AP Biology Practice Test 12

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. Ice floats on water, water has high specific heat, and water molecules cohere strongly. Which of these properties most directly allows a large lake to resist rapid temperature change?

(A) Low density of ice, because it insulates the surface
(B) Cohesion, because it pulls water molecules apart
(C) Adhesion, because water sticks to the lake bed
(D) High specific heat, because much energy is needed to change the temperature

Q2. A buffer solution resists pH change when acid is added. What does the buffer contain that makes this possible?

(A) A strong acid and a strong base in equal amounts
(B) Only water molecules with no dissolved ions
(C) A weak acid and its conjugate base, which can absorb added H^+ or OH^-
(D) An enzyme that destroys hydrogen ions

Q3. Which molecule is a monomer of a nucleic acid?

(A) An amino acid joined by a peptide bond
(B) A glycerol molecule with three fatty acids
(C) A nucleotide, composed of a sugar, a phosphate and a nitrogenous base
(D) A glucose molecule with a hydroxyl group

Q4. Sucrose is formed from glucose and fructose. What type of reaction joins them, and what is released?

(A) Hydrolysis, releasing a water molecule
(B) Dehydration synthesis, releasing carbon dioxide
(C) Dehydration synthesis, releasing a water molecule
(D) Hydrolysis, releasing oxygen

Q5. Which lipid is the main component of cell membranes and has both a hydrophilic head and hydrophobic tails?

(A) A triglyceride used only for energy storage
(B) A wax that waterproofs leaves
(C) A steroid that stores genetic information
(D) A phospholipid

Q6. A protein’s function depends on its shape. Which interaction is most important in stabilising the tertiary structure of a protein in water?

(A) Peptide bonds between amino acids in the backbone
(B) Hydrogen bonds between complementary base pairs
(C) Hydrophobic interactions that bury nonpolar side chains in the interior
(D) Ionic bonds between phosphate groups

Q7. DNA and RNA differ in several ways. Which statement correctly distinguishes them?

(A) DNA is single-stranded and RNA is double-stranded
(B) DNA contains ribose and RNA contains deoxyribose
(C) DNA uses uracil and RNA uses thymine
(D) DNA contains deoxyribose and thymine; RNA contains ribose and uracil

Cell Structure and Function

Q8. Which organelle modifies, sorts and packages proteins for secretion?

(A) The Golgi apparatus
(B) The smooth endoplasmic reticulum
(C) The mitochondrion
(D) The lysosome

Q9. A cell with a large surface area relative to its volume is best suited to which function?

(A) Long-term storage of glycogen
(B) Protection from mechanical damage
(C) Rapid exchange of materials with its environment
(D) Production of large amounts of DNA

Q10. Red blood cells placed in distilled water swell and burst, while plant cells in distilled water become turgid but do not burst. What explains the difference?

(A) Plant cells lack a plasma membrane
(B) The plant cell wall resists the turgor pressure
(C) Red blood cells actively pump water out
(D) Plant cells have no vacuole to fill

Q11. Which process requires ATP and moves ions against their concentration gradient?

(A) Facilitated diffusion through a channel protein
(B) Simple diffusion across the bilayer
(C) Active transport by a pump protein
(D) Osmosis through an aquaporin

Q12. A researcher labels a membrane protein and finds it moves laterally within the membrane. This supports which model?

(A) The lock-and-key model of enzymes
(B) The cell theory of Schleiden and Schwann
(C) The fluid mosaic model
(D) The endosymbiotic theory

Q13. Which structure is found in both prokaryotic and eukaryotic cells?

(A) A membrane-bound nucleus
(B) Mitochondria
(C) A Golgi apparatus
(D) Ribosomes

Q14. Cholesterol in an animal cell membrane primarily functions to

(A) transport glucose across the membrane
(B) store energy for the cell
(C) catalyse the synthesis of phospholipids
(D) modulate membrane fluidity, stiffening it at high temperatures and preventing solidification at low temperatures

Cellular Energetics

Q15. ATP hydrolysis releases energy that cells use for work. What happens to the ATP molecule itself?

(A) It gains a phosphate group, forming AMP
(B) It is broken down into glucose and oxygen
(C) It is converted directly into DNA
(D) It loses a phosphate group, forming ADP and inorganic phosphate

Q16. An enzyme works best at pH 7 but loses activity at pH 2. What is the most likely explanation?

(A) The acidic conditions alter the enzyme's shape, including its active site
(B) The substrate is destroyed by the enzyme at low pH
(C) The enzyme gains extra active sites at pH 2
(D) The reaction becomes exergonic only at pH 7

Q17. In an experiment, adding a competitive inhibitor to an enzyme reaction increases the apparent K_m but does not change V_{max}. Why can V_{max} still be reached?

(A) High substrate concentration can outcompete the inhibitor for the active site
(B) The inhibitor is destroyed by the substrate
(C) The enzyme makes more active sites in response
(D) Competitive inhibitors bind only to the product

Q18. During the Calvin cycle, how many turns are needed to produce one molecule of glucose ($C_6H_{12}O_6$)?

(A) One turn, fixing one CO_2
(B) Three turns, fixing three CO_2
(C) Twelve turns, fixing twelve CO_2
(D) Six turns, fixing six CO_2 molecules

Q19. A leaf is exposed to light of only green wavelengths. What is the expected rate of photosynthesis compared with white light?

(A) Lower, because chlorophyll absorbs green light poorly
(B) Higher, because green light carries the most energy
(C) The same, because all wavelengths are absorbed equally
(D) Zero, because green light destroys chlorophyll

Q20. In glycolysis, glucose is broken down to pyruvate. What is the net ATP yield per glucose?

(A) 2 ATP
(B) 4 ATP
(C) 0 ATP
(D) 36 ATP

Q21. Acetyl-CoA enters the Krebs cycle. For each glucose molecule, how many CO_2 molecules are released by the Krebs cycle in total?

(A) 4 CO_2
(B) 2 CO_2
(C) 6 CO_2
(D) 1 CO_2

Cell Communication and Cell Cycle

Q22. A steroid hormone such as testosterone can enter a target cell and bind an intracellular receptor. Why can it cross the membrane?

(A) It is carried by aquaporins
(B) It is small enough to pass through ion channels
(C) It is lipid-soluble and diffuses through the phospholipid bilayer
(D) It binds a surface receptor that pulls it inside

Q23. A mutation makes a G protein unable to hydrolyse GTP to GDP. What is the expected effect on the signalling pathway?

(A) The pathway never activates
(B) The receptor is destroyed
(C) Second messengers are never produced at all
(D) The pathway stays switched on, because the G protein remains active

Q24. In quorum sensing, bacteria release autoinducer molecules. When the concentration reaches a threshold, gene expression changes. What is the main purpose of this system?

(A) To attract predators to the colony
(B) To coordinate behaviour based on population density
(C) To prevent any cell division
(D) To block all signal transduction

Q25. Apoptosis differs from necrosis in that apoptosis is

(A) an uncontrolled bursting of the cell
(B) a controlled, programmed process that does not damage neighbouring cells
(C) caused only by external injury
(D) a process that releases cell contents into tissue

Q26. During the cell cycle, DNA is replicated in which phase?

(A) S phase
(B) G_1 phase
(C) M phase
(D) G_0 phase

Q27. A cancer cell is found to divide even when growth factors are absent. Which defect best explains this?

(A) A mutation that increases apoptosis
(B) A mutation in a proto-oncogene creates a permanently active growth signal
(C) A loss of ribosomes in the cytoplasm
(D) An increase in the number of mitochondria

Q28. Which checkpoint ensures that DNA has been replicated correctly and checks for damage before mitosis?

(A) The G_1 checkpoint
(B) The spindle checkpoint
(C) The G_2 checkpoint
(D) The cytokinesis checkpoint

Q29. A cell is exposed to a signal that raises intracellular calcium. Calcium ions in this context act as

(A) the primary signal that binds the receptor
(B) enzymes that degrade the signal
(C) second messengers that activate target proteins
(D) structural components of the membrane

Heredity

Q30. A woman who is a carrier for an X-linked recessive disorder has children with an unaffected man. What is the probability that a son will be affected?

(A) 1/4
(B) 0
(C) 1
(D) 1/2

Q31. In a cross between two heterozygotes for a recessive trait, a chi-square test is used. What is the null hypothesis?

(A) The trait is sex-linked
(B) The observed offspring ratio does not differ significantly from the expected 3:1 ratio
(C) The genes are linked
(D) The parents are homozygous

Q32. A fruit fly with red eyes and normal wings is crossed with a white-eyed, vestigial-winged fly. The offspring show mostly parental phenotypes. What does this suggest?

(A) The genes assort independently
(B) The traits are controlled by the same allele
(C) The cross involves codominance
(D) The genes for eye colour and wing shape are linked

Q33. Which event in meiosis produces genetically different gametes even without crossing over?

(A) DNA replication in S phase
(B) Cytokinesis after meiosis II
(C) Formation of the spindle
(D) Independent assortment of homologous chromosomes

Q34. A couple has three children, all with blood type O. Both parents have blood type A. What are the parents' genotypes?

(A) Both are homozygous I^AI^A
(B) Both are heterozygous (I^Ai)
(C) One is I^AI^A and one is ii
(D) Both are ii

Q35. A plant with genotype AaBb self-fertilises. What proportion of offspring are expected to be aabb?

(A) 1/4
(B) 1/8
(C) 9/16
(D) 1/16

Q36. Down syndrome is most commonly caused by

(A) a deletion on chromosome 5
(B) trisomy 21 due to nondisjunction
(C) a dominant mutation on chromosome 21
(D) an extra copy of the X chromosome

Q37. In a test cross, an individual of unknown genotype is crossed with a homozygous recessive individual. What is the purpose?

(A) To determine whether the unknown individual is homozygous or heterozygous
(B) To produce only homozygous offspring
(C) To test for linkage between two genes
(D) To create a new species

Gene Expression and Regulation

Q38. Which enzyme unwinds DNA and separates the strands during replication?

(A) DNA ligase
(B) RNA polymerase
(C) Helicase
(D) DNA polymerase

Q39. In transcription, RNA polymerase binds to which DNA region to begin synthesis?

(A) The promoter
(B) The terminator only
(C) The origin of replication
(D) The anticodon

Q40. A tRNA molecule has the anticodon 3′-UAC-5′. Which mRNA codon does it pair with, and which amino acid does it carry?

(A) 5′-UAC-3′, tyrosine
(B) 5′-AUG-3′, methionine
(C) 5′-TAC-3′, methionine
(D) 3′-AUG-5′, leucine

Q41. A gene is transcribed but its mRNA is rapidly degraded before translation. How is gene expression affected?

(A) The protein is produced in larger amounts
(B) The DNA sequence is permanently changed
(C) Transcription is increased to compensate
(D) No protein is produced, despite transcription occurring

Q42. In eukaryotic cells, transcription factors bind to enhancers. What is the effect?

(A) They increase the rate of transcription of a gene, even from a distance
(B) They block DNA replication
(C) They splice introns from the mRNA
(D) They translate mRNA into protein

Q43. A frameshift mutation is caused by

(A) substitution of one nucleotide for another
(B) insertion or deletion of nucleotides not in multiples of three
(C) duplication of an entire chromosome
(D) methylation of a promoter

Q44. Gel electrophoresis separates DNA fragments mainly by

(A) base composition, with AT-rich fragments moving fastest
(B) size, with smaller fragments moving farther toward the positive electrode
(C) charge, with larger fragments carrying more charge
(D) shape, with circular fragments moving slowest

Q45. A bacterial plasmid is cut with a restriction enzyme and a human gene is inserted. This is an example of

(A) natural selection
(B) PCR amplification only
(C) gel electrophoresis
(D) recombinant DNA technology

Natural Selection

Q46. Stabilising selection is most likely when

(A) one extreme phenotype is favoured
(B) both extremes are favoured over intermediates
(C) allele frequencies change by chance alone
(D) intermediate phenotypes have the highest fitness and extremes are selected against

Q47. In a large population, the frequency of allele A is 0.6. Assuming Hardy-Weinberg equilibrium, what is the frequency of genotype AA?

(A) 0.36
(B) 0.60
(C) 0.48
(D) 0.24

Q48. A new allele arises by mutation in a single individual. In a very large population, what is its most likely fate?

(A) It will immediately spread to the whole population
(B) It will be removed by stabilising selection
(C) It is likely to be lost by chance or remain rare unless it confers an advantage
(D) It will double in frequency every generation

Q49. Two species share a similar wing structure that evolved independently for flight. This is an example of

(A) homologous structures from a common ancestor
(B) vestigial structures with no function
(C) convergent evolution producing analogous structures
(D) divergent evolution from one ancestor

Q50. A cladogram places birds and crocodiles in the same clade, separate from lizards. What does this imply?

(A) Birds evolved directly from lizards
(B) Birds and crocodiles share a more recent common ancestor than either shares with lizards
(C) Crocodiles are more closely related to lizards
(D) Birds and lizards are the same species

Q51. Which evidence provides the strongest support for common ancestry of all living organisms?

(A) The fact that all organisms live on Earth
(B) Similarities in habitat preferences
(C) The near-universality of the genetic code
(D) Differences in body size

Q52. A population of lizards colonises a new island with few predators. Over time, body size increases. What is the most likely explanation?

(A) Genetic drift with no change in fitness
(B) Directional selection favouring larger size in the new environment
(C) Stabilising selection maintaining the original size
(D) Gene flow from the mainland

Q53. The fossil record shows a sudden appearance of many new animal body plans in the Cambrian period. What does this suggest?

(A) All animal phyla appeared simultaneously with no ancestors
(B) A rapid diversification of animal life occurred at that time
(C) Evolution stopped after the Cambrian
(D) Fossils from earlier periods were destroyed by humans

Ecology

Q54. A caterpillar eats leaves and is eaten by a bird. In a food chain, the caterpillar is a

(A) primary consumer
(B) producer
(C) secondary consumer
(D) decomposer

Q55. Why is the total biomass at each trophic level usually less than at the level below it?

(A) Producers make less energy than consumers
(B) Decomposers add biomass at higher levels
(C) Energy is lost as heat and in waste at each transfer
(D) Photosynthesis is more efficient in animals

Q56. A population of deer grows rapidly after wolves are removed, then crashes when food runs out. This pattern is best explained by

(A) overshoot of carrying capacity followed by a crash
(B) logistic growth with a stable equilibrium
(C) density-independent regulation by weather only
(D) exponential growth with unlimited resources

Q57. Which factor is density-dependent?

(A) A severe frost killing individuals regardless of density
(B) Competition for food within a population
(C) A flood destroying nests at random
(D) A volcanic eruption

Q58. A forest is cleared and abandoned. Grasses appear first, then shrubs, then trees. This is an example of

(A) secondary succession
(B) primary succession on bare rock
(C) climax community formation with no change
(D) competitive exclusion

Q59. Which ecosystem service is provided by wetlands?

(A) Water filtration and flood control
(B) Production of fossil fuels
(C) Increased soil erosion
(D) Removal of all nitrogen from soil

Q60. A species is introduced to a new area, spreads rapidly and reduces native biodiversity. This species is best described as

(A) endemic
(B) invasive
(C) keystone
(D) mutualistic

Answer Key

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

Worked explanations for all 60 questions: quaidianpoint.com/ap-biology-practice-test-12/