AP Biology Practice Test 7

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 pH meter reads 6.0 for one solution and 4.0 for another. How do their hydrogen ion concentrations compare?

(A) The pH 4 solution has 100 times more H^+ than the pH 6 solution
(B) The pH 6 solution has 100 times more H^+ than the pH 4 solution
(C) The pH 4 solution has twice as much H^+ as the pH 6 solution
(D) Their H^+ concentrations are equal because pH is linear

Q2. A plant cell in a dry soil loses water from its leaves, yet water keeps arriving from the roots. Which property of water molecules best explains the continuous column of water in the xylem?

(A) The nonpolar nature of water molecules
(B) The low specific heat of water
(C) Cohesion between water molecules through hydrogen bonding
(D) The ability of water to dissolve cellulose

Q3. A molecule has a hydroxyl group (-OH) attached to a carbon atom. What is the most likely effect of this group on the molecule's behaviour in water?

(A) It makes the molecule hydrophobic and insoluble
(B) It makes the molecule polar and able to form hydrogen bonds with water
(C) It makes the molecule acidic by releasing a proton
(D) It prevents the molecule from reacting with other molecules

Q4. Two monosaccharides join to form a disaccharide. A molecule of water is released in the process. What is the name of the bond formed between the two sugars?

(A) A peptide bond
(B) A hydrogen bond
(C) A phosphodiester bond
(D) A glycosidic bond

Q5. A sample of double-stranded DNA contains 22 percent cytosine. What percentage of its bases are thymine?

(A) 22 percent
(B) 56 percent
(C) 44 percent
(D) 28 percent

Q6. An egg white is heated and turns from clear liquid to white solid, and the change cannot be reversed by cooling. The protein's amino acid sequence is unchanged. What has happened?

(A) The protein has been denatured, losing its secondary and tertiary structure
(B) The protein has been hydrolysed into amino acids
(C) New peptide bonds have formed between the proteins
(D) The protein has been translated into a new sequence

Q7. A phospholipid is placed in water. It spontaneously forms a bilayer with its tails hidden inside. Which property drives this arrangement?

(A) The fatty acid tails are hydrophilic and attract water
(B) The tails are hydrophobic, so they cluster away from water while the heads face it
(C) The phosphate heads are hydrophobic and repel water
(D) The phospholipids are held together by covalent bonds

Q8. Which level of protein structure is formed when an alpha helix in one region of a polypeptide interacts with a beta sheet in another region of the same chain?

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

Cell Structure and Function

Q9. A protein is made on the rough ER, modified in the Golgi apparatus, and then released from the cell in a vesicle. Which sequence of membrane structures does it pass through?

(A) Nucleus, lysosome, plasma membrane
(B) Rough ER, transport vesicle, Golgi, secretory vesicle, plasma membrane
(C) Smooth ER, ribosome, vacuole, plasma membrane
(D) Golgi, rough ER, mitochondrion, plasma membrane

Q10. A child has Tay-Sachs disease, in which lipids accumulate inside cells because a lysosomal enzyme is missing. Which cellular function is directly impaired?

(A) Protein synthesis on ribosomes
(B) ATP production in mitochondria
(C) Intracellular digestion of macromolecules in lysosomes
(D) Photosynthesis in chloroplasts

Q11. A cell is treated with a drug that depolymerises microtubules. Which process is most directly affected?

(A) Diffusion of oxygen across the membrane
(B) Glycolysis in the cytoplasm
(C) Transcription in the nucleus
(D) Movement of vesicles and separation of chromosomes during division

Q12. Plant cells are connected by plasmodesmata, and animal heart muscle cells are connected by gap junctions. What do these structures have in common?

(A) They allow direct exchange of small molecules between neighbouring cells
(B) They prevent all substances from leaving a cell
(C) They anchor cells to the extracellular matrix
(D) They generate ATP for neighbouring cells

Q13. At high temperatures, cholesterol in an animal cell membrane reduces its fluidity. At low temperatures, the same cholesterol increases fluidity. What is the best description of cholesterol's role?

(A) It makes the membrane rigid at all temperatures
(B) It dissolves the phospholipid bilayer
(C) It acts as a buffer of membrane fluidity, restraining phospholipid movement when hot and preventing close packing when cold
(D) It transports cholesterol across the membrane by active transport

Q14. A plant cell has a solute potential of -0.8 MPa and a pressure potential of +0.5 MPa. What is its water potential?

(A) -1.3 MPa
(B) +1.3 MPa
(C) +0.3 MPa
(D) -0.3 MPa

Q15. A red blood cell is placed in distilled water. It swells and eventually bursts. Why does this happen?

(A) Water enters by osmosis because the cell interior has a higher solute concentration than the surroundings
(B) Salt enters the cell by active transport
(C) The membrane pumps water in using ATP
(D) The cell wall prevents water from leaving

Q16. A researcher separates cell components by spinning a broken-cell mixture at increasing speeds. Nuclei pellet first, then mitochondria, then ribosomes. What is this technique called?

(A) Gel electrophoresis
(B) Cell fractionation by differential centrifugation
(C) Chromatography
(D) Fluorescence microscopy

Cellular Energetics

Q17. A reaction has a change in Gibbs free energy of -30 kJ/mol. What does the negative sign indicate?

(A) The reaction is exergonic and can proceed spontaneously
(B) The reaction is endergonic and requires a net input of energy
(C) The reaction is at equilibrium
(D) The reaction absorbs heat from the surroundings

Q18. ATP hydrolysis releases energy that a cell uses to drive an endergonic reaction. Which term describes this pairing of reactions?

(A) Denaturation
(B) Energy coupling
(C) Competitive inhibition
(D) Photorespiration

Q19. An enzyme's activity is measured across a range of pH values. Activity is highest at pH 7 and falls sharply at pH 3 and pH 11. What best explains the fall at the extremes?

(A) The substrate is used up faster at extreme pH
(B) The enzyme is competitively inhibited by water
(C) The enzyme's active site is permanently enlarged
(D) Extreme pH disrupts the bonds that maintain the enzyme's shape, changing the active site

Q20. A noncompetitive inhibitor binds to an enzyme at a site other than the active site. What effect does it have on Vmax and Km?

(A) Vmax increases and Km decreases
(B) Vmax stays the same and Km increases
(C) Vmax decreases and Km stays the same
(D) Both Vmax and Km increase

Q21. In cyclic photophosphorylation, electrons from photosystem I return to the electron transport chain instead of reducing $NADP^+$. What is the net product of this pathway?

(A) Oxygen and NADPH
(B) Glucose
(C) Carbon dioxide
(D) ATP only

Q22. On a hot, dry afternoon a plant closes its stomata. Inside the leaf, oxygen accumulates and carbon dioxide falls. Rubisco begins to bind oxygen instead of carbon dioxide. What is this wasteful process called?

(A) Chemiosmosis
(B) Fermentation
(C) Photorespiration
(D) Oxidative phosphorylation

Q23. ATP synthase sits in the inner mitochondrial membrane. How does it make ATP?

(A) Protons flowing down their gradient through ATP synthase drive the joining of ADP and phosphate
(B) Electrons flow through ATP synthase and reduce oxygen
(C) ATP synthase pumps protons into the matrix using ATP
(D) ATP synthase splits water to release oxygen

Cell Communication and Cell Cycle

Q24. A hydrophilic signalling molecule such as insulin cannot cross the plasma membrane. Where is its receptor most likely to be located?

(A) In the nucleus
(B) On the outer surface of the plasma membrane
(C) Inside the mitochondrion
(D) In the cytoplasm, bound to DNA

Q25. A receptor tyrosine kinase is activated when a growth factor binds. What happens next in the receptor itself?

(A) The receptor is degraded in a lysosome immediately
(B) Two receptor molecules pair up and phosphorylate each other on tyrosine residues
(C) The receptor releases cAMP into the cytoplasm
(D) The receptor moves into the nucleus and binds DNA directly

Q26. Bacteria in a dense culture release a signalling molecule; when its concentration passes a threshold, the whole population switches on genes for bioluminescence. What is this communication called?

(A) Quorum sensing
(B) Apoptosis
(C) Synaptic signalling
(D) Endocrine signalling

Q27. A mutation inactivates the G1 checkpoint protein p53 in a human cell line. Which consequence is most likely?

(A) The cell cannot enter mitosis at all
(B) DNA replication is permanently blocked in S phase
(C) Damaged DNA can be copied in S phase without repair
(D) The cell skips cytokinesis and becomes multinucleate

Q28. In anaphase of mitosis, sister chromatids separate and move to opposite poles. What structure pulls them apart?

(A) The nuclear envelope
(B) The cell plate
(C) The contractile ring
(D) Microtubules of the spindle apparatus

Q29. A plant cell divides, and a new wall forms across the middle of the cell. What is this structure called, and what produces it?

(A) A cleavage furrow produced by actin filaments
(B) A septum produced by the rough ER
(C) A cell plate produced by vesicles from the Golgi apparatus
(D) A plasmodesma produced by the nucleus

Q30. A proto-oncogene mutates into an oncogene. What is the most likely consequence for the cell?

(A) The cell stops dividing permanently
(B) The cell divides without normal control, as if a growth signal were always on
(C) The cell undergoes apoptosis immediately
(D) The cell loses its mitochondria

Heredity

Q31. A human cell has 46 chromosomes. How many different combinations of maternal and paternal chromosomes are possible in its gametes through independent assortment alone?

(A) 23
(B) 46
(C) 46 x 2
(D) 2^{23}

Q32. A plant with purple flowers (P) is crossed with a white-flowered plant (pp). Half the offspring have purple flowers and half have white flowers. What is the genotype of the purple parent?

(A) Pp
(B) PP
(C) pp
(D) pP is impossible in diploids

Q33. In snapdragons, crossing a red-flowered plant with a white-flowered plant produces all pink-flowered offspring. What pattern of inheritance is this?

(A) Incomplete dominance
(B) Complete dominance
(C) Codominance
(D) Sex linkage

Q34. In mice, coat colour is controlled by two genes. Gene B gives black pigment, while a recessive mutation at gene C blocks all pigment production, so cc mice are albino regardless of their B genotype. What is this interaction called?

(A) Polygenic inheritance
(B) Codominance
(C) Multiple alleles
(D) Epistasis

Q35. A pedigree shows a trait appearing in every generation, and every affected person has an affected parent. Which inheritance pattern is most likely?

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

Q36. A person has blood group AB. Which statement about their red blood cells is correct?

(A) They carry neither A nor B antigens
(B) They carry both A and B antigens, showing codominance
(C) They carry only A antigens because A is dominant to B
(D) They carry only B antigens because B is dominant to A

Q37. A child is born with Down syndrome (trisomy 21). Which event most likely caused it?

(A) A point mutation in chromosome 21
(B) Crossing over between chromosomes 21 and 22
(C) A deletion of part of chromosome 21
(D) Nondisjunction of chromosome 21 during meiosis

Gene Expression and Regulation

Q38. During DNA replication, one new strand is built continuously and the other is built in short fragments. What are those fragments called?

(A) Primers
(B) Okazaki fragments
(C) Telomeres
(D) Introns

Q39. A newly made pre-mRNA in a human cell contains introns. What happens to these introns before translation?

(A) They are removed by splicing, and the exons are joined together
(B) They are translated into the first amino acids of the protein
(C) They are copied into the DNA of the next generation
(D) They are exported to the cytoplasm unchanged

Q40. A ribosome is translating an mRNA. The tRNA carrying the growing polypeptide chain is in the P site, and a new tRNA has just arrived. In which site is the new tRNA?

(A) The E site
(B) The promoter site
(C) The A site
(D) The operator site

Q41. In a eukaryotic cell, a gene is switched on only when a specific activator protein binds to an enhancer far from the promoter. How does the enhancer influence the promoter?

(A) The enhancer is transcribed into mRNA instead of the gene
(B) The enhancer deletes the promoter sequence
(C) DNA looping brings the bound activator into contact with the transcription machinery at the promoter
(D) The enhancer blocks RNA polymerase from leaving the gene

Q42. Methyl groups are added to the DNA of a gene's promoter in a liver cell, and the gene is silenced for the rest of the cell's life. What is this an example of?

(A) Epigenetic regulation by DNA methylation
(B) A frameshift mutation
(C) Alternative splicing of the promoter
(D) Competitive inhibition of RNA polymerase

Q43. A scientist wants to cut a DNA molecule at a specific sequence and leave short single-stranded overhangs. Which tool should she use?

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

Q44. CRISPR-Cas9 is used to edit a gene in a cell. What guides the Cas9 enzyme to the correct DNA sequence?

(A) A protein antibody
(B) A primer made of DNA polymerase
(C) A restriction enzyme
(D) A guide RNA complementary to the target sequence

Natural Selection

Q45. In a population, the frequency of the recessive allele for a trait is 0.4. Assuming Hardy-Weinberg equilibrium, what is the frequency of the dominant allele?

(A) 0.4
(B) 0.6
(C) 0.16
(D) 0.36

Q46. Human birth weight shows a pattern in which very small and very large babies have lower survival rates than average-weight babies. Which type of selection is acting?

(A) Directional selection
(B) Disruptive selection
(C) Sexual selection
(D) Stabilising selection

Q47. A few individuals from a mainland bird population colonise a remote island. The island population has different allele frequencies from the mainland, purely by chance. What is this called?

(A) Natural selection
(B) Gene flow
(C) The founder effect
(D) Mutation

Q48. Male peacocks with larger, brighter tails attract more mates, even though the tails make them easier for predators to spot. What drives the evolution of these tails?

(A) Sexual selection
(B) Artificial selection
(C) Genetic drift
(D) Stabilising selection

Q49. Two populations of fireflies live in the same meadow but flash their mating signals at different times of night, so they never interbreed. What type of reproductive isolation is this?

(A) Hybrid inviability
(B) Temporal isolation
(C) Mechanical isolation
(D) Gametic isolation

Q50. A mule, the offspring of a horse and a donkey, is healthy but sterile. What type of reproductive barrier does this illustrate?

(A) Habitat isolation
(B) Behavioural isolation
(C) Mechanical isolation
(D) Hybrid sterility, a postzygotic barrier

Q51. Sharks and dolphins both have streamlined bodies and fins, although sharks are fish and dolphins are mammals. What does this similarity illustrate?

(A) Convergent evolution producing analogous structures
(B) Homologous structures from a recent common ancestor
(C) Divergent evolution from a shared marine ancestor
(D) Artificial selection by humans

Q52. The fossil record shows a sequence of horse fossils in which teeth change from low-crowned browsers to high-crowned grazers as grasslands spread. What does this series best demonstrate?

(A) That fossils never change over time
(B) That evolution occurs by sudden creation of new species
(C) Gradual change in a lineage in response to a changing environment
(D) That horses evolved from modern grasses

Ecology

Q53. A bacterial population doubles every 20 minutes under ideal conditions. Starting from 100 cells, approximately how many cells will there be after 2 hours?

(A) 200
(B) 1,200
(C) 6,400
(D) 3,200

Q54. A population pyramid for a country is wide at the base and narrow at the top, with many children and few elderly people. What does this shape predict?

(A) The population will grow rapidly as the large young cohorts reach reproductive age
(B) The population will shrink immediately
(C) The population is at carrying capacity
(D) The birth rate is lower than the death rate

Q55. Which survivorship curve is typical of a species that produces many offspring, gives them little care, and has very high juvenile mortality, such as an oyster?

(A) Type I, with most deaths in old age
(B) Type II, with a constant death rate at all ages
(C) A curve with no deaths at any age
(D) Type III, with most deaths early in life

Q56. In a food web, removing wolves from a valley leads to a deer population boom, overgrazing, and a decline in songbirds that nest in shrubs. What is this chain of effects called?

(A) Primary succession
(B) A trophic cascade
(C) Competitive exclusion
(D) Eutrophication

Q57. Fertilisers wash into a lake, causing an algal bloom. When the algae die, decomposers consume the oxygen in the water and fish die. What is this process called?

(A) Biomagnification
(B) Acid rain formation
(C) Primary succession
(D) Eutrophication

Q58. A pesticide is applied to crops at low concentration, but top predators such as eagles accumulate much higher concentrations in their tissues. What is this phenomenon called?

(A) Eutrophication
(B) Biomagnification
(C) Primary productivity
(D) Denitrification

Q59. Which ecosystem has the highest net primary productivity per square metre?

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

Q60. An invasive plant species spreads rapidly in a new habitat, outcompeting native plants. Which factor most likely explains its success?

(A) It has left behind its natural predators and pathogens
(B) It cannot reproduce in the new habitat
(C) It requires more nutrients than native plants
(D) It is eaten by more herbivores than native plants

Answer Key

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

Q9: B	Q19: D	Q29: C	Q39: A	Q49: B	Q59: C
Q10: C	Q20: C	Q30: B	Q40: C	Q50: D	Q60: A

Worked explanations for all 60 questions: quaidianpoint.com/ap-biology-practice-test-7/