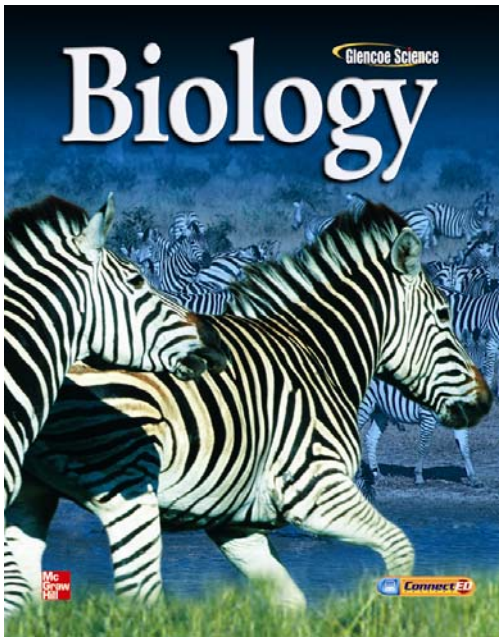
Glencoe

Science
Academic Content Standards
Grade Ten

Ohio



Biology

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STANDARDS	PAGE REFERENCES
Life Sciences	
Characteristics and Structure of Life	
1. Explain that living cells a. are composed of a small number of key chemical elements (carbon, hydrogen, oxygen, nitrogen, phosphorus and sulfur) b. are the basic unit of structure and function of all living things c. come from pre-existing cells after life originated, and d. are different from viruses	**Student Edition:** 8, 166-171, 183, 185-186, 525 *Launch Lab* 180 **Teacher Wraparound Edition:** FA 171; MI 525; SP 167
2. Compare the structure, function and interrelatedness of cell organelles in eukaryotic cells (e.g., nucleus, chromosome, mitochondria, cell membrane, cell wall, chloroplast, cilia, flagella) and prokaryotic cells.	**Student Edition:** 185-186, 187-190, 191-200, 518 **Teacher Wraparound Edition:** SP 185, 192

Codes used for Teacher Wraparound Edition pages are the initial caps of headings on that page.

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3. Explain the characteristics of life as indicated by cellular processes including a. homeostasis b. energy transfers and transformation c. transportation of molecules d. disposal of wastes e. synthesis of new molecules	**Student Edition:** 6-10, 187, 201-207, 218-221, 222-227, 228-233 *BioLab* 209 *MiniLab* 203, 221 **Teacher Wraparound Edition:** CT 221; DC 201, 206; FA 233; SP 207
4. Summarize the general processes of cell division and differentiation, and explain why specialized cells are useful to organisms and explain that complex multicellular organisms are formed as highly organized arrangements of differentiated cells.	**Student Edition:** 8, 186, 248-252, 271-276, 344-345, 694, 697 *Launch Lab* 242 **Teacher Wraparound Edition:** CT 186; DE 249; LL 242; SP 275
Heredity	
5. Illustrate the relationship of the structure and function of DNA to protein synthesis and the characteristics of an organism.	**Student Edition:** 171, 270, 329-332, 336-341, 344-345 *MiniLab* 331 **Teacher Wraparound Edition:** DC 338; DE 330; MI 336
6. Explain that a unit of hereditary information is called a gene, and genes may occur in different forms called alleles (e.g., gene for pea plant height has two alleles, tall and short).	**Student Edition:** 270, 278-279 **Teacher Wraparound Edition:** RS 279
7. Describe that spontaneous changes in DNA are mutations, which are a source of genetic variation. When mutations occur in sex cells, they may be passed on to future generations; mutations that occur in body cells may affect the functioning of that cell or the organism in which that cell is found.	**Student Edition:** 345-349, 434 **Teacher Wraparound Edition:** AC 347; CT 349
8. Use the concepts of Mendelian and non-Mendelian genetics (e.g., segregation, independent assortment, dominant and recessive traits, sex-linked traits and jumping genes) to explain inheritance.	**Student Edition:** 279-282, 296-301, 302-309 *BioLab* 317 *BioLab: Design Your Own* 287 *MiniLab* 281, 300 **Teacher Wraparound Edition:** AC 279; DC 282, 303, 305

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Diversity and Interdependence of Life	
9. Describe how matter cycles and energy flows through different levels of organization in living systems and between living systems and the physical environment. Explain how some energy is stored and much is dissipated into the environment as thermal energy (e.g., food webs and energy pyramids).	**Student Edition:** 41-44, 218-219, 45-49 *MiniLab* 42 **Teacher Wraparound Edition:** DC 43, 219; FA 49; MI 45; SP 47
10. Describe how cells and organisms acquire and release energy (photosynthesis, chemosynthesis, cellular respiration and fermentation).	**Student Edition:** 41, 220, 222-227, 228-233 *MiniLab* 220 **Teacher Wraparound Edition:** FA 227, 233; MI 41
11. Explain that living organisms use matter and energy to synthesize a variety of organic molecules (e.g., proteins, carbohydrates, lipids and nucleic acids) and to drive life processes (e.g., growth, reacting to the environment, reproduction and movement).	**Student Edition:** 10, 166-171, 218-221, 1025-1027 *Launch Lab* 216 **Teacher Wraparound Edition:** DC 219; ITC 217; LL 216; MI 218, 1025
12. Describe that biological classification represents how organisms are related with species being the most fundamental unit of the classification system. Relate how biologists arrange organisms into a hierarchy of groups and subgroups based on similarities and differences that reflect their evolutionary relationships.	**Student Edition:** 486-488, 490-498, 499-503 *BioLab* 505 *Data Analysis Lab* 494 *Launch Lab* 482 *MiniLab* 488 **Teacher Wraparound Edition:** DC 489, 503; MI 499; RS 487, 491
13. Explain that the variation of organisms within a species increases the likelihood that at least some members of a species will survive under gradually changing environmental conditions.	**Student Edition:** 420-421, 435 *BioLab* 443 *Data Analysis Lab* 435 *Launch Lab* 416 **Teacher Wraparound Edition:** AC 421; LL 416
14. Relate diversity and adaptation to structures and their functions in living organisms (e.g., adaptive radiation).	**Student Edition:** 428-430, 439-440, 605-607, 669-671 *BioLab* 753 *MiniLab* 429, 605, 765, 884 **Teacher Wraparound Edition:** FA 430; WS 439

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15. Explain how living things interact with biotic and abiotic components of the environment (e.g., predation, competition, natural disasters and weather).	**Student Edition:** 34-35, 38-40, 41-42, 62-64, 65-66, 94-96 *BioLab* 107 *BioLab: Design Your Own* 83 *Data Analysis Lab* 39 **Teacher Wraparound Edition:** DC 35; WS 96
16. Relate how distribution and abundance of organisms and populations in ecosystems are limited by the ability of the ecosystem to recycle materials and the availability of matter, space and energy.	**Student Edition:** 60-61, 80-81, 92-95, 98 *BioLab: Design Your Own* 83 **Teacher Wraparound Edition:** DC 94; FA 99; MI 60
17. Conclude that ecosystems tend to have cyclic fluctuations around a state of approximate equilibrium that can change when climate changes, when one or more new species appear as a result of immigration or when one or more species disappear.	**Student Edition:** 62-64, 95-96, 128 *Biology & Society* 870 *Data Analysis Lab* 63 **Teacher Wraparound Edition:** AG 870; FA 99, 128; WS 96
18. Describe ways that human activities can deliberately or inadvertently alter the equilibrium in ecosystems. Explain how changes in technology/biotechnology can cause significant changes, either positive or negative, in environmental quality and carrying capacity.	**Student Edition:** 66, 67, 123-128 *Biology & Society* 50, 680, 716, 870 *MiniLab* 120 **Teacher Wraparound Edition:** DC 67; DE 126; RS 123
19. Illustrate how uses of resources at local, state, regional, national, and global levels have affected the quality of life (e.g., energy production and sustainable vs. nonsustainable agriculture).	**Student Edition:** 118-121, 126-127, 129-130 *Biology & Society* 50, 680 **Teacher Wraparound Edition:** AG 50; DC 118, 130; DE 118; DIB 50
Evolutionary Theory	
20. Recognize that a change in gene frequency (genetic composition) in a population over time is a foundation of biological evolution.	**Student Edition:** 420, 421, 431-436 *BioLab* 443 **Teacher Wraparound Edition:** CT 433; DC 421; WS 433

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21. Explain that natural selection provides the following mechanism for evolution; undirected variation in inherited characteristics exist within every species. These characteristics may give individuals an advantage or disadvantage compared to others in surviving and reproducing. The advantaged offspring are more likely to survive and reproduce. Therefore, the proportion of individuals that have advantageous characteristics will increase. When an environment changes, the survival value of some inherited characteristics may change.	**Student Edition:** 420-421, 434-436 *BioLab* 443 *Launch Lab* 416 **Teacher Wraparound Edition:** AC 421; DC 421; DE 420; LL 416; SP 434
22. Describe historical scientific developments that occurred in evolutionary thought (e.g., Lamarck and Darwin, Mendelian Genetics and modern synthesis).	**Student Edition:** 277-280, 326-331, 418-422, 423, 440-441 *Launch Lab* 324 **Teacher Wraparound Edition:** LL 324; RS 326; TFYI 277; WS 418
23. Analyze how natural selection and other evolutionary mechanisms (e.g., genetic drift, immigration, emigration, mutation) and their consequences provide a scientific explanation for the diversity and unity of past life forms, as depicted in the fossil record, and present life forms.	**Student Edition:** 393-396, 423-429, 431-436, 439-440 *BioLab* 443 *Launch Lab* 390 **Teacher Wraparound Edition:** DC 428; LL 390; WS 433
24. Explain that life on Earth is thought to have begun as simple, one celled organisms approximately 4 billion years ago. During most of the history of Earth only single celled microorganisms existed, but once cells with nuclei developed about a billion years ago, increasingly complex multicellular organisms evolved.	**Student Edition:** 396-400, 401-407 **Teacher Wraparound Edition:** DC 405, 406, 407
Historical Perspectives and Scientific Revolutions	
25. Use historical examples to explain how new ideas are limited by the context in which they are conceived. These ideas are often rejected by the scientific establishment; sometimes spring from unexpected findings; and usually grow slowly through contributions from many different investigators (e.g., biological evolution, germ theory, biotechnology and discovering germs).	**Student Edition:** 11, 182-183, 326-331, 401-407, 418-422, 1076-1077 *BioLab* 409 *Launch Lab* 324 **Teacher Wraparound Edition:** CB 12; CT 402; DC 119, 407; LL 324; RS 326

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26. Describe advances in life sciences that have important long-lasting effects on science and society (e.g., biological evolution, germ theory, biotechnology and discovering germs).	**Student Edition:** 182-183, 277, 330-331, 363-371, 378-379, 418-422, 1076-1077, 1082-1083 *Biology and Society* 680 *MiniLab* 365 **Teacher Wraparound Edition:** DC 363
27. Analyze and investigate emerging scientific issues (e.g., genetically modified food, stem cell research, genetic research and cloning).	**Student Edition:** 15, 256-257, 370-371, 378-379 *Biology & Society* 258, 350, 680, 1066 **Teacher Wraparound Edition:** BA 258; DC 257; DIB 350, 680, 1066; RS 370
Science and Technology	
Understanding Technology	
1. Cite examples of ways that scientific inquiry is driven by the desire to understand the natural world and how technology is driven by the need to meet human needs and solve human problems.	**Student Edition:** 5-6, 182-185, 326-331, 363-371, 372-379 *BioDiscoveries* 286, 474, 652, 924 *In the Field* 1038 *Cutting-Edge Biology* 22, 208, 982, 1010 **Teacher Wraparound Edition:** DC 363; RS 326; SP 182; WS 6
2. Describe examples of scientific advances and emerging technologies and how they may impact society.	**Student Edition:** 15, 256-257, 363-371, 372-379 *BioLab* 381 *Biology & Society* 680, 1066 *Cutting-Edge Biology* 982, 1010 **Teacher Wraparound Edition:** DIB 680, 1066; MI 372; RS 370; WS 257, 374
Abilities To Do Technological Design	
3. Explain that when evaluating a design for a device or process, thought should be given to how it will be manufactured, operated, maintained, replaced and disposed of in addition to who will sell, operate and take care of it. Explain how the costs associated with these considerations may introduce additional constraints on the design.	The following references can be incorporated in classroom discussion to meet this objective. **Student Edition:** *BioLab: Design Your Own* 23, 871 *Cutting-Edge Biology* 982 **Teacher Wraparound Edition:** DC 133

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Scientific Inquiry	
Doing Scientific Inquiry	
1. Research and apply appropriate safety precautions when designing and conducting scientific investigations (e.g., OSHA, MSDS, eyewash, goggles and ventilation).	**Student Edition:** 21 *BioLab: Design Your Own* 173, 533, 567, 593 *BioLab: Forensics* 351 *Investigation and Experimentation* 1105-1109 **Teacher Wraparound Edition:** 38T-39T; DC 21
2. Present scientific findings using clear language, accurate data, appropriate graphs, tables, maps and available technology.	**Student Edition:** 20 *BioLab: Design Your Own* 23, 51, 173, 593, 653 *Skillbuilder Handbook* 1128-1132 **Teacher Wraparound Edition:** AC 97; SP 129; WS 103
3. Use mathematical models to predict and analyze natural phenomena.	**Student Edition:** 44, 97-99, 102-103, 244-245, 280-282, 284, 431-432 *BioLab: Design Your Own* 287 *MiniLab* 66, 245, 281, 284 **Teacher Wraparound Edition:** AC 97; CB 432; SP 98, 103
4. Draw conclusions from inquiries based on scientific knowledge and principles, the use of logic and evidence (data) from investigations.	**Student Edition:** 12, 20 *BioLab: Design Your Own* 173, 235, 533, 593, 925 *Data Analysis Lab* 39, 63, 232, 714, 970 **Teacher Wraparound Edition:** WS 20
5. Explain how new scientific data can cause any existing scientific explanation to be supported, revised or rejected.	**Student Edition:** 11, 13-14, 20 *BioDiscoveries* 474, 842 *In the Field* 408 **Teacher Wraparound Edition:** CB 12; DC 403

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Scientific Ways of Knowing	
Nature of Science	
1. Discuss science as a dynamic body of knowledge that can lead to the development of entirely new disciplines.	**Student Edition:** 363, 375, 378-379 *Cutting-Edge Biology* 208 *In the Field* 566 **Teacher Wraparound Edition:** CB 20; DC 375
2. Describe that scientists may disagree about explanations of phenomena, about interpretation of data or about the value of rival theories, but they do agree that questioning, response to criticism and open communication are integral to the process of science.	**Student Edition:** 12, 13, 14 *In the Field* 408 **Teacher Wraparound Edition:** AG 408; DC 403
3. Recognize that science is a systematic method of continuing investigation, based on observation, hypothesis testing, measurement, experimentation, and theory building, which leads to more adequate explanations of natural phenomena.	**Student Edition:** 11, 12, 16-20 *BioLab* 173, 235, 533, 567, 593 **Teacher Wraparound Edition:** CT 18; DC 16; SP 17
Ethical Practices	
4. Recognize that ethical considerations limit what scientists can do.	The following references can be incorporated in classroom discussion to meet this objective. **Student Edition:** 15, 256-257, 314-315 **Teacher Wraparound Edition:** BA 258; DC 257
5. Recognize that research involving voluntary human subjects should be conducted only with the informed consent of the subjects and follow rigid guidelines and/or laws.	The following references can be incorporated in classroom discussion to meet this objective. **Student Edition:** 378 *Biology & Society* 258
6. Recognize that animal-based research must be conducted according to currently accepted professional standards and laws.	The following references can be incorporated in classroom discussion to meet this objective. **Student Edition:** *BioDiscoveries* 286 *Cutting-Edge Biology* 982

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Science and Society	
7. Investigate how the knowledge, skills and interests learned in science classes apply to the careers students plan to pursue.	**Student Edition:** 5-6 *Careers in Biology* 9, 165, 254, 278, 590 *In the Field* 316, 1038 **Teacher Wraparound Edition:** WS 4, 6