

Biology EOC Exam Coverage for Semester I

SCIENTIFIC METHODS/THINKING

1. Students will design and/or evaluate a scientific investigation using evidence of scientific thinking and/or problem solving.
2. Students will interpret and analyze data to make predictions and/or defend conclusions.
3. Students will compare and/or contrast the structure and function of the compound microscope, dissecting microscope, scanning electron microscope, and/or the transmission electron microscope.
4. Students will evaluate the merits of scientific explanations produced by others.
5. Students will assess the reliability of sources of information according to scientific standards.
6. Students will identify examples of scientific inferences made from observations.

PLANTS

7. Students will explain how the structures of plant tissues and organs are directly related to their roles in physiological processes.

Items will assess the function of plant tissues and organs in the context of physiological processes.

Items will not assess specific functions of structures within organs and tissues in isolation.

Items assessing plant organs are limited to roots, stems, leaves, flowers, fruits, and cones.

Items referring to physiological processes are limited to photosynthesis, cellular respiration, transpiration, growth, and reproduction.

Items assessing plant tissues are limited to meristematic, ground, dermal, and vascular tissues.

Items referring to plant structures are limited to cambium, guard cells, phloem, root hairs, root cap, seed, stomata, xylem, stamen, pistil, ovary, petals, sperm, egg, sepal, filament, anther, style, and stigma.

BRAIN

8. Students will identify the major parts of the brain on diagrams.

Items are limited to the cerebrum, cerebellum, pons, medulla oblongata, brain stem, frontal lobe, parietal lobe, occipital lobe, and temporal lobe.

Items will not assess the function of the major parts of the brain.

CIRCULATORY SYSTEM

9. Students will identify factors that affect blood flow or describe how these factors affect blood flow through the cardiovascular system.

Items may address factors such as blood pressure, blood volume, resistance, blood viscosity, disease, and exercise.

IMMUNE SYSTEM

10. Students will identify and/or explain the basic functions of the human immune system, including specific and nonspecific immune responses.

11. Students will describe the basic function of vaccines and/or antibiotics.

12. Students will explain the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspective of both individual and public health.

Items assessing the significance of genetic factors, environmental factors, and pathogenic agents to health are limited to a conceptual understanding.

Items assessing the mode of action of antibiotics are limited to a conceptual understanding and will not require knowledge regarding a specific antibiotic.

EVOLUTION

13. Students will identify evidence and/or explain how the scientific theory of evolution is supported by the fossil record, comparative anatomy, comparative embryology, biogeography, molecular biology, and observable evolutionary change.

14. Students will identify examples of and basic trends in hominid evolution from early ancestors to modern humans.

15. Students will identify ways in which a scientific claim is evaluated (e.g., through scientific argumentation, critical and logical thinking, and consideration of alternative explanations).

16. Students will assess the reliability of sources of information according to scientific standards.

17. Students will identify examples of scientific inferences made from observations.

18. Students will identify the criteria that differentiate science from nonscience and pseudoscience.

19. Students will explain the development of a theory.

20. Students will recognize the differences between theories and laws.

Items assessing evolution will focus on a conceptual understanding of the supporting scientific evidence.

Items will not require memorization of the names of specific human fossils or the names of the different hominid species.

Items assessing the fossil record must focus on the fossil rather than geologic formations in isolation.

Items assessing the fossil record will not require understanding of the specific mechanisms used for relative dating and radioactive dating.

Items will not require the memorization of the geologic time scale, including era, period, and/or epoch.

Items will not assess the origin of Earth.

Items will not assess specific knowledge of the formation of microspheres or the evolution of RNA and DNA.

Items will not address or assess the endosymbiotic theory.

Items referring to adaptive radiation, convergent evolution, coevolution, or punctuated equilibrium should focus on the concepts rather than on the definition of the terms.

Items referring to the development of language or the manufacturing of tools will relate this development to changes in the skull or brain size.

Items will not assess types of genetic mutation or how these mutations occur.

Items referring to comparative anatomy and comparative embryology will assess anatomical similarities such as homologous structures and vestigial organs but will not require specific knowledge of embryologic stages or structures.

Items will not require knowledge of changes to specific species or geographic location of those species.

Items will not assess genes, alleles, genetic drift, or gene flow.

Items may assess how the overall contributions of scientists such as Darwin, Lamarck, Lyell, Malthus, Mendel, or Wallace aided in the development of the scientific theory of evolution.

Items will not assess the differences among intelligent design, creationism, and the scientific theory of evolution.

Items assessing a scientific claim, the development of a theory, or the differences between theories and laws are limited to the scientific theory of evolution.

CLASSIFICATION

21. Students will classify organisms based on the distinguishing characteristics of the domains and/or kingdoms of living organisms.

22. Students will identify and/or describe how and/or why organisms are hierarchically classified based on evolutionary relationships.

23. Students will identify and/or explain the reasons for changes in how organisms are classified.

24. Students will identify ways in which a scientific claim is evaluated (e.g., through scientific argumentation, critical and logical thinking, and consideration of alternative explanations).

25. Students will identify examples of scientific inferences made from observations.

Items referring to distinguishing characteristics of living organisms are limited to the domains of Archaea, Bacteria, and Eukarya and the kingdoms of Protista, Fungi, Plantae, and Animalia.

Items will not require specific knowledge of organisms classified in any domain or kingdom; items should describe the characteristics of an organism and assess its classification.

Items may refer to prokaryotic, eukaryotic, unicellular and/or multicellular organisms, autotrophs, and/or heterotrophs, but they will not assess the definition of those terms.

Items referring to changes in classification systems should be conceptual and will not require specific knowledge of those changes.

Items may address evolutionary classification, phylogeny, and the use of cladograms, but they may not assess the definition of those terms.

Items assessing a scientific claim are limited to the classification of organisms.

ORIGINS OF LIFE

26. Students will describe scientific explanations of the origin of life on Earth.

27. Students will identify situations or conditions contributing to the origin of life on Earth.

Items may address the conditions required for the origin of life on Earth but may not require specific knowledge of the age of Earth or its eras, periods, or epochs.

Items may assess how contributions of scientists such as Pasteur, Oparin, Miller and Urey, Margulis, or Fox aided in the development of the scientific explanation of the origin of life but will not assess what each scientist contributed.

Items assessing the origin of organic molecules, chemical evolution, and/or eukaryotic cells should be conceptual.

Items may refer to the endosymbiotic theory but may not assess the term in isolation.

Items assessing a scientific claim are limited to the scientific explanations of the origins of life on Earth.

EVOLUTION

28. Students will explain and/or describe the conditions required for natural selection that result in differential reproductive success.
29. Students will explain and/or describe the scientific mechanisms, such as genetic drift, gene flow, and nonrandom mating, resulting in evolutionary change.
30. Students will explain and/or describe how mutation and genetic recombination increase genetic variation.
31. Students will identify ways in which a scientific claim is evaluated (e.g., through scientific argumentation, critical and logical thinking, and consideration of alternative explanations).

Items will not address descent with modification or common descent.

Items addressing mutation and genetic recombination in relation to increasing genetic variation must be assessed in the context of evolution.

Items will not assess the Hardy-Weinberg principle or genetic equilibrium.

Items may address how meiosis contributes to genetic variation but may not assess the steps or stages of meiosis.

REPRODUCTIVE SYSTEM

32. Students will identify and/or describe the basic anatomy and physiology of the human reproductive system.
33. Students will describe the process of human development from the zygotic stage to the end of the third trimester and birth.

Items referring to the male human reproductive system are limited to the seminal vesicle, prostate gland, vas deferens, urethra, epididymis, scrotum, penis, and testes.

Items referring to the female human reproductive system are limited to the ovaries, oviduct (fallopian tube), uterus, cervix, and vagina.

Items assessing the function of the placenta, umbilical cord, amniotic sac, and amniotic fluid are limited to how these structures relate to the development of the fetus.

Items will not assess physiological or hormonal changes of the mother during pregnancy.

Items assessing the production of hormones in the context of the physiology of the human reproductive system are limited to a conceptual understanding of the production of hormones.

Items will not assess hormonal control during pregnancy.

Items may refer to the early stages of development (implantation, morula, blastocyst, gastrulation, neurulation) but will not assess the definition of these terms in isolation.

Items referring to changes in each trimester are limited to normal human development.

Items will not assess specific knowledge of malformations in the human fetus, miscarriages, maternal preexisting conditions, genetic conditions, or the impact of exposure to environmental conditions.

Items will not assess the utilization of technology to assist in or prevent fertilization or monitor development of the fetus.

Items will not address or assess the menstrual cycle.

ECOLOGY

34. Students will use data and information about population dynamics, abiotic factors, and/or biotic factors to explain and/or analyze a change in carrying capacity and its effect on population size in an ecosystem.

35. Students will explain that different types of organisms exist within aquatic systems due to chemistry, geography, light, depth, salinity, and/or temperature.

36. Students will describe the potential changes to an ecosystem resulting from seasonal changes, climate changes, and/or succession.

37. Students will identify positive and/or negative consequences that result from a reduction in biodiversity.

Items referring to chemical factors in aquatic systems are limited to pH, oxygen, carbon dioxide, nitrogen, phosphorous, and salinity.

Items referring to geography in aquatic systems are limited to water depth, latitude, temperature, underwater topography, and proximity to land.

Items will not require the identification of oceanic zones.

Items must focus on changes to the ecosystem and not on how a single population changes/responds to seasonal changes, climate changes, and/or succession.

Items referring to reduction in biodiversity may include examples of catastrophic events, climate changes, human activities, and the introduction of invasive and nonnative species, but they will not assess specific knowledge of these.

Items referring to reduction in biodiversity will focus on the consequence and not require knowledge of the specific event that led to the reduction.

Items addressing climate change are limited to biodiversity, population dynamics, and ecosystem contexts.

Items addressing sources of information and reliability of information are limited to population dynamics, distribution of life in aquatic systems, changes in ecosystems, and biodiversity.

38. Students will describe the energy pathways through the different trophic levels of a food web or energy pyramid.

39. Students will analyze the movement of matter through different biogeochemical cycles.

Items addressing food webs will require application of the knowledge of roles of organisms in a food web to describe energy pathways rather than the identification of producers, consumers (primary, secondary, tertiary), and decomposers in isolation.

Items referring to organisms in food webs are limited to the impact of changes in energy within different trophic levels.

Items will not require knowledge of specific organisms or their feeding habits.

Items assessing biogeochemical cycles are limited to the water cycle and the carbon cycle.

Items referring to the biogeochemical cycles may address but will not assess photosynthesis and cellular respiration in isolation.

40. Students will predict how the actions of humans may impact environmental systems and/or affect sustainability.

41. Students will evaluate possible environmental impacts resulting from the use of renewable and/or nonrenewable resources.

Items referring to renewable and nonrenewable resources will focus on the environmental costs and benefits of using those resources and not on identifying examples of renewable and nonrenewable resources.

Items will not require knowledge of specific energy technologies, environmental regulations, pollution prevention technologies or devices, or other mechanisms used to prevent pollution.

Items assessing a scientific claim are limited to impacts on the environment and renewable and nonrenewable resources.

Items referring to monitoring of environmental parameters will focus on why monitoring is needed and not on how the monitoring is used.

PHOTOSYNTHESIS/RESPIRATION

42. Students will explain how the products of photosynthesis are used as reactants for cellular respiration and vice versa.

43. Students will explain how photosynthesis stores energy in organic compounds and cellular respiration releases energy from organic compounds.

44. Students will identify the reactants, products, and/or the basic function of photosynthesis.

45. Students will identify the reactants, products, and/or the basic functions of aerobic and anaerobic cellular respiration.

46. Students will connect the role of adenosine triphosphate (ATP) to energy transfers within the cell.

Items will not require the memorization of the stages, specific events, or intermediate molecules produced during these processes.

Items will not require the balancing of equations.

Items will not assess plant structures.

WATER

47. Students will explain the properties of water at a conceptual level.

48. Students will explain how the properties make water essential for life on Earth.

Items referring to the properties of water are limited to hydrogen bonding, polarity, cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.

Items may address adhesion but will not assess adhesion.