BIO 1B
Biology, Second Semester
CBE Review (ONLINE)
(v.4.0)

To the Student:

After your registration is complete, you may take the online Credit by Examination for BIO 1B.

WHAT TO BRING

- calculator (standard or scientific are allowed)

ABOUT THE EXAM

The examination for the second semester of Biology consists of 40 multiple choice questions and 5 short-answer essay questions. The exam is based on the Texas Essential Knowledge and Skills (TEKS) for this subject. The full list of TEKS is included in this document (it is also available online at the Texas Education Agency website). The TEKS outline specific topics covered in the exam, as well as more general areas of knowledge and levels of critical thinking. Use the TEKS to focus your study in preparation for the exam.

The examination will take place under supervision, and the recommended time limit is three hours. You may not use any notes or books. A percentage score from the examination will be reported to the official at your school.

In preparation for the examination, review the TEKS for this subject. All TEKS are assessed. A list of key concepts is included in this document to focus your studies. It is important to prepare adequately. Since questions are not taken from any one source, you can prepare by reviewing any of the state-adopted textbooks that are used at your school. The textbook used with our BIO 1B course is:

> Miller and Levine, *Biology*, Pearson Education, 2015, ISBN 0-13-317640-1 (this title may also be known as *Miller & Levine Biology, Texas Biology Student Edition*)

Good luck on your examination!

BIO 1B Key Concepts: Major Topics

1. **Evolution** (Darwin's Theory of Evolution; Evolution of Populations; Classification; History of Life)

2. **From Microorganisms to Plants** (Viruses and Prokaryotes; Protists and Fungi; Introduction to Plants; Plant Structure and Function; Plant Reproduction and Response)

3. **Animals** (Introduction to Animals; Animal Evolution and Diversity; Animal Systems; Animal Behavior; The Human Body)

Selected Vocabulary

Evolution

evolution
fossil
artificial selection
adaptation
fitness
natural selection
biogeography
homologous structure
analogous structure
vestigial structure
gene pool
allele frequency
single-gene trait
polygenic trait
directional selection
stabilizing selection
disruptive selection
genetic drift
bottleneck effect
founder effect
genetic equilibrium
Hardy-Weinberg principle
sexual selection
gene flow
species
reproductive isolation
speciation
behavioral isolation
geographic isolation
temporal isolation
taxonomy
binomial nomenclature
genus
systematics
taxon
family
order
class
phylum
kingdom
phylogeny
clade
monophyletic group
cladogram
derived character
domain
Bacteria
Archaea
Eukarya
extinct
paleontologist
relative dating
index fossil
radiometric dating
half-life
geologic time scale
era
period
plate tectonics
macroevolutionary patterns
background extinction
mass extinction
gradualism
punctuated equilibrium
adaptive radiation
convergent evolution
coevolution
endosymbiotic theory

From Microorganisms to Plants

virus
capsid
bacteriophage
lytic infection
lysogenic infection
prophage
retrovirus
prokaryote
bacillus
coccus
spirillum
binary fission
endospore
conjugation
pathogen
vaccine
antibiotic
emerging disease
prion
pseudopod
cilium
flagellum
spore
conjugation
alternation of generations
sporangium
algal bloom
food vacuole
gullet
plasmodium
chitin
hypha
fruiting body
mycelium
lichen
mycorrhiza
alternation of generations
sporophyte
gametophyte
bryophyte
vascular tissue
archegonium
antheridium
sporangium
tracheophyte
tracheid
xylem
phloem
seed
gymnosperm
angiosperm
pollen grain
pollination
seed coat
ovule
pollen tube
ovary
fruit
cotyledon
monocot
dicot
woody plant
herbaceous plant
epidermis
lignin
vessel element
sieve tube element
companion cell
parenchyma
collenchyma
sclerenchyma
meristem
apical meristem
root hair
cortex
endodermis
vascular cylinder
root cap
Casparian strip
node
bud
vascular bundle
pith
primary growth
secondary growth
vascular cambium
cork cambium
heartwood
sapwood
bark
blade
petiole
mesophyll
palisade mesophyll
spongy mesophyll
stoma

transpiration
guard cell
adhesion
capillary action
pressure-flow hypothesis
stamen
anther
carpel
stigma
pistil
embryo sac
double fertilization
endosperm
vegetative reproduction
grafting
dormancy
germination
hormone
target cell
receptor
auxin
apical dominance
cytokinin
gibberellin
abscisic acid
ethylene
tropism
phototropism
gravitropism
thigmotropism
photoperiodism
green revolution

Animals

invertebrate
chordate
notochord
pharyngeal pouch
vertebrate
feedback inhibition
radial symmetry
bilateral symmetry
endoderm
mesoderm
ectoderm
coelom
pseudocoelom
zygote
blastula
protostome
deuterostome
cephalization
appendage
larva
trochophore
cartilage
tetrapod
binocular vision
anthropoid
prehensile tail
hominoid
hominine
bipedal
opposable thumb
intracellular digestion
extracellular digestion
gastrovascular cavity
digestive tract
rumen
gill
lung
alveolus
heart
open circulatory system
closed circulatory system
atrium
ventricle
excretion
kidney
nephridium
Malpighian tubule
neuron
stimulus
sensory neuron
interneuron
response
motor neuron
ganglion
cerebrum
cerebellum
hydrostatic skeleton

exoskeleton
molting
endoskeleton
joint
ligament
tendon
oviparous
ovoviviparous
viviparous
placenta
metamorphosis
nymph
pupa
amniotic egg
mammary gland
endocrine gland

ectotherm
endotherm
behavior
innate behavior
learning
habituation
classical conditioning
operant conditioning
insight learning
imprinting
circadian rhythm
migration
courtship
territory
aggression
society

kin selection
communication
language
epithelial tissue
connective tissue
nervous tissue
muscle tissue
homeostasis
feedback inhibition
infectious disease
inflammatory response
antigen
humoral immunity
cell-mediated immunity

Texas Essential Knowledge and Skills
BIO 1 – Biology

§112.34. Biology, Beginning with School Year 2010-2011.

(a) General requirements. Students shall be awarded one credit for successful completion of this course. Prerequisites: none. This course is recommended for students in Grade 9, 10, or 11.

(b) Introduction.

(1) Biology. In Biology, students conduct laboratory and field investigations, use scientific methods during investigations, and make informed decisions using critical thinking and scientific problem solving. Students in Biology study a variety of topics that include: structures and functions of cells and viruses; growth and development of organisms; cells, tissues, and organs; nucleic acids and genetics; biological evolution; taxonomy; metabolism and energy transfers in living organisms; living systems; homeostasis; and ecosystems and the environment.

(2) Nature of science. Science, as defined by the National Academy of Sciences, is the "use of evidence to construct testable explanations and predictions of natural phenomena, as well as the knowledge generated through this process." This vast body of changing and increasing knowledge is described by physical, mathematical, and conceptual models. Students should know that some questions are outside the realm of science because they deal with phenomena that are not scientifically testable.

(3) Scientific inquiry. Scientific inquiry is the planned and deliberate investigation of the natural world. Scientific methods of investigation are experimental, descriptive, or comparative. The method chosen should be appropriate to the question being asked.

(4) Science and social ethics. Scientific decision making is a way of answering questions about the natural world. Students should be able to distinguish between scientific decision-making methods (scientific methods) and ethical and social decisions that involve science (the application of scientific information).

(5) Science, systems, and models. A system is a collection of cycles, structures, and processes that interact. All systems have basic properties that can be described in space, time, energy, and matter. Change and constancy occur in systems as patterns and can be observed, measured, and modeled. These patterns help to make predictions that can be scientifically tested. Students should analyze a system in terms of its components and how these components relate to each other, to the whole, and to the external environment.

(c) Knowledge and skills.

(1) Scientific processes. The student, for at least 40% of instructional time, conducts laboratory and field investigations using safe, environmentally appropriate, and ethical practices. The student is expected to:

(A) demonstrate safe practices during laboratory and field investigations; and

(B) demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials.

(2) Scientific processes. The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:

(A) know the definition of science and understand that it has limitations, as specified in subsection (b)(2) of this section;

(B) know that hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power which have been tested over a wide variety of conditions are incorporated into theories;

(C) know scientific theories are based on natural and physical phenomena and are capable of being tested by multiple independent researchers. Unlike hypotheses, scientific theories are well-established and highly-reliable explanations, but they may be subject to change as new areas of science and new technologies are developed;

(D) distinguish between scientific hypotheses and scientific theories;

(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology;

(F) collect and organize qualitative and quantitative data and make measurements with accuracy and precision using tools such as calculators, spreadsheet software, data-collecting probes, computers, standard laboratory glassware, microscopes, various prepared slides, stereoscopes, metric rulers, electronic balances, gel electrophoresis apparatuses, micropipettors, hand lenses, Celsius thermometers, hot plates, lab notebooks or journals, timing devices, cameras, Petri dishes, lab incubators, dissection equipment, meter sticks, and models, diagrams, or samples of biological specimens or structures;

(G) analyze, evaluate, make inferences, and predict trends from data; and

(H) communicate valid conclusions supported by the data through methods such as lab reports, labeled drawings, graphic organizers, journals, summaries, oral reports, and technology-based reports.

(3) Scientific processes. The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom. The student is expected to:

(A) in all fields of science, analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations, so as to encourage critical thinking by the student;

(B) communicate and apply scientific information extracted from various sources such as current events, news reports, published journal articles, and marketing materials;

(C) draw inferences based on data related to promotional materials for products and services;

(D) evaluate the impact of scientific research on society and the environment;

(E) evaluate models according to their limitations in representing biological objects or events; and

(F) research and describe the history of biology and contributions of scientists.

(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:

(A) compare and contrast prokaryotic and eukaryotic cells;

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

(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.

(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;

(B) examine specialized cells, including roots, stems, and leaves of plants; and animal cells such as blood, muscle, and epithelium;

(C) describe the roles of DNA, ribonucleic acid (RNA), and environmental factors in cell differentiation; and

(D) recognize that disruptions of the cell cycle lead to diseases such as cancer.

(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;

(B) recognize that components that make up the genetic code are common to all organisms;

(C) explain the purpose and process of transcription and translation using models of DNA and RNA;

(D) recognize that gene expression is a regulated process;

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

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

(G) recognize the significance of meiosis to sexual reproduction; and

(H) describe how techniques such as DNA fingerprinting, genetic modifications, and chromosomal analysis are used to study the genomes of organisms.

(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;

(B) analyze and evaluate scientific explanations concerning any data of sudden appearance, stasis, and sequential nature of groups in the fossil record;

(C) analyze and evaluate how natural selection produces change in populations, not individuals;

(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;

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

(F) analyze and evaluate the effects of other evolutionary mechanisms, including genetic drift, gene flow, mutation, and recombination; and

(G) analyze and evaluate scientific explanations concerning the complexity of the cell.

(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;

(B) categorize organisms using a hierarchical classification system based on similarities and differences shared among groups; and

(C) compare characteristics of taxonomic groups, including archaea, bacteria, protists, fungi, plants, and animals.

(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;

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

(C) identify and investigate the role of enzymes; and

(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.

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

(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;

(B) describe the interactions that occur among systems that perform the functions of transport, reproduction, and response in plants; and

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

(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;

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

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

(D) describe how events and processes that occur during ecological succession can change populations and species diversity.

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

(A) interpret relationships, including predation, parasitism, commensalism, mutualism, and competition among organisms;

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

(C) analyze the flow of matter and energy through trophic levels using various models, including food chains, food webs, and ecological pyramids;

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

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

(F) describe how environmental change can impact ecosystem stability.

Source: The provisions of this §112.34 adopted to be effective August 4, 2009, 34 TexReg 5063.