

Biology

Description of the Examination

The Biology examination covers material that is usually taught in a one-year college general biology course. The subject matter tested covers the broad field of the biological sciences, organized into three major areas: molecular and cellular biology, organismal biology, and population biology. The examination gives approximately equal weight to these three areas.

The examination contains approximately 115 questions to be answered in 90 minutes. Some of these are pretest questions that will not be scored. Any time candidates spend on tutorials and providing personal information is in addition to the actual testing time.

Knowledge and Skills Required

Questions on the Biology examination require candidates to demonstrate one or more of the following abilities.

- Knowledge of facts, principles, and processes of biology
- Understanding the means by which information is collected, how it is interpreted, how one hypothesizes from available information, how one draws conclusions and makes further predictions
- Understanding that science is a human endeavor with social consequences

The subject matter of the Biology examination is drawn from the following topics. The percentages next to the main topics indicate the approximate percentage of exam questions on that topic.

33% Molecular and Cellular Biology

Chemical composition of organisms

- Simple chemical reactions and bonds
- Properties of water
- Chemical structure of carbohydrates, lipids, proteins, nucleic acids
- Origin of life

Cells

- Structure and function of cell organelles
- Properties of cell membranes
- Comparison of prokaryotic and eukaryotic cells

Enzymes

- Enzyme-substrate complex
- Roles of coenzymes
- Inorganic cofactors
- Inhibition and regulation

Energy transformations

- Glycolysis, respiration, anaerobic pathways
- Photosynthesis

Cell division

- Structure of chromosomes
- Mitosis, meiosis, and cytokinesis in plants and animals

Chemical nature of the gene

- Watson-Crick model of nucleic acids
- DNA replication
- Mutations
- Control of protein synthesis: transcription, translation, post-transcriptional processing
- Structural and regulatory genes
- Transformation
- Viruses

34% Organismal Biology

Structure and function in plants with emphasis on angiosperms

- Root, stem, leaf, flower, seed, fruit
- Water and mineral absorption and transport
- Food translocation and storage

Plant reproduction and development

- Alternation of generations in ferns, conifers, and flowering plants
- Gamete formation and fertilization
- Growth and development: hormonal control
- Tropisms and photoperiodicity

Structure and function in animals with emphasis on vertebrates

- Major systems (e.g., digestive, gas exchange, skeletal, nervous, circulatory, excretory, immune)
- Homeostatic mechanisms
- Hormonal control in homeostasis and reproduction

Animal reproduction and development

- Gamete formation, fertilization
- Cleavage, gastrulation, germ layer formation, differentiation of organ systems
- Experimental analysis of vertebrate development
- Extraembryonic membranes of vertebrates
- Formation and function of the mammalian placenta
- Blood circulation in the human embryo

Principles of heredity

- Mendelian inheritance (dominance, segregation, independent assortment)
- Chromosomal basis of inheritance
- Linkage, including sex-linked
- Polygenic inheritance (height, skin color)
- Multiple alleles (human blood groups)

33% Population Biology

Principles of ecology

- Energy flow and productivity in ecosystems
- Biogeochemical cycles
- Population growth and regulation (natality, mortality, competition, migration, density, *r*- and *K*-selection)
- Community structure, growth, regulation (major biomes and succession)
- Habitat (biotic and abiotic factors)
- Concept of niche
- Island biogeography
- Evolutionary ecology (life history strategies, altruism, kin selection)

Principles of evolution

- History of evolutionary concepts
- Concepts of natural selection (differential reproduction, mutation, Hardy-Weinberg equilibrium, speciation, punctuated equilibrium)
- Adaptive radiation
- Major features of plant and animal evolution
- Concepts of homology and analogy
- Convergence, extinction, balanced polymorphism, genetic drift
- Classification of living organisms
- Evolutionary history of humans

Principles of behavior

- Stereotyped, learned social behavior
- Societies (insects, birds, primates)

Social biology

- Human population growth (age composition, birth and fertility rates, theory of demographic transition)
- Human intervention in the natural world (management of resources, environmental pollution)
- Biomedical progress (control of human reproduction, genetic engineering)

Sample Test Questions

The following sample questions do not appear on an actual CLEP examination. They are intended to give potential test-takers an indication of the format and difficulty level of the examination and to provide content for practice and review. Knowing the correct answers to all of the sample questions is not a guarantee of satisfactory performance on the exam.

Directions: Each of the questions or incomplete statements below is followed by five suggested answers or completions. Select the one that is best in each case.

- In which of the following ways do social insects benefit most from having several types or castes within the species?
 - Each colony is able to include a large number of individuals.
 - The secretions or odors produced by the protective caste are an effective defense.
 - The division of the species into castes ensures the survival of the fittest.
 - Large numbers of the worker caste can migrate to start new colonies.
 - The specialized structure of each caste permits division of labor and greater efficiency.
- The greatest diversity of structure and of methods of locomotion is exhibited in the individuals of
 - a class
 - a family
 - an order
 - a species
 - a phylum
- Of the following, which is an example of a mutualistic relationship?
 - The protozoan *Trichonympha* digesting wood in the gut of a termite
 - The sporozoan *Plasmodium* reproducing in human blood cells and liberating toxins into the human body
 - Two species of *Paramecium* deriving food from a common laboratory culture
 - Rabbits being eaten by foxes
 - Humans inadvertently providing food for cockroaches
- Evidence that multicellular green plants may have evolved from green algae is best supplied by the fact that in both
 - the gametophyte generation is dominant
 - the sporophyte generation is dominant
 - chlorophylls *a* and *b* are photosynthetic pigments
 - xylem vessels are pitted and spiraled
 - male gametes are nonflagellated
- All of the following statements concerning the light-dependent reactions of photosynthesis are true EXCEPT
 - An initial event is the excitation of electrons from chlorophyll by light energy.
 - The excited electrons are raised to a higher energy level.
 - If not captured, the excited electrons drop back to their initial energy levels.
 - If captured, some of the energy of the excited electrons is used to split carbon dioxide into carbon and oxygen.
 - Light is absorbed by pigments that are embedded in membranes.

6. Which of the following statements best explains the hypothesis that the development of sexual reproduction has resulted in acceleration of the rate of evolution?

- (A) Mutations are more likely to occur in spermatogenesis and oogenesis than in mitotically dividing cells.
- (B) Sexual reproduction results in more offspring than does asexual reproduction.
- (C) Those members of a species that are best adapted to their environment are most likely to be successful in sexual reproduction.
- (D) Mutations usually do not occur in the production of spores or in cells dividing by fission.
- (E) Sexual reproduction is more likely to result in genetic recombination than is asexual reproduction.

7. A frog gastrocnemius muscle gives a smooth tetanic contraction at any rate of stimulation above 20 per second. At threshold stimulus intensity, a response of some specific strength will be obtained. Increase of the stimulus intensity by 50 percent will increase the strength of response nearly 50 percent. If the intensity is again increased 50 percent, the response will increase only about another 25 percent. Further increase in the stimulus intensity produces no further increase in response.

The observations above are best explained by which of the following?

- (A) A muscle functions with an all-or-none mechanism.
- (B) Muscle-fiber sarcolemma is electrically resistant.
- (C) The fibers of a muscle do not all contract at the same rate.
- (D) The fibers of a muscle fatigue at varying rates.
- (E) The fibers of a muscle have varying thresholds for response.

8. In an amphibian gastrula, transplantation experiments that involve the dorsal lip of the blastopore indicate that this tissue

- (A) is destined to be ectoderm
- (B) does not differ from other tissues of the blastula in any significant manner
- (C) will cause a concentration of yolk in adjacent cells
- (D) has the ability to initiate differentiation of the embryonic neural tube
- (E) is so sensitive that it will develop into any embryonic structure, depending on its surroundings

9. Deposits of coal in Greenland and the Antarctic indicate that

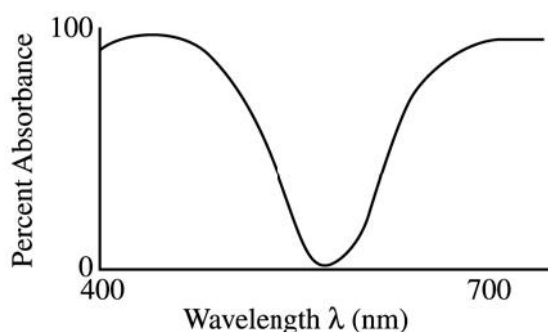
- (A) these regions once contained numerous mollusks that deposited carbohydrates in their shells
- (B) the Earth's crust in these regions contains vast amounts of limestone
- (C) these regions were once thickly vegetated
- (D) there is a rich store of dissolved carbon dioxide in the seas surrounding these regions
- (E) a geologic uplift of coral rock and ocean bed has recently occurred in these regions

10. Thirst, loss of weight, and sugar in the urine result from the undersecretion of a hormone by which of the following glands?

- (A) Thyroid
- (B) Parathyroid
- (C) Pancreas
- (D) Adrenal
- (E) Thymus

11. Considering the role of mitochondria in cells, mitochondria would likely be most abundant in which of the following?
- (A) Mature red blood cells
 - (B) Callous cells of the skin
 - (C) Cells of the heart muscle
 - (D) Epithelial cells of the cheek lining
 - (E) Fat cells
12. All of the following statements about enzymes are true EXCEPT
- (A) A single enzyme molecule can be used over and over again.
 - (B) Most enzymes are highly specific with regard to the reactions they catalyze.
 - (C) Some enzymes contain an essential nonprotein component.
 - (D) Enzymes can function only within living cells.
 - (E) Most enzymes are denatured by high temperatures.
13. Which of the following is most significant in limiting the size to which an animal cell may grow?
- (A) The ratio of cell surface to cell volume
 - (B) The abundance of mitochondria in the cytoplasm
 - (C) The chemical composition of the cell membrane
 - (D) The presence of an inelastic cell wall
 - (E) The relative number of nucleoli
14. Which of the following best describes the effect on heart action of the stimulation of the parasympathetic nerve fibers of the vagus nerve?
- (A) There is a decrease in the volume of blood pumped and an increase in the heartbeat rate.
 - (B) There is an increase in the volume of blood pumped without a decrease in the heartbeat rate.
 - (C) There is a prolonged acceleration in the heartbeat rate.
 - (D) There is a decrease in the heartbeat rate.
 - (E) There is an increase in the blood pressure.
15. If poorly drained soils encourage the growth of bacteria that convert nitrate to nitrogen, the effect on higher plants will be to
- (A) increase lipid production
 - (B) decrease protein production
 - (C) increase carbohydrate production
 - (D) produce unusually large fruits
 - (E) stimulate chlorophyll production
16. A patient is placed on a restricted diet of water, pure cooked starch, olive oil, adequate minerals, and vitamins. If a urinalysis several weeks later reveals the presence of relatively normal amounts of urea, the urea probably came from the
- (A) food eaten during the restricted diet
 - (B) withdrawal of reserve urea stored in the liver
 - (C) chemical combination of water, carbon dioxide, and free nitrogen
 - (D) deamination of cellular proteins
 - (E) urea synthesized by kidney tubule cells

17.



Shown above is the absorption spectrum of a compound of biological importance. If a person with normal human color vision viewed this compound under ordinary white light, what color would it appear to be?

- (A) Red
- (B) Blue
- (C) Green
- (D) Black
- (E) White

18. The codon for a particular amino acid is 5'CAU3'. The DNA sequence that complements this codon is

- (A) 3'CAU5'
- (B) 3'GTA5'
- (C) 3'GTT5'
- (D) 3'GUA5'
- (E) 3'GUT5'

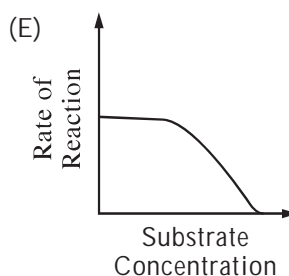
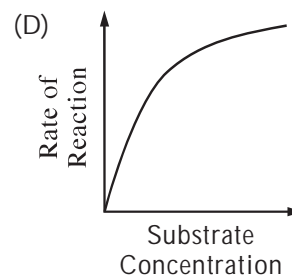
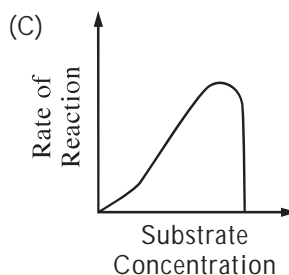
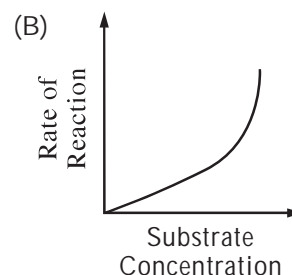
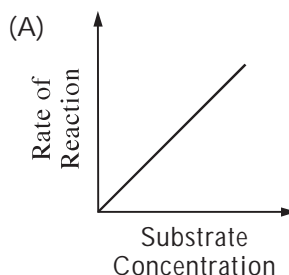
19. Viral DNA would be most likely to contain genes that code for

- (A) regulatory hormones
- (B) viral-coat protein
- (C) viral-ribosome proteins
- (D) glycolytic enzymes
- (E) restriction enzymes

20. Which of the following statements about imprinting is NOT true?

- (A) The capacity for imprinting may be limited to a specific and brief period in the early life of the organism.
- (B) The behavior pattern associated with imprinting is the result of reward or punishment.
- (C) The learned behavior resulting from imprinting is difficult to reverse in later life.
- (D) A gosling imprinted by a moving wooden decoy may exhibit courting behavior to the decoy in later life.
- (E) Odors and sounds may serve as stimuli for imprinting.

21. Which of the graphs below illustrates the effect of substrate concentration on the initial rate of reaction when a limited amount of enzyme is present?



22. Which of the following is the final electron acceptor in the mitochondrial electron transport system?
- (A) ADP + Pi
 - (B) ATP
 - (C) NAD or FAD
 - (D) H₂O
 - (E) O₂
23. In a eukaryotic cell, glycolysis occurs in which of the following parts of the cell?
- (A) Chloroplast
 - (B) Cytosol
 - (C) Nucleolus
 - (D) Mitochondrion
 - (E) Ribosome
24. The clotting process in blood is initiated by
- (A) erythrocytes
 - (B) lymphocytes
 - (C) hemoglobins
 - (D) platelets
 - (E) neutrophils
25. Which of the following membranes is correctly matched to its function?
- (A) Allantois .. food absorption
 - (B) Yolk sac .. embryonic bladder
 - (C) Amnion .. gas exchange
 - (D) Dura mater .. brain protection
 - (E) Peritoneum .. heart protection
26. Which of the following statements best describes the movement of energy in an ecosystem?
- (A) Radiant energy is converted into chemical energy in plant photosynthesis and then released as heat energy during cellular respiration.
 - (B) Energy cycles within an ecosystem.
 - (C) Plants get energy from the nutrients in the soil.
 - (D) The animals in an ecosystem absorb the radiant energy of the Sun and use it to make organic molecules such as proteins.
 - (E) Some chemoautotrophic bacteria release energy that can then be used by soil animals to make food.
27. Which of the following elements is correctly linked to its role in a living organism?
- (A) Calcium .. component of proteins
 - (B) Carbon .. component of lipids
 - (C) Magnesium .. neuron action potential
 - (D) Potassium .. component of ATP
 - (E) Zinc .. component of carbohydrates
28. Mistletoe is attached to the branches of trees such as sweet gum, from which it obtains water and some nutrients. The trees do not benefit from this association. Which of the following terms describes the relationship between the two plants?
- (A) Commensalism
 - (B) Competition
 - (C) Mutualism
 - (D) Parasitism
 - (E) Predation

29. ATP is which type of molecule?

- (A) A nucleotide
- (B) A peptide
- (C) A phospholipid
- (D) A disaccharide
- (E) A tripeptide

30. Which of the following is generally true about bacterial viruses?

- (A) They infect animal cells only.
- (B) They have a protective capsid made of chitin.
- (C) They inject their nucleic acids into the cells that they infect.
- (D) They produce haploid gametes in meiosis.
- (E) They carry out glycolysis but not the Krebs cycle.

31. A typical photosynthetic eukaryotic cell contains which of the following?

- I. Ribosomes
- II. Chloroplasts
- III. Mitochondria

- (A) II only
- (B) I and II only
- (C) II and III only
- (D) I and III only
- (E) I, II, and III

32. Which of the following pairs of organisms are most closely related?

- (A) *Mus bufo* and *Bufo americanus*
- (B) *Lynx lynx* and *Alces alces*
- (C) *Panthera leo* and *Felis concolor*
- (D) *Odocoileus virginianus* and *Colinus virginianus*
- (E) *Canis latrans* and *Canis lupus*

33. Which of the following is an example of a testcross?

- (A) $AA \times Aa$
- (B) $A? \times AA$
- (C) $A? \times Aa$
- (D) $A? \times aa$
- (E) $a? \times aa$

Directions: The following group of questions consists of five lettered headings followed by a list of numbered phrases. For each numbered phrase select the one heading that is most closely related to it. A heading may be used once, more than once, or not at all.

Questions 34–36 refer to the following.

- (A) Fertilization
- (B) Meiosis
- (C) Mitosis
- (D) Pollination
- (E) Nondisjunction

34. The process by which a zygote is formed

35. The process by which the nuclei of somatic (body) cells divide

36. The process by which monoploid (haploid) cells are formed from diploid cells

Questions 37–41 refer to the following classes of vertebrates.

- (A) Amphibians
- (B) Bony fish
- (C) Cartilaginous fish
- (D) Mammals
- (E) Reptiles

37. Birds are most closely related to which class?
38. Which class includes animals that have a moist skin as the primary organ for gas exchange?
39. Which class includes whales?
40. Members of which class produce milk for their young in specialized skin glands?
41. Which class includes snakes?

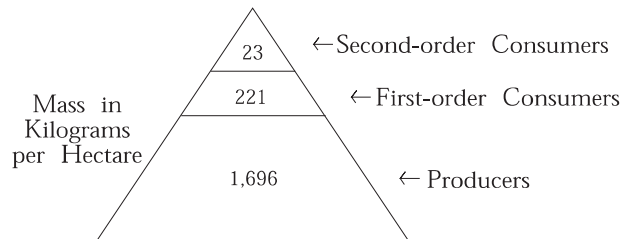
Directions: Each group of questions below concerns an experimental situation. In each case, first study the description of the situation. Then choose the best answer to each question following it.

Questions 42–44

Expenditures of solar energy, calculated by C. Juday for Lake Mendota in southern Wisconsin, appear in the table below.

Reflected or otherwise lost	49.5%
Absorbed in evaporation of water	25.0%
Raised temperatures in the lake	21.7%
Melted ice in the spring	3.0%
Used directly by organisms	0.8%

The pyramid of biomass for this same lake is represented by the following diagram.



42. The most probable explanation for the relative masses of the first- and second-order consumers is that
- (A) each link in the food chain of an ecosystem has less available energy than the previous link has
 - (B) only a small fraction of sunlight that reaches the Earth is transformed into chemical energy by photosynthesis
 - (C) the total energy of the decomposers is greater than that of the rest of the organisms put together
 - (D) seasonal fluctuations in weather limit the number of consumers
 - (E) second-order consumers require more total energy than first-order consumers do

43. The energy incorporated into this ecosystem is most dependent on the

- (A) photoperiod
- (B) total amount of photosynthesis
- (C) predator-prey relationships
- (D) length of the food chains
- (E) total amount of respiration

44. If the lake is assumed to be a typical ecosystem, the percent of radiant energy from the Sun that is trapped in photosynthesis is about

- (A) 100%
- (B) 10%
- (C) 1%
- (D) 0.1%
- (E) 0.01%

Questions 45–47

Inheritance of certain characteristics of the fruit fly, *Drosophila*, is as indicated by the table below.

<u>Characteristic</u>	<u>Dominant</u>	<u>Recessive</u>
Body color	Gray	Black
Eye color	Red	White

A female fruit fly had a gray body and white eyes. After being mated with a male fruit fly, she laid 112 eggs that developed into the following kinds of offspring.

<u>Number</u>	<u>Body</u>	<u>Eyes</u>
28	Gray	Red
29	Gray	White
28	Black	Red
27	Black	White

45. With respect to body color, the male parent of the 112 offspring was most probably

- (A) homozygous gray
- (B) heterozygous gray
- (C) homozygous black
- (D) heterozygous black
- (E) hemizygous gray

46. Examination revealed that all of the 56 red-eyed offspring were females and all of the 56 white-eyed offspring were males. This observation indicates that

- (A) red and white eye colors segregate independently of sex
- (B) all of the red-eyed offspring inherited their eye color from their female parent
- (C) all of the red-eyed offspring were homozygous
- (D) the gene for eye color is linked to the gene for body color
- (E) the gene for red or for white eye color is carried on the X chromosome

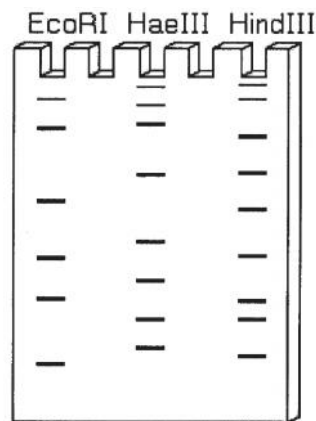
47. In this experiment, the number of offspring that exhibit both recessive characters is

- (A) 1
- (B) 27
- (C) 28
- (D) 55
- (E) 56

48. Carbon dioxide is produced by which of the following?
- I. A mesophyll cell in a flowering plant during the night
 - II. A muscle cell in a mammalian heart during contraction
 - III. A yeast cell growing under anaerobic conditions
- (A) I only
 (B) II only
 (C) III only
 (D) I and II only
 (E) I, II, and III
49. Which of the following is a function of ATP?
- (A) It creates energy.
 (B) It transports energy.
 (C) It is a building block of proteins.
 (D) It stores amino acids.
 (E) It gives the cells shape.
50. Protein synthesis is the main function of which of the following structures?
- (A) Nucleus
 (B) Ribosome
 (C) Chromosome
 (D) Mitochondrion
 (E) Vacuole

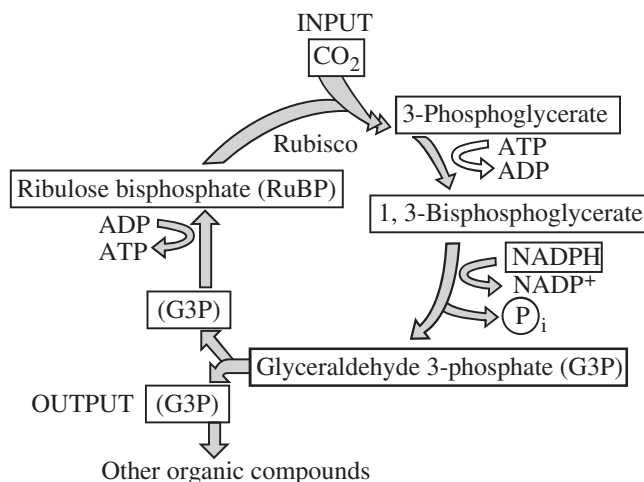
Questions 51–55

Several different samples of DNA were digested with different restriction enzymes (endonucleases) and separated by gel electrophoresis, as shown below.



51. The terms “EcoRI,” “HaeIII,” and “HindIII” refer to which of the following?
- (A) The voltage intensity used to prepare the electrophoresis medium
 (B) The restriction enzymes used
 (C) The organisms from which the original DNA sample was obtained
 (D) The types of buffers used to maintain a constant pH in the preparation as the sample was processed
 (E) The types of proteins encoded by each fragment
52. The patterns of bands in the different lanes result from which of the following?
- (A) Different voltages applied to different lanes
 (B) Different buffers applied to different lanes
 (C) Different sizes of fragments in the samples in different lanes
 (D) Different terminal configurations of the fragments, with some having blunt ends while others have sticky ends
 (E) Mutations produced by the electrophoresis

53. In this gel, the smallest fragments are
- (A) at the top of the gel, near the wells
 - (B) at the bottom of the gel, furthest from the wells
 - (C) at the left side of the gel
 - (D) at the right side of the gel
 - (E) randomly scattered from top to bottom in each lane
54. Restriction enzymes cut samples of DNA into fragments by
- (A) binding to specific sequences of nucleotides
 - (B) oxidizing the DNA
 - (C) heating the DNA to its denaturation point
 - (D) breaking peptide bonds
 - (E) unwinding the DNA
55. Which of the following is the most probable explanation for the different numbers of fragments in the different lanes?
- (A) There were more EcoRI cut sites than HaeIII or HindIII cut sites.
 - (B) There were more HaeIII cut sites than EcoRI or HindIII cut sites.
 - (C) There were more HindIII cut sites than HaeIII or EcoRI cut sites.
 - (D) A stronger voltage was applied to the first lane.
 - (E) Different buffers were used in the different lanes.
-
56. Which of the following best explains why a pictorial presentation of the biomass at each trophic level of an ecosystem is a pyramid?
- (A) The loss of iron from an ecosystem
 - (B) The amount of energy passed from one trophic level to the next
 - (C) The number of predators in the ecosystem
 - (D) The chemical compounds in an ecosystem are recycled
 - (E) The average size of the individuals in each species



57. The original description of the pathway shown above is attributed to
- (A) Louis Pasteur
 - (B) James Watson and Francis Crick
 - (C) Hans Krebs
 - (D) Robert Hooke
 - (E) Melvin Calvin and Andrew Benson
58. A diet with insufficient iodine will most likely lead to which of the following symptoms in an individual?
- (A) Bleeding gums
 - (B) Decreased metabolic rate
 - (C) Increased body temperature
 - (D) Increased respiratory rate
 - (E) Weight loss
59. Which of the following structures is correctly paired with its function?
- (A) Alveolus . . . locomotion
 - (B) Cilium . . . impulse transmission
 - (C) Sarcomere . . . nutrient uptake
 - (D) Neuron . . . gas exchange
 - (E) Nephron . . . filtration

60. Based on the information in the table, which of the following substitutions is synonymous?

	SECOND BASE				
	U	C	A	G	
U	UUU } Phe	UCU } Ser	UAU } Tyr	UGU } Cys	U
	UUC } Leu	UCC } Ser	UAC } Tyr	UGC } Cys	C
	UUA } Leu	UCA } Ser	UAA Stop	UGA Stop	A
	UUG } Leu	UCG } Ser	UAG Stop	UGG Trp	G
C	CUU } Leu	CCU } Pro	CAU } His	CGU } Arg	U
	CUC } Leu	CCC } Pro	CAC } His	CGC } Arg	C
	CUA } Leu	CCA } Pro	CAA } Gln	CGA } Arg	A
	CUG } Leu	CCG } Pro	CAG } Gln	CGG } Arg	G
A	AUU } Ile	ACU } Thr	AAU } Asn	AGU } Ser	U
	AUC } Ile	ACC } Thr	AAC } Asn	AGC } Ser	C
	AUA } Ile	ACA } Thr	AAA } Lys	AGA } Arg	A
	AUG Met or Start	ACG } Thr	AAG } Lys	AGG } Arg	G
G	GUU } Val	GCU } Ala	GAU } Asp	GGU } Gly	U
	GUC } Val	GCC } Ala	GAC } Asp	GGC } Gly	C
	GUA } Val	GCA } Ala	GAA } Lys	GGA } Gly	A
	GUG } Val	GCG } Ala	GAG } Lys	GGG } Gly	G

- (A) AGU to AGA
- (B) GUU to GCU
- (C) UUG to CUG
- (D) UGA to GGA
- (E) CAA to CCA

61. Excess sewage can lead to the death of aquatic animals in a lake because sewage pollution promotes

- (A) mineral starvation
- (B) erosion
- (C) thermal stratification
- (D) oxygen depletion
- (E) a temperature decrease

62. The aerobic cellular respiration of glucose is different from the simple burning of glucose in that the aerobic respiration of glucose

- (A) releases no heat
- (B) requires no oxygen
- (C) releases more energy
- (D) releases hydrocarbons
- (E) occurs at a lower temperature

63. A given trait occurs in two alternative types, *M* and *m*, in a population at Hardy-Weinberg equilibrium. If 49 percent of the population has only type *M* alleles, what percentage of the population is expected to be heterozygous for the trait?

- (A) 9%
- (B) 14%
- (C) 21%
- (D) 42%
- (E) 51%

64. The forelimbs of horses and frogs are considered to be homologous structures. The best evidence for this homology is that the forelimbs have

- (A) a similar appearance in both species
- (B) a similar function in both species
- (C) a common embryological origin
- (D) the same chemical composition
- (E) the same number of bones

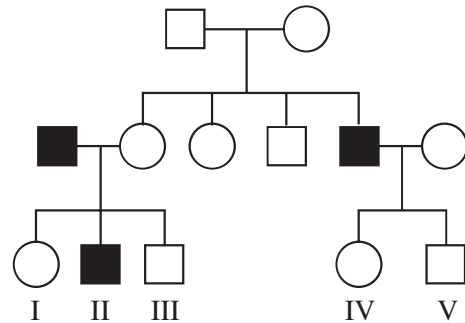
65. Which of the following types of plant cells is dead at functional maturity?

- (A) Phloem companion cell
- (B) Xylem vessel element
- (C) Root endodermal cell
- (D) Stem cortex cell
- (E) Mesophyll cell

66. In a particular plant species, the allele for tall plants is dominant and the allele for dwarfing is recessive. Which of the following is the expected phenotypic ratio of the offspring from a cross between a heterozygous plant and a dwarf plant?
- (A) 1 tall plant : 3 dwarf plants
 (B) 1 tall plant : 9 dwarf plants
 (C) 1 tall plant : 1 dwarf plant
 (D) 3 tall plants : 1 dwarf plant
 (E) 9 tall plants : 3 dwarf plants
67. Which of the following best describes the decomposers in an ecological community?
- (A) They are the top predators.
 (B) They do not occur in early successional stages.
 (C) They are the main contributors to the gross primary productivity.
 (D) They fix carbon for plant respiration.
 (E) They are heterotrophic.
68. The nearly universal nature of the genetic code supports the view that
- (A) all living organisms on Earth share a common ancestor
 (B) nucleic acids were the first living things
 (C) proteins are of secondary importance to living systems
 (D) the protein composition of all living organisms is the same
 (E) there is redundancy in the genetic code

Questions 69–70

The pedigree below shows the occurrence of a rare, sex-linked genetic condition in a family. Shaded symbols indicate the presence of the condition. Circles indicate females, and squares indicate males.



69. Individual I most likely has the same genotype as
- (A) her father
 (B) her grandfather
 (C) Individual III
 (D) Individual IV
 (E) Individual V
70. If the parents of Individuals I, II, and III have a second daughter, what is the probability that the daughter will exhibit the condition?
- (A) 0%
 (B) 25%
 (C) 33%
 (D) 50%
 (E) 100%

Study Resources

Most textbooks used in college-level biology courses cover the topics in the outline given earlier, but the approaches to certain topics and the emphases given to them may differ. To prepare for the Biology exam, it is advisable to study one or more college textbooks, which can be found in most college bookstores. When selecting a textbook, check the table of contents against the knowledge and skills required for this test.

Candidates would do well to consult pertinent articles from magazines such as *Scientific American*, *Science News*, and *Natural History*.

Visit www.collegeboard.com/clepprep for additional biology resources. You can also find suggestions for exam preparation in Chapter IV of the *Official Study Guide*. In addition, many college faculty post their course materials on their schools' Web sites.

Answer Key

- | | | | |
|-----|---|-----|---|
| 1. | E | 36. | B |
| 2. | E | 37. | E |
| 3. | A | 38. | A |
| 4. | C | 39. | D |
| 5. | D | 40. | D |
| 6. | E | 41. | E |
| 7. | E | 42. | A |
| 8. | D | 43. | B |
| 9. | C | 44. | C |
| 10. | C | 45. | C |
| 11. | C | 46. | E |
| 12. | D | 47. | B |
| 13. | A | 48. | E |
| 14. | D | 49. | B |
| 15. | B | 50. | B |
| 16. | D | 51. | B |
| 17. | C | 52. | C |
| 18. | B | 53. | B |
| 19. | B | 54. | A |
| 20. | B | 55. | C |
| 21. | D | 56. | B |
| 22. | E | 57. | E |
| 23. | B | 58. | B |
| 24. | D | 59. | E |
| 25. | D | 60. | C |
| 26. | A | 61. | D |
| 27. | B | 62. | E |
| 28. | D | 63. | D |
| 29. | A | 64. | C |
| 30. | C | 65. | B |
| 31. | E | 66. | C |
| 32. | E | 67. | E |
| 33. | D | 68. | A |
| 34. | A | 69. | D |
| 35. | C | 70. | D |