

Biology Keystone Eligible Content

1	Describe the characteristics of life shared by all prokaryotic and eukaryotic organisms
2	Compare cellular structures and their functions in prokaryotic and eukaryotic cells
3	Describe and interpret relationships between structure and function at various levels of biological organization (i.e. organelles, cells, tissues, organs, organ systems and multicellular organisms)
4	Describe the unique properties of water and how these properties support life on Earth (e.g. freezing point, high specific heat, cohesion)
5	Explain how carbon is uniquely suited to form biological macromolecules
6	Describe how biological macromolecules form from monomers
7	Compare the structure and function of carbohydrates, lipids, proteins and nucleic acids in organisms
8	Describe the role of an enzyme as a catalyst in regulating a specific biochemical reaction
9	Explain how factors such as pH, temperature, and concentration levels can affect enzyme function
10	Describe the fundamental roles of plastids (e.g. chloroplasts) and mitochondria in energy transformation
11	Compare the basic transformation of energy during photosynthesis and cellular respiration
12	Describe the role of ATP in biochemical reactions
13	Describe how the structure of the plasma membrane allows it to function as a regulatory structure and/or protective barrier for a cell
14	Compare the mechanisms that transport materials across the plasma membrane (i.e. passive transport - diffusion, osmosis, facilitated diffusion; and active transport - pumps, endocytosis, exocytosis)
15	Describe how membrane-bound cellular organelles (e.g. endoplasmic reticulum, Golgi apparatus) facilitate the transport of materials
16	Explain how organisms maintain homeostasis (e.g. thermoregulation, water regulation, oxygen regulation)
17	Describe the events that occur during the cell cycle: interphase, nuclear division (i.e. mitosis or meiosis), cytokinesis
18	Compare the processes and outcomes of mitotic and meiotic nuclear divisions
19	Describe how the process of DNA replication results in the transmission and/or conservation of genetic information
20	Explain the functional relationships between DNA, genes, alleles, and chromosomes and their roles in inheritance
21	Describe and/or predict observed patterns of inheritance (i.e. dominant, recessive, co-dominance, incomplete dominance, sex-linked, polygenic, and multiple alleles)
22	Describe processes that can alter composition or number of chromosomes (i.e. crossing-over, nondisjunction, duplication, translocation, deletion, insertion, and inversion)
23	Describe how the processes of transcription and translation are similar in all organisms
24	Describe the role of ribosomes, endoplasmic reticulum, Golgi apparatus, and the nucleus in the production of specific types of proteins
25	Describe how genetic mutations alter the DNA sequence and may or may not affect phenotype (e.g. silent, nonsense, frame-shift)
26	Explain how genetic engineering has impacted the field of medicine, forensics, and agriculture (e.g. selective breeding, gene splicing, cloning, genetically modified organisms, gene therapy)
27	Explain how natural selection can impact allele frequency of a population
28	Describe the factors that can contribute to the development of new species (e.g. isolating mechanisms genetic drift, founder effect,
29	Explain how genetic mutations may result in genotypic and phenotypic variations within a population
30	Interpret evidence supporting the theory of evolution (i.e. fossil, anatomical, physiological, embryological, biochemical, and universal
31	Distinguish between the scientific terms: hypothesis, inference, law, theory, principle, fact, observation
32	Describe the levels of ecological organization (i.e. organisms, population, community, ecosystem, biome, and biosphere)
33	Describe characteristic biotic and abiotic components of aquatic and terrestrial ecosystems
34	Describe how energy flows through an ecosystem (e.g. food chains, food webs, energy pyramids)
35	Describe biotic interactions in an ecosystem (e.g. competition, predation, symbiosis)
36	Describe how matter recycles through an ecosystem (i.e. water cycle, carbon cycle, oxygen cycle, and nitrogen cycle)
37	Describe how ecosystems change in response to natural and human disturbances (e.g. climate change, introduction of nonnative species, pollution, fires)
38	Describe the effects of limiting factors on population dynamics and potential species extinction

Basic Biological Principles

1. Cell
2. Organelle
3. Organism
4. Eukaryote
5. Prokaryote
6. Nucleus
7. Extracellular
8. Intracellular
9. Endoplasmic reticulum (ER)
10. Chloroplast
11. Golgi apparatus
12. Mitochondrion/mitochondria
13. Ribosome
14. Plasma/cell membrane
15. Unicellular
16. Multicellular
17. Deoxyribonucleic acid (DNA)
18. Chromosomes
19. Biology
20. Science

The Chemical Basis for Life

1. Protein
2. Enzyme
3. pH
4. temperature
5. macromolecule
6. catalyst
7. molecule
8. carbohydrate
9. lipids
10. nucleic acids
11. deoxyribonucleic acid (DNA)
12. nucleus
13. monomer
14. polymer
15. adhesion
16. cohesion
17. freezing point
18. atom
19. organic molecule
20. energy

Bioenergetics

1. chloroplast
2. mitochondrion/mitochondria
3. bioenergetics
4. cellular respiration
5. photosynthesis
6. adenosine triphosphate (ATP)
7. energy transformation
8. chlorophyll
9. biochemical conversion
10. photon
11. plastid

Homeostasis and Transport

1. impermeable
2. active transport
3. plasma membrane
4. osmosis
5. homeostasis
6. concentration gradient
7. concentration
8. passive transport
9. endoplasmic reticulum (ER)
10. Golgi apparatus
11. Carrier (transport) proteins
12. Endocytosis
13. Exocytosis
14. Facilitated diffusion
15. Pumps (ion or molecule)
16. Hydrophobic
17. Hydrophilic
18. Isotonic
19. Hypotonic
20. Hypertonic

Cell Growth and Reproduction

1. Deoxyribonucleic acid (DNA)
2. Chromosome
3. Cell cycle
4. Mitosis
5. DNA replication
6. Interphase
7. Cytokinesis
8. Centriole
9. Asexual reproduction
10. Sexual reproduction
11. Anaphase
12. Metaphase
13. Prophase
14. Telophase
15. nucleus
16. nuclear envelope
17. centromere
18. sister chromatid
19. microtubules

Genetics: Inheritance

1. Clone
2. Gene
3. Allele
4. Inheritance
5. Nucleic acid
6. Nucleus
7. Genotype
8. Phenotype
9. Deoxyribonucleic acid (DNA)
10. Chromosomes
11. Crossing-over
12. Sister chromatids
13. Nondisjunction
14. Co-dominance
15. Dominant inheritance
16. Recessive inheritance
17. Incomplete dominance
18. Multiple alleles
19. Polygenic
20. Sex-linked trait

Genetics: Gene Expression

1. Biotechnology
2. Cloning
3. Genetic engineering
4. Genetically modified organisms (GMO)
5. Protein synthesis
6. Transcription
7. Translation
8. Gene
9. Gene expression
10. Chromosomal mutation
11. Mutation
12. Point mutation
13. Frame-shift mutation
14. Nucleus
15. Ribosome
16. Deoxyribonucleic acid (DNA)
17. Ribonucleic acid (RNA)
18. Chromosomes
19. Messenger RNA (mRNA)
20. Genetic code

Ecology

1. Limiting factor
2. Extinction
3. Nonnative species
4. Succession
5. Biogeochemical cycle
6. Consumer (ecological)
7. Decomposer
8. Producer
9. Competition
10. Endemic species
11. Symbiotic relationship
12. Predation
13. Parasitism
14. Mutualism
15. Commensalism
16. Predator
17. Niche
18. Prey
19. Herbivore
20. Carnivore
21. Omnivore
22. Abiotic
23. Biotic
24. Biome
25. Habitat
26. Terrestrial
27. Biosphere
28. Community (ecological)
29. Ecology
30. Ecosystem
31. Environment
32. Population

Evolution

1. Theory (scientific)
2. Inference
3. Observation
4. Hypothesis
5. Law (scientific)
6. Principle (scientific)
7. Fact
8. Opinion
9. Analogous structure
10. Embryology
11. Fossils
12. Homologous structure
13. Selective breeding / artificial selection
14. Vestigial structure
15. Founder effect
16. Gradualism
17. Migration
18. Punctuated equilibrium
19. Extinction
20. Isolating mechanism
21. Speciation
22. Evolution
23. Natural selection