

BIOLOGY HONORS

CEOCE Study Guide

BENCHMARK: H141: Experimental Procedures, The Scientific Method, Hypothesis, Variables, Controls, Constants, Data Reporting, Safety and Appropriate Lab Equipment, Technology and Demands on Society

TEXTBOOK: Glencoe: Biology: The Dynamics of Life Textbook, 2006: Chapter 1

ESSENTIAL QUESTION: How does the use of the scientific method assist scientists in performing valid research?

KEY VOCABULARY: data, independent variable, dependent variable, control, constants, hypothesis

STUDENT TASKS:

1. Explain why a scientist's research and conclusions must be repeatable in order to be valid.
 2. How do "controls" in an experiment assist in validating the results?
 3. George is experimenting with plants for his science fair project. His bean plant receives "Miracle-Grow" fertilizer and his corn plant receives "Rapid-Grow" fertilizer. They both receive the same temperature and amount of sunlight. He measures their growth after four weeks. How would you improve George's experiment to make it valid?
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BENCHMARK: G242: Ecology

TEXTBOOK: Glencoe: Biology: The Dynamics of Life Textbook, 2006: Chapter 2

ESSENTIAL QUESTION: How do we describe the flow of energy and nutrient cycling through the biosphere?

KEY VOCABULARY: heterotroph, autotroph, decomposers, symbiosis, abiotic, biotic, succession, ecological pyramids

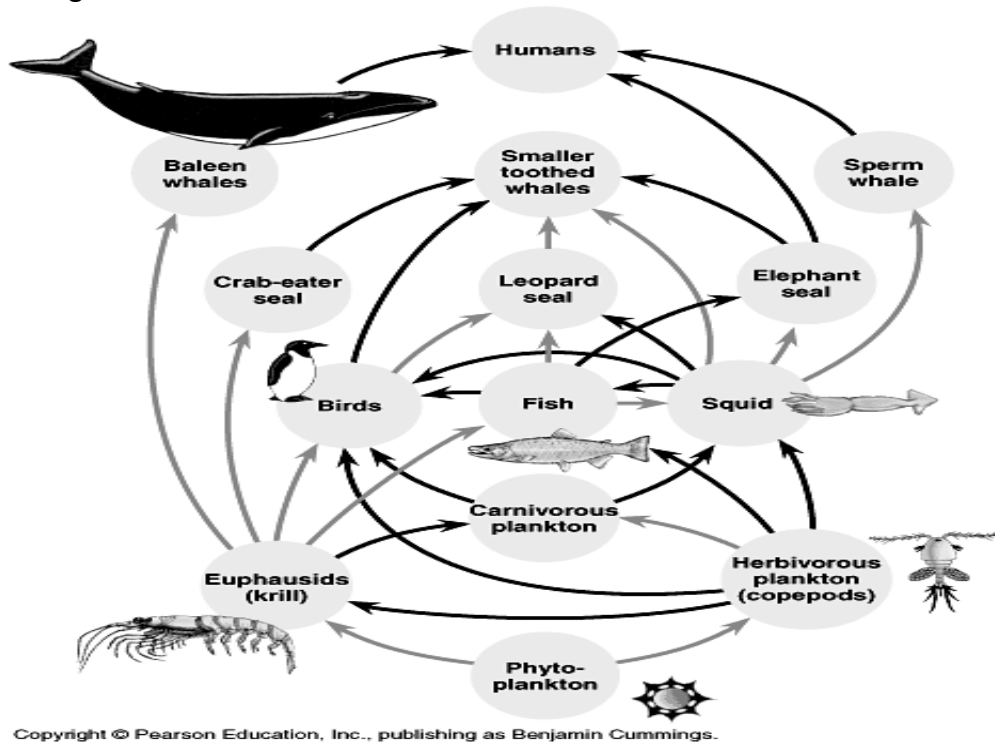
STUDENT TASKS:

1. Design a terrestrial food web of at least six consumers. Name the decomposers in your food web.
2. Describe and give examples of each type of symbiosis.
3. Why is a pyramid the best model of flow of energy through an ecosystem?
4. Contrast the role of autotrophs and heterotrophs in the ecosystem.

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5. What would be the effect on the food web below if the fish population is eliminated due to overfishing?



6. Compare and contrast primary and secondary succession.
7. List typical pioneer species and typical climax species found in a terrestrial community.

BENCHMARK: G242: Ecology

TEXTBOOK: Glencoe: Biology: The Dynamics of Life Textbook, 2006: Chapters 4 and 5

ESSENTIAL QUESTION: What are some positive and negative outcomes of human interventions on the biosphere?

KEY VOCABULARY: habitat fragmentation, exotic species, acid rain, poaching, wildlife refuge, biodiversity, soil depletion, run-off, carbon foot-print

STUDENT TASKS:

1. Why are exotic species a problem in the environment?
2. How has agriculture interfered with the nitrogen cycle?
3. List techniques humans can initiate in order to increase biodiversity.

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BENCHMARK: G242: Ecology

TEXTBOOK: Glencoe: Biology: The Dynamics of Life Textbook, 2006: Chapter 3

ESSENTIAL QUESTION: Why is climate a determining limiting factor for the biomes on our planet?

KEY VOCABULARY: biomes, limiting factors, climate, permafrost

STUDENT TASKS:

1. What is the effect of latitude and altitude on a biome?
 2. Compare and contrast tropical rainforest, temperate deciduous forest and taiga.
 3. How is the tundra similar to a grassland?
 4. What are the benefits of biodiversity to the natural world including humans?
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BENCHMARK: D241: Human Impact on Ecosystems, Connectivity of Life, Limit of Productivity.

TEXTBOOK: Glencoe: Biology: The Dynamics of Life Textbook, 2006: Chapter 3

ESSENTIAL QUESTION: How do limiting factors and ranges of tolerance affect the distribution of organisms?

KEY VOCABULARY: limiting factors, tolerance, community, optimum range

STUDENT TASKS:

1. Plan an investigation that would test water availability as a limiting factor in an ecosystem.
 2. Identify your independent variable and dependent variables in that investigation.
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BENCHMARK: G242: Ecology

TEXTBOOK: Glencoe: Biology: The Dynamics of Life Textbook, 2006: Chapter 3

ESSENTIAL QUESTION: How do ecosystems change over time?

KEY VOCABULARY: succession, primary succession, climax community, secondary succession

STUDENT TASKS:

1. Sequence the stages of succession in a meadow. Is this primary or secondary succession?
2. How does a pond show succession as it fills with sediment over time?
3. Give examples of pioneer and climax species in Marion County.

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BENCHMARK: D241: Human Impact on Ecosystems, Connectivity of Life, Limit of Productivity.

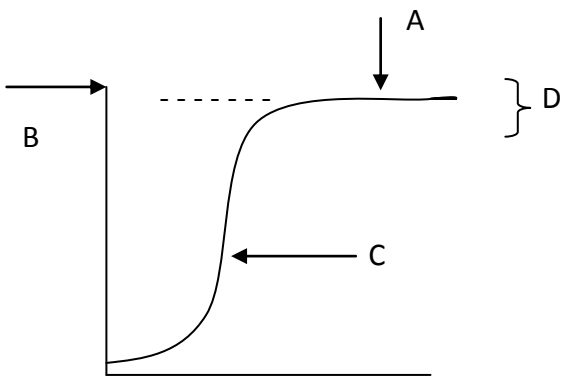
TEXTBOOK: Glencoe: Biology: The Dynamics of Life Textbook, 2006: Chapter 4; pp. 93-94, Problem-solving Lab p.101

ESSENTIAL QUESTION: How are the factors that control population growth shown on the graph provided?

KEY VOCABULARY: exponential growth, carrying capacity, limiting factors, S-Curve, J- Curve

STUDENT TASKS:

1. Define and give examples of limiting factors.
2. Label the carrying capacity on an S-Curve.
3. What causes the S shape of a typical population growth curve?
4. Why don't populations continue to grow at an exponential rate?
5. What limiting factors affect the human population? How have they changed in the last 100 years?
6. Label carrying capacity, limiting factors, exponential phase and leveling-off phase in the diagram below.



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BENCHMARK: D241: Human Impact on Ecosystems, Connectivity of life, Limit of Productivity.

TEXTBOOK: Glencoe: Biology: The Dynamics of Life Textbook, 2006: Chapter 5

ESSENTIAL QUESTION: How have humans affected our planet's biodiversity in both positive and negative ways?

KEY VOCABULARY: biodiversity, extinction, Endangered Species Act, habitat degradation, global warming, exotic species

STUDENT TASKS:

1. Compare the effectiveness of protecting a species habitat with protecting just the species organism.
2. Humans affect the environment in various ways. Fill in the effects of these human activities in the table below.

Human Activity	Environmental Impact
Use of fossil fuels	
CFCs from aerosol spray cans	
Habitat destruction	
Endangered Species Act	
Habitat preservation	
Captive breeding	
Release of exotic species	

BENCHMARK: F142: Cell Organelles, Cell Cycle, Macromolecules

TEXTBOOK: Glencoe: Biology: The Dynamics of Life Textbook, 2006: Chapter 6

ESSENTIAL QUESTION: How are carbohydrates, proteins, lipids and nucleic acids important to living things?

KEY VOCABULARY: monomer, polymer, protein, carbohydrates, lipids, nucleic acids, enzymes, amino acids, polypeptides

STUDENT TASKS:

1. What is an organic compound?
2. What are the general roles of each major biochemical group?
3. What is the role of enzymes in living things?

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BENCHMARK: F142: Cell Organelles, Cell Cycle, Macromolecules

TEXTBOOK: Glencoe: Biology: The Dynamics of Life Textbook, 2006: Chapter 7, pp. 186, 207

ESSENTIAL QUESTION: How do cells carry out the basic functions of life?

KEY VOCABULARY: nucleus, mitochondria, chloroplast, cell wall, chromosome, vacuole, endoplasmic reticulum, ribosome, Golgi apparatus, lysosome, centriole

STUDENT TASKS:

1. Compare and contrast structures of a plant cell with the structures found in an animal cell.
 2. Identify organelles on a diagram of a cell.
 3. Sequence the stages of mitosis in a diagram.
 4. Why must cells divide to form new cells?
 5. What are the jobs of the various organelles in plant and animal cells?
 6. In which stage of the cell cycle are the chromosomes not visible? During which stages are they visible?
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BENCHMARK: F141: Cellular Transport

TEXTBOOK: Glencoe: Biology: The Dynamics of Life Textbook, 2006: Chapter 8, p. 177, p. 197, Figures and Table pp. 198-199

ESSENTIAL QUESTION: How does the structure of the plasma membrane allow for the transport of various substances into and out of the cell?

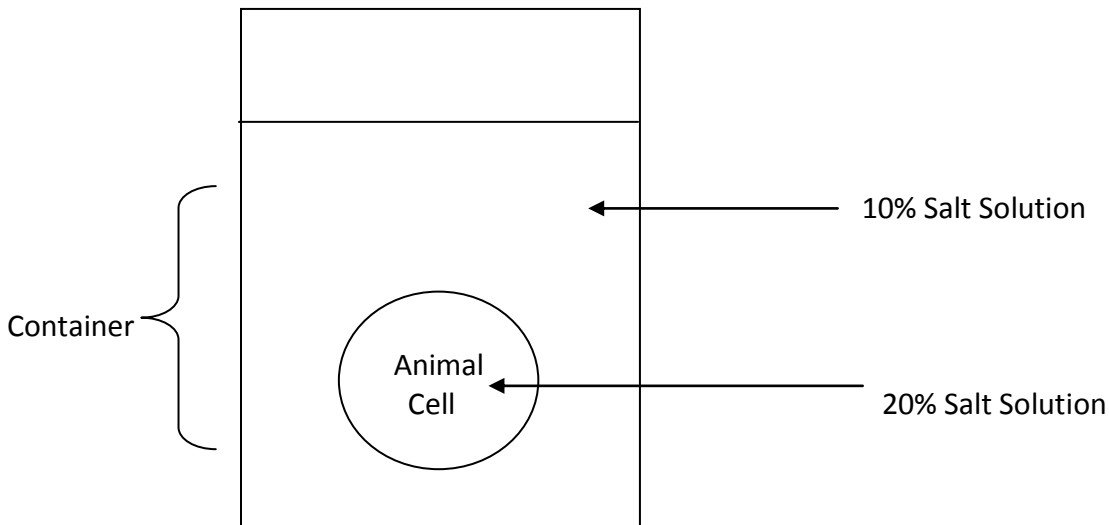
KEY VOCABULARY: plasma membrane, phospholipid, protein, diffusion, active transport, osmosis, passive transport, exocytosis, endocytosis, fluid mosaic model

STUDENT TASKS:

1. Draw and label a section of a plasma membrane.
2. Compare and contrast active transport and passive transport. Include energy requirements and types of molecules used.
3. What determines the direction of osmosis across a membrane?

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4. Draw an arrow indicating water movement across the plasma membrane



5. Compare and contrast diffusion and osmosis.
6. Through what process do cells maintain disequilibrium of certain molecules across their cell membranes? Which component of the plasma membrane carries out this process?

BENCHMARK: F141: Photosynthesis, Cellular Respiration, ADP/ATP

TEXTBOOK: Glencoe: Biology: The Dynamics of Life Textbook, 2006: Chapter 9

ESSENTIAL QUESTION: How does photosynthesis convert solar radiation into chemical energy?

KEY VOCABULARY: chloroplast, light-dependent reactions, Calvin cycle, pigment, chlorophyll, light-independent reactions, glucose

STUDENT TASKS:

1. Write the balanced equation for photosynthesis.
2. How does the plant store the products of photosynthesis and how do we test for its presence?
3. What environmental factors influence the rate of photosynthesis?

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BENCHMARK: F141: Photosynthesis, Cellular Respiration, ADP/ATP

TEXTBOOK: Glencoe: Biology: The Dynamics of Life Textbook, 2006: Chapter 9, pp. 241, 244

ESSENTIAL QUESTION: How do cells obtain chemical energy from our food and how is it used?

KEY VOCABULARY: mitochondria, cellular respiration, ATP, ADP, metabolism, synthesis, excretion, digestion

STUDENT TASKS:

1. Compare the equation for cellular respiration with the equation for photosynthesis.
 2. How do organisms make and use ATP?
 3. Give examples of processes included in metabolism.
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BENCHMARK: F243: Mendelian Genetics; Genotype/Phenotype; Punnett Squares; Monohybrid Crosses

TEXTBOOK: Glencoe: Biology: The Dynamics of Life Textbook, 2006: Chapters 10, 12 pp. 255,335

ESSENTIAL QUESTION: How is inherited genetic information expressed in an organism?

KEY VOCABULARY: heredity, trait, hybrid, allele, dominant, recessive, Law of independent Assortment, Law of Segregation, homozygous, heterozygous, genotype, phenotype, karyotype, dihybrid, incomplete dominance

STUDENT TASKS:

1. Construct a Punnett Square of the two crosses shown in Figure. 10.2, page 255 in Biology: The Dynamics of Life. List the genotype and phenotype of the F₁ and F₂ generations. Indicate each offspring as heterozygous or homozygous for tallness.
2. Contrast the Law of Segregation with the Law of Independent Assortment.
3. Study the karyotype on page 335 of Biology: The Dynamics of Life. Answer questions #23 – 25 on that page. In addition, what do we call the pairs of chromosomes shown in the karyotype?
4. A litter of guinea pigs is 50% black fur and 50% white fur. Black is the dominant fur color for this particular species. What is the genotype and phenotype of the parents of this litter?
5. What gametes may be produced by an individual with genotype BbDd?
6. Consider this Punnett Square showing the cross between two pink flowers.

Pink

Pink

Red	Pink
Pink	White

7. What type of inheritance is illustrated? How is the inheritance different from typical Mendelian inheritance?

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BENCHMARK: F242: DNA/RNA, Protein Synthesis, Mutations, Meiosis

TEXTBOOK: Glencoe: Biology: The Dynamics of Life Textbook, 2006: Chapter 10

ESSENTIAL QUESTION: What are the stages of meiosis, and how does meiosis ensure genetic diversity?

KEY VOCABULARY: meiosis, diploid, haploid, homologous chromosomes, crossing-over, genetic recombination, sexual reproduction

STUDENT TASKS:

1. Sequence the stages of meiosis in diagrams.
 2. A cell has 4 pairs of homologous chromosomes: AA, BB, CC, and DD. What is the chromosomal make-up of each gamete produced during meiosis?
 3. How does sexual reproduction increase genetic recombination?
 4. How many haploid cells are produced during the process of meiosis in sperm cells?
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BENCHMARK: F242: DNA/RNA, Protein Synthesis, Mutations, Meiosis

TEXTBOOK: Glencoe: Biology: The Dynamics of Life Textbook, 2006: Chapters 11, 12

ESSENTIAL QUESTION: How do cells make use of the information stored in DNA?

KEY VOCABULARY: DNA replication, nitrogenous base, ribosome, transcription, translation, mRNA, tRNA, mutation, somatic cell, gametes

STUDENT TASKS:

1. How is information stored in DNA?
2. What is the role of mRNA, tRNA, and the ribosome?
3. Sequence the events of protein synthesis.
4. How do mutations reflect a change in an organism's DNA?
5. Contrast the effect of mutations in somatic cells and gametes.
6. What are the steps of DNA replication?
7. Why is DNA replication necessary?

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BENCHMARK: F243: Population genetics; Natural Selection; Evolution; Gene pools

TEXTBOOK: Glencoe: Biology: The Dynamics of Life Textbook, 2006: Chapter 15

ESSENTIAL QUESTION: How do the composition of a gene pool and the process of natural selection affect evolution?

KEY VOCABULARY: gene pool, natural selection, adaptation, speciation, adaptive radiation

STUDENT TASKS:

1. How does natural selection act on the gene pool of a population?
 2. Why do beneficial adaptations become more common over time in a population while less beneficial traits gradually disappear?
 3. Do Problem Solving Lab on page 397, Biology: The Dynamics of Life.
 4. Answer the green question on figure 15.15, page 409, Biology: The Dynamics of Life.
 5. How does Figure 15.18 on page 412, Biology: The Dynamics of Life illustrate speciation and adaptive radiation?
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BENCHMARK: G141: Classification/Taxonomy; Diversity of Living Things; Explain the Great Diversity of Life through Evolutionary Evidence Found in Fossils, DNA, and Biochemistry

TEXTBOOK: Glencoe: Biology: The Dynamics of Life Textbook, 2006: Chapter 17

ESSENTIAL QUESTION: How do we classify organisms into groups?

KEY VOCABULARY: taxonomy, kingdom, phyla, class, order, family, genus, species

STUDENT TASKS:

1. What are the taxa used to classify organisms?
2. Which taxon is the most general?
3. Which taxon is the most specific?

BIOLOGY HONORS CEOCE Study Guide

BENCHMARK: G141: Classification/Taxonomy, Diversity of Living Things, Explain the Great Diversity of Life through the Evolutionary Evidence Found in Fossils, DNA, and Biochemistry

TEXTBOOK: Glencoe: Biology: The Dynamics of Life Textbook, 2006: Chapter 15, 17

ESSENTIAL QUESTION: What are the evidences for evolutionary relationships between organisms and how do we illustrate those relationships in a cladogram?

KEY VOCABULARY: cladogram, speciation, homologous structures, analogous structures, fossils, biochemistry

STUDENT TASKS:

1. Why are homologous structures considered evidence of evolutionary relationships but analogous structures only show the result of natural selection?
2. Organisms A and B share 80% of their DNA; organisms A and C share 60% of their DNA. Which two organisms are most closely related?
3. Give biochemical, anatomical, and embryological examples of how organisms are evolutionarily related.
4. Explain how Figure 15.6 on page 401 of Biology: The Dynamics of Life illustrates common evolutionary ancestry.
5. Do Mini-Lab 17.2 on page 453.