A-Level Biology Practice Test 16

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 feature of a prokaryotic cell distinguishes it most clearly from a eukaryotic cell?

(A) Absence of membrane-bound organelles and a true nucleus
(B) Presence of a cell wall made of cellulose
(C) Presence of mitochondria for aerobic respiration
(D) Presence of a large permanent vacuole

Q2. The rough endoplasmic reticulum is closely associated with protein synthesis because it is studded with which structures?

(A) Lysosomes
(B) Ribosomes
(C) Peroxisomes
(D) Centrioles

Q3. Which organelle modifies, packages and secretes proteins, forming vesicles that carry them to the cell surface?

(A) Nucleolus
(B) Smooth endoplasmic reticulum
(C) Golgi apparatus
(D) Chloroplast

Biological molecules

Q4. Which bond is formed when two monosaccharides join in a condensation reaction?

(A) Peptide bond
(B) Glycosidic bond
(C) Hydrogen bond
(D) Ester bond

Q5. Why is glycogen a more suitable storage polysaccharide in animals than glucose alone?

(A) It is soluble and raises the water potential of liver cells
(B) It is transported freely in the blood plasma
(C) It is insoluble and therefore has little osmotic effect, yet is rapidly hydrolysed when glucose is needed
(D) It cannot be broken down by enzymes in animal cells

Q6. A triglyceride is formed from glycerol and three fatty acids. Which type of bond links each fatty acid to the glycerol?

(A) Glycosidic bond
(B) Peptide bond
(C) Hydrogen bond
(D) Ester bond

Enzymes

Q7. Which statement best explains why a competitive inhibitor reduces the rate of an enzyme-catalysed reaction at low substrate concentration?

(A) It denatures the enzyme by breaking its tertiary structure
(B) It binds to an allosteric site and changes the shape of the active site
(C) It occupies the active site, so fewer substrate molecules can bind
(D) It increases the activation energy of the reaction permanently

Q8. A non-competitive inhibitor differs from a competitive inhibitor in that it does what?

(A) Binds only when substrate concentration is very high
(B) Binds reversibly to the active site of the enzyme
(C) Raises the maximum rate of reaction if more substrate is added
(D) Binds to a site other than the active site and alters the active site shape

Q9. Immobilised enzymes are widely used in industry because they offer which advantage over free enzymes?

(A) They can be recovered and reused, and they do not contaminate the product
(B) They always work faster than the same enzyme in solution
(C) They are unaffected by temperature or pH changes
(D) They no longer require a specific substrate to function

Cell membranes and transport

Q10. In the fluid mosaic model, which component is mainly responsible for the fluidity of the membrane?

(A) Glycoproteins anchored to the cytoskeleton
(B) Cholesterol molecules packed between phospholipids only at low temperature
(C) Channel proteins spanning the whole bilayer
(D) Phospholipid molecules moving laterally within each layer

Q11. Facilitated diffusion differs from simple diffusion in that it requires what?

(A) A transport protein in the membrane
(B) ATP hydrolysed directly by the transported molecule
(C) Movement against a concentration gradient
(D) Endocytosis of the surrounding fluid

Q12. Which process moves sodium ions out of a cell against their concentration gradient using energy from ATP?

(A) Osmosis through aquaporins
(B) Active transport by a sodium-potassium pump
(C) Facilitated diffusion through a channel
(D) Simple diffusion across the lipid bilayer

The mitotic cell cycle

Q13. During which stage of the cell cycle does DNA replication occur?

(A) S phase of interphase
(B) Prophase of mitosis
(C) Cytokinesis
(D) Metaphase of mitosis

Q14. What is the key event of anaphase in mitosis?

(A) Chromosomes condense and the nuclear envelope breaks down
(B) Sister chromatids separate and move to opposite poles
(C) Chromosomes align along the equator of the cell
(D) The nuclear envelope reforms around each set of chromosomes

Q15. Uncontrolled mitosis is dangerous because it can lead to which outcome?

(A) Loss of all cell differentiation in every tissue
(B) Failure of meiosis in reproductive organs only
(C) Formation of a tumour of genetically identical cells
(D) Immediate death of the affected cell by apoptosis

Nucleic acids and protein synthesis

Q16. Which feature of DNA structure allows it to be copied accurately during semi-conservative replication?

(A) The sugar-phosphate backbone is identical in both strands
(B) Complementary base pairing between the two strands
(C) The presence of uracil in place of thymine
(D) The double helix is held together only by covalent bonds

Q17. In protein synthesis, the role of tRNA is best described as what?

(A) Carrying the genetic code from the nucleus to the cytoplasm
(B) Forming the structural framework of the ribosome
(C) Carrying a specific amino acid to the ribosome according to its anticodon
(D) Splicing introns out of pre-mRNA in the nucleus

Q18. A mutation that changes a single base in a codon but leaves the amino acid unchanged is best described as which type?

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

Transport in plants

Q19. Which tissue transports assimilates such as sucrose from sources to sinks, and which feature supports that role?

(A) Xylem, with lignified walls that withstand tension
(B) Cambium, with rapidly dividing meristematic cells
(C) Phloem, with sieve tube elements lacking nuclei but supported by companion cells
(D) Epidermis, with a waxy cuticle that limits water loss

Q20. Transpiration pull depends mainly on which property of water?

(A) Water is a good solvent for mineral ions
(B) Water has a low specific heat capacity
(C) Water molecules are small enough to pass through cell walls
(D) Cohesion between water molecules and adhesion to xylem walls

Q21. At a sink in mass flow, sucrose is actively unloaded from phloem sieve tubes. What happens to water in the sieve tubes as a result, and why?

(A) Water potential in the sieve tubes rises as sucrose is removed, so water leaves by osmosis and hydrostatic pressure falls
(B) Water evaporates from leaf stomata, pulling sap upward
(C) Root pressure pushes sap from the roots into the leaves
(D) Gravity acting on sap in vertical sieve tubes drives the flow

Transport in mammals

Q22. Why is the left ventricle wall much thicker than the right ventricle wall?

(A) It must prevent backflow into the left atrium
(B) It contracts less frequently than the right ventricle
(C) It receives blood directly from the pulmonary vein
(D) It must generate enough pressure to pump blood around the whole body

Q23. Which sequence correctly describes the mammalian double circulation, starting at the right ventricle?

(A) Pulmonary artery, lungs, pulmonary vein, left atrium, left ventricle, body, vena cava, right atrium
(B) Aorta, body, pulmonary vein, left atrium, lungs, right atrium, vena cava
(C) Pulmonary vein, lungs, aorta, body, vena cava, left atrium, right ventricle
(D) Vena cava, right atrium, aorta, body, pulmonary artery, lungs, left ventricle

Q24. Tissue fluid formation at the arteriole end of a capillary is driven mainly by which pressure difference?

(A) Lower solute potential in the tissue fluid than in the blood
(B) Higher hydrostatic pressure in the capillary than the opposing solute potential gradient
(C) Active transport of plasma proteins out of the capillary
(D) Lower hydrostatic pressure in the capillary than in the surrounding tissue

Q25. Haemoglobin unloads oxygen more readily in actively respiring tissue because of which combined effect?

(A) Higher carbon dioxide concentration and lower pH shifting the dissociation curve to the right
(B) Higher oxygen concentration and higher pH shifting the curve to the left
(C) Lower temperature and lower carbon dioxide concentration in the tissue
(D) Direct binding of carbon dioxide to the haem group of haemoglobin

Gas exchange

Q26. Which feature of mammalian alveoli most increases the rate of gas exchange?

(A) A very large total surface area and a thin diffusion barrier
(B) A thick layer of mucus trapping inhaled particles
(C) Cartilage rings keeping the airways permanently open
(D) Ciliated cells moving mucus toward the pharynx

Q27. In fish, countercurrent flow across the gills is advantageous because it does what?

(A) Prevents water from entering the mouth
(B) Maintains a concentration gradient along the whole length of the lamella
(C) Allows blood to flow in the same direction as water for faster exchange
(D) Increases the oxygen content of water before it reaches the gills

Q28. During inspiration in mammals, which sequence of events occurs?

(A) Diaphragm relaxes, intercostal muscles relax, thorax volume falls, pressure rises
(B) Diaphragm contracts, internal intercostal muscles contract, ribs move down and in
(C) Diaphragm contracts and flattens, external intercostal muscles contract, thorax volume rises, pressure falls
(D) Diaphragm flattens, thorax volume falls, air is forced out of the lungs

Q29. Insects use a tracheal system for gas exchange. Which feature of tracheoles makes them effective for direct delivery to tissues?

(A) They are lined with cartilage that holds them open
(B) They contain blood that carries oxygen to muscles
(C) They open and close using a diaphragm muscle
(D) Their walls are very thin and they penetrate deep into tissues

Infectious diseases

Q30. Which statement about the transmission of cholera is correct?

(A) It is spread mainly by airborne droplets from coughing
(B) It is spread through water or food contaminated with faeces containing Vibrio cholerae
(C) It is spread only by direct skin contact with an infected person
(D) It is spread by the bite of an infected mosquito

Q31. The human immunodeficiency virus (HIV) causes AIDS by progressively destroying which cells of the immune system?

(A) B lymphocytes that produce antibodies
(B) Neutrophils that carry out phagocytosis
(C) Helper T lymphocytes (CD4 cells) that coordinate the immune response
(D) Platelets involved in blood clotting

Q32. Why does antibiotic resistance spread rapidly in a bacterial population exposed to an antibiotic?

(A) Antibiotics cause new mutations in every bacterium they contact
(B) Bacteria learn to recognise and avoid the antibiotic molecule
(C) Antibiotics weaken the immune system so bacteria multiply unchecked
(D) Resistant mutants survive and reproduce, passing resistance genes to offspring and sometimes to other bacteria

Q33. Which measure is most effective for controlling malaria in a region where the mosquito vector is present?

(A) Quarantining all infected people in hospitals
(B) Reducing mosquito breeding sites, using insecticide-treated nets, and treating cases promptly
(C) Vaccinating the whole population against the Plasmodium parasite with a single lifelong dose
(D) Adding antibiotics to the local drinking water supply

Immunity

Q34. In the primary immune response, which sequence occurs after a pathogen enters the body?

(A) Memory cells are activated immediately and produce large amounts of antibody within hours
(B) Antibodies are produced before any phagocyte encounters the pathogen
(C) Phagocytes engulf the pathogen, present antigens, and specific B and T lymphocytes are activated and divide
(D) Plasma cells form first and only later stimulate phagocytosis

Q35. What distinguishes the secondary immune response from the primary response?

(A) It involves only the non-specific defences of the skin and mucus
(B) It produces no memory cells at all
(C) It relies entirely on antibiotics rather than antibodies
(D) It is faster and stronger because memory cells are already present

Q36. A vaccine gives long-lasting protection because it does what?

(A) Introduces memory cells and triggers the formation of memory cells without causing the full disease
(B) Kills all pathogens already present in the body permanently
(C) Replaces the need for phagocytes in future infections
(D) Provides ready-made antibodies that remain in the blood for life

Energy and respiration

Q37. In aerobic respiration, most ATP is produced during which stage and by what mechanism?

(A) Glycolysis, by substrate-level phosphorylation in the cytoplasm
(B) Link reaction, by direct transfer of phosphate to ADP
(C) Krebs cycle, by photophosphorylation in the mitochondria
(D) Oxidative phosphorylation, by chemiosmosis as protons flow through ATP synthase

Q38. Anaerobic respiration in mammalian muscle produces lactate. Why is lactate formation necessary?

(A) It regenerates NAD from reduced NAD, allowing glycolysis to continue
(B) It produces more ATP than aerobic respiration per glucose molecule
(C) It removes all carbon dioxide from the muscle cell
(D) It directly supplies oxygen to the mitochondria

Q39. Which molecule is the final electron acceptor in the electron transport chain of aerobic respiration?

(A) Carbon dioxide
(B) Oxygen
(C) NAD
(D) Glucose

Photosynthesis

Q40. In the light-dependent stage, photolysis of water provides which products for the rest of photosynthesis?

(A) Electrons, protons and oxygen
(B) Glucose and carbon dioxide
(C) ATP and glycerate 3-phosphate only
(D) NADP and ADP only

Q41. Cyclic photophosphorylation differs from non-cyclic photophosphorylation in that it produces what?

(A) Oxygen and reduced NADP in equal amounts
(B) ATP only, with no reduced NADP and no oxygen released
(C) Glucose directly from carbon dioxide
(D) Reduced NADP only, with no ATP formed

Q42. In the Calvin cycle, what is the role of reduced NADP and ATP from the light-dependent stage?

(A) They split water to release oxygen
(B) They fix carbon dioxide directly to ribulose bisphosphate
(C) They reduce glycerate 3-phosphate to triose phosphate
(D) They regenerate chlorophyll in the photosystems

Homeostasis

Q43. Which sequence correctly describes negative feedback control of blood glucose after a meal?

(A) Blood glucose falls, glucagon is released, liver glycogen is broken down
(B) Blood glucose rises, insulin is released, liver and muscle cells take up glucose and store glycogen
(C) Blood glucose rises, glucagon is released, glucose is converted to glycogen in the liver
(D) Blood glucose falls, insulin is released, fat stores are mobilised

Q44. In the kidney, ultrafiltration occurs in the glomerulus because of which combination of factors?

(A) Active transport of plasma proteins through the basement membrane
(B) Low blood pressure and a wide efferent arteriole
(C) High hydrostatic pressure from a narrow efferent arteriole and a large filtration surface
(D) Reabsorption of water in the collecting duct

Q45. Antidiuretic hormone (ADH) increases water reabsorption in the kidney by acting on which structures?

(A) Glomerular capillaries, increasing the filtration rate
(B) Proximal convoluted tubule cells, increasing glucose reabsorption
(C) Loop of Henle, preventing all sodium reabsorption
(D) Collecting duct walls, inserting aquaporins that make them more permeable to water

Control and coordination

Q46. At a cholinergic synapse, an action potential arrives at the presynaptic neurone. Why is calcium influx into the synaptic knob essential for transmission?

(A) Acetylcholinesterase is released from the postsynaptic membrane
(B) The presynaptic membrane becomes impermeable to calcium ions
(C) Calcium ions trigger synaptic vesicles to fuse with the presynaptic membrane and release acetylcholine
(D) Vesicles in the postsynaptic cell release more acetylcholine

Q47. Which statement about the refractory period of a neurone is correct?

(A) It allows action potentials to travel in both directions along the axon
(B) It is the time when the resting potential is maintained by the sodium-potassium pump alone
(C) It increases the speed of impulse transmission in myelinated neurones
(D) It prevents a new action potential being generated immediately, ensuring impulses travel one way

Q48. In the eye, accommodation for a near object involves which changes?

(A) Ciliary muscles contract, suspensory ligaments slacken, lens becomes more convex
(B) Ciliary muscles relax, suspensory ligaments tighten, lens becomes flatter
(C) Radial muscles of the iris contract and the pupil dilates
(D) Suspensory ligaments contract and pull the lens into a flat shape

Inheritance

Q49. In a dihybrid cross between two heterozygotes (AaBb x AaBb), what phenotypic ratio is expected if the genes assort independently?

(A) 3:1
(B) 1:2:1
(C) 1:1:1:1
(D) 9:3:3:1

Q50. A woman who is a carrier for haemophilia (X-linked recessive) has children with an unaffected man. What is the probability that a son will have haemophilia?

(A) 1 in 2 (50 percent)
(B) 1 in 4 (25 percent)
(C) 0 percent, because the father is unaffected
(D) 100 percent, because the mother is a carrier

Q51. Codominance is best illustrated by which example?

(A) A pink flower produced by crossing red and white parents
(B) AB blood group, where both A and B antigens are expressed on red blood cells
(C) A recessive allele masked in the heterozygous phenotype
(D) Continuous variation in human height

Selection and evolution

Q52. Which statement best describes natural selection?

(A) Individuals with alleles that increase survival and reproduction become more common in the population over generations
(B) Individuals change their genes during their lifetime to suit the environment
(C) All individuals in a population acquire identical advantageous mutations
(D) The environment directly creates the mutations that a species needs

Q53. Directional selection differs from stabilising selection in that it does what?

(A) Favours the average phenotype and reduces variation
(B) Favours one extreme phenotype, shifting the population mean over time
(C) Favours both extremes at the expense of the average
(D) Acts only on discontinuous variation

Q54. The Hardy-Weinberg principle can be used to estimate allele frequencies in a population provided which condition holds?

(A) Mutation and migration are frequent
(B) The population is very small and isolated
(C) Mating is random and there is no selection, mutation, migration or genetic drift
(D) Only dominant alleles are present in the population

Classification, biodiversity and conservation

Q55. Which hierarchy correctly lists taxonomic groups from largest to smallest?

(A) Species, genus, family, order, class, phylum, kingdom, domain
(B) Domain, kingdom, phylum, class, order, family, genus, species
(C) Kingdom, domain, class, phylum, family, order, genus, species
(D) Domain, phylum, kingdom, order, class, genus, family, species

Q56. The Simpson index of diversity takes account of which two factors?

(A) The total area of the habitat and the age of the community
(B) The number of trophic levels and the biomass of producers
(C) Species richness and the evenness of abundance across species
(D) Genetic variation within a single species only

Q57. Why is in situ conservation generally preferred to ex situ conservation for maintaining a species?

(A) It is always cheaper and requires no management
(B) It removes all predators and competitors from the habitat
(C) It allows unlimited captive breeding without genetic problems
(D) It preserves the species in its natural habitat, maintaining ecological interactions and natural selection

Genetic technology

Q58. In recombinant DNA technology, what is the role of a restriction enzyme?

(A) It joins DNA fragments together with phosphodiester bonds
(B) It copies a target DNA sequence many times in a thermal cycler
(C) It cuts DNA at specific recognition sequences, producing fragments that can be joined into a vector
(D) It translates mRNA into a protein product

Q59. In the polymerase chain reaction (PCR), what is the purpose of the high-temperature step in each cycle?

(A) To activate DNA ligase
(B) To allow primers to anneal to the template strands
(C) To synthesise new DNA strands from primers
(D) To denature double-stranded DNA into separate template strands

Q60. Genetically modified bacteria can produce human insulin because of which fact?

(A) The genetic code is universal, so bacterial ribosomes can translate human insulin mRNA correctly
(B) Bacteria naturally contain the human insulin gene in their plasmids
(C) Human insulin is identical in structure to bacterial enzymes
(D) Bacteria can absorb insulin directly from their growth medium

Answer Key

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

Worked explanations for all 60 questions: quaidianpoint.com/alevel-biology-practice-test-16/