



IDAHO
Science Standards Grades 9-12
***Biology: A Community Context* © 2003**

OBJECTIVES	PAGE REFERENCES
648. UNIFYING CONCEPTS OF SCIENCE.	
01. Understand systems, order, and organization.	
a. Know the scientific meaning and application of the concepts of system, order, and organization.	SE: 102-104, 206-210, 329-331, 436-442 <i>Guided Inquiry</i> 13-17, 28-31, 94-97, 99-102 <i>Extended Inquiry</i> 122-123 TE: 49-50, 61, 126-127, 149
02. Understand concepts and processes of evidence, models, and explanation.	
a. Know that observations and data are evidence on which to base scientific explanations.	SE: 27-28 <i>Guided Inquiry</i> 28-31 <i>Extended Inquiry</i> 47-48 <i>Self-Check</i> 63 (#11) TE: 93
b. Use models to explain how things work.	SE: 22-23 <i>Guided Inquiry</i> 13-17, 28-31, 35-38, 243-244, 331-335 TE: 57, 61, 62-63, 294
c. Develop scientific explanations based on scientific knowledge, logic, and analysis.	SE: 27-28 <i>Guided Inquiry</i> 28-31, 202-205, 378-380 <i>Extended Inquiry</i> 47, 54-55, 260-261
03. Understand constancy, change, and measurement.	
a. Identify constancy in some concepts in science that do not change with time such as the speed of light.	SE: 88 <i>Summary of Major Concepts</i> (#4) 135
b. Recognize that change occurs in and among systems and change can be measured.	SE: 27-28 <i>Guided Inquiry</i> 28-31, 143-145, 211-216, 506-507 <i>Extended Inquiry</i> 49-53, 187-188
c. Measure in both the metric and U.S. customary system.	SE: <i>Guided Inquiry</i> 28-31 <i>Extended Inquiry</i> 54-55, 78-80, 202-205 <i>Appendix H</i> 544-546
04. Understand the theory that evolution is a process that relates to the gradual changes in the universe and of equilibrium as a physical state.	
a. Know that the present arises from materials and forms of the past.	SE: 27, 380-381, 430-433, 440-441, 456-459 <i>Guided Inquiry</i> 428-429, 453-455, 462-464, 466-467 TE: 371-375, 381, 384-385
b. Understand evolution as a series of changes, some gradual and some sporadic, that account for present form and function of objects, organisms, and natural or mechanical systems.	SE: 27, 380-381, 456-459 <i>Guided Inquiry</i> 453-455 TE: 381, 384-385

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c. Know that equilibrium is a physical state in which forces and changes occur in opposite and offsetting directions.	SE: 198, 200-201, 375 <i>Guided Inquiry</i> 211-214
05. Understand concepts of form and function.	
a. Know that form refers to function and function refers to form.	SE: 231-232, 458-459 <i>Extended Inquiry</i> 59-61, 120-121 <i>Guided Inquiry</i> 222-224, 331-335 <i>BioThought</i> 459 TE: 147, 231
649. CONCEPTS OF SCIENTIFIC INQUIRY.	
01. Understand scientific inquiry and develop critical thinking skills.	
a. Identify questions and concepts that guide scientific investigations.	SE: 6, 22-23, 27-28 <i>Guided Inquiry</i> 28-31 <i>Extended Inquiry</i> 47, 125, 269, 405-407
b. Design and conduct scientific investigations.	SE: <i>Guided Inquiry</i> 29-31, 78-81, 392-396 <i>Extended Inquiry</i> 120-121, 124-125, 187-188, 405-407 TE: 56-60
c. Use technology and mathematics to improve investigations and communication.	SE: <i>Extended Inquiry</i> 120-121, 130, 185, 189, 355 <i>Internet Resources</i> 195 TE: 155-156
d. Formulate and revise scientific explanations and models using logic and evidence.	SE: <i>Guided Inquiry</i> 29-31, 78-81, 162-165, 392-396 <i>Extended Inquiry</i> 120-121, 187-188, 405-407 TE: 56-60
e. Recognize and analyze alternative explanations and models.	SE: 441-442, 456-458 <i>Guided Inquiry</i> 28-31, 99-102 <i>Congress</i> 191-192, 522-523 <i>BioIssue</i> 443
f. Communicate and defend a scientific argument.	SE: <i>Extended Inquiry</i> 54-55, 58-61, 124-125, 269-270, 347, 413-414 <i>Presenting Your Research</i> 62 <i>Guided Inquiry</i> 78-81, 106-111
g. Know the differences among observations, hypotheses, and theories.	SE: 27, 30 <i>Self-Check (#7)</i> 131 TE: 158
651. CELLULAR AND MOLECULAR CONCEPTS.	
01. Understand the cell is the basis of form and function for all living things and how living things carry out their life functions.	
a. Know that cells have particular structures that underlie their functions.	SE: 206-210 <i>Guided Inquiry</i> 211-216, 222-223 TE: 231

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b. Know that most cell functions involve chemical reactions.	SE: 34, 38-40, 86-88, 265 <i>Guided Inquiry</i> 28-31, 35-38, 82-84, 225-228 <i>Extended Inquiry</i> 260-261, 262-268 TE: 56-61, 62-64
c. Know that cells store and use information in the form of DNA to guide their functions.	SE: 329-331 <i>Guided Inquiry</i> 326-329, 331-333 TE: 294, 299
d. Know that cell functions are regulated by expressed genes that provide code for the synthesis of proteins.	SE: 284, 310-311, 335-337 <i>Extended Inquiry</i> 344-346 <i>Summary of Major Concepts (#6)</i> 362 TE: 302-303
e. Know that cellular differentiation is regulated through the expression of different genes. A single cell can differentiate to form the many specialized cells, tissues, and organs.	SE: 304, 307, 309 <i>Extended Inquiry</i> 347
02. Understand the form and function of DNA.	
a. Know that the instructions for specifying the characteristics of the organism are carried in DNA.	SE: 284, 329-331, 352-353 <i>Extended Inquiry</i> 326-329, 344-346 <i>Guided Inquiry</i> 331-333, 335
b. Know that genetic information is both encoded in genes and replicated.	SE: 284-285, 294-297, 301-302 <i>Guided Inquiry</i> 292-294, 299-301, 331-333, 335
c. Know that most of the cells in a human contain 23 pairs of chromosomes, and that transmission of chromosomal information to offspring occurs through the combination of egg and sperm cells.	SE: 284, 290-292, 304, 307
d. Know that changes in DNA (mutations) occur spontaneously at low rates. Some of these changes make no difference to the organism whereas others can change cells and organisms. Only mutations in gametes can create the variation that changes an organism's offspring.	SE: 338, 478 <i>Extended Inquiry</i> 344-346 TE: 302-303
e. Know that DNA plays a major role in health issues. Through the development of new technologies we have discovered new information about the human genome, medical disorders, and forensic sciences.	SE: 288-289, 348-349, 350-353 <i>Initial Inquiry</i> 282-283 <i>Extended Inquiry</i> 347-348, 349-350 TE: 305-307

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652. INTERDEPENDENCE OF ORGANISMS AND BIOLOGICAL CHANGE.	
01. Understand the theory of biological evolution.	
a. Know that the theory of evolution explains how species evolve over time and how evolution is the consequence of interactions of: <ul style="list-style-type: none"> - Potential of a species to increase its numbers; - Genetic variability; - A finite supply of resources; - Selection by the environment of those offspring better able to survive and leave offspring. 	SE: 380-381, 456-459 <i>Guided Inquiry</i> 453-455 <i>BioThought</i> 459 TE: 381-386
b. Know that natural selection and its evolutionary consequences provide a scientific explanation for the fossil record of ancient life forms, as well as for the striking molecular similarities observed among the diverse species of organisms.	SE: 380-381, 432-433, 437, 438, 456-459 <i>Guided Inquiry</i> 429-430 <i>BioThoughts</i> 437 TE: 371-375
c. Know that the theory of evolution explains how different species of plants, animals, and microorganisms that live on earth today are related by descent from common ancestors.	SE: 432-433, 437, 438, 456-459 <i>Guided Inquiry</i> 429-430 <i>BioThoughts</i> 437 TE: 371-375
d. Know that biological classifications are based on similarities, which reflect their evolutionary relationships.	SE: 436-442 <i>Biolssue</i> 443
02. Understand the interdependence of organisms.	
a. Know that atoms and molecules cycle among the living and nonliving components of the biosphere.	SE: 26, 39-40, 92-93 <i>Self-Check (#7)</i> 44 <i>Summary of Major Concepts (#5)</i> 135 TE: 71
b. Trace energy flows through ecosystems in one direction, from photosynthetic organisms to herbivores to carnivores and decomposers.	SE: 38-39, 43, 81, 88, 101-102 <i>Guided Inquiry</i> 99-101, 502-503 TE: 126-129
c. Know that organisms both cooperate and compete in ecosystems.	SE: 75, 105, 142, 165-166, 458-459 <i>Extended Inquiry</i> 187-188 <i>Biolssue</i> 452 <i>BioThought</i> 459 <i>Extended Inquiry</i> 472-473
d. Know that living organisms have the capacity to produce populations of infinite size, but environments and resources are finite.	SE: 157-160, 165-168 <i>Guided Inquiry</i> 154-155 <i>BioPrediction</i> 169 <i>Extended Inquiry</i> 187-188 TE: 181
e. Know that human beings live within the world's ecosystems. Increasingly, humans modify ecosystems as a result of population growth, technology, and consumption.	SE: 5-6, 17-21, 105, 126-127, 496-497 <i>Extended Inquiry</i> 56, 58, 182-185 <i>Initial Inquiry</i> 72-75, 490-491 <i>Congress</i> 191-192 <i>Guided Inquiry</i> 492-496

OBJECTIVES	PAGE REFERENCES
653. MATTER, ENERGY, AND ORGANIZATION IN LIVING SYSTEMS.	
01. Understand the relationship between matter, energy, and organization to trace matter as it cycles and energy as it flows through living systems and between living systems and the environment.	
a. Know that all matter tends toward more disorganized states.	SE: 88, 102-103 <i>Guided Inquiry</i> 99-102 TE: 126-127
b. Know that living systems require a continuous input of energy to maintain their chemical and physical organization.	SE: 27, 38-39, 81, 88, 112 <i>Guided Inquiry</i> 99-102, 106-111 TE: 126-127, 129-130
c. Know that the energy for life is primarily derived from the sun through photosynthesis.	SE: 38-39, 81, 84-86, 88, 129-130 <i>Guided Inquiry</i> 82-84, 99 <i>Extended Inquiry</i> 128 TE: 154-155
d. Understand cellular respiration and the synthesis of macromolecules.	SE: 31, 39 <i>Guided Inquiry</i> 28-31, 35-38, 225-228 <i>Extended Inquiry</i> 260-261 TE: 56-64
e. Know that chemical bonds of food molecules contain energy, which is released when the bonds are broken.	SE: 39, 112 <i>Guided Inquiry</i> 99-102, 106-111, 225-228 TE: 58, 59
f. Know that cells usually store energy as adenosine triphosphate (ATP).	SE: 38-39, 201, 209 <i>BioThoughts</i> 437 TE: 57-58, 59
g. Know that the distribution and abundance of organisms and populations in ecosystems are limited by the availability of matter and energy.	SE: 81, 165-168 <i>Summary of Major Concepts (#11, #12)</i> 194
h. Trace how matter cycles and energy flows through different levels of organization of living systems – cells, organs, organisms, communities – and between living systems and the physical environment.	SE: 26, 31, 38-40, 43, 87, 88, 102-103, 224-225 <i>Guided Inquiry</i> 28-31, 99-102, 222-224, 502-503
02. Understand the individual behavior of organisms and their interactions in populations and communities as influenced by physiological and environmental factors.	
a. Know that multi-cellular animals have nervous systems that generate behavior.	SE: 373, 396-398 <i>BioIssue</i> 368 <i>BioPrediction</i> 372 <i>Guided Inquiry</i> 386-389, 392-396, 399-400 TE: 346-348
b. Know that the nerve cells communicate with each other by secreting specific excitatory and inhibitory molecules.	SE: 373, 374
c. Know that organisms have behavioral responses to internal changes and to external stimuli. The broad patterns of behavior have evolved to ensure reproductive success.	SE: 367, 373, 380-381, 389-390 <i>Guided Inquiry</i> 378-380, 382-383, 386-389, 392-396, 399-400 <i>Extended Inquiry</i> 407-412
d. Know that behaviors often have an adaptive logic when viewed in terms of natural selection.	SE: 380-381 <i>Guided Inquiry</i> 386-389, 399-400

OBJECTIVES	PAGE REFERENCES
655. TECHNOLOGY.	
01. Understand the relationship between science and technology and develop the abilities of technological design and application.	
a. Know the ways that science advances technology and technology advances science.	SE: 19, 321, 350-353 <i>BioOccupation</i> 16 <i>Extended Inquiry</i> 349-350 TE: 307
b. Recognize that science and technology are pursued for different purposes and that scientific inquiry is driven by the desire to understand the natural world and technological design is driven by the need to meet human needs and solve human problems.	SE: 27-28, 219-220, 321, 348-349, 350-353 <i>Extended Inquiry</i> 58-61, 347-348, 349-350 <i>Biolssue</i> 89 <i>BioOccupation</i> 324 TE: 305, 307
c. Know that critical thinking, creativity, imagination, and a good knowledge base are all required in the work of science and engineering.	SE: 27-28 <i>Guided Inquiry</i> 28-31, 143-145 <i>Extended Inquiry</i> 56, 127, 187-188, 269-270 TE: 58, 60
d. Know the elements of technological design, which include the following: - Identify a problem or design an opportunity; - Propose designs and choose between alternative solutions; - Implement a proposed solution; - Evaluate the solution and its consequences; - Communicate the problem, process, and solution.	SE: <i>Guided Inquiry</i> 13-17, 506-507 <i>Extended Inquiry</i> 49-53, 58-61 <i>Extended Inquiry</i> (#3) 269 TE: 51-53
e. Use available technology to assist in solving problems.	SE: <i>Guided Inquiry</i> 82-84, 326-329 <i>Extended Inquiry</i> 255-257
656. PERSONAL AND SOCIAL PERSPECTIVES.	
01. Understand common environmental quality issues, both natural and human induced.	
a. Identify issues, including but not limited to: - Water quality; - Air quality; - Hazardous waste; - Forest health.	SE: 5-6, 17-21 <i>Initial Inquiry</i> 2-5, 72-75, 426-427, 492-496 <i>Guided Inquiry</i> 7-9 <i>Extended Inquiry</i> 56-61, 127, 472-479, 516-517 TE: 36-41, 80-88
02. Understand the causes and effects of population change.	
a. Understand the impact of technological development and the growth of human population on the living and nonliving environment.	SE: <i>Initial Inquiry</i> 140 <i>BioPrediction</i> 169 <i>Extended Inquiry</i> 182-185, 473-475, 476-477 <i>Congress</i> 191-192 <i>Guided Inquiry</i> 492-496, 502-503 TE: 170-173

OBJECTIVES	PAGE REFERENCES
b. Understand the impact of population change on natural resources and community infrastructure.	SE: 165-168, 174-175 <i>Initial Inquiry</i> 140 <i>BiolIssue</i> 156 <i>Guided Inquiry</i> 162-165, 492-496, 502-503 <i>BioPrediction</i> 169 <i>Extended Inquiry</i> 182-185, 188, 473-475, 476-477 TE: 170-173
03. Understand the importance of natural resources and the need to manage and conserve them.	
a. Understand the differences between renewable and nonrenewable resources.	SE: *18, 19, 491, 504 <i>Initial Inquiry</i> 72-75 <i>Extended Inquiry</i> 119-120, 516-518 TE: 430-431 These locators discuss various types of resources that students can classify as renewable or nonrenewable.
b. Understand the differences between preservation and conservation.	SE: <i>Initial Inquiry</i> 426-427 <i>Extended Inquiry</i> 479-480 <i>Forum</i> 484-485 TE: 399-400
c. Understand the role and effect of management of natural resources.	SE: 75 <i>Extended Inquiry</i> 56, 119-120, 476-477, 479-480, 511-513, 516-517 <i>Initial Inquiry</i> 72-75, 426-427 <i>BioOccupation</i> 90 <i>BiolIssue</i> 452
04. Understand different uses of technology in science and how they affect our standard of living.	
a. Identify examples of technologies used in scientific fields, including but not limited to: - Weather forecasting; - Food production; - Environmental cleanup; - Advances in medicine; - Communications; - The space program.	SE: 217-218, 219-220, 246, 288-289, 321, 350-353 <i>BioOccupation</i> 10, 16 <i>Guided Inquiry</i> 286-287 <i>Extended Inquiry</i> 349-350
657. HISTORY OF SCIENCE.	
01. Understand the significance of major scientific milestones.	
a. Understand the social and economic impact of historical scientific events.	SE: 165-166, 167-168, 187, 206, 230, 249, 316-317, 397, 439, 456-458
b. Understand the contributions of notable scientists.	SE: 165-166, 167-168, 187, 206, 230, 249, 316-317, 397, 439, 456-458
658. INTERDISCIPLINARY CONCEPTS.	
01. Understand that interpersonal relationships are important in scientific endeavors.	
a. Know the importance of working in interdisciplinary teams to solve scientific problems.	SE: * <i>Guided Inquiry</i> 28-31, 369-371, 392-396, 497, 499-500 <i>Congress</i> 191-192, 358-359 <i>Forum</i> 193 *Activities are group projects.

OBJECTIVES	PAGE REFERENCES
02. Understand technical communication.	
a. Read for information.	SE: <i>Extended Inquiry</i> 57, 58-61, 255-257 <i>BioPrediction</i> 372 <i>Guided Inquiry</i> 376-377, 326-329, 331-335
b. Write and articulate technical information.	SE: <i>Extended Inquiry</i> 58-61, 347-348, 349-350 <i>Guided Inquiry</i> 326-329, 376-377