AP Biology Practice Test 14

60 original multiple-choice questions covering all 8 AP Biology CED units. Choose one answer for each question. The full answer key is on the last page — worked explanations for every question are free on the test page at QuaidianPoint.com.

Name: _____ Class: _____ Score: _____ / 60

Chemistry of Life

Q1. Water has a high heat of vaporisation. How does this benefit a human who sweats on a hot day?

(A) Sweat raises body temperature quickly
(B) Evaporation of sweat removes a large amount of heat from the skin
(C) Water vapour condenses and warms the body
(D) Sweating prevents all water loss

Q2. A solution has $[H^+] = 1 \times 10^{-9}$ M. What is its pH and is it acidic or basic?

(A) pH 9, basic
(B) pH 9, acidic
(C) pH 5, basic
(D) pH 3, acidic

Q3. Which pair of molecules are isomers?

(A) Glucose and sucrose, which have the same formula
(B) Water and carbon dioxide
(C) Glucose and fructose, which share the formula $C_6H_{12}O_6$ but differ in structure
(D) Starch and cellulose, which are identical

Q4. Amino acids are joined by peptide bonds. What is removed when a peptide bond forms?

(A) A water molecule
(B) A carbon dioxide molecule
(C) An oxygen molecule
(D) A nitrogen atom

Q5. Which carbohydrate is the main energy storage molecule in animals?

(A) Cellulose
(B) Chitin
(C) Starch
(D) Glycogen

Q6. A protein contains several polypeptide chains. What level of structure describes how these chains are arranged together?

(A) Primary structure
(B) Secondary structure
(C) Tertiary structure
(D) Quaternary structure

Q7. In DNA, the two strands are antiparallel. What does this mean?

(A) They have identical sequences
(B) They run in opposite 5′ to 3′ directions
(C) They are joined by covalent bonds between bases
(D) They run in the same direction

Q8. Chitin is a structural polysaccharide found in fungal cell walls and arthropod exoskeletons. What is its monomer?

(A) Fructose
(B) A nitrogen-containing derivative of glucose (N-acetylglucosamine)
(C) Amino acids
(D) Fatty acids

Cell Structure and Function

Q9. Which organelle is the site of lipid synthesis and detoxification in liver cells?

(A) The smooth endoplasmic reticulum
(B) The rough endoplasmic reticulum
(C) The Golgi apparatus
(D) The ribosome

Q10. A cell takes in large droplets of fat by endocytosis. Which type of endocytosis is most likely?

(A) Osmosis
(B) Phagocytosis
(C) Facilitated diffusion
(D) Active transport through a pump

Q11. The plasma membrane is selectively permeable. What does this mean?

(A) It allows all substances through equally
(B) It allows some substances through but not others
(C) It blocks all substances
(D) It only allows water through

Q12. A plant cell in a hypotonic solution gains water. What prevents it from bursting?

(A) The vacuole pumps water out
(B) The chloroplasts absorb the extra water
(C) The cell wall provides mechanical resistance
(D) The nucleus expands to absorb pressure

Q13. Which component of the cell membrane is responsible for cell recognition and signalling?

(A) Phospholipid tails in the interior
(B) Cholesterol buried in the bilayer
(C) Integral proteins that span the membrane only for transport
(D) Glycoproteins and glycolipids on the outer surface

Q14. A eukaryotic cell is 20 micrometres across. Which microscope is needed to see its internal organelles in detail?

(A) A transmission electron microscope
(B) A light microscope at low power only
(C) A magnifying glass
(D) No microscope, because organelles are visible to the eye

Q15. Which process moves vesicles from the Golgi apparatus to the plasma membrane for secretion?

(A) Endocytosis
(B) Phagocytosis
(C) Osmosis
(D) Exocytosis

Cellular Energetics

Q16. Which statement best describes the role of enzymes in a reaction?

(A) They increase activation energy to slow the reaction
(B) They are consumed and must be replaced after each reaction
(C) They change the equilibrium position of the reaction
(D) They lower activation energy and speed the reaction without being consumed

Q17. A metabolic pathway is regulated by feedback inhibition. What happens when the end product accumulates?

(A) It activates the first enzyme in the pathway
(B) It is converted back to the starting substrate
(C) It destroys the pathway enzymes
(D) It binds to an allosteric site on an early enzyme and slows the pathway

Q18. In the light reactions, which photosystem is responsible for splitting water?

(A) Photosystem I only
(B) The Calvin cycle
(C) Photosystem II
(D) The Krebs cycle

Q19. A C_4 plant fixes carbon dioxide into a four-carbon compound in mesophyll cells, then releases it in bundle-sheath cells. What is the advantage?

(A) It allows photosynthesis in the dark
(B) It eliminates the need for water
(C) It concentrates CO_2 around Rubisco, reducing photorespiration in hot conditions
(D) It produces more oxygen than C_3 plants

Q20. During aerobic respiration, NADH from glycolysis is shuttled into the mitochondria. What is the main purpose of this?

(A) To make glucose in the cytoplasm
(B) To release carbon dioxide
(C) To synthesise ATP by substrate-level phosphorylation
(D) To deliver electrons to the electron transport chain for ATP production

Q21. A yeast culture is grown with oxygen and then switched to anaerobic conditions. What change in glucose consumption is expected?

(A) Glucose consumption falls to zero
(B) Glucose consumption stays the same
(C) Glucose consumption rises because fermentation yields far less ATP per glucose
(D) Glucose is no longer needed

Q22. The proton gradient across the inner mitochondrial membrane stores energy. What happens if the membrane becomes leaky to protons?

(A) ATP synthesis increases
(B) ATP synthesis falls because the gradient that drives ATP synthase is lost
(C) The electron transport chain stops producing NADH
(D) Glycolysis produces more ATP

Cell Communication and Cell Cycle

Q23. A cell responds to a signal by changing gene expression. Which step in the pathway is most likely to be the slowest?

(A) Transcription and translation of new proteins
(B) Binding of the ligand to its receptor
(C) Activation of a second messenger
(D) Phosphorylation of a target protein

Q24. In a signal transduction pathway, a protein phosphatase removes phosphate groups from target proteins. What is its role?

(A) To turn off the signal by reversing phosphorylation
(B) To amplify the signal by adding phosphates
(C) To bind the ligand at the receptor
(D) To synthesise second messengers

Q25. A plant responds to a pathogen attack by producing defensive chemicals throughout the plant. This systemic response is an example of

(A) long-distance cell communication
(B) cell division only
(C) apoptosis in all cells
(D) photosynthesis

Q26. Which of the following is a correct sequence of events in the cell cycle?

(A) S, G_1, M, G_2
(B) M, G_1, G_2, S
(C) G_2, G_1, S, M
(D) G_1, S, G_2, M

Q27. A cell is treated with a drug that prevents microtubules from depolymerising, so chromosomes cannot move toward the poles. Which mitotic stage is directly blocked?

(A) Anaphase, when sister chromatids are pulled to opposite poles
(B) Prophase, when chromosomes condense and the spindle forms
(C) Metaphase, when chromosomes align at the cell equator
(D) Telophase, when nuclear envelopes re-form around the two sets of chromosomes

Q28. A drug that prevents microtubule formation would most directly block which process?

(A) Separation of chromosomes during mitosis
(B) DNA replication
(C) Protein synthesis
(D) Glycolysis

Q29. In a multicellular organism, cell division is controlled by growth factors. What happens when a cell loses its response to growth factors?

(A) It always divides faster
(B) It may stop dividing or divide inappropriately, depending on the mutation
(C) It always undergoes apoptosis
(D) It becomes a stem cell

Heredity

Q30. A pea plant with purple flowers (dominant) is crossed with a white-flowered plant. Half the offspring have white flowers. What is the genotype of the purple parent?

(A) Homozygous dominant (PP)
(B) Heterozygous (Pp)
(C) Homozygous recessive (pp)
(D) Hemizygous

Q31. Two genes are located on different chromosomes. What is the expected phenotypic ratio in the offspring of AaBb x aabb?

(A) 9:3:3:1
(B) 3:1
(C) 1:2:1
(D) 1:1:1:1

Q32. A geneticist observes that a trait is passed from father to son and appears in all male descendants. What is the most likely mode of inheritance?

(A) X-linked recessive
(B) Y-linked
(C) Autosomal dominant
(D) Mitochondrial

Q33. In humans, the ABO blood group system shows codominance between I^A and I^B. What blood type results from genotype I^AI^B?

(A) Type A
(B) Type AB
(C) Type B
(D) Type O

Q34. A woman with blood type O has a child with blood type AB. What can be concluded about the father?

(A) He must be type O
(B) He must be type A
(C) He must carry both I^A and I^B alleles
(D) He must be type B

Q35. A cross between two heterozygous parents for a single gene gives 200 offspring. How many are expected to be homozygous recessive?

(A) 100
(B) 25
(C) 50
(D) 150

Q36. Which statement about linked genes is correct?

(A) They are always on different chromosomes
(B) They always assort independently
(C) They cannot be separated by crossing over
(D) They are on the same chromosome and tend to be inherited together

Gene Expression and Regulation

Q37. Which molecule carries the genetic information from the nucleus to the ribosome?

(A) Messenger RNA
(B) Transfer RNA
(C) Ribosomal RNA alone
(D) DNA polymerase

Q38. A DNA fragment is replicated in vitro. Which enzyme is used in PCR to withstand high temperatures?

(A) DNA ligase
(B) Helicase
(C) Taq polymerase
(D) RNA polymerase

Q39. A mutation deletes three nucleotides from a coding region. What is the most likely effect?

(A) Loss of one amino acid, with the rest of the protein unchanged
(B) A frameshift changing all downstream amino acids
(C) No change in the protein
(D) A premature stop codon

Q40. In a eukaryotic cell, the 5′ cap and poly-A tail are added to mRNA. What is their main function?

(A) To code for amino acids
(B) To splice out introns
(C) To replicate the DNA
(D) To protect the mRNA from degradation and aid export and translation

Q41. A gene is regulated by a repressor protein that binds to an operator. When the repressor is bound, what happens?

(A) Transcription is blocked
(B) Transcription is increased
(C) Translation is increased
(D) DNA replication is blocked

Q42. A researcher wants to determine the sequence of a DNA fragment. Which technique is most appropriate?

(A) Gel electrophoresis alone
(B) PCR alone, without sequencing
(C) DNA sequencing (e.g. Sanger or next-generation sequencing)
(D) Southern blotting alone

Q43. A plasmid containing a gene for insulin is inserted into bacteria, which then produce human insulin. What is this an example of?

(A) Natural selection
(B) Meiosis
(C) Genetic engineering using recombinant DNA
(D) Cloning by cell division only

Q44. A point mutation in a gene changes the amino acid from leucine to proline in the middle of an alpha helix. What is the most likely effect on the protein?

(A) No effect, because all amino acids are identical
(B) The helix is disrupted, potentially altering protein function
(C) The protein becomes longer
(D) The DNA is repaired automatically

Natural Selection

Q45. A population of moths has light and dark forms. After industrial soot darkens tree trunks, dark moths become more common. This is an example of

(A) mutation creating new alleles in response to soot
(B) genetic drift with no selection
(C) natural selection acting on existing variation
(D) artificial selection by humans

Q46. In a population in Hardy-Weinberg equilibrium, the frequency of the dominant allele is 0.7. What is the frequency of carriers (heterozygotes)?

(A) 0.49
(B) 0.09
(C) 0.70
(D) 0.42

Q47. Which situation would most increase the chance of speciation?

(A) High gene flow between populations
(B) A very large, well-mixed population
(C) Geographic isolation of a population in a new environment
(D) Random mating with no selection

Q48. A trait that is no longer used, such as the pelvic bones in whales, is called

(A) homologous
(B) analogous
(C) adaptive
(D) vestigial

Q49. Which of the following is a prezygotic reproductive barrier?

(A) Hybrid offspring that are sterile
(B) Different mating seasons preventing fertilisation
(C) Hybrid offspring that die before reproducing
(D) A zygote that fails to develop

Q50. A scientist compares the amino-acid sequence of haemoglobin in several species. Species with the most similar sequences are most likely to be

(A) most closely related evolutionarily
(B) most distantly related
(C) unrelated to each other
(D) the same species

Q51. The first cells on Earth were most likely

(A) eukaryotic, photosynthetic autotrophs
(B) multicellular animals
(C) viruses with DNA genomes
(D) prokaryotic, anaerobic heterotrophs

Q52. A population of bacteria is exposed to an antibiotic. A few resistant cells survive and reproduce. What has happened?

(A) The antibiotic caused mutations for resistance in every cell
(B) The bacteria learned to resist the antibiotic
(C) Natural selection has favoured resistant variants already present in the population
(D) The antibiotic created a new species immediately

Ecology

Q53. A plant closes its stomata during a drought. What is the main benefit and the main cost?

(A) Increased water loss and increased photosynthesis
(B) Reduced water loss and increased CO_2 uptake
(C) Reduced water loss, but reduced CO_2 uptake for photosynthesis
(D) No benefit and no cost

Q54. A food web includes grass, rabbits, foxes and eagles. If rabbits are removed, what is the most likely immediate effect?

(A) Eagles increase in number immediately
(B) Grass biomass decreases
(C) Foxes switch to eating eagles
(D) Foxes lose a food source and grass biomass increases

Q55. A population of bacteria doubles every 20 minutes. Starting from 100 cells, how many cells are there after 1 hour?

(A) 300 cells
(B) 800 cells
(C) 400 cells
(D) 1,600 cells

Q56. Which factor is density-independent?

(A) A hurricane destroying nests regardless of population size
(B) Competition for nesting sites
(C) Spread of disease in a crowded population
(D) Predation that increases with prey density

Q57. In primary succession, the first organisms to colonise bare rock are usually

(A) large trees
(B) lichens and mosses
(C) shrubs
(D) mammals

Q58. Which biome has the highest net primary productivity per unit area?

(A) Desert
(B) Tropical rainforest
(C) Tundra
(D) Open ocean per unit area

Q59. A lake is polluted with heavy metals that accumulate in fish. Top predators have the highest concentrations. This is an example of

(A) biomagnification
(B) bioaccumulation only in producers
(C) eutrophication
(D) competitive exclusion

Q60. Which human activity most directly contributes to the loss of biodiversity in rainforests?

(A) Establishing nature reserves
(B) Reducing fossil fuel use
(C) Deforestation for agriculture and logging
(D) Replanting native trees

Answer Key

Q1: B	Q11: B	Q21: C	Q31: D	Q41: A	Q51: D
Q2: A	Q12: C	Q22: B	Q32: B	Q42: C	Q52: C
Q3: C	Q13: D	Q23: A	Q33: B	Q43: C	Q53: C
Q4: A	Q14: A	Q24: A	Q34: C	Q44: B	Q54: D
Q5: D	Q15: D	Q25: A	Q35: C	Q45: C	Q55: B
Q6: D	Q16: D	Q26: D	Q36: D	Q46: D	Q56: A
Q7: B	Q17: D	Q27: A	Q37: A	Q47: C	Q57: B
Q8: B	Q18: C	Q28: A	Q38: C	Q48: D	Q58: B
Q9: A	Q19: C	Q29: B	Q39: A	Q49: B	Q59: A
Q10: B	Q20: D	Q30: B	Q40: D	Q50: A	Q60: C

Worked explanations for all 60 questions: quaidianpoint.com/ap-biology-practice-test-14/