AP Biology Practice Test 19

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 drop of water on a waxy leaf forms a bead rather than spreading out. Which property of water best explains the beading?

(A) High surface tension from hydrogen bonding between water molecules
(B) The nonpolar nature of water molecules
(C) Adhesion of water to the waxy surface
(D) Low specific heat, so the water warms quickly

Q2. Blood pH is maintained between 7.35 and 7.45. If blood pH falls below 7.35, the condition is called acidosis. Which system is most directly responsible for keeping blood pH in range?

(A) The lungs, which produce hydrogen ions to balance the blood
(B) The stomach, which secretes acid into the blood
(C) Buffer systems, including bicarbonate, that absorb excess hydrogen ions
(D) The kidneys, which remove all hydrogen ions permanently within seconds

Q3. Starch, glycogen and cellulose are all glucose polymers. Which statement correctly distinguishes their roles?

(A) Cellulose stores energy in animals, while starch provides structure
(B) Starch and glycogen store energy, while cellulose provides structural support
(C) Glycogen provides structure in plants, while cellulose stores energy
(D) All three are structural polysaccharides with identical linkages

Q4. A saturated fatty acid has no double bonds, while an unsaturated fatty acid has one or more. Which statement about their shapes is correct?

(A) Both are identical in shape because both contain glycerol
(B) Saturated fatty acids contain rings that make them bend
(C) Unsaturated fatty acids are straight and pack tightly; saturated fatty acids bend
(D) Saturated fatty acids are straight and pack tightly; unsaturated fatty acids bend at double bonds

Q5. A protein has four polypeptide chains that work together as a single functional unit. Which level of structure describes the arrangement of these chains?

(A) Secondary structure, the folding into alpha helices and beta sheets
(B) Quaternary structure, the interaction of multiple polypeptide subunits
(C) Tertiary structure, the folding of a single chain
(D) Primary structure, the sequence of amino acids in one chain

Q6. A nucleotide consists of three parts. Which combination is correct?

(A) A phosphate group, a six-carbon sugar, and an amino acid
(B) A glycerol molecule, a fatty acid, and a nitrogenous base
(C) A phosphate group, a five-carbon sugar, and a fatty acid
(D) A phosphate group, a five-carbon sugar, and a nitrogenous base

Q7. A chemical reaction joins amino acids into a polypeptide. What type of reaction is this, and what is released?

(A) Hydrolysis, consuming a water molecule for each bond formed
(B) Dehydration synthesis, releasing carbon dioxide
(C) Dehydration synthesis, releasing a water molecule for each peptide bond formed
(D) Hydrolysis, releasing a water molecule for each bond broken

Cell Structure and Function

Q8. A cell with a large surface-area-to-volume ratio is better at exchanging materials with its environment. Which cell shape would maximise this ratio?

(A) A large spherical cell with a smooth membrane
(B) A cell with no membrane at all
(C) A long, thin cell with many folds in its membrane
(D) A cube with the largest possible volume

Q9. A membrane contains many unsaturated phospholipids. Compared with a membrane rich in saturated phospholipids, how does its fluidity differ at the same temperature?

(A) It is more fluid, because kinks in unsaturated tails prevent tight packing
(B) It has the same fluidity, because tail saturation does not matter
(C) It is less fluid, because unsaturated tails pack more tightly
(D) It is rigid, because unsaturated phospholipids form a solid layer

Q10. A freshwater fish lives in water that is hypotonic to its body fluids. What problem does this create, and how does the fish respond?

(A) Salt enters the body, so the fish excretes concentrated urine
(B) Water leaves the body, so the fish drinks large volumes of water
(C) Water enters by osmosis, so the fish excretes large volumes of dilute urine
(D) No water moves, so the fish needs no osmoregulation

Q11. A student observes that iodine solution diffuses into a dialysis bag containing starch, turning it blue-black, while starch does not leave the bag. What does this show about the bag membrane?

(A) It is selectively permeable to small molecules only
(B) It is impermeable to all molecules
(C) It allows starch to diffuse out but not iodine to diffuse in
(D) It actively transports iodine into the bag using ATP

Q12. A vesicle fuses with the plasma membrane and releases its contents outside the cell. Which process is this, and what is its purpose?

(A) Exocytosis, secreting substances such as hormones or enzymes
(B) Endocytosis, bringing substances into the cell
(C) Osmosis, moving water across the membrane
(D) Facilitated diffusion, moving small molecules down a gradient

Q13. The nucleus is surrounded by a double membrane with pores. What is the main function of these pores?

(A) To synthesise proteins directly
(B) To allow whole chromosomes to leave the nucleus during interphase
(C) To produce ATP for the cell
(D) To allow mRNA and other molecules to pass between the nucleus and the cytoplasm

Q14. A plant cell and an animal cell are both placed in a hypertonic solution. The animal cell shrivels, while the plant cell becomes plasmolysed. What is plasmolysis?

(A) The cell wall dissolves and the cell bursts
(B) The plasma membrane pulls away from the cell wall
(C) The chloroplasts move to the centre of the cell
(D) The vacuole expands and pushes the membrane outward

Cellular Energetics

Q15. ATP is often called the energy currency of the cell. Which feature of ATP makes it suited to this role?

(A) It is made only in the nucleus and transported everywhere
(B) It contains more energy than glucose per molecule
(C) It releases a useful amount of energy on hydrolysis
(D) It stores energy permanently and is never broken down

Q16. An enzyme-catalysed reaction is studied at 20, 30, 40 and 50 degrees Celsius. The rate rises up to 40 degrees, then falls sharply at 50 degrees. What best explains the fall?

(A) The substrate is used up completely at 40 degrees
(B) The enzyme denatures at 50 degrees, losing its active site shape
(C) The reaction becomes exergonic only below 40 degrees
(D) The enzyme becomes a competitive inhibitor at high temperature

Q17. A noncompetitive inhibitor binds to an enzyme. Adding more substrate does not restore the reaction rate. Why not?

(A) The inhibitor binds at an allosteric site and changes the enzyme shape
(B) The inhibitor competes with substrate for the active site
(C) The inhibitor destroys the substrate before it reaches the enzyme
(D) The inhibitor is converted into product by the enzyme

Q18. In the Calvin cycle, three molecules of carbon dioxide are fixed. How many molecules of glyceraldehyde-3-phosphate (G3P) are produced, and how many leave the cycle to make glucose?

(A) Three G3P are produced and all three leave the cycle
(B) One G3P is produced and it leaves the cycle immediately
(C) Six G3P are produced and one leaves the cycle, while five regenerate RuBP
(D) Nine G3P are produced and three leave the cycle

Q19. A researcher blocks photosystem II in a plant. Which product of the light reactions is most directly affected, and what happens to oxygen release?

(A) Electrons from water cannot enter the chain, so oxygen release stops
(B) Carbon dioxide fixation increases in the stroma
(C) ATP production increases because photosystem I works harder
(D) NADPH production increases because water is not needed

Q20. In glycolysis, glucose is broken down to two molecules of pyruvate. What is the net ATP gain, and how many NADH are produced?

(A) A net gain of 4 ATP and 0 NADH
(B) A net gain of 2 ATP and 4 NADH
(C) A net gain of 2 ATP and 2 NADH per glucose molecule
(D) A net gain of 32 ATP and 2 NADH

Q21. A yeast culture is grown without oxygen. It produces ethanol and carbon dioxide. Which process is occurring, and why does it produce less ATP than aerobic respiration?

(A) Aerobic respiration, which is slower without oxygen
(B) Alcoholic fermentation, which uses only glycolysis and does not oxidise glucose fully
(C) Photosynthesis, which requires light to make ATP
(D) The Krebs cycle, which runs without the electron transport chain

Q22. A mitochondrion is treated with a chemical that makes its inner membrane freely permeable to protons. What happens to ATP production?

(A) The Krebs cycle speeds up to replace the lost gradient
(B) Glycolysis stops, because glucose cannot enter the mitochondrion
(C) ATP production stops, because the proton gradient needed by ATP synthase is lost
(D) ATP production increases, because protons flow more freely

Cell Communication and Cell Cycle

Q23. A signal molecule binds to a receptor on a target cell, but neighbouring cells without that receptor do not respond. What does this show?

(A) The signal molecule is toxic to cells without receptors
(B) All cells respond to all signals equally
(C) The receptor is not needed for signalling
(D) Only cells with the specific receptor can respond to the signal

Q24. In the insulin signalling pathway, insulin binds a receptor tyrosine kinase, triggering a cascade that moves glucose transporters to the cell surface. A mutation prevents the receptor from phosphorylating itself. What is the most likely effect?

(A) Glucose uptake falls, because the signal cannot be relayed inside the cell
(B) Glucose uptake rises, because the receptor is always active
(C) The glucose transporters move to the nucleus instead
(D) Insulin is produced in larger amounts to compensate

Q25. A cell divides by mitosis. Before division, each chromosome is duplicated. What is the chromosome number in each daughter cell compared with the parent cell?

(A) Zero, because chromosomes are destroyed during division
(B) Half the parent cell, because homologous chromosomes separate
(C) Double the parent cell, because DNA is duplicated
(D) The same as the parent cell

Q26. During anaphase of mitosis, sister chromatids separate. What holds them together before separation, and what pulls them apart?

(A) The cell wall holds them together; cytoplasmic streaming pulls them apart
(B) The nuclear envelope holds them together; ribosomes pull them apart
(C) Cohesin holds them together; spindle microtubules pull them to opposite poles
(D) Hydrogen bonds hold them together; ATP synthase pulls them apart

Q27. A cell is exposed to a growth factor, but a drug blocks the relay proteins downstream of the receptor. What happens to cell division?

(A) The growth factor enters the nucleus directly
(B) Division is not stimulated, because the signal cannot reach the nucleus
(C) Division increases, because the receptor becomes overactive
(D) The cell undergoes apoptosis immediately

Q28. In the cell cycle, cyclins bind to cyclin-dependent kinases (Cdks) to drive the cycle forward. What happens to cyclin levels after they have done their job?

(A) Cyclins are converted into DNA for the next cycle
(B) Cyclins accumulate permanently in the cell
(C) Cyclins are degraded, so the cycle can only move forward in one direction
(D) Cyclins are exported from the cell to signal neighbours

Q29. A researcher observes that a cell with unattached chromosomes does not enter anaphase. Which checkpoint is active, and what is it checking?

(A) The G1 checkpoint, checking cell size
(B) The spindle assembly checkpoint
(C) The G2 checkpoint, checking DNA replication
(D) The cytokinesis checkpoint, checking cytoplasmic division

Q30. A plant cell divides by mitosis. How does cytokinesis differ from cytokinesis in an animal cell?

(A) A cell plate forms across the middle of the plant cell, while an animal cell pinches in two
(B) A plant cell pinches in two, while an animal cell forms a cell plate
(C) Animal cells form a cell wall during cytokinesis
(D) Plant cells do not undergo cytokinesis at all

Heredity

Q31. In meiosis, crossing over occurs between homologous chromosomes. When does it occur, and what is exchanged?

(A) During metaphase I, when homologous chromosomes exchange whole arms
(B) During prophase II, when sister chromatids exchange centromeres
(C) During anaphase II, when sister chromatids exchange segments
(D) During prophase I, when non-sister chromatids exchange segments

Q32. A couple are both heterozygous for cystic fibrosis (Cc), an autosomal recessive disorder. What is the probability that their next child will have cystic fibrosis?

(A) 1 in 4, because the child must inherit c from both parents
(B) 3 in 4, because the disorder is recessive
(C) 0, because carriers never have affected children
(D) 1 in 2, because each parent is a carrier

Q33. A dihybrid cross between two heterozygous parents (AaBb x AaBb) produces 1600 offspring. How many are expected to show both recessive phenotypes (aabb)?

(A) 400, which is 1/4 of 1600
(B) 300, which is 3/16 of 1600
(C) 900, which is 9/16 of 1600
(D) 100, which is 1/16 of 1600

Q34. A scientist performs a test cross on a plant showing the dominant phenotype for two genes. The offspring show a 1:1:1:1 ratio. What can be concluded about the parent plant?

(A) It is homozygous recessive for both genes
(B) The two genes are tightly linked
(C) It is homozygous dominant for both genes
(D) It is heterozygous for both genes

Q35. A pedigree shows a trait that affects mainly males, is passed from a carrier mother to her sons, and never passes from father to son. Which inheritance pattern is this?

(A) Y-linked, because it passes from father to son
(B) Mitochondrial, because it passes only through mothers
(C) X-linked recessive, because males receive their X chromosome from their mother
(D) Autosomal dominant, because it affects males more often

Q36. In humans, ABO blood groups show codominance between IA and IB. A person with blood type AB has which genotype, and which antigens are present?

(A) Genotype ii, with neither antigen
(B) Genotype IBIB, with only B antigens
(C) Genotype IAIA, with only A antigens
(D) Genotype IAIB, with both A and B antigens on red blood cells

Q37. A gene has two alleles, and heterozygotes show a phenotype intermediate between the two homozygotes. A cross between two heterozygotes is expected to give which phenotypic ratio?

(A) 3:1, with the dominant phenotype most common
(B) 1:1, with equal numbers of each phenotype
(C) All offspring show the intermediate phenotype
(D) 1:2:1, with the intermediate phenotype most common

Q38. A chi-square test on a genetic cross gives a value of 6.5 with 1 degree of freedom. The critical value at p = 0.05 is 3.84. What should the scientist conclude?

(A) The observed results differ significantly from the expected ratio, so the hypothesis is rejected
(B) The expected ratio must be changed to match the observed data
(C) The hypothesis is supported, because the value is greater than the critical value
(D) The test is invalid, because the value exceeds the critical value

Gene Expression and Regulation

Q39. DNA polymerase can only add nucleotides to an existing 3′ end. How does replication begin on a new strand?

(A) Primase synthesises a short RNA primer that provides a 3′ end
(B) The leading strand provides a primer for the lagging strand
(C) Helicase adds nucleotides directly to the template
(D) DNA ligase creates a free 3′ end by cutting the template

Q40. A mRNA molecule has the sequence 5′-AUG-GCU-UAA-3′. How many amino acids will the translated protein contain?

(A) 0, because the sequence contains a stop codon
(B) 2
(C) 3, because each codon codes for one amino acid
(D) 1, because only AUG is translated

Q41. A mutation changes a codon from GAA (glutamate) to GUA (valine). Which type of mutation is this, and what is its likely effect?

(A) A silent mutation, leaving the amino acid unchanged
(B) A missense mutation, replacing one amino acid with another in the protein
(C) A frameshift mutation, altering all following amino acids
(D) A nonsense mutation, causing translation to stop early

Q42. In a eukaryotic cell, a transcription factor binds to an enhancer region far from a gene promoter. How does this binding increase transcription?

(A) The enhancer replaces the promoter entirely
(B) The transcription factor blocks the promoter and prevents repression
(C) The enhancer is copied into the mRNA to increase its length
(D) The DNA loops so the transcription factor contacts the promoter and recruits RNA polymerase

Q43. A bacterial operon is controlled by a repressor that is active only when bound to its corepressor. When the corepressor is absent, what happens to the operon?

(A) Transcription stops, because the promoter is blocked by the corepressor
(B) Transcription occurs, because the corepressor is an inducer
(C) Transcription occurs, because the repressor cannot bind the operator without the corepressor
(D) Transcription stops, because the repressor binds the operator alone

Q44. A stem cell differentiates into a muscle cell. Its DNA sequence does not change. What best explains the change in the proteins it produces?

(A) Mutations accumulate in the genes for muscle proteins
(B) The cell gains new genes from neighbouring cells
(C) The cell loses the chromosomes carrying unneeded genes
(D) Different genes are switched on and off as the cell specialises

Q45. A scientist uses CRISPR-Cas9 to edit a gene in a cell. Which component guides Cas9 to the correct DNA sequence?

(A) A plasmid that carries the edited gene
(B) A guide RNA that is complementary to the target sequence
(C) A restriction enzyme that cuts the target gene
(D) A DNA primer that anneals to the target

Q46. A plasmid carrying an antibiotic resistance gene is transferred between two bacteria by direct cell-to-cell contact. Which process is this?

(A) Transformation, in which bacteria take up free DNA from the environment
(B) Binary fission, in which a bacterium divides into two
(C) Transduction, in which a virus carries DNA between bacteria
(D) Conjugation, in which a pilus transfers DNA between bacteria

Natural Selection

Q47. A population of insects is exposed to a pesticide. Initially, 1 percent survive; after ten generations, 80 percent survive. Which statement best explains this change?

(A) The pesticide caused every insect to develop resistance during its lifetime
(B) The insects learned to avoid the pesticide by changing behaviour
(C) The pesticide mutated the insects so they all became resistant at once
(D) The pesticide selected for resistant individuals, whose proportion increased over generations

Q48. In a population at Hardy-Weinberg equilibrium, the frequency of heterozygotes is 0.48 and the frequency of the recessive allele is 0.4. What is the frequency of the dominant allele?

(A) 0.4, equal to the recessive allele frequency
(B) 0.6, because $p = 1 - q = 1 - 0.4$
(C) 0.16, which is the frequency of recessive homozygotes
(D) 0.48, equal to the heterozygote frequency

Q49. A small population of cheetahs has very low genetic variation. Which evolutionary consequence is most likely?

(A) The population is protected from extinction by its uniformity
(B) The population is more vulnerable to disease and environmental change
(C) The population will evolve more rapidly by natural selection
(D) Genetic drift will have no effect on the population

Q50. A phylogenetic tree is built using DNA sequences from several species. Species X and Y share 98 percent of their DNA in the gene studied, while X and Z share 85 percent. What can be concluded?

(A) X and Y share a more recent common ancestor than X and Z
(B) DNA similarity does not indicate relatedness
(C) Y evolved directly from Z
(D) X and Z are the same species

Q51. The fossil record shows simple single-celled organisms appearing long before multicellular animals. What does this sequence support?

(A) That all life forms appeared at the same time
(B) That multicellular animals appeared first and then simplified
(C) That complex life evolved gradually from simpler forms over billions of years
(D) That fossils cannot reveal the order in which life appeared

Q52. In a population of fish, females prefer males with bright colours. Over generations, males become brighter, even though bright males are more visible to predators. Which process is acting?

(A) Artificial selection by predators
(B) Natural selection for camouflage
(C) Sexual selection
(D) Genetic drift in a small population

Q53. Two species of warblers live in the same forest but feed at different heights. Over time, their beak shapes diverge further. Which process best explains this divergence?

(A) Hybridisation, producing offspring with intermediate beaks
(B) Convergent evolution, making the species more similar
(C) Character displacement, reducing competition between the species
(D) Gene flow, mixing the two populations

Ecology

Q54. In an ecosystem, decomposers break down dead organic matter. What is their main role in nutrient cycling?

(A) They remove nutrients from the ecosystem permanently
(B) They return nutrients to the soil for producers
(C) They consume living producers and reduce their numbers
(D) They convert light energy into chemical energy

Q55. A population of 200 rabbits has a per capita birth rate of 0.4 and a per capita death rate of 0.1 per year. What is the expected population size after one year, ignoring migration?

(A) 140, because deaths exceed births
(B) 260, because the net growth rate is 0.3 per individual per year
(C) 230, because only births add to the population
(D) 200, because births and deaths balance exactly

Q56. A species of lizard is active at night in a desert, while a related species is active during the day. Which ecological concept best describes this difference?

(A) Predation, because one lizard eats the other
(B) Mutualism, because the species help each other
(C) Competitive exclusion, eliminating one species
(D) Temporal niche partitioning, reducing competition and heat stress

Q57. A lake has a high concentration of nitrates from fertiliser run-off. Algae grow rapidly, blocking light to plants below. Which term describes the overall process?

(A) Eutrophication, leading to oxygen depletion when the algae die and decompose
(B) Acidification, lowering the pH of the lake water
(C) Succession, creating a climax community in the lake
(D) Biomagnification, concentrating toxins in top predators

Q58. A nature reserve protects a large area of rainforest. A neighbouring reserve protects a small, isolated fragment. Which reserve is expected to support more species, and why?

(A) The large reserve, because larger areas support larger populations and more habitats
(B) Both support the same number, because area does not affect diversity
(C) The small fragment, because edge effects increase diversity
(D) The small fragment, because isolation increases speciation

Q59. A predator is introduced to an island where it has no natural enemies. It preys heavily on native ground-nesting birds. What is the most likely outcome for the birds?

(A) Their population is unaffected, because predators never affect prey
(B) Their population declines sharply and some species may go extinct
(C) The birds evolve to fly within a single generation
(D) Their population increases, because the predator controls competitors

Q60. A community contains many species that perform similar roles, such as several species of pollinating insects. If one pollinator species is lost, the plants are still pollinated. What does this illustrate?

(A) Functional redundancy, which increases ecosystem resilience
(B) Trophic cascade, where loss of one species collapses the food web
(C) Competitive exclusion, where one species eliminates the others
(D) The keystone species effect, where one species controls the community

Answer Key

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

Q8: C	Q18: C	Q28: C	Q38: A	Q48: B	Q58: A
Q9: A	Q19: A	Q29: B	Q39: A	Q49: B	Q59: B
Q10: C	Q20: C	Q30: A	Q40: B	Q50: A	Q60: A

Worked explanations for all 60 questions: quaidianpoint.com/ap-biology-practice-test-19/