

## READINESS STANDARDS - Biology

**(B.4) Science concepts.** The student knows that cells are the basic structures of all living things with specialized parts that perform specific functions and that viruses are different from cells. The student is expected to

(B) investigate and explain cellular processes, including homeostasis, energy conversions, transport of molecules, and synthesis of new molecules

Homeostasis, Feedback loops

(C) compare the structures of viruses to cells, describe viral reproduction, and describe the role of viruses in causing diseases such as human immunodeficiency virus (HIV) and influenza

Capsid, Envelope, Nucleic acid, DNA, RNA, Genome

**(B.5) Science concepts.** The student knows how an organism grows and the importance of cell differentiation. The student is expected to

(A) describe the stages of the cell cycle, including deoxyribonucleic acid (DNA) replication and mitosis, and the importance of the cell cycle to the growth of organisms

Deoxyribonucleic Acid (DNA), Cytokinesis, Chromosome, Mitosis

**(B.9) Science concepts.** The student knows the significance of various molecules involved in metabolic processes and energy conversions that occur in living organisms. The student is expected to

(A) compare the structures and functions of different types of biomolecules, including carbohydrates, lipids, proteins, and nucleic acids

Biomolecules, Carbohydrates, Lipids, Proteins, Nucleic acids

**(B.6) Science concepts.** The student knows the mechanisms of genetics, including the role of nucleic acids and the principles of Mendelian Genetics. The student is expected to

(A) identify components of DNA, and describe how information for specifying the traits of an organism is carried in the DNA

Traits, Hydrogen bonds, Phosphate group, Dexoyribose sugar, Nitrogen base, Replication, DNA, RNA, Codons

(E) identify and illustrate changes in DNA and evaluate the significance of these changes

Mutations, Nondisjunction

(F) predict possible outcomes of various genetic combinations such as monohybrid crosses, dihybrid crosses and non-Mendelian inheritance

Punnett squares, Genotype, Phenotype, Incomplete dominance, Co-dominance, Sex-linked traits, Principle of dominance, Law of segregation, Law of independent assortment

**(B.7) Science concepts.** The student knows evolutionary theory is a scientific explanation for the unity and diversity of life. The student is expected to

(A) analyze and evaluate how evidence of common ancestry among groups is provided by the fossil record, biogeography, and homologies, including anatomical, molecular, and developmental

Biogeography, Homologies

(E) analyze and evaluate the relationship of natural selection to adaptation and to the development of diversity in and among species

Adaptation, Natural selection, Biodiversity, Diversity, Extinction

## READINESS STANDARDS - Biology

(B.8) **Science concepts.** The student knows that taxonomy is a branching classification based on the shared characteristics of organisms and can change as new discoveries are made. The student is expected to

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| (B) categorize organisms using a hierarchical classification system based on similarities and differences shared among groups | Archaeabacteria, Eubacteria, Protists, Fungi, Plants, Animals |
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(B.10) **Science concepts.** The student knows that biological systems are composed of multiple levels. The student is expected to

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| (A) describe the interactions that occur among systems that perform the functions of regulation, nutrient absorption, reproduction, and defense from injury or illness in animals | Regulation, Nutrient absorption, Reproduction, Defenses |
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| (B) describe the interactions that occur among systems that perform the functions of transport, reproduction, and response in plants | Transport, Xylem, Phloem, Stoma, Guard cells |
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(B.11) **Science concepts.** The student knows that biological systems work to achieve and maintain balance. The student is expected to

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| (D) describe how events and processes that occur during ecological succession can change populations and species diversity | Primary succession, Secondary succession, Populations, Species diversity |
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(B.12) **Science concepts.** The student knows that interdependence and interactions occur within an environmental system. The student is expected to

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| (A) interpret relationships, including predation, parasitism, commensalism, mutualism, and competition among organisms | Predation, Parasitism, Commensalism, Mutualism, Competition |
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| (C) analyze the flow of matter and energy through trophic levels using various models, including food chains, food webs, and ecological pyramids | Food web, Food chain, Ecological pyramid, Trophic levels |
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| (F) describe how environmental change can impact ecosystem stability | Global warming, Greenhouse effect, Deforestation, Acid rain, Stability |
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## SUPPORTING STANDARDS - Biology

(B.4) **Science concepts.** The student knows that cells are the basic structures of all living things with specialized parts that perform specific functions and that viruses are different from cells. The student is expected to

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| (A) compare and contrast prokaryotic and eukaryotic cells | Prokaryote, Eukaryote, Organelles |
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(B.5) **Science concepts.** The student knows how an organism grows and the importance of cell differentiation. The student is expected to

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| (B) examine specialized cells, including roots, stems, and leaves of plants; and animal cells such as blood, muscle, and epithelium | Xylem, Phloem, Epithelial, Cellulose |
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| (C) describe the roles of DNA, ribonucleic acid (RNA), and environmental factors in cell differentiation | DNA, RNA, Cell differentiation |
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| (D) recognize that disruptions of the cell cycle lead to diseases such as cancer | Cell division, Disease |
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# SUPPORTING STANDARDS - Biology

(B.6) **Science concepts.** The student knows the mechanisms of genetics, including the role of nucleic acids and the principles of Mendelian Genetics. The student is expected to

(B) recognize that components that make up the genetic code are common to all organisms	Genetic code
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(B.6) **Science concepts.** The student knows the mechanisms of genetics, including the role of nucleic acids and the principles of Mendelian Genetics. The student is expected to

(C) explain the purpose and process of transcription and translation using models of DNA and RNA	Transcription, Translation, Nitrogen bases, Codon
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(D) recognize that gene expression is a regulated process	Gene expression
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(G) recognize the significance of meiosis to sexual reproduction	Meiosis, Sex cells, Genetic variability, Mendel's laws of inheritance, Crossing over, Independent assortment
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(H) describe how techniques such as DNA fingerprinting, genetic modifications, and chromosomal analysis are used to study the genomes of organisms.	Genome, DNA fingerprinting, Electrophoresis
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(B.7) **Science concepts.** The student knows evolutionary theory is a scientific explanation for the unity and diversity of life. The student is expected to

(B) analyze and evaluate scientific explanations concerning any data of sudden appearance, stasis, and sequential nature of groups in the fossil record	Fossil record, Homologies, Biogeography
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(C) analyze and evaluate how natural selection produces change in populations, not individuals	Natural selection, Disruptive selection, Directional selection, Stabilizing selection, Populations
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(D) analyze and evaluate how the elements of natural selection, including inherited variation, the potential of a population to produce more offspring than can survive, and a finite supply of environmental resources, result in differential reproductive success	Inherited variation, Reproductive success
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(F) analyze and evaluate the effects of other evolutionary mechanisms, including genetic drift, gene flow, mutation, and recombination	Genetic drift, Gene flow, Mutation, Recombination, Artificial selection, Non-random mating
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(G) analyze and evaluate scientific explanations concerning the complexity of the cell	Endosymbiosis
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(B.8) **Science concepts.** The student knows that taxonomy is a branching classification based on the shared characteristics of organisms and can change as new discoveries are made. The student is expected to

(A) define taxonomy and recognize the importance of a standardized taxonomic system to the scientific community	Taxonomy, Binomial nomenclature, Dichotomous key
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(C) compare characteristics of taxonomic groups, including archaea, bacteria, protists, fungi, plants, and animals	Archaea, Bacteria, Protists, Fungi, Plants, Animals
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# SUPPORTING STANDARDS - Biology

(B.9) **Science concepts.** The student knows the significance of various molecules involved in metabolic processes and energy conversions that occur in living organisms. The student is expected to

(B) compare the reactants and products of photosynthesis and cellular respiration in terms of energy and matter

Photosynthesis, Cellular respiration

(C) identify and investigate the role of enzymes

Enzymes, Catalyst, Substrate, Activation energy

(D) analyze and evaluate the evidence regarding formation of simple organic molecules and their organization into long complex molecules having information such as the DNA molecule for self-replicating life.

Organic Molecule

(B.10) **Science concepts.** The student knows that biological systems are composed of multiple levels. The student is expected to

(C) analyze the levels of organization in biological systems and relate the levels to each other and to the whole system

Atom, Molecule, Organelle, Cell, Tissue, Organ, Organ system, Organism, Population, Community, Ecosystem

(B.11) **Science concepts.** The student knows that biological systems work to achieve and maintain balance. The student is expected to

(A) describe the role of internal feedback mechanisms in the maintenance of homeostasis

Internal feedback, Feedback loops, Homeostasis

(B) investigate and analyze how organisms, populations, and communities respond to external factors

External Factors

(C) summarize the role of microorganisms in both maintaining and disrupting the health of both organisms and ecosystems

Microorganisms

(B.12) **Science concepts.** The student knows that interdependence and interactions occur within an environmental system. The student is expected to

(B) compare variations and adaptations of organisms in different ecosystems

Adaptations

(D) recognize that long-term survival of species is dependent on changing resource bases that are limited

Limiting factor, Carrying capacity

(E) describe the flow of matter through the carbon and nitrogen cycles and explain the consequences of disrupting these cycles

Carbon cycle, Nitrogen cycle