AP Biology Practice Test 15

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. A water strider can walk on the surface of a pond. Which property of water makes this possible?

(A) Low specific heat of water
(B) The high density of ice
(C) The nonpolar nature of water
(D) Surface tension from hydrogen bonding between water molecules

Q2. Blood pH is maintained near 7.4 by the bicarbonate buffer system. If blood becomes too acidic, what does the buffer do?

(A) Hydrogen ions are converted to oxygen
(B) Bicarbonate ions combine with excess H^+ to form carbonic acid
(C) The buffer releases more H^+ into the blood
(D) The buffer stops all metabolic reactions

Q3. Which functional group is characteristic of carboxylic acids and amino acids?

(A) The carboxyl group (-COOH)
(B) The amino group only
(C) The phosphate group
(D) The methyl group

Q4. Starch is made of glucose units joined by alpha 1-4 linkages with alpha 1-6 branches. Which molecule has this structure?

(A) Amylopectin, the branched component of starch
(B) Cellulose
(C) Chitin
(D) Glycogen is the only branched polymer

Q5. A triglyceride is formed from glycerol and three fatty acids. What type of bond joins them?

(A) A peptide bond
(B) An ester bond, formed by dehydration synthesis
(C) A glycosidic bond
(D) A phosphodiester bond

Q6. The primary structure of a protein is its sequence of amino acids. What type of bond holds this sequence together?

(A) Hydrogen bonds between bases
(B) Peptide bonds
(C) Disulfide bonds only
(D) Ionic bonds between side chains

Q7. A nucleotide in RNA contains ribose, phosphate and uracil. How does this differ from a nucleotide in DNA?

(A) DNA nucleotides contain no phosphate
(B) RNA nucleotides contain no sugar
(C) There is no difference between them
(D) DNA nucleotides contain deoxyribose and thymine instead of ribose and uracil

Q8. Which statement about hydrogen bonds in water is correct?

(A) They are weak attractions between the hydrogen of one water molecule and the oxygen of another
(B) They are strong covalent bonds within a water molecule
(C) They form only between water and nonpolar molecules
(D) They are permanent bonds that never break

Cell Structure and Function

Q9. Which organelle contains hydrolytic enzymes that digest worn-out organelles?

(A) The vacuole in animal cells
(B) The chloroplast
(C) The lysosome
(D) The nucleolus

Q10. A cell has a nucleus, mitochondria and a Golgi apparatus but no chloroplasts. What can be concluded?

(A) It is a prokaryotic cell
(B) It is a eukaryotic cell, most likely an animal or fungal cell, not a photosynthetic plant cell
(C) It must be a plant root cell with chloroplasts
(D) It cannot carry out respiration

Q11. A red blood cell is placed in a hypertonic solution. What happens to it?

(A) It swells and bursts
(B) It shrinks as water leaves by osmosis
(C) It stays the same size
(D) It takes in salt by diffusion

Q12. Which transport protein uses ATP to pump sodium out of the cell and potassium into the cell?

(A) An aquaporin
(B) A glucose channel
(C) The sodium-potassium pump
(D) A facilitated diffusion carrier for oxygen

Q13. A cell membrane is treated with a drug that removes cholesterol. What is the expected effect at high temperature?

(A) The membrane becomes rigid and impermeable
(B) Transport proteins stop working immediately
(C) The membrane dissolves completely
(D) The membrane becomes more fluid and less stable

Q14. Which structure is shared by chloroplasts and mitochondria?

(A) A nucleus
(B) A double membrane and their own DNA
(C) Thylakoids in both
(D) A cell wall

Q15. A protein is synthesised on a free ribosome in the cytoplasm. Where is it most likely to function?

(A) Outside the cell after secretion
(B) In the cytoplasm or nucleus, not in the secretory pathway
(C) In the lumen of the endoplasmic reticulum
(D) In the Golgi apparatus

Q16. A cell is exposed to a toxin that blocks the formation of vesicles from the Golgi apparatus. Which process is most affected?

(A) DNA replication
(B) Glycolysis in the cytoplasm
(C) Active transport of ions
(D) Secretion of proteins and delivery of membrane lipids

Cellular Energetics

Q17. Which molecule is oxidised and which is reduced in the overall equation for cellular respiration?

(A) Glucose is oxidised and oxygen is reduced
(B) Oxygen is oxidised and glucose is reduced
(C) Water is oxidised and carbon dioxide is reduced
(D) ATP is oxidised and ADP is reduced

Q18. An inhibitor blocks ATP synthase in mitochondria. What happens to the proton gradient?

(A) It disappears immediately
(B) It builds up because protons cannot flow back into the matrix
(C) It reverses direction
(D) It is used to make glucose

Q19. In the Calvin cycle, what is the role of Rubisco?

(A) It splits water to release oxygen
(B) It produces ATP by chemiosmosis
(C) It transports electrons to $NADP^+$
(D) It catalyses the fixation of CO_2 onto RuBP

Q20. A plant is kept in darkness for 24 hours. Which process continues and which stops?

(A) Photosynthesis continues; respiration stops
(B) Both processes stop completely
(C) Cellular respiration continues; photosynthesis stops
(D) Both processes continue at the same rate

Q21. During glycolysis, NAD^+ is reduced to NADH. What is the fate of this NADH in aerobic respiration?

(A) It is converted to glucose
(B) It is excreted from the cell
(C) It is oxidised by the electron transport chain, donating electrons for ATP synthesis
(D) It is used to fix carbon dioxide

Q22. A student measures oxygen consumption in germinating seeds at different temperatures. Oxygen consumption rises with temperature up to 40 degrees C, then falls. What best explains the fall?

(A) Respiratory enzymes are denatured at high temperature
(B) Seeds stop respiring because they run out of oxygen
(C) Photosynthesis overtakes respiration
(D) The seeds germinate faster at high temperature

Q23. Which of the following yields the most ATP per glucose molecule?

(A) Aerobic respiration
(B) Fermentation
(C) Glycolysis alone
(D) Anaerobic respiration in yeast

Cell Communication and Cell Cycle

Q24. A hormone binds to a receptor on the surface of a target cell, but a neighbouring cell with no receptor does not respond. What does this demonstrate?

(A) Cellular response depends on the presence of specific receptors
(B) Hormones act on all cells equally
(C) Receptors are not needed for signalling
(D) The hormone enters every cell

Q25. In a pathway, a ligand activates a receptor, which activates a kinase, which activates another kinase. What is this sequence called?

(A) A phosphorylation cascade
(B) A feedback loop
(C) A metabolic pathway
(D) A transport chain

Q26. A cell in a developing embryo receives a signal that triggers apoptosis. What is the biological significance?

(A) It removes cells in a controlled way to shape tissues, such as separating fingers
(B) It kills the whole embryo
(C) It causes uncontrolled growth
(D) It prevents all cell division

Q27. Which phase of the cell cycle is the longest in most actively dividing cells?

(A) M phase
(B) Interphase, especially G_1
(C) Cytokinesis
(D) Anaphase

Q28. A cell has completed DNA replication but has not yet divided. How many chromosomes and chromatids does a human cell have at this stage?

(A) 46 chromosomes and 92 chromatids
(B) 92 chromosomes and 46 chromatids
(C) 23 chromosomes and 46 chromatids
(D) 46 chromosomes and 46 chromatids

Q29. Cancer cells often have mutations in genes that control the cell cycle. Which type of gene, when mutated, can act as an accelerator of division?

(A) A tumour suppressor gene
(B) A gene for ribosomal RNA
(C) A proto-oncogene
(D) A gene for a structural protein

Q30. A researcher adds a growth factor to cultured cells and observes increased division. What is the growth factor acting as?

(A) An enzyme that digests the cell wall
(B) A nutrient that provides ATP directly
(C) A toxin that kills the cells
(D) A signal that activates a cell division pathway

Heredity

Q31. A trait is controlled by a single gene with two alleles, T (tall) and t (short). A cross Tt x tt produces 100 offspring. How many are expected to be tall?

(A) 50
(B) 25
(C) 75
(D) 100

Q32. In a family, a mother has blood type A and a father has blood type B. Their child has blood type O. What are the parents' genotypes?

(A) Both are homozygous
(B) Mother is I^AI^A and father is I^BI^B
(C) Both are heterozygous: I^Ai and I^Bi
(D) Mother is ii and father is I^AI^B

Q33. A gene is located on the X chromosome. A father passes his X chromosome to which of his children?

(A) Only his sons
(B) All of his children
(C) None of his children
(D) Only his daughters

Q34. Which process during meiosis I is the main source of new combinations of maternal and paternal chromosomes?

(A) Independent assortment of homologous pairs
(B) Crossing over between sister chromatids only
(C) DNA replication
(D) Cytokinesis

Q35. A dihybrid test cross gives offspring in the ratio 1:1:1:1. What does this tell us about the two genes?

(A) They are tightly linked
(B) They assort independently (or are far apart on the same chromosome)
(C) They are on the same chromosome with no crossing over
(D) They are sex-linked

Q36. A couple are both carriers for cystic fibrosis, an autosomal recessive disorder. What is the probability that their child will be affected?

(A) 1/2
(B) 3/4
(C) 1/4
(D) 1/8

Q37. A chromosome segment is duplicated. What type of mutation is this?

(A) A point mutation
(B) A frameshift mutation
(C) A chromosomal duplication
(D) A deletion

Gene Expression and Regulation

Q38. During translation, the ribosome moves along the mRNA in which direction?

(A) 3′ to 5′
(B) From the 3′ end to the 5′ end only in eukaryotes
(C) In both directions simultaneously
(D) 5′ to 3′

Q39. A gene has the template strand 3′-AAA-5′. What is the codon in the mRNA?

(A) 5′-AAA-3′
(B) 5′-UUU-3′
(C) 5′-TTT-3′
(D) 3′-UUU-5′

Q40. Which enzyme is responsible for synthesising RNA from a DNA template?

(A) RNA polymerase
(B) DNA polymerase
(C) Reverse transcriptase
(D) DNA ligase

Q41. A cell is exposed to a signal that activates a transcription factor. What is the most direct result?

(A) Decreased DNA replication
(B) Increased protein degradation
(C) Blocked translation of all mRNAs
(D) Increased transcription of target genes

Q42. A mutation in an intron affects splicing, causing an exon to be skipped. What is the likely effect on the protein?

(A) A shorter protein missing the amino acids coded by the skipped exon
(B) No effect, because introns are never transcribed
(C) A longer protein with extra amino acids
(D) A protein with a single amino-acid change

Q43. A scientist uses a DNA probe to detect a specific gene on a Southern blot. What does the probe bind to?

(A) Any protein in the sample
(B) The RNA polymerase
(C) A complementary DNA sequence
(D) The gel matrix

Q44. In bacteria, the lac operon is an example of what type of gene regulation?

(A) Regulation by alternative splicing only
(B) Regulation by RNA interference only
(C) Negative regulation by a repressor, with positive regulation by CAP
(D) No regulation at all

Natural Selection

Q45. A population of birds has a range of beak sizes. During a drought, only large, hard seeds are available, and birds with large beaks survive better. This is an example of

(A) stabilising selection
(B) disruptive selection
(C) sexual selection
(D) directional selection

Q46. A small population of animals is isolated on an island. Over generations, allele frequencies change randomly. This is an example of

(A) natural selection
(B) gene flow
(C) genetic drift
(D) mutation

Q47. Which of the following would violate Hardy-Weinberg equilibrium?

(A) Random mating in a large population
(B) No selection acting on the gene
(C) Non-random mating, such as inbreeding
(D) No migration

Q48. Two populations of the same species are separated by a mountain range. Over time, they become unable to interbreed. This is an example of

(A) sympatric speciation
(B) allopatric speciation
(C) artificial selection
(D) convergent evolution

Q49. A fossil is found in a rock layer dated to 300 million years ago. What can be inferred about the organism?

(A) It is the direct ancestor of all modern species
(B) It lived around 300 million years ago, assuming the dating is correct
(C) It lived only 300 years ago
(D) It evolved from modern species

Q50. Which structure is homologous to the human arm?

(A) The wing of an insect
(B) The wing of a bat
(C) The fin of a shark
(D) The leg of a spider

Q51. A phylogenetic tree shows a node where two lineages diverge. What does the node represent?

(A) A species that is extinct
(B) A mutation event
(C) A common ancestor of the two lineages
(D) A geographic barrier

Q52. Which evidence best supports the theory of evolution by natural selection?

(A) A single fossil
(B) The fact that all organisms look similar
(C) The absence of variation in populations
(D) The fossil record, comparative anatomy, molecular data and observed selection all converge on the same conclusion

Ecology

Q53. A plant species is adapted to dry conditions with thick, waxy leaves. What is the main advantage of this adaptation?

(A) Increased photosynthesis in the dark
(B) Faster growth in wet soil
(C) Attraction of more pollinators
(D) Reduced water loss through the leaves

Q54. In a food chain, energy flows from producers to consumers. What happens to most of the energy at each step?

(A) It is stored as biomass in the consumer
(B) It is recycled back to producers
(C) It is converted to light
(D) It is lost as heat through respiration and in waste

Q55. A population of rabbits is introduced to an island with no predators. What is the most likely initial growth pattern?

(A) Logistic growth at carrying capacity
(B) Immediate extinction
(C) Exponential growth
(D) No growth

Q56. Which interaction benefits one species and harms the other?

(A) Mutualism
(B) Commensalism
(C) Parasitism
(D) Competition between unrelated species

Q57. A community has high species richness and evenness. What does this indicate about its biodiversity?

(A) It has low biodiversity
(B) It has only one species
(C) It is dominated by a single species
(D) It has high biodiversity

Q58. Nitrogen-fixing bacteria in root nodules convert nitrogen gas into ammonia. What is this process called?

(A) Denitrification
(B) Nitrogen fixation
(C) Nitrification
(D) Assimilation

Q59. A river is dammed, blocking fish migration. What is the most likely ecological consequence?

(A) Fish populations increase immediately
(B) The river ecosystem becomes more diverse
(C) No effect on the fish
(D) Fish populations decline because they cannot reach breeding grounds

Q60. Which of the following is a density-dependent factor that limits population growth?

(A) Disease spreading more easily in crowded populations
(B) A drought affecting all individuals equally
(C) A volcanic eruption
(D) A sudden frost

Answer Key

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

Worked explanations for all 60 questions: quaidianpoint.com/ap-biology-practice-test-15/