A-Level Biology Practice Test 13

60 original multiple-choice questions covering all 19 Cambridge A-Level Biology 9700 topics. 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

Cell structure

Q1. Which statement about the cell surface membrane is supported by the fluid mosaic model?

(A) Proteins are fixed in place and cannot move sideways in the bilayer
(B) The membrane is a solid layer of protein with no lipids
(C) Phospholipids and some proteins can move laterally within the membrane
(D) Cholesterol makes the membrane completely rigid at all temperatures

Q2. Which organelle contains hydrolytic enzymes and breaks down ingested material and worn-out organelles?

(A) The Golgi apparatus
(B) The ribosome
(C) The lysosome
(D) The chloroplast

Q3. In a plant cell, which structure is responsible for maintaining turgor pressure?

(A) The nucleus, which controls water uptake genes
(B) The chloroplast, which produces water in photosynthesis
(C) The large permanent vacuole, which pushes the cytoplasm against the cell wall when full of water
(D) The mitochondrion, which pumps water into the cell

Q4. Why can a light microscope not show the detailed structure of a mitochondrion?

(A) Mitochondria are too large to fit in the field of view
(B) Mitochondria are transparent and cannot be stained
(C) The resolution of a light microscope is limited by the wavelength of light, so structures smaller than about 200 nanometres cannot be resolved
(D) Light microscopes cannot magnify living cells at all

Biological molecules

Q5. Which test result indicates the presence of a non-reducing sugar such as sucrose?

(A) A brick-red precipitate with Benedict’s reagent on first heating
(B) A purple colour with biuret reagent
(C) No precipitate on first heating, but a brick-red precipitate after hydrolysis with acid and neutralisation, followed by heating with Benedict’s reagent
(D) A milky emulsion when mixed with ethanol and water

Q6. Olive oil remains liquid at room temperature while butter is solid. Which molecular difference best explains this observation?

(A) Saturated fatty acids contain double bonds that kink the chain
(B) Both types of fatty acid have identical melting points
(C) Olive oil contains more unsaturated fatty acids, whose double bonds kink the chain so molecules pack less tightly
(D) Unsaturated fatty acids cannot form triglycerides

Q7. Which level of protein structure is determined directly by the sequence of amino acids?

(A) The tertiary structure, which is independent of the primary sequence
(B) The quaternary structure only
(C) The primary structure, which then determines how the protein folds into higher levels
(D) The secondary structure, which is set by the environment alone

Enzymes

Q8. A student investigates the effect of temperature on an enzyme. The rate rises to an optimum, then falls sharply. Why does it fall?

(A) The substrate is used up completely at the optimum
(B) Kinetic energy falls as temperature rises
(C) Bonds holding the tertiary structure break, the active site loses its shape, and the enzyme denatures
(D) The enzyme is converted into its substrate

Q9. Why does a competitive inhibitor reduce the rate of an enzyme-catalysed reaction at low substrate concentrations but have much less effect when substrate concentration is very high?

(A) It permanently destroys the enzyme molecule
(B) It changes the pH of the cell irreversibly
(C) At high substrate concentrations, substrate molecules outcompete the inhibitor for the active site
(D) It binds to an allosteric site and cannot be displaced

Q10. In a metabolic pathway, the end product inhibits the first enzyme in the pathway. What is this an example of?

(A) Competitive inhibition by a foreign drug
(B) Denaturation by extreme pH
(C) End-product inhibition, a form of negative feedback that prevents overproduction
(D) Activation by a cofactor

Cell membranes and transport

Q11. Which statement about channel proteins is correct?

(A) They use ATP to pump substances against their gradient
(B) They are found only in plant cell walls
(C) They carry large proteins across the membrane by endocytosis
(D) They provide a hydrophilic pore through which specific ions or water can diffuse down a gradient

Q12. A plant cell is placed in a concentrated sucrose solution. What happens to the cell, and what is this state called?

(A) The cell swells and becomes turgid
(B) The cell wall dissolves and the cell becomes flaccid only
(C) Sucrose enters by diffusion and the cell bursts
(D) Water leaves by osmosis, the cytoplasm shrinks away from the wall, and the cell becomes plasmolysed

Q13. Which process describes the uptake of a large particle by a cell wrapping its membrane around it?

(A) Exocytosis
(B) Facilitated diffusion
(C) Endocytosis
(D) Osmosis

The mitotic cell cycle

Q14. Which statement about cytokinesis in plant and animal cells is correct?

(A) Both form a cleavage furrow that pinches the cell in two
(B) Cytokinesis does not occur in plant cells
(C) Plant cells divide by a cleavage furrow, while animal cells form a cell plate
(D) Animal cells divide by a cleavage furrow, while plant cells form a cell plate across the equator

Q15. During metaphase, chromosomes are at their most condensed and visible. Where are they positioned?

(A) Randomly throughout the cytoplasm
(B) At opposite poles of the cell
(C) Along the equator of the spindle, attached by their centromeres
(D) Inside the reformed nuclear envelope

Q16. Which process relies on mitosis?

(A) Formation of genetically varied gametes
(B) Crossing over between homologous chromosomes
(C) Reduction of chromosome number before fertilisation
(D) Asexual reproduction in a single-celled organism, producing genetically identical offspring

Nucleic acids and protein synthesis

Q17. Which statement about DNA replication is correct?

(A) RNA polymerase joins amino acids to the new strand
(B) The whole molecule is copied without unwinding
(C) Only one strand is copied, and the other is discarded
(D) The two strands separate, and each acts as a template for a new complementary strand, with DNA polymerase adding nucleotides

Q18. In eukaryotic cells, pre-mRNA is modified before leaving the nucleus. What happens?

(A) Ribosomes are attached to the pre-mRNA in the nucleus
(B) Exons are removed and introns are translated
(C) The mRNA is converted back into DNA
(D) Introns are removed by splicing and exons are joined, producing mature mRNA

Q19. A gene codes for a protein of 100 amino acids. Approximately how many bases are in the coding sequence, excluding the stop codon?

(A) 33
(B) 100
(C) 200
(D) 300

Transport in plants

Q20. Which statement about water movement through a root is correct?

(A) Water moves only through the symplast pathway
(B) Water enters root hairs by facilitated diffusion of sucrose
(C) Water moves only by active transport from the soil
(D) Water can move through cell walls in the apoplast pathway and through cytoplasm in the symplast pathway, until the endodermis

Q21. What is a sink in the context of translocation?

(A) A leaf that produces sucrose by photosynthesis
(B) The soil, which absorbs sugars from the roots
(C) A dead xylem vessel that stores water
(D) Any region that uses or stores assimilates, such as a growing root or a developing fruit

Q22. Which evidence supports the mass flow hypothesis for translocation?

(A) Translocation stops completely in the dark
(B) Phloem sap contains only water and no sugars
(C) Sieve tubes are dead and hollow like xylem vessels
(D) Phloem sap moves far faster than diffusion could explain, and it flows from source to sink

Transport in mammals

Q23. Which blood vessel carries oxygenated blood, and which carries deoxygenated blood?

(A) The aorta carries deoxygenated blood to the body
(B) The pulmonary artery carries oxygenated blood, while the pulmonary vein carries deoxygenated blood
(C) The vena cava carries oxygenated blood to the right atrium
(D) The pulmonary vein carries oxygenated blood to the left atrium, while the pulmonary artery carries deoxygenated blood to the lungs

Q24. Which statement about haemoglobin is correct?

(A) Haemoglobin is found dissolved in plasma, not in red blood cells
(B) Each haemoglobin molecule binds one oxygen molecule only
(C) Haemoglobin binds oxygen irreversibly in the lungs
(D) Each haemoglobin molecule can bind four oxygen molecules, one to each haem group

Q25. What is the role of carbonic anhydrase in red blood cells as blood passes through respiring tissues?

(A) It dissolves carbonic acid directly in plasma
(B) It binds carbon dioxide to haemoglobin as carbamino compounds
(C) It catalyses the reaction of carbon dioxide with water to form carbonic acid, which dissociates to hydrogencarbonate ions
(D) It converts carbon dioxide to glucose in the plasma

Gas exchange

Q26. Which statement about breathing out at rest is correct?

(A) It is an active process requiring contraction of the diaphragm
(B) It is driven by the internal intercostal muscles at rest
(C) It requires contraction of the external intercostal muscles
(D) It is mainly passive, as elastic recoil of the lungs and relaxation of inspiratory muscles reduce thoracic volume

Q27. Which adaptation increases gas exchange in the lungs of a mammal?

(A) A thick layer of cartilage around each alveolus
(B) A slow blood flow that stops in the capillaries
(C) A large dead space in the trachea
(D) A moist alveolar surface, which allows gases to dissolve before diffusing

Q28. In a fish, water flows over the gills in the opposite direction to blood flow. What is the name of this arrangement?

(A) Concurrent flow
(B) Crosscurrent flow
(C) Tidal flow
(D) Countercurrent flow

Infectious diseases

Q29. Which statement about cholera is correct?

(A) It is caused by a virus that attacks the liver
(B) It is caused by the bacterium Vibrio cholerae, which colonises the small intestine
(C) It is caused by a protoctist carried by mosquitoes
(D) It is an inherited condition caused by a faulty gene

Q30. Why do malaria symptoms recur in cycles every few days in an untreated patient?

(A) The parasite reproduces only in the mosquito and never enters human blood cells
(B) Infected red blood cells burst synchronously, releasing parasites and toxins that cause fever
(C) The parasite is a bacterium that lives in the gut of the mosquito
(D) The parasite infects only the salivary glands of humans

Q31. Which statement about the immune response to tuberculosis is correct?

(A) Antibiotics are ineffective because the bacteria live inside phagocytes and are walled off in tubercles
(B) The bacteria are easily destroyed by antibodies in the blood alone
(C) Tuberculosis is controlled only by vaccination, never by drugs
(D) The bacteria cannot survive inside human cells

Immunity

Q32. After a first infection, some lymphocytes do not become effector cells but remain in the body for years. What is the function of these cells on re-exposure to the same pathogen?

(A) They instruct the pathogen to produce antibodies
(B) They divide rapidly to produce a clone of effector cells and antibodies against that pathogen
(C) They are artificially selected in a laboratory
(D) They destroy all other lymphocytes after an infection

Q33. Which description of antibody structure and binding is correct?

(A) Each antibody has two identical antigen-binding sites specific to one antigen
(B) Each antibody can bind to any antigen it meets
(C) Antibodies are produced by phagocytes
(D) Antibodies kill pathogens directly by digesting them

Q34. A person receives an injection of antibodies after exposure to a toxin. What type of immunity is this?

(A) Natural active immunity
(B) Artificial passive immunity
(C) Natural passive immunity
(D) Artificial active immunity

Energy and respiration

Q35. Which statement about glycolysis is correct?

(A) Glucose is split into two molecules of pyruvate, with a net gain of 2 ATP and production of reduced NAD
(B) Glucose is completely oxidised to carbon dioxide and water
(C) Pyruvate is converted to acetyl coenzyme A
(D) Oxygen is required for every step of glycolysis

Q36. Which statement about anaerobic respiration in mammalian muscle is correct?

(A) Pyruvate is converted to ethanol and carbon dioxide
(B) Pyruvate is reduced to lactate, regenerating NAD so glycolysis can continue
(C) Glucose is converted directly to oxygen and water
(D) No ATP is produced at all

Q37. During the electron transport chain, electrons pass through a series of carriers and lose energy at each step. What happens to the energy released?

(A) It combines electrons directly with oxygen to form water at every carrier
(B) It phosphorylates ADP directly at each carrier
(C) It is used to pump hydrogen ions across the inner mitochondrial membrane, creating a gradient for ATP synthesis
(D) It splits water molecules in the chloroplast

Photosynthesis

Q38. Which statement about the light-independent stage is correct?

(A) It occurs in the thylakoids and directly uses light energy
(B) It occurs in the stroma and uses ATP and reduced NADP from the light-dependent stage to fix carbon dioxide
(C) It produces oxygen by photolysis of water
(D) It occurs only at night

Q39. An experiment measures the rate of photosynthesis at increasing light intensities. The rate levels off at high intensity. What is the most likely limiting factor at this point?

(A) Light intensity itself
(B) Temperature or carbon dioxide concentration
(C) The amount of chlorophyll in the leaf, which falls at high light
(D) The rate of respiration, which stops

Q40. Which statement about photosystems I and II is correct?

(A) Photosystem II comes first in non-cyclic photophosphorylation, and its electrons are replaced by electrons from photolysis of water
(B) Photosystem I comes first and splits water
(C) Only photosystem I is used in non-cyclic photophosphorylation
(D) Electrons flow from photosystem I to photosystem II

Homeostasis

Q41. Which statement about osmoreceptors is correct?

(A) They are in the hypothalamus and detect changes in the water potential of the blood
(B) They are in the kidney and directly control urine volume
(C) They detect blood glucose concentration
(D) They release ADH into the blood

Q42. A desert mammal produces very small volumes of highly concentrated urine. Which kidney structure most directly enables this, and how?

(A) A long loop of Henle, which creates a gradient of solute concentration in the medulla, allowing water reabsorption from the collecting duct
(B) The loop of Henle reabsorbing all glucose by active transport
(C) The loop of Henle as the site of ultrafiltration
(D) The loop of Henle producing ADH

Q43. Which statement about temperature regulation in a mammal is correct?

(A) Receptors in the hypothalamus detect core temperature, and effectors such as sweat glands and blood vessels respond
(B) Temperature is controlled only by behaviour, such as moving into shade
(C) Shivering reduces heat production by relaxing muscles
(D) Vasodilation conserves heat in cold conditions

Control and coordination

Q44. What is meant by the all-or-nothing principle in nerve impulses?

(A) A neurone either fires a full-sized action potential or does not fire at all, once threshold is reached
(B) All neurones in a nerve fire at the same time
(C) The size of the action potential increases with stimulus strength
(D) A neurone can only fire once in its lifetime

Q45. Which statement about the refractory period is correct?

(A) It is the time during which a neurone cannot be restimulated, which ensures impulses travel in one direction and limits frequency
(B) It is the time taken for an impulse to cross a synapse
(C) It occurs only in sensory neurones
(D) It allows impulses to travel backwards along the axon

Q46. Which statement about plant growth regulators is correct?

(A) Gibberellins promote seed germination and stem elongation
(B) Gibberellins inhibit all growth in plants
(C) Auxins are produced only in roots
(D) Ethene prevents fruit ripening

Inheritance

Q47. Which statement about meiosis is correct?

(A) It produces four genetically identical diploid cells
(B) It produces four genetically varied haploid cells through two divisions, with crossing over and independent assortment
(C) It involves one division only and no genetic variation
(D) It doubles the chromosome number in gametes

Q48. In snapdragon flowers, red and white parents produce pink offspring. What type of inheritance is this?

(A) Codominance
(B) Incomplete dominance, where the heterozygote shows an intermediate phenotype
(C) Complete dominance
(D) Sex linkage

Q49. A woman is a carrier for a recessive X-linked condition. Her partner does not have the condition. What is the probability that their son will have the condition?

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

Selection and evolution

Q50. Which statement about directional selection is correct?

(A) It favours the intermediate phenotype
(B) It favours one extreme phenotype, shifting the mean of the population over time
(C) It favours both extremes at the expense of the intermediate
(D) It has no effect on allele frequencies

Q51. Which statement about reproductive isolation is correct?

(A) It prevents gene flow between populations, allowing them to evolve into separate species
(B) It increases gene flow between populations
(C) It occurs only when populations live in the same area
(D) It requires populations to have identical courtship behaviour

Q52. Which evidence for evolution is provided by the fossil record?

(A) It shows that all species alive today have existed unchanged for millions of years
(B) It shows sequences of forms over time, with transitional features linking groups
(C) It proves that evolution occurs only by sudden jumps
(D) It shows that DNA sequences are identical in all species

Classification, biodiversity and conservation

Q53. Which statement about the binomial system is correct?

(A) Each species is named by its genus and species, written in italics with a capital letter for the genus
(B) Each species is named only by its common name
(C) The genus name is written in lower case and the species name in capitals
(D) Two different species can share the same binomial name

Q54. Which statement about the classification hierarchy is correct?

(A) Kingdom, phylum, class, order, family, genus, species, from largest to smallest
(B) Species, genus, family, order, class, phylum, kingdom, from largest to smallest
(C) Domain, kingdom, genus, species only
(D) Class, kingdom, phylum, order, family, genus, species

Q55. A survey finds many species but most individuals belong to one species. How does this affect Simpson's index of diversity?

(A) It raises D, because species richness is high
(B) It lowers D, because evenness is low and one species dominates
(C) It has no effect on D, which measures only total numbers
(D) It makes D impossible to calculate

Q56. Which human activity is a major cause of biodiversity loss?

(A) Captive breeding of endangered species
(B) Habitat destruction, such as deforestation for agriculture
(C) Establishing marine protected areas
(D) Seed banking

Genetic technology

Q57. Which statement about the polymerase chain reaction is correct?

(A) It requires a living cell to copy DNA
(B) It uses a heat-stable DNA polymerase from a thermophilic bacterium, so it can work through repeated heating cycles
(C) It copies RNA directly into protein
(D) It can only copy very long DNA molecules

Q58. Which statement about restriction enzymes is correct?

(A) They cut DNA at random positions
(B) They cut DNA at specific recognition sequences, often producing sticky ends
(C) They join DNA fragments together
(D) They copy DNA in the polymerase chain reaction

Q59. A genetically modified bacterium is used to produce human insulin. Which step is essential?

(A) The human insulin gene is inserted into a bacterial plasmid, and the bacteria are grown in a fermenter to express the gene
(B) Bacteria are fed insulin tablets
(C) The bacterial genome is replaced with a human genome
(D) Insulin is extracted from the pancreas of the bacteria

Q60. Which statement about genetic engineering in agriculture is a potential benefit, and which is a potential risk?

(A) Benefit: increased crop yield and pest resistance; risk: gene flow to wild relatives and reduced biodiversity
(B) Benefit: crops need more pesticide; risk: higher yields
(C) Benefit: all pests are eliminated permanently; risk: none
(D) Benefit: reduced genetic diversity; risk: lower yields

Answer Key

Q1: C	Q11: D	Q21: D	Q31: A	Q41: A	Q51: A
Q2: C	Q12: D	Q22: D	Q32: B	Q42: A	Q52: B
Q3: C	Q13: C	Q23: D	Q33: A	Q43: A	Q53: A

Q4: C	Q14: D	Q24: D	Q34: B	Q44: A	Q54: A
Q5: C	Q15: C	Q25: C	Q35: A	Q45: A	Q55: B
Q6: C	Q16: D	Q26: D	Q36: B	Q46: A	Q56: B
Q7: C	Q17: D	Q27: D	Q37: C	Q47: B	Q57: B
Q8: C	Q18: D	Q28: D	Q38: B	Q48: B	Q58: B
Q9: C	Q19: D	Q29: B	Q39: B	Q49: C	Q59: A
Q10: C	Q20: D	Q30: B	Q40: A	Q50: B	Q60: A

Worked explanations for all 60 questions: quaidianpoint.com/alevel-biology-practice-test-13/