AP Biology Practice Test 8

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 beaker of water is heated from 20 degrees C to 30 degrees C, while the same mass of sand heated with the same energy rises from 20 degrees C to 60 degrees C. What does this comparison show about water?

(A) Water has a lower specific heat than sand
(B) Water is a poor solvent for minerals
(C) Water has a high specific heat, absorbing much energy for a small temperature rise
(D) Water molecules cannot form hydrogen bonds

Q2. A water strider stands on the surface of a pond without sinking. Which property of water supports it?

(A) Adhesion to the insect’s legs
(B) The high density of ice
(C) The low heat of vaporisation
(D) Surface tension from cohesion between water molecules

Q3. Amino acids differ from one another only in their side chains. Which part of an amino acid is identical in all twenty amino acids?

(A) The central carbon with its amino group, carboxyl group and hydrogen atom
(B) The R group
(C) The disulfide bridge
(D) The peptide bond

Q4. A fatty acid has no double bonds between its carbon atoms. How is it classified, and how does it behave at room temperature?

(A) Unsaturated; it is usually liquid
(B) Saturated; its straight chains pack tightly so it is usually solid
(C) Polyunsaturated; it cannot be digested
(D) Trans fat; it is always a gas

Q5. Sucrose is made of glucose joined to fructose. Which statement about sucrose is correct?

(A) Sucrose is a disaccharide formed by dehydration synthesis
(B) Sucrose is a monosaccharide found in DNA
(C) Sucrose is a polysaccharide used to build plant walls
(D) Sucrose is a protein made of amino acids

Q6. Chitin strengthens the cell walls of fungi and the exoskeletons of arthropods. What is chitin made of?

(A) Amino acids joined by peptide bonds
(B) Modified glucose monomers joined into a structural polysaccharide
(C) Fatty acids joined to glycerol
(D) Nucleotides joined by phosphodiester bonds

Q7. A DNA double helix is heated and the two strands separate. Which bonds are broken?

(A) Covalent phosphodiester bonds in the backbone
(B) Peptide bonds between nucleotides
(C) Ionic bonds between phosphate groups
(D) Hydrogen bonds between complementary base pairs

Q8. A protein's shape depends on hydrogen bonds forming between the carbonyl oxygen of one amino acid and the amide hydrogen of another four residues away. Which level of structure do these bonds create?

(A) Primary structure
(B) Quaternary structure
(C) Secondary structure, such as an alpha helix
(D) No structure, because hydrogen bonds are too weak to matter

Cell Structure and Function

Q9. A cell is viewed under an electron microscope. The observer sees a network of flattened sacs near the nucleus, studded with small dots. Which organelle is this?

(A) Smooth endoplasmic reticulum
(B) Golgi apparatus
(C) Lysosome
(D) Rough endoplasmic reticulum

Q10. A liver cell detoxifies drugs and synthesises lipids. Which organelle is especially well developed in this cell?

(A) Chloroplast
(B) Central vacuole
(C) Smooth endoplasmic reticulum
(D) Nucleolus

Q11. A student places potato cylinders in a range of sucrose solutions and measures their mass change. In a 0.3 mol/L solution the mass does not change. What is the water potential of the potato cells?

(A) Equal to the water potential of the 0.3 mol/L sucrose solution
(B) Zero, because the cells are dead
(C) Higher than any sucrose solution
(D) Lower than the water potential of pure water by exactly 0.3 MPa

Q12. Oxygen diffuses from the alveoli of the lungs into the blood. Which feature of the alveolar wall makes this exchange efficient?

(A) It is thick and covered in mucus
(B) It is a single layer of thin cells with a large surface area and a rich blood supply
(C) It actively pumps oxygen using ATP
(D) It is impermeable to gases

Q13. A membrane protein binds a molecule on the outside of the cell, changes shape, and releases the molecule inside, using ATP. Which process is this?

(A) Simple diffusion
(B) Active transport
(C) Facilitated diffusion
(D) Osmosis

Q14. A white blood cell releases antibodies into the blood. How do the antibodies leave the cell?

(A) By exocytosis, as vesicles fuse with the plasma membrane
(B) By simple diffusion through the lipid bilayer
(C) By osmosis through aquaporins
(D) By phagocytosis of the surrounding fluid

Q15. A cell's mitochondria are damaged, but its chloroplasts work normally. Which cell type is this most likely to be, and what will it struggle to do?

(A) An animal muscle cell that will struggle to photosynthesise
(B) A plant root cell that will struggle to make ATP by respiration
(C) A plant leaf cell that will struggle to make ATP by respiration in the dark
(D) A bacterial cell that will struggle to divide

Q16. A protein destined for secretion is synthesised on a ribosome attached to the rough endoplasmic reticulum. Which is the next organelle it passes through on its way out of the cell?

(A) The nucleus, where the protein is checked before export
(B) A lysosome, where it is broken down by enzymes
(C) A mitochondrion, where it gains energy for transport
(D) The Golgi apparatus, which modifies, sorts and packages it

Cellular Energetics

Q17. A graph of reaction rate against substrate concentration for an enzyme is plotted. At low substrate concentrations the rate rises steeply, then it levels off. What does the plateau represent?

(A) The enzyme has been denatured
(B) The substrate has run out completely
(C) The enzyme is saturated, with all active sites occupied
(D) The reaction has reached equilibrium and stopped

Q18. Glycolysis takes place in a cell with no oxygen. What is the net yield of ATP from one glucose molecule by glycolysis alone?

(A) 0 ATP
(B) 2 ATP
(C) 4 ATP
(D) 32 ATP

Q19. Yeast cells fermenting grape juice produce bubbles of gas and a small amount of alcohol. Which products are these?

(A) Oxygen and lactic acid
(B) Hydrogen and ethanol
(C) Nitrogen and acetic acid
(D) Carbon dioxide and ethanol

Q20. A molecule of glucose is fully oxidised in aerobic respiration. How many molecules of CO_2 are released in total?

(A) 6
(B) 2
(C) 3
(D) 12

Q21. A researcher adds a chemical that makes the inner mitochondrial membrane freely permeable to protons. What happens to ATP production?

(A) ATP production increases because protons move faster
(B) ATP production is unaffected
(C) Oxygen consumption stops completely
(D) ATP production falls because the proton gradient that drives ATP synthase is destroyed

Q22. In the light reactions, electrons excited in photosystem II are replaced by electrons from water, and electrons from photosystem I reduce $NADP^+$. What is the order of electron flow in non-cyclic photophosphorylation?

(A) NADPH, photosystem I, photosystem II, water
(B) Water, photosystem II, photosystem I, $NADP^+$
(C) Photosystem I, water, photosystem II, $NADP^+$
(D) Water, photosystem I, photosystem II, ATP synthase

Q23. A desert plant opens its stomata at night, stores CO_2 as an organic acid, and releases it during the day for the Calvin cycle. Which adaptation is this?

(A) C3 photosynthesis
(B) Photorespiration
(C) CAM photosynthesis
(D) Fermentation

Q24. A chloroplast is placed in darkness after being in the light. The Calvin cycle continues for a short time, then stops. Why does it stop?

(A) The ATP and NADPH made in the light reactions run out
(B) Carbon dioxide is used up in the light reactions
(C) The thylakoid membranes dissolve in the dark
(D) Rubisco is destroyed by darkness

Cell Communication and Cell Cycle

Q25. A neurotransmitter is released from a neurone into a synaptic cleft and binds receptors on the next cell within milliseconds. Which type of signalling is this?

(A) Endocrine signalling through the blood
(B) Synaptic signalling over a very short distance
(C) Paracrine signalling by diffusion through tissue
(D) Direct contact signalling through gap junctions

Q26. A cell receives a signal that activates a protein kinase. The kinase adds a phosphate group to the next protein in the pathway, which activates another kinase, and so on. What is this series called?

(A) A feedback loop
(B) A metabolic cycle
(C) An operon
(D) A phosphorylation cascade

Q27. During embryonic development, the tissue between a human embryo's fingers disappears, leaving separate digits. What process removes those cells?

(A) Apoptosis, programmed cell death
(B) Necrosis from injury
(C) Mitosis of the finger cells
(D) Differentiation into bone

Q28. A cell in G2 phase has duplicated chromosomes but its DNA is damaged. Which checkpoint will stop it from entering mitosis?

(A) The G1 checkpoint
(B) The spindle checkpoint
(C) The G2 checkpoint
(D) The cytokinesis checkpoint

Q29. A scientist observes chromosomes lining up along the equator of a cell, each attached to spindle fibres from both poles. Which stage of mitosis is this?

(A) Prophase
(B) Telophase
(C) Metaphase
(D) Interphase

Q30. A growth factor binds to a cell's surface receptor, but the cell does not divide because it lacks the matching intracellular relay protein. What does this show about cell signalling?

(A) A cell responds only if it has the full signalling pathway for that signal
(B) All cells respond identically to any growth factor
(C) Growth factors act directly on DNA in every cell
(D) Receptors are not needed for cell division

Q31. A tumour suppressor gene is mutated so that its protein no longer works. What is the likely effect on the cell cycle?

(A) The cell cycle is blocked permanently in G1
(B) A brake on cell division is lost, so the cell may divide when it should not
(C) The cell can no longer replicate its DNA
(D) The cell immediately undergoes apoptosis

Heredity

Q32. A woman with normal colour vision has a colour-blind father. She has children with a colour-blind man. What is the probability that a daughter of theirs will be colour-blind?

(A) 100 percent
(B) 75 percent
(C) 0 percent
(D) 50 percent

Q33. A dihybrid cross in fruit flies gives 400 offspring: 230 with the parental phenotypes and 170 with recombinant phenotypes. What is the approximate recombination frequency between the two genes?

(A) 17 percent
(B) 23 percent
(C) 57 percent
(D) 42.5 percent

Q34. A couple are both carriers of cystic fibrosis, an autosomal recessive disorder. What is the probability that their child will be a carrier but not have the disorder?

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

Q35. In a chi-square test of a monohybrid cross, the calculated chi-square value is 5.20 with 1 degree of freedom. The critical value at p = 0.05 is 3.84. What is the correct conclusion?

(A) The null hypothesis is rejected, because the calculated value exceeds the critical value
(B) The null hypothesis is accepted, because the sample is large
(C) The genes must be linked
(D) The test proves the hypothesis is true

Q36. A chromosome diagram shows two homologous chromosomes with segments swapped between non-sister chromatids. When did this exchange occur?

(A) During anaphase II of meiosis
(B) During mitosis
(C) During prophase I of meiosis
(D) During fertilisation

Q37. A gene has three alleles in a population: I^A, I^B and i. A person with genotype I^Ai has blood group A. Which term describes the existence of three alleles for one gene?

(A) Polygenic inheritance
(B) Multiple alleles
(C) Epistasis
(D) Incomplete dominance

Q38. Meiosis II is often described as similar to mitosis. What is the key difference between the two?

(A) Meiosis II involves DNA replication, mitosis does not
(B) Meiosis II produces four cells, mitosis produces two
(C) Meiosis II separates homologous chromosomes
(D) Meiosis II starts with haploid cells whose chromosomes are still duplicated, and separates sister chromatids

Gene Expression and Regulation

Q39. DNA polymerase adds nucleotides to a growing strand. In which direction does it build the new strand, and what does it require to start?

(A) 5′ to 3′, and a primer to provide a free 3′ end
(B) 3′ to 5′, and no primer at all
(C) 5′ to 3′, and a terminator sequence
(D) In both directions at once, and a ribosome

Q40. A mutation changes one base in a gene, but the amino acid sequence of the protein is unchanged. What type of mutation is this?

(A) A frameshift mutation
(B) A nonsense mutation
(C) A silent mutation
(D) A chromosomal deletion

Q41. The lac operon is switched off when glucose is present, even if lactose is also present. What explains this preference for glucose?

(A) Lactose cannot enter the cell when glucose is present
(B) The repressor binds more strongly in the presence of glucose
(C) Low cAMP levels mean CAP cannot activate the operon, so transcription stays low
(D) Glucose destroys the lac genes

Q42. A gene for insulin is inserted into a bacterial plasmid, and the bacteria produce human insulin. What is the plasmid acting as in this process?

(A) A vector carrying the foreign gene into the host cell
(B) A restriction enzyme
(C) A primer for PCR
(D) A ribosome for translation

Q43. A researcher uses reverse transcriptase to make DNA from an mRNA sample. What is the product called, and why is it useful?

(A) Genomic DNA, because it contains all introns
(B) Plasmid DNA, because it replicates in bacteria
(C) Primer DNA, because it starts replication
(D) Complementary DNA (cDNA), because it represents only the expressed genes without introns

Q44. In a eukaryotic cell, a small RNA molecule binds to a target mRNA and blocks its translation. What is this regulatory mechanism called?

(A) DNA methylation
(B) RNA interference (RNAi)
(C) Alternative splicing
(D) Operon repression

Q45. A protein-coding gene is transcribed, but its mRNA is spliced in two different ways in liver cells and brain cells, producing two different proteins. What is this process called?

(A) Transcriptional initiation
(B) DNA replication
(C) Translation
(D) Alternative splicing

Natural Selection

Q46. A population of beetles lives on dark volcanic rock. Birds eat the light-coloured beetles more often, and over time the population becomes mostly dark. Which mechanism is acting?

(A) Genetic drift
(B) Natural selection favouring camouflaged individuals
(C) Mutation creating dark beetles in response to predation
(D) Gene flow from a distant population

Q47. Which of the following is a condition required for a population to remain in Hardy-Weinberg equilibrium?

(A) Strong natural selection on the trait
(B) A small population size
(C) Random mating and no migration, mutation or selection
(D) Frequent non-random mating

Q48. Two populations of the same species of fish are separated by a waterfall. After many generations, they can no longer produce fertile offspring together. What has occurred?

(A) Speciation by geographic isolation
(B) Extinction of both populations
(C) Convergent evolution
(D) Artificial selection

Q49. A cladogram places humans and chimpanzees as sister taxa, with gorillas as the next closest group. What does this mean?

(A) Humans and chimpanzees share a more recent common ancestor with each other than either does with gorillas
(B) Humans evolved directly from chimpanzees
(C) Gorillas are the ancestors of humans
(D) Chimpanzees and gorillas are the same species

Q50. The wings of a bat and the wings of an insect both allow flight, but they have completely different anatomical structures. How are these wings classified?

(A) Homologous structures
(B) Vestigial structures
(C) Analogous structures
(D) Embryological structures

Q51. A species of plant produces some seeds that germinate immediately and others that stay dormant for years. In an unpredictable climate, which type of selection favours this variation?

(A) Directional selection for immediate germination
(B) Disruptive selection favouring both extremes of germination timing
(C) Stabilising selection for average germination time
(D) Sexual selection

Q52. The earliest life on Earth is thought to have appeared in an environment with little free oxygen. Which evidence best supports the idea that the first cells were anaerobic?

(A) Modern bacteria are all aerobic
(B) Oxygen is toxic to all living cells
(C) Fossils of fish appear before fossils of bacteria
(D) The early atmosphere lacked oxygen, and many ancient metabolic pathways do not require it

Ecology

Q53. A population of rabbits is growing logistically with a carrying capacity of 500. When the population is 450, what is expected to happen to the growth rate?

(A) It will be at its maximum
(B) It will be zero because the population has stopped growing
(C) It will increase exponentially
(D) It will be low, because resources are nearly exhausted and density-dependent factors limit growth

Q54. In a forest food chain, leaves are eaten by caterpillars, which are eaten by birds, which are eaten by hawks. Which trophic level do the birds occupy?

(A) Secondary consumers
(B) Primary consumers
(C) Producers
(D) Decomposers

Q55. Decomposers break down dead organisms in a forest. What is their main role in nutrient cycling?

(A) They fix nitrogen from the air
(B) They return inorganic nutrients to the soil for producers to reuse
(C) They carry out photosynthesis
(D) They remove carbon dioxide from the atmosphere permanently

Q56. A farmer adds compost to a field. Soil bacteria convert the organic nitrogen in the compost first to ammonia and then, through nitrification, to nitrate. Which process releases the ammonia in the first step?

(A) Nitrogen fixation
(B) Denitrification
(C) Ammonification by decomposers
(D) Photosynthesis

Q57. Two species of barnacle live on a rocky shore. One occupies the upper shore and the other the lower shore. When the lower-shore species is removed, the upper-shore species expands downwards. What does this show?

(A) The upper-shore species cannot survive in the lower shore
(B) The upper-shore species is limited by competition, not by its physical tolerance
(C) The two species are mutualists
(D) The lower-shore species is a predator of the upper-shore species

Q58. After a forest fire, grasses and shrubs regrow quickly from seeds and roots already in the soil. What type of succession is this?

(A) Primary succession
(B) Climax succession
(C) Secondary succession
(D) No succession, because the soil is destroyed

Q59. A lake contains 1,000 kg of algae. Using the 10 percent rule, approximately how much biomass can the tertiary consumers in the lake support?

(A) 1,000 kg
(B) 100 kg
(C) 10 kg
(D) 1 kg

Q60. A coral reef supports hundreds of fish species, while a nearby sandy seabed supports only a few. Which statement best explains the difference in biodiversity?

(A) The reef offers many habitats and niches, supporting more species
(B) The sandy seabed has more sunlight
(C) Reefs have fewer producers than sandy areas
(D) Fish cannot survive on sand because it is too warm

Answer Key

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

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

Worked explanations for all 60 questions: quaidianpoint.com/ap-biology-practice-test-8/