equilibrium of ecosystems Examples: natural disasters—habitat destruction resulting from tornadoes; climate changes—changes in migratory patterns of birds; nonnative species—exponential growth of kudzu and Zebra mussels due to absence of natural controls; human activity—habitat destruction resulting in reduction of biodiversity, conservation resulting in preservation of biodiversity	23, 26, 54–57, 60, 88, 115–120, 121–125, 128, 130–131, 135, 137, 348, 378
	• Describing the process of ecological succession	67–69, 84–85, 88–89, 135
15.	Identify biomes based on environmental factors and native organisms. Example: tundra—permafrost, low humidity, lichens, polar bears	70–83, 88–89, 132, 1062–1063
16.	Identify density-dependent and density-independent limiting factors that affect populations in an ecosystem. Examples: density-dependent—disease, predator-prey relationships, availability of food and water; density-independent—natural disasters, climate	96–99, 108
	• Discriminating among symbiotic relationships, including mutualism, commensalism, and parasitism	44–45, 62, 132–133, 136