AP Biology Practice Test 10

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 researcher adds a base to a solution containing a weak acid. The pH rises slowly at first, then sharply. Which part of the titration curve represents the buffer region?

(A) The sharp rise, where pH changes rapidly
(B) The point where the solution is neutral
(C) The end point, where the indicator changes colour
(D) The flat region, where added base is absorbed with little pH change

Q2. A molecule has a carbonyl group (C=O) at the end of its carbon chain. What functional group is this, and what type of molecule contains it?

(A) A hydroxyl group, found in alcohols
(B) An aldehyde group, found in sugars such as glucose
(C) A carboxyl group, found in fatty acids only
(D) An amino group, found in proteins only

Q3. Starch, glycogen and cellulose are all polymers of glucose. Which statement correctly compares them?

(A) Starch and glycogen are storage polysaccharides with alpha linkages, while cellulose is structural with beta linkages
(B) All three are made of fructose monomers
(C) Cellulose is a storage molecule in animals
(D) Glycogen is a structural molecule in plant walls

Q4. A protein’s quaternary structure is disrupted by a chemical that breaks the bonds between its subunits, but each subunit keeps its own shape. Which level of structure is lost?

(A) Primary structure only
(B) Secondary structure only
(C) Quaternary structure only
(D) All levels of structure at once

Q5. A DNA strand has the base sequence 5′-A-T-G-C-C-A-3′. What is the sequence of its complementary strand?

(A) 5′-A-T-G-C-C-A-3′
(B) 3′-U-A-C-G-G-U-5′
(C) 3′-T-A-C-G-G-T-5′
(D) 5′-T-A-C-G-G-T-3′

Q6. A phospholipid bilayer is exposed to a detergent. The membrane breaks apart into small droplets. Why does the detergent destroy the membrane?

(A) It disrupts the hydrophobic interactions holding the bilayer together
(B) It dissolves the DNA in the nucleus
(C) It denatures all the proteins in the cell
(D) It breaks the covalent bonds in the phospholipid heads

Q7. Amino acids with nonpolar side chains are usually found in the interior of a folded protein in water. Why?

(A) Nonpolar side chains form hydrogen bonds with water
(B) Hydrophobic side chains cluster away from water, stabilising the folded protein
(C) Nonpolar side chains are attracted to the polar heads of phospholipids
(D) Nonpolar side chains dissolve in the cytoplasm

Cell Structure and Function

Q8. A cell is stained and viewed under a light microscope. A large, dark structure is visible inside the nucleus. What is it?

(A) A mitochondrion
(B) A lysosome
(C) A ribosome
(D) The nucleolus, where ribosomal RNA is made

Q9. A paramecium lives in fresh water and constantly takes in water by osmosis. How does it avoid bursting?

(A) It has a rigid cell wall
(B) Its contractile vacuole collects excess water and pumps it out
(C) Its membrane is impermeable to water
(D) It stops feeding when it is full

Q10. A drug blocks the sodium-potassium pump in nerve cells. What is the immediate effect on the cell?

(A) The membrane potential is unaffected
(B) Glucose uptake by facilitated diffusion stops
(C) Water leaves the cell by osmosis
(D) Sodium builds up inside the cell and potassium is lost, disrupting the ion gradients

Q11. A cell membrane is found to contain many unsaturated phospholipids and little cholesterol. At room temperature, what is the membrane most likely to be?

(A) Rigid and impermeable
(B) Solid and crystalline
(C) Fluid, because kinks in the tails prevent tight packing
(D) Dissolved in the cytoplasm

Q12. A vesicle inside a cell fuses with the plasma membrane and releases digestive enzymes outside the cell. What is this process, and which cells use it?

(A) Exocytosis, used by secretory cells such as those in the pancreas
(B) Phagocytosis, used by bacteria only
(C) Osmosis, used by plant cells
(D) Endocytosis, used by all cells to take in food

Q13. A tissue sample is treated with an enzyme that digests the extracellular matrix. The cells separate easily. What does this show about the matrix?

(A) It is made only of water
(B) It holds cells together and provides structural support
(C) It prevents all cell communication
(D) It is inside the nucleus

Q14. A red blood cell has no nucleus and no mitochondria. How does it produce the ATP it needs?

(A) By photosynthesis
(B) By oxidative phosphorylation
(C) By the Krebs cycle
(D) By glycolysis alone in the cytoplasm

Q15. A cell is placed in a solution with a lower solute concentration than its cytoplasm. What is the solution called, and what happens to the cell?

(A) Hypotonic; water enters the cell and it swells
(B) Isotonic; nothing changes
(C) Hypertonic; the cell shrinks
(D) Hypertonic; the cell swells

Cellular Energetics

Q16. A scientist measures the rate of an enzyme reaction at 20, 30, 40 and 50 degrees C. The rate rises up to 40 degrees C, then falls sharply at 50 degrees C. What explains the fall?

(A) The substrate is used up at 50 degrees C
(B) The enzyme is activated by heat at 50 degrees C
(C) The enzyme denatures at 50 degrees C, losing its active site shape
(D) The reaction becomes endergonic at 50 degrees C

Q17. A competitive inhibitor and a noncompetitive inhibitor are compared. Which statement correctly distinguishes them?

(A) Both bind to the active site
(B) Both can be overcome by adding more substrate
(C) The competitive inhibitor binds the active site, while the noncompetitive inhibitor binds elsewhere
(D) The noncompetitive inhibitor raises Vmax

Q18. A plant is grown in a sealed chamber with radioactive carbon dioxide ($^{14}CO_2$). After a few seconds in the light, radioactivity is found in a three-carbon compound. What is this compound?

(A) 3-phosphoglycerate (3-PGA), the first product of carbon fixation
(B) Glucose
(C) RuBP
(D) Pyruvate

Q19. A mitochondrion produces ATP by oxidative phosphorylation. How many ATP molecules are produced per NADH molecule oxidised, approximately?

(A) 1
(B) 1.5
(C) 6
(D) 2.5

Q20. A cell is supplied with glucose labelled with radioactive carbon. The radioactivity first appears in pyruvate, then in acetyl-CoA, then in carbon dioxide. Which sequence of stages does this trace?

(A) Calvin cycle, glycolysis, fermentation
(B) Glycolysis, link reaction, Krebs cycle
(C) Photosynthesis, glycolysis, Krebs cycle
(D) Fermentation, glycolysis, electron transport

Q21. A researcher blocks photosystem I but leaves photosystem II working. Which products can the chloroplast still make?

(A) Both ATP and NADPH
(B) Neither ATP nor NADPH
(C) NADPH only
(D) ATP only, through cyclic and non-cyclic flow up to photosystem I

Q22. A CAM plant and a C4 plant are both adapted to hot, dry conditions. How do their adaptations differ?

(A) C4 plants open stomata at night, CAM plants do not
(B) CAM plants separate carbon fixation and the Calvin cycle in time, while C4 plants separate them in space
(C) CAM plants do not use Rubisco at all
(D) C4 plants photosynthesise only at night

Q23. A beaker contains an enzyme and its substrate. A second beaker contains the same mixture plus a cofactor. The second reaction is faster. What is the cofactor most likely to be?

(A) A competitive inhibitor
(B) A denaturing agent
(C) A non-protein helper, such as a metal ion or vitamin-derived molecule, that the enzyme needs to work
(D) A second substrate that the enzyme cannot use

Cell Communication and Cell Cycle

Q24. A target cell has receptors for a signalling molecule, but a neighbouring cell does not. What determines whether a cell responds to a signal?

(A) Whether the cell has the specific receptor for that signal
(B) Whether the cell is in mitosis
(C) The size of the cell
(D) The number of mitochondria in the cell

Q25. A signal molecule binds a receptor and activates a G protein. The G protein then opens an ion channel. Which step in cell signalling is the opening of the channel?

(A) Transduction, converting the signal into a cellular response
(B) Reception only
(C) Termination of the signal
(D) Transcription of a new gene

Q26. A cell's DNA is damaged by ultraviolet light. The cell arrests in G1, repairs the damage, and then proceeds. Which protein is most important in this arrest?

(A) Cyclin B
(B) Separase
(C) p53
(D) Tubulin

Q27. A cell in prophase of mitosis is observed. Which of the following is visible?

(A) Two new nuclei forming
(B) Chromosomes condensing and the spindle beginning to form
(C) Sister chromatids separating
(D) A cell plate across the middle

Q28. A population of cells is grown in a culture dish. They divide until they form a single layer covering the dish, then stop. What has happened?

(A) They have run out of DNA
(B) They have become cancerous
(C) They have undergone apoptosis
(D) Density-dependent inhibition has stopped further division

Q29. A researcher adds a growth factor to a culture of fibroblasts, and the cells begin to divide. What did the growth factor most likely do?

(A) It directly copied the cells' DNA
(B) It destroyed the cells' checkpoints
(C) It entered the nucleus and became a chromosome
(D) It bound a cell-surface receptor and triggered a signalling pathway that promoted division

Q30. A cell is in anaphase of mitosis. What is happening to its chromosomes?

(A) Sister chromatids are being pulled apart to opposite poles
(B) Chromosomes are aligning at the equator
(C) Chromosomes are decondensing into chromatin
(D) DNA is being replicated

Q31. A student counts onion root tip cells: 80 percent are in interphase, 10 percent in prophase, 5 percent in metaphase, 3 percent in anaphase and 2 percent in telophase. What can be concluded?

(A) Telophase is the longest phase of mitosis
(B) Interphase lasts longest, and telophase is the shortest mitotic phase observed
(C) All phases last the same time
(D) The cells are not dividing at all

Heredity

Q32. A couple have four children, all of whom are girls. What is the probability that their fifth child will be a boy?

(A) 1/32
(B) 1/16
(C) 1/2
(D) 1/5

Q33. A test cross is performed on a plant showing a dominant phenotype. The offspring show a 1:1 ratio of dominant to recessive phenotypes. What is the plant's genotype?

(A) Homozygous dominant
(B) Heterozygous
(C) Homozygous recessive
(D) Hemizygous

Q34. In a population, 16 percent of individuals have a recessive phenotype. What is the frequency of the recessive allele, assuming Hardy-Weinberg equilibrium?

(A) 0.16
(B) 0.84
(C) 0.4
(D) 0.6

Q35. A gene for flower colour has two alleles, red and white, with red dominant. A red plant is crossed with a white plant and all offspring are pink. Which pattern is this?

(A) Complete dominance
(B) Codominance
(C) Epistasis
(D) Incomplete dominance

Q36. A pedigree shows a trait that skips generations, affects both sexes equally, and appears in children of unaffected parents. Which inheritance pattern fits best?

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

Q37. Two genes are located on the same chromosome, 20 map units apart. A heterozygous parent produces gametes. What percentage of the gametes will be recombinant?

(A) 10 percent
(B) 50 percent
(C) 20 percent
(D) 80 percent

Q38. A cell undergoes meiosis and produces four gametes. Each gamete receives one chromosome from each homologous pair. What is this process called?

(A) Crossing over
(B) Fertilisation
(C) Replication
(D) Segregation of alleles

Q39. A woman is a carrier of Duchenne muscular dystrophy, an X-linked recessive disorder. She has a son. What is the probability that the son will have the disorder?

(A) 50 percent
(B) 25 percent
(C) 100 percent
(D) 0 percent

Gene Expression and Regulation

Q40. A ribosome reads an mRNA codon 5′-UGG-3′. Which amino acid is added to the growing polypeptide?

(A) Methionine, the start amino acid
(B) Tryptophan, because UGG codes only for tryptophan
(C) Glycine, because UGG is a glycine codon
(D) A stop signal, ending translation

Q41. A mutation changes a DNA base, and the new codon still codes for the same amino acid. Which property of the genetic code makes this possible?

(A) The code is degenerate, with several codons for most amino acids
(B) The code is overlapping
(C) The code is read in pairs of bases
(D) The code differs in every species

Q42. A scientist wants to determine the sequence of bases in a newly discovered gene. Which technique should she use?

(A) Gel electrophoresis alone
(B) DNA sequencing
(C) PCR alone
(D) Cell fractionation

Q43. A gene in a eukaryotic cell is switched on by a transcription factor that binds to its promoter. What is the transcription factor’s role?

(A) It cuts the DNA at the promoter
(B) It replicates the gene
(C) It translates the mRNA
(D) It helps recruit RNA polymerase to start transcription

Q44. A bacterial plasmid is used to clone a human gene. After transformation, the bacteria are grown on a plate containing an antibiotic. Only bacteria with the plasmid grow. What does this show?

(A) The antibiotic is a nutrient for bacteria
(B) The human gene kills all bacteria
(C) The plasmid carries an antibiotic resistance gene used as a selectable marker
(D) The plasmid prevents all bacterial growth

Q45. A cell makes a protein only when a specific environmental signal is present. At the level of gene regulation, what is the most likely control point?

(A) The protein is always made and then destroyed
(B) The mRNA is always made but never translated
(C) The DNA is deleted when the signal is absent
(D) Transcription of the gene is switched on only when the signal is present

Q46. A mutation in a gene's promoter region reduces its transcription by half. The coding sequence is unchanged. What is the most likely effect on the cell?

(A) The protein will have a different amino acid sequence
(B) The protein will be twice as long
(C) Less of the normal protein will be produced
(D) The gene will be deleted

Natural Selection

Q47. A population of snails shows shell colour variation. In a forest with dark leaf litter, dark snails survive better; in a nearby pale sandy area, pale snails survive better. What is this an example of?

(A) Natural selection acting differently in different environments
(B) Genetic drift in a large population
(C) Artificial selection by humans
(D) Mutation caused by the environment

Q48. A small population of island birds has lost many alleles through chance events over generations. Which evolutionary mechanism is responsible?

(A) Natural selection
(B) Genetic drift
(C) Gene flow
(D) Mutation

Q49. Two species of frog live in the same pond but breed in different seasons, so they never interbreed. What type of isolation is this?

(A) Habitat isolation
(B) Temporal isolation
(C) Mechanical isolation
(D) Behavioural isolation

Q50. A cladogram shows that a shared derived character, feathers, is present in birds but not in crocodiles or lizards. What does this suggest?

(A) Feathers evolved in the common ancestor of birds after it split from other reptiles
(B) Crocodiles evolved from birds
(C) Feathers are an ancestral character of all reptiles
(D) Lizards and birds are the same species

Q51. The forelimbs of a mole and the forelimbs of a bat have the same basic bone pattern but are used for digging and flying. What are these structures?

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

Q52. A population is in Hardy-Weinberg equilibrium for a gene with two alleles. The frequency of the homozygous dominant genotype is 0.49. What is the frequency of the recessive allele?

(A) 0.49
(B) 0.51
(C) 0.7
(D) 0.3

Q53. A new antibiotic is introduced, and within a decade most bacteria in a hospital are resistant. Which statement best explains this change?

(A) The antibiotic selected for bacteria that already carried resistance alleles
(B) The bacteria learned to resist the drug
(C) The antibiotic created the resistance genes in the bacteria
(D) All bacteria mutated at the same time

Ecology

Q54. A population of wolves is limited by the number of deer available. When deer are scarce, wolf cubs die of starvation. What type of limiting factor is food supply?

(A) A density-independent factor
(B) An abiotic factor
(C) A density-dependent factor
(D) A factor that only affects plants

Q55. A forest is cleared for farming, and the soil is left bare. Heavy rain washes the topsoil away. Which ecological problem has occurred?

(A) Eutrophication
(B) Soil erosion and loss of nutrients, reducing the land’s productivity
(C) Biomagnification
(D) Primary succession

Q56. A keystone predator is removed from a rocky shore. Mussels, its prey, spread and crowd out barnacles, algae and limpets, and species richness falls. What does this show?

(A) Predators always reduce biodiversity
(B) Competition between prey species is unimportant
(C) Mussels are producers
(D) The predator maintained diversity by keeping the dominant competitor in check

Q57. A plant and a fungus form a mycorrhizal association: the fungus supplies minerals to the plant, and the plant supplies sugars to the fungus. What type of interaction is this?

(A) Mutualism, because both partners benefit
(B) Parasitism, because the fungus harms the plant
(C) Competition, because both want the same resources
(D) Commensalism, because only the fungus benefits

Q58. A lichen is a partnership between a fungus and an alga. It colonises bare rock where almost nothing else can grow. What ecological role does it play?

(A) A climax species only
(B) A decomposer of dead animals
(C) A top predator
(D) A pioneer species in primary succession

Q59. A researcher estimates the population of fish in a pond using mark-recapture. She marks 30 fish, releases them, then catches 60 fish and finds 6 marked. What is the estimated population?

(A) 60
(B) 180
(C) 300
(D) 600

Q60. Global temperatures are rising, and a species of butterfly is now found further north than it was 30 years ago. What is the most likely explanation?

(A) The butterflies have evolved to fly faster
(B) The species' range has shifted as its climate envelope moves north
(C) The butterflies have stopped breeding
(D) The species has become extinct in the south because of predators only

Answer Key

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

Worked explanations for all 60 questions: quaidianpoint.com/ap-biology-practice-test-10/